further activity is contemplated. If EPA receives such comments, the direct final rule will be withdrawn and all public comments received will be addressed in a subsequent final rule based on this proposed rule. EPA will not institute a second comment period. Any parties interested in commenting on this action should do so at this time. For additional information, see the direct final rule which is located in the Final Rules section of this **Federal Register**.

List of Subjects in 40 CFR Part 62

Environmental protection, Air pollution control, Intergovernmental relations, Reporting and recordkeeping requirements, Waste treatment and disposal.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: January 5, 2023.

KC Becker,

Regional Administrator, Region 8.

[FR Doc. 2023–00410 Filed 1–13–23; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 9

[PS Docket No. 18–64; FCC 22–96; FR ID 121633]

Location-Based Routing for Wireless 911 Calls

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Federal Communications Commission (the FCC or Commission) proposes rules to more precisely route wireless 911 calls and texts to Public Safety Answering Points (PSAPs), which can result in faster response times during emergencies. Wireless 911 calls have historically been routed to PSAPs based on the location of the cell tower that handles the call. Sometimes, however, the 911 call is routed to the wrong PSAP because the cell tower is not in the same jurisdiction as the 911 caller. This can happen, for instance, when an emergency call is placed near a county border. These misrouted 911 calls must be transferred from one PSAP to another, which consumes time and resources and can cause confusion and delay in emergency response. The Notice of Proposed Rulemaking (*NPRM*) proposes to require wireless and covered text providers to deploy technology that supports location-based routing, a method that relies on precise information about the location of the wireless caller's device, on some networks and to use location-based routing to route 911 voice calls and texts originating on those networks when caller location is accurate and timely. In addition, the *NPRM* proposes to require CMRS and covered text providers to deliver 911 calls, texts, and associated routing information in internet Protocol (IP) format upon request of certain 911 authorities.

DATES: Comments are due on or before February 16, 2023, and reply comments are due on or before March 20, 2023.

ADDRESSES: You may submit comments, identified by PS Docket No. 18–64, by any of the following methods:

- *Federal Communications Commission's Website: https://www.fcc.gov/ecfs/.* Follow the instructions for submitting comments.
- *Mail:* Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701. U.S. Postal Service first-class, Express, and Priority mail must be addressed to 45 L Street NE, Washington, DC 20554.
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID–19. *See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy,* public notice, DA 20–304 (March 19, 2020), *https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy.*

People with Disabilities: To request materials in accessible formats for people with disabilities (Braille, large print, electronic files, audio format), send an email to *fcc504@fcc.gov* or call the Consumer & Governmental Affairs Bureau at 202–418–0530 (voice).

FOR FURTHER INFORMATION CONTACT: Rachel Wehr, Attorney Advisor, Policy and Licensing Division, Public Safety and Homeland Security Bureau, (202) 418–1138, *Rachel.Wehr@fcc.gov,* or Brenda Boykin, Deputy Division Chief, Policy and Licensing Division, Public Safety and Homeland Security Bureau, (202) 418–2062, *Brenda.Boykin@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Notice of Proposed Rulemaking (*NPRM*), FCC 22–96, in PS Docket No. 18–64, adopted on December 21, 2022, and released on December 22, 2022. The full text of this document is available at *https://www.fcc.gov/edocs/search-results?t=quick&fccdaNo=22-96.*

Initial Paperwork Reduction Act of 1995 Analysis

This *NPRM* may contain proposed new or modified information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA). The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on any information collection requirements contained in this document, as required by the PRA. If the Commission adopts any new or modified information collection requirements, they will be submitted to OMB for review under section 3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the new or modified information collection requirements contained in this proceeding. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

Pursuant to §§ 1.415 and 1.419 of the Commission's rules, 47 CFR 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated in the **DATES** section above. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). See Electronic Filing of Documents in Rulemaking Proceedings, 63 FR 24121 (1998), *https://transition.fcc.gov/Bureaus/OGC/Orders/1998/fcc98056.pdf.*

The Commission will treat this proceeding as a ''permit-but-disclose'' proceeding in accordance with the Commission's *ex parte* rules. Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within 2 business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and

arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda, or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule § 1.1206(b). In proceedings governed by rule § 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.,* .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

Synopsis

Background

In this *NPRM,* we propose to require wireless carriers and covered text providers to implement location-based routing for 911 calls and texts nationwide.[1] With location-based routing, wireless providers that originate 911 calls and texts use precise information about the location of the wireless caller's device to route 911 calls and texts to the appropriate PSAP for that location.[2] Nationwide implementation of location-based routing will significantly reduce misrouted 911 calls and texts and the delays associated with transferring misrouted 911 calls and texts from one PSAP to another. For the millions of wireless 911 callers seeking emergency assistance each year, improving call routing will reduce emergency response times and save lives.

In 2018, the Commission released a Notice of Inquiry that sought to determine the best way to avoid misrouted 911 calls.[3] Earlier this year, we refreshed the record on location-based routing with a public notice that sought to update the record on developments since the release of the Notice of Inquiry, including recent technological improvements in location-based routing and the extent to which wireless carriers have deployed location-based routing in their networks.[4]

Developments since the Notice of Inquiry and comments in response to the public notice make clear that location technology has advanced significantly since 2018. Location-based routing appears to now be technologically feasible, and indeed is already being implemented by some wireless carriers. Moreover, implementing location-based routing on a nationwide basis has the potential to provide significant public safety benefits. Accordingly, in this *NPRM,* we propose rules to require all wireless carriers and covered text providers to implement location-based routing for all 911 calls and texts nationwide, including calls and texts originating in legacy, transitional, and Next Generation 911 (NG911)-capable[5] public safety jurisdictions. Specifically, we propose to:

- Require all Commercial Mobile Radio Service (CMRS) providers to (1) deploy technology that supports location-based routing on their IP-based networks (*i.e.,* 4G, 5G, and subsequent generations of IP-based networks) and (2) use location-based routing to route all 911 voice calls originating on their IP-based networks when caller location information available during origination of the 911 call meets certain requirements for accuracy and timeliness. Nationwide CMRS providers would have six months from the effective date of final rules to meet these requirements. Non-nationwide CMRS providers would have an additional year (*i.e.,* eighteen months from the effective date of final rules) to meet the same requirements.
- Require covered text providers to (1) deploy technology that supports location-based routing and (2) use location-based routing to route all 911 texts originating on their IP-based networks when location information available during origination of the 911 text meets certain requirements for accuracy and timeliness. Covered text providers would have eighteen months from the effective date of final rules to meet these requirements.
- Establish baseline requirements with respect to the accuracy and timeliness of location information used for location-based routing. When location information does not meet one or both of these requirements, CMRS providers and covered text providers would be required to route 911 calls and texts based on the best available location information, which may include latitude/longitude coordinates of the cell tower.

To help ensure that public safety jurisdictions transitioning to NG911 can realize the benefits of location-based routing in an efficient and cost-effective manner, we also propose to:

- Require CMRS providers and covered text providers to deliver 911 calls, texts, and associated routing information in IP format upon request of 911 authorities who have established the capability to accept NG911-compatible IP-based 911 communications. Nationwide CMRS providers and covered text providers would be subject to this requirement six months from the effective date of final rules on location-based routing or within six months of a valid request for IP-based service from a local or state public safety authority, whichever is later. Non-nationwide CMRS providers would have an additional six months to comply with this requirement.

We believe that the above proposals for location-based routing of 911 calls and texts will promote the safety of life and property by helping to ensure that those in need of emergency assistance can receive the help they need in a more timely manner. We seek comment on the tentative conclusions, proposals, and analyses set forth in this *NPRM,* as well as on any alternative approaches.

Legacy E911 Routing

When 911 service was first introduced, all 911 calls originated from wireline networks, and wireline providers used the fixed location of the calling telephone to route 911 calls to the nearest PSAP. With the deployment of the first generation of cellular service,

[1] In this *NPRM,* we use ''wireless carrier'' to mean Commercial Mobile Radio Service (CMRS) provider as defined in 47 CFR 9.3. The Commission defines the term ''covered text provider'' as including ''all CMRS providers as well as all providers of interconnected text messaging services that enable consumers to send text messages to and receive text messages from all or substantially all text-capable U.S. telephone numbers, including through the use of applications downloaded or otherwise installed on mobile phones.'' 47 CFR 9.10(q)(1).

[2] For purposes of this *NPRM,* we use the term ''caller'' to mean senders of both 911 voice calls and 911 texts except where otherwise indicated.

[3] *Location-Based Routing for Wireless 911 Calls,* PS Docket No. 18–64, Notice of Inquiry, 33 FCC Rcd 3238, 3238 through 40, paragraphs 1, 3 through 4 (2018) (*Notice of Inquiry*).

[4] *Federal Communications Commission Seeks to Refresh the Record on Location-Based Routing for Wireless 911 Calls,* PS Docket No. 18–64, public notice, FCC 22–42, 2022 WL 2128689, at *1 (June 9, 2022) (*public notice*).

[5] In this *NPRM,* we use ''NG911-capable'' to refer to PSAPs or jurisdictions that have implemented IP-based network and software components that are capable of supporting the provision of NG911, including but not limited to an Emergency Services internet Protocol Network (ESInet).

wireless 911 calls could originate from any location served by the wireless network, and the caller could move locations during the call. To enable timely routing of wireless 911 calls, CMRS providers typically programmed their networks to use the location of the first cell tower receiving the call to determine the nearest PSAP and route the call accordingly. This became the basis for routing of wireless Enhanced 911 (E911) calls (legacy E911 routing).

In legacy E911 routing, because the location of the cell tower may be some distance from the caller's location, CMRS providers may route a wireless 911 call to a PSAP other than the one designated by the relevant state or local 911 authority to receive calls from the actual location of the caller. For example, a cell tower in Northern Virginia may pick up a wireless 911 call originating in Washington, DC, but route the call to a Virginia PSAP.[6] The Commission considers calls routed to a PSAP other than the one designated for the actual location of the caller to be ''misrouted.'' [7] Misroutes can occur for several reasons, including when more than one PSAP is within the coverage area of a cell site or sector.[8] The record indicates that misroutes are frequent where legacy E911 routing is used. NENA: The 9–1–1 Association (NENA) estimates that 23 million calls using legacy E911 routing are misrouted annually. Other parties estimate that approximately 11–12% of legacy E911 calls are misrouted,[9] and the percentage of misrouted calls can vary between and even within jurisdictions. For example, the Fayetteville (Arkansas) Police Department reports that 30% of the 911 calls its jurisdiction receives are misrouted from neighboring jurisdictions.[10] Intrado estimates that Palm Beach County, Florida, experiences misrouted calls at a rate as high as 20–50% along PSAP boundaries.

When a 911 call is misrouted, the answering telecommunicator must transfer the call to the PSAP that has jurisdiction to dispatch aid to the 911 caller's location. This process consumes time and resources for both the transferring PSAP and the receiving PSAP and delays the dispatch of first responders to render aid.[11] Commenters submit anecdotal evidence that a typical misroute introduces a delay of about a minute.[12] NENA estimates that call transfers consume over 200,000 hours per year of excess 911 professional labor. Misrouted wireless calls can also contribute to confusion and delay in emergency response.[13] This delay can have deadly consequences.[14]

2018 Notice of Inquiry

In 2018, the Commission released a Notice of Inquiry seeking comment on issues related to misrouted wireless 911 calls, including the feasibility of location-based routing.[15] The Commission observed that it had not previously addressed the accuracy of wireless 911 call routing. Historically,

[6] *See, e.g.,* Jodie Fleischer et al., *Nearly 100,000 Local 911 Calls Each Year Sent to Wrong 911 Center, Require Transfer,* NBC4 Washington (Apr. 20, 2021), *https://www.nbcwashington.com/investigations/nearly-100000-local-911-calls-each-year-sent-to-wrong-911-center-require-transfer/2646442/* (discussing the number of 911 calls that require transfer from one jurisdiction to another in the Washington, DC, region).

[7] *Notice of Inquiry,* 33 FCC Rcd at 3239, paragraph 2 & n.1. The misroutes that are the subject of this proceeding generally result from current 911 call routing mechanisms that rely on cell tower location and are working as designed, not from technical failure of those mechanisms. *Id.* In addition, the Commission's definition of misroute excludes transfers that occur as the result of preexisting routing arrangements. *E.g.,* T-Mobile USA, Inc. (T-Mobile) Comments at 2 n.3 (rec. July 11, 2022) (T-Mobile Comments) (noting that a state emergency service office may adopt policies requiring calls from state highways to be routed to state police instead of city or county agencies, ''even if the state highway is located in city or county boundaries'').

[8] *See* Communications Security, Reliability and Interoperability Council (CSRIC) V, Working Group 1, Evolving 911 Services, Final Report—Task 2: 911 Location-Based Routing at 9 (2016), *https://transition.fcc.gov/bureaus/pshs/advisory/csric5/WG1_Task2_FinalReport_092016.docx* (*CSRIC V LBR Report*). The CSRIC is a Federal advisory committee subject to the requirements of the Federal Advisory Committee Act (FACA), 5 U.S.C. app. 2, and charged with providing recommendations to the Commission to ensure, among other things, the security and reliability of communications systems. FCC, *Communications Security, Reliability, and Interoperability Council, https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-0* (last visited Nov. 22, 2022).

[9] *E.g.,* The Association of Public-Safety Communications Officials International, Inc. (APCO) Comments at 2 (rec. July 11, 2022) (APCO Comments) (citing Alliance for Telecommunications Industry Solutions (ATIS), Analysis of Predetermined Cell Sector Routing Outcomes Compared to Caller's Device Location, ATIS–0500039 (July 2, 2019), *https://access.atis.org/apps/group_public/document.php?document_id=48697* (*ATIS–0500039*)); Intrado Life & Safety, Inc. (Intrado) Comments at 3 & n.8, 4 (rec. July 11, 2022) (Intrado Comments) (first citing a 2018 Intrado study concluding that 12.96% out of a set of five million wireless calls were misrouted; and then finding at least 11% of calls in Palm Beach County, Florida in February/March 2022 were misrouted due to tower-based routing).

[10] Natisha Claypool, Assistant Dispatch Manager, Fayetteville Police Department (rec. July 11, 2022) (Fayetteville Police Department Comments) (stating that the jurisdiction has determined that ''roughly 30% or more of the 9–1–1 calls received in our county are misroutes due to calls hitting cellular towers that border our jurisdictions'').

[11] *Notice of Inquiry,* 33 FCC Rcd at 3239, 3240 through 41, paragraphs 2, 8. As the Commission has previously noted, a study in Snohomish County, Washington, found that a call transfer adds approximately 40 seconds to the total call time. *Id.* at 3239, paragraph 2 n.2 (citing Robert Thurston, GIS Technician, Snohomish County, Determining Routing of Wireless Sectors in a Multi PSAP 9–1–1 System (2018), *http://proceedings.esri.com/library/userconf/proc15/papers/19_248.pdf*).

[12] APCO Comments at 2 (''[I]t's possible that a misrouted call will introduce a delay of a minute or longer.''); NENA: The 9–1–1 Association (NENA) Comments at 4 (rec. July 11, 2022) (NENA Comments) (''[T]he general anecdotal consensus was that a call transfer typically takes 'about a minute.' ''); Peninsula Fiber Network Comments at 1 (rec. July 8, 2022) (Peninsula Fiber Network Comments) (''Each transfer takes between 15 to 90 seconds to set up and complete.'').

[13] For example, on June 4, 2020, 16-year-old Fitz Thomas drowned at Confluence Park on the Potomac River, which separates Loudoun County, Virginia, and Montgomery County, Maryland. Press Release, Office of the County Administrator, Public Affairs and Communications, Loudoun County Releases Significant Incident Review of Goose Creek Drowning at 1 (Aug. 31, 2020), *https://www.loudoun.gov/ArchiveCenter/ViewFile/Item/10062.* Due to the incident's proximity to the jurisdictional border of the Potomac River and the use of legacy E911 routing, both counties received wireless 911 calls routed from the park located on the Virginia side of the river. *Id.* at 2. Efforts to determine Thomas's actual location contributed to a delay in dispatching first responders. *Id.* On July 15, 2022, Ma Kaing was shot and killed by a stray bullet outside her home in the East Colfax neighborhood of Denver. Jennifer Kovaleski, *Stuck on the line: Cellphone calls routed to the wrong 911 center are costing life-saving seconds,* Denver7 (Nov. 18, 2022), *https://www.denver7.com/news/investigations/stuck-on-the-line-cellphone-calls-routed-to-the-wrong-911-center-are-costing-life-saving-seconds.* The news media reports that four calls from her family and neighbors were misrouted to a neighboring PSAP and required transfer; three callers hung up after waiting minutes on hold. *Id.*

[14] The news media has widely reported on such tragic occurrences. For example, in December 2014, dispatchers were unable to locate Shanell Anderson, who drowned after accidentally driving off the road and into a pond close to the line between Fulton and Cherokee Counties in Georgia. Brendan Keefe and Phillip Kish, *Lost on the Line: Why 911 is broken,* 11alive (Dec. 29, 2016), *https://www.11alive.com/article/news/local/lost-on-the-line-why-911-is-broken/85-225104578.* According to the news media, Shanell Anderson was able to call 911, but the call was picked up by a cell tower in Fulton County and routed to that county's PSAP, where critical minutes were lost while dispatchers sought to determine the county in which she was located (Cherokee County). *Id.* In another case in 2008, Olidia Kerr Day made a wireless 911 call before she was fatally shot in a murder-suicide in front of the Plantation, Florida police department. Sofia Santana, *Cell Phone 911 Calls Are Often Routed to the Wrong Call Centers,* Sun Sentinel (June 21, 2008), *https://www.sun-sentinel.com/sfl-flbsafe911calls0621sbjun21-story.html.* According to the news media, though she placed the call in Plantation, the call was routed to the 911 center in Sunrise, Florida, and had to be transferred to Plantation. *Id.*

[15] *Notice of Inquiry,* 33 FCC Rcd at 3246 through 51, paragraphs 17 through 33. The *Notice of Inquiry* stated that advances in location technology suggested it was possible to support initial call-routing based on a caller's actual location in many situations. *Id.* at 3240, paragraph 3. The Commission also noted that while many location-based routing methods were promising, uncertainty remained regarding their reliability, the time required to develop necessary standards, and the potential transition costs of implementing location-based routing on current wireless 911 systems. *Id.* at 3240, paragraph 4.

precise caller location information typically took too long to generate to be available for routing purposes. The Commission noted, however, that then-recent advances in location technology suggested it was feasible to pinpoint a 911 caller's location quickly enough to support an initial routing determination. The Commission found that many location-based routing methods were promising and sought comment on the ''technical and operational implications, limitations, deployments, and best common practices'' of location-based routing. The Commission also requested comment on the frequency of wireless 911 call misroutes, the impact of misroutes on public safety, and the implementation of location-based routing technologies, including location-based routing capabilities for jurisdictions that had deployed elements of NG911. In addition, the Commission requested specific comment on the findings and recommendations of a 2016 report on location-based routing released by CSRIC V (*CSRIC V LBR Report*).[16] The Commission also sought comment on the means available to facilitate improvements to 911 routing and reduce the likelihood of misrouted 911 calls, including the promotion of voluntary best practices, implementation of incentive-based mechanisms, or regulatory action, and on costs and benefits relating to location-based routing.

The Commission received 22 comments and 14 reply comments in response to the Notice of Inquiry.[17] The record reflected uncertainty about the capabilities of location-based routing at the time.[18] In particular, nationwide CMRS providers noted the lack of available handset-based solutions that could generate a fix within a short period of time [19] and the presumption that any feasible solution would require significant investments from PSAPs.[20]

Developments Since 2018

Since the comment period for the Notice of Inquiry closed over four years ago, several developments indicate that location-based routing has become a viable methodology for CMRS providers to route 911 calls and texts. These developments include studies on misroutes and location-based routing technology, increased deployment of device-based hybrid (DBH) location technologies on consumer handsets,[21] and voluntary implementation of location-based routing on CMRS provider networks. In 2018, CTIA announced that the nationwide wireless carriers planned to add DBH location technologies to their networks to improve 911 location accuracy. In 2019, the Alliance for Telecommunications Industry Solutions (ATIS) published two studies with new information on legacy E911 misroutes and the feasibility of location-based routing.[22] In those studies, ATIS concluded that ''location-based routing is technically feasible within the timing considerations recommended by CSRIC V'' and evaluated where ''sub-optimal routing'' occurred for a sample set of wireless emergency calls. In a 2019 *ex parte* filing in the instant docket, Apple Inc. (Apple) noted that it had made DBH location technology available on certain device models that would support carrier implementation of location-based routing.[23]

The three nationwide wireless carriers (AT&T, T-Mobile, and Verizon) now indicate that they have deployed or plan to deploy location-based routing to varying extents on their networks. T-Mobile launched location-based routing on its network in the states of Texas and Washington in 2020 and as of July 2022 was offering location-based routing to 770 PSAPs. AT&T completed the rollout of location-based routing on its network in June 2022 and uses location-based routing to deliver 911 calls and texts to nearly all PSAPs nationwide, whether they are legacy or NG911-capable and without any additional action from the receiving PSAP.[24] Verizon has indicated that it plans to start work in the first quarter of 2023 to enable location-based routing nationwide.[25]

In June 2022, the Commission released a public notice to refresh the record on location-based routing developments since the Notice of Inquiry. The Commission sought information on industry trends, the 2019 ATIS studies on misroutes and location-based routing, increased deployment of DBH, the use of location-based routing for text-to-911, and implementation of location-based routing on carrier networks. The Commission received 15 comments and 6 reply comments in response to the public notice. We discuss these comments below in the context of the proposals made in this *NPRM.*

[16] *Id.* at 3246 through 50, paragraphs 18 through 29. CSRIC V defined location-based routing as ''[a] system of rules to varying degrees of complexity dictating to where 9–1–1 calls from various locations are routed.'' *CSRIC V LBR Report* at 6 through 7.

[17] See Appendix C for a complete list of entities submitting comments and/or reply comments both to the p*ublic notice* and the *Notice of Inquiry*. Commenters to the *Notice of Inquiry* included, among others, national public safety entities, state and regional 911 entities, nationwide CMRS providers, emergency telecommunications service providers, a handset manufacturer, a technical standards organization, a public safety consulting firm, and concerned members of the public. The record in this proceeding may be viewed at: *https://www.fcc.gov/ecfs/search/search-filings/results?q=*(proceedings.name:(''18–64'')).

[18] Commenters to the *Notice of Inquiry* offered varying opinions about whether technologies were capable of location-based routing without delaying 911 calls. *E.g.,* AT&T Reply 11 through 12 (rec. June 28, 2018) (AT&T NOI Reply) (''Even the most promising of location-based technologies . . . have limits.''); Motorola Solutions, Inc. (Motorola) Comments at 2 (rec. May 7, 2018) (Motorola NOI Comments) (asserting that testing has confirmed that location-based wireless routing is faster and more accurate than legacy wireless routing).

[19] AT&T stated that although location-based routing solutions hold potential to reduce wireless 911 call misroutes, regulatory requirements were ''premature.'' AT&T NOI Reply at 3. AT&T asserted that instead, the Commission should ''encourage further study of potential handset-based solutions, which send location information directly to the routing element,'' and that ''[g]iven their superior speed, such solutions are preferable to network-based solutions''. *Id.; see also* Verizon Comments at 3 (rec. May 7, 2018) (Verizon NOI Comments) (''LBR is dependent on the handset's ability to deliver an accurate and timely fix which, for well-established reasons, is not feasible for every 911 call.''); T-Mobile Comments at 4 (rec. May 7, 2018) (T-Mobile NOI Comments) (''Even if a 'real-time' location fix could be obtained in a sufficiently short amount of time so as not to disrupt the need to route the call quickly, . . . leveraging any location fix for legacy PSAP call routing would require fundamental changes to the wireless carrier's legacy call flow logic.'').

[20] Verizon NOI Comments at 5 (''PSAP systems, not just wireless networks, may require a number of software programming and other changes. And PSAPs' and wireless providers' ability to handle LBR would require testing to ensure reliability.'').

[21] Device-based hybrid (DBH) location is an estimation method that typically utilizes either a selection or a combination of location methods available to the handset in an environment, including crowd-sourced Wi-Fi, A–GNSS, and possibly other handset-based sensors. ATIS, Enhancing Location-Based Routing of Emergency Calls, ATIS–0700042 at 2 (July 2019), *https://access.atis.org/apps/group_public/document.php?document_id=48218* (*ATIS–0700042*). It also includes an associated uncertainty estimate reflective of the quality of the returned location. *Id.*

[22] *ATIS–0700042; ATIS–0500039.* ATIS observed that calls that are ''sub-optimally routed'' tend to occur along PSAP boundaries, in areas with a dense concentration of PSAPs, around major water features, and along narrow strips of jurisdictional territory. *ATIS–0500039* at 12.

[23] Letter from Paul Margie, Counsel, Apple, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 18–64 et al., at 2 (filed Sept. 24, 2019) (Apple *Ex Parte*). Apple also noted that it offers wireless carriers the option to enable location-based routing for iPhone models 6s and later running iOS 13 and Apple Watch devices running watch OS 6. *Id.*

[24] AT&T Comments at 4 (rec. July 11, 2022) (AT&T Comments). AT&T notes that a few PSAPs are using unique internal routing solutions and that the company is working to ensure that its implementation of location-based routing meets the needs of these PSAPs. *Id.* at 4 n.3.

[25] Noelle Phillips, *Verizon agrees to upgrade 911 call-routing in wake of complaints from Denver's East Colfax neighborhood,* Denver Post (Aug. 3, 2022), *https://www.denverpost.com/2022/08/03/verizon-911-call-routing-policy-change-east-colfax-ma-kaing/.* Verizon did not discuss plans to implement location-based routing in its comments to the instant docket.

A. Location Based Routing

1. Wireless 911 Voice Calls

Developments since the Notice of Inquiry and the record received in response to the public notice indicate that nationwide location-based routing is now feasible and has the potential to provide significant public safety benefits by reducing the number of misrouted calls to 911. Commenters confirm that continued reliance on cell tower-based routing results in a considerable number of 911 calls being misrouted [26] and that this is a significant problem for public safety.[27] NENA estimates that nationwide implementation of location-based routing would reduce misrouted wireless 911 calls by 85% from 23 million to 3.45 million per year. Other commenters agree that implementation of location-based routing can significantly mitigate misroutes and, as a result, save lives and property.

The record also indicates that carrier deployments of location-based routing have already had a positive impact. As noted above, two nationwide carriers, T-Mobile and AT&T, have already implemented location-based routing: as of July 2022, T-Mobile was offering location-based routing to 770 PSAPs,[28] while AT&T has implemented location-based routing throughout its network and is using it to deliver 911 calls and texts to nearly all PSAPs nationwide.[29] Commenters report that jurisdictions where carriers have implemented location-based routing now experience fewer misroutes, fewer transfers, and faster dispatch times. AT&T states that in trials and in subsequent deployment, its location-based routing solution has significantly improved call routing: AT&T estimates that it is able to route 80% of 911 calls on its network to the correct PSAP using location-based routing, and that approximately 10% of these calls would have been misrouted (and would have required a transfer) if it had used legacy E911 routing based on cell tower location.[30] The Texas 911 Entities state that the rollout of T-Mobile's location-based routing solution has had a ''noticeably positive impact'' on PSAPs experiencing misrouted calls and has resulted in fewer transfers for some PSAPs.[31] In 2020, T-Mobile announced that some areas where it implemented location-based routing experienced 40% fewer call transfers. Commenters' reported experiences align with CSRIC V's finding that location-based routing would reduce call transfers when a location fix is available within a few seconds of call origination.

The record further indicates that it is now technologically feasible for all CMRS providers to support location-based routing for a significant percentage of wireless 911 calls. In its 2019 feasibility study, ATIS concluded that location-based routing is technically feasible within the five-second window recommended by CSRIC V.[32] The feasibility of location-based routing has also significantly increased as a result of the widespread availability of DBH technologies to support 911 location. Android devices using Emergency Location Service (ELS) and iOS devices using Hybridized Emergency Location (HELO) are capable of generating high accuracy, low latency location information in time to support 911 call routing.[33] In response to the public notice released in 2022, several commenters note that these DBH location technologies are widely available on mobile devices and can be used for routing a high percentage of wireless 911 calls. This is a significant change from the comments received in response to the Notice of Inquiry, which indicated uncertainty regarding the availability of technology that would support location-based routing information.[34]

Based on the above, we propose to require that all CMRS providers (1) deploy technology that supports location-based routing and (2) use location-based routing to route all wireless 911 voice calls originating on IP-based networks, when timely and accurate information about the caller's location is available. When such information is not available in time for routing the call, we propose to allow CMRS providers to route 911 calls using the best available location information, which may include cell tower coordinates. We also propose to establish timeframes for compliance with these requirements and to define specific terms to clarify the obligations of regulated entities. We seek comment on these proposals.

Public safety commenters agree that early location-based routing implementations by CMRS providers have shown that the technology is technically feasible. Intrado states that AT&T's deployment of location-based routing can serve as a model for other CMRS providers. We seek comment on this analysis. For nationwide and non-nationwide carriers that have not

[26] *E.g.,* Intrado Comments at 3 n.8, 4 through 5 (first finding a 12.96% average rate of misroutes for a sample set of five million wireless calls in 2018; and then reporting that 20–50% of wireless calls may misroute along PSAP boundaries in Palm Beach County, Florida); NENA Comments at 2 (estimating 23 million 911 calls are misrouted annually); Fayetteville Police Department Comments (noting that as many as 30% of wireless 911 calls it receives are misroutes from neighboring jurisdictions); *see also ATIS–0500039* at 4 (estimating a 12% national average rate for sub-optimally routed wireless 911 calls in 2019).

[27] *E.g.,* APCO Comments at 2 (stating that there is a consensus among Emergency Communications Centers that ''misroutes are a problem''); The Boulder Regional Emergency Telephone Service Authority (BRETSA) Reply at 1 through 3 (rec. July 25, 2022) (BRETSA Reply) (calling misroutes ''problematic'' and detailing the difficulties of misroutes for PSAPs).

[28] *T-Mobile First to Roll Out Cutting-Edge 911 Capabilities* (Dec. 17, 2020), *https://www.t-mobile.com/news/network/tmobile-next-generation-911-location-based-routing;* T-Mobile Reply at 2 n.6 (rec. July 25, 2022) (T-Mobile Reply).

[29] AT&T Comments at 4. AT&T notes that a few PSAPs are using unique internal routing solutions and that the company is working to ensure that its implementation of location-based routing meets the needs of these PSAPs. *Id.* at 4 n.3.

[30] *Id.* at 4. Intrado further clarifies that AT&T's solution has been able to route 80% of all wireless 911 calls since early implementation in February 2022 using device location information with a small uncertainty range and high confidence level and that most calls using location-based routing route on device locations under 50 meters. Intrado Comments at 2, 9.

[31] The Texas 9–1–1 Alliance, the Texas Commission on State Emergency Communications, and the Municipal Emergency Communication Districts Association (Texas 911 Entities) Comments at 2, 4 (rec. July 11, 2022) (Texas 911 Entities Comments) (showing that average percentage of 911 call transfers for two out of three PSAPs in initial beta sites decreased by roughly 4 to 5% after T-Mobile implemented location-based routing; the remaining PSAP showed a slight increase in transfers of less than 1%).

[32] *See ATIS–0700042* at 22. CSRIC V noted that location information must be available to the Mobile Switching Center (MSC) in 5 seconds or less in order for a carrier to route the voice portion of a wireless 911 call no later than 6 seconds from call initiation. *CSRIC V LBR Report* at 8. CSRIC V determined that if location fixes are obtained in 5 seconds or less, location-based routing would allow for delivery to a jurisdictionally appropriate PSAP. *CSRIC V LBR Report* at 3.

[33] Apple *Ex Parte* at 2 (indicating that device-based hybrid location is available from certain devices during call set-up and that location-based routing can be enabled on models 6s and later running iOS 13 and Apple Watch devices running watch OS 6); Android, *Emergency Location Service—How It Works, https://www.android.com/safety/emergency-help/emergency-location-service/how-it-works/* (last visited Dec. 5, 2022) (''On average, [Android's Emergency Location Service (]ELS[)] is able to get a first location 3–4 seconds after the call has started.''); Android, *Emergency Location Service—Overview, https://www.android.com/safety/emergency-help/emergency-location-service/* (last visited Dec. 5, 2022) (''ELS works on over 99% of active Android devices running OS4.4 and up, with Google Play Services installed—no new hardware or activation required.'').

[34] AT&T NOI Reply at 3; Verizon NOI Comments at 3 (''LBR is dependent on the handset's ability to deliver an accurate and timely fix which, for well-established reasons, is not feasible for every 911 call.''); T-Mobile NOI Comments at 4 (''Even if a 'real-time' location fix could be obtained in a sufficiently short amount of time so as not to disrupt the need to route the call quickly, . . . leveraging any location fix for legacy PSAP call routing would require fundamental changes to the wireless carrier's legacy call flow logic.'').

implemented location-based routing across their entire networks, we seek comment on the feasibility and cost of network upgrades (including hardware, software, Geographic Information System (GIS), and service upgrades) and testing that would be required to implement location-based routing in their service areas by the proposed deadlines.

We tentatively conclude that a high percentage of consumer handsets currently in use on nationwide and non-nationwide networks are technically capable of supporting location-based routing using device-based location technology. We seek comment on this tentative conclusion. AT&T states that device-based location routing solutions do not require changes to the network core and are relatively easy to implement.[35] However, T-Mobile states that ''not every carrier is prepared to use DBH location estimates for routing today,'' [36] and Peninsula Fiber Network states that ''[o]ne major provider has a 99% failure rate in providing the caller's location within the 5 second window.'' We seek comment on whether there are technology or cost barriers that prevent some CMRS providers from supporting device-based location solutions.

Public safety entities and some technology providers urge the Commission to require all CMRS providers to support location-based routing.[37] For example, APCO states that location-based routing technology ''is available today, and the Commission should act quickly to require service providers to implement it.'' NENA states that the Commission should establish rules to implement location-based routing nationwide to reduce response times for millions of 911 calls and save lives. However, some CMRS providers urge us not to adopt requirements and instead to permit carriers to implement location-based routing voluntarily. We believe that requiring all CMRS providers to support location-based routing would generate substantial public safety benefits, whereas allowing CMRS providers to implement location-based routing voluntarily would result in inconsistent routing of calls to PSAPs and a higher risk of 911 misroutes for subscribers on CMRS networks that did not support location-based routing.[38] We seek comment on whether there are countervailing reasons to allow voluntary implementation of location-based routing by carriers rather than adopting a requirement.

We also seek comment on whether CMRS providers should be required to use location-based routing to deliver 911 calls to all PSAPs served by their networks, or whether the requirement should be triggered by PSAP request or limited to certain categories of PSAPs. T-Mobile and Verizon assert that not all PSAPs are currently interested in receiving calls routed using device location and that in some instances it could adversely impact PSAP operations. However, AT&T provides location-based routing to virtually all PSAPs on its network and asserts that it can do so without action by the PSAP. We seek comment on whether there have been instances in which carrier implementation of location-based routing has imposed costs or had an adverse impact on PSAPs or where public safety authorities have had ''significant issues with implementation.''

Some commenters contend that location-based routing should only be made available to PSAPs that have achieved some level of NG911 capability. Verizon supports location-based routing only for PSAPs that are operating in accordance with NG911 standards. T-Mobile states that it deploys NG911 and location-based routing ''where jurisdictions are ready,'' noting that it does so for PSAP operational awareness and awareness of situations ''where service-area boundaries require specific routing to achieve optimal routing improvements.'' CTIA argues that providers and PSAPs need flexibility to implement location-based routing in a manner that accounts for PSAP capabilities. However, AT&T has implemented location-based routing for both legacy and NG911 PSAPs across its network, with only very limited exceptions and without a requirement that PSAPs take any particular action to receive calls using location-based routing. In addition, the ATIS–0700042 standard supports location-based routing of 911 calls delivered to both Emergency Services internet Protocol Networks (ESInets) and legacy selective routers.

We seek comment on our tentative conclusion that location-based routing should be required for wireless 911 calling in legacy E911 jurisdictions as well as jurisdictions that have achieved partial or full NG911 capability. Although many PSAPs are connected to ESInets and some have become wholly or partially NG911-capable, approximately half of primary PSAPs in the United States are not yet connected to an ESInet.[39] Thus, limiting location-based routing to jurisdictions that are ESInet-connected or have developed some level of NG911 capability would deprive legacy PSAPs and the communities they serve of the benefits of location-based routing. We seek comment on whether the requirement for CMRS providers to support location-based routing should be conditioned on a determination that jurisdictions are ''ready'' to receive location-routed calls, and if so, what criteria should be used to make this determination.

Some commenters contend that location-based routing should only be required in jurisdictions with the highest incidence of misroutes. T-Mobile asserts that location-based routing would not improve emergency response in all jurisdictions and that the Commission should not require location-based routing where it would not improve emergency response. ATIS suggests that legacy E911 routing may be preferred for cell sectors ''which display a very low (or no) incidence of sub-optimal routing behavior'' and ''[i]n these cases, the potential time delay associated with LBR may not be

[35] AT&T NOI Reply at 10 (''Provided a device-based location solution can generate accurate location information within the necessary timeframe, implementing such a solution on the network would be relatively straight forward as it would not require changes to the network core.'').

[36] T-Mobile Comments at 6. *But see* T-Mobile Reply at 1 through 2 (''[T]here are commenters that assert that wireless carriers are not ready to offer location-based routing even though multiple carriers and their vendors confirm that they can, and do, offer location-based routing and are i3 compliant. Indeed, T-Mobile has deployed location-based routing in twenty-one states; it has also converted over 1,900 PSAPs in 24 states from TDM to NG911 SIP.'').

[37] In a separate docket, APCO also called for a rulemaking to require carriers to implement location-based routing in comments on a petition from NASNA regarding NG911. APCO Comments, PS Docket No. 21–479, 4 (rec. Jan. 19, 2022).

[38] For example, in Denver, Colorado, carriers have not uniformly implemented location-based routing. After 911 calls following the fatal shooting of Ma Kaing in the East Colfax neighborhood of Denver were misrouted to the city of Aurora, a news report indicated that although AT&T and T-Mobile had previously implemented location-based routing in Denver, Verizon initially declined to do so. Noelle Phillips, *911 calls from cellphones can be precisely pinpointed. One carrier won't install the technology in Colorado,* Denver Post (Aug. 1, 2022), *https://www.denverpost.com/2022/08/01/verizon-location-based-routing-denver-aurora/.* Verizon later agreed to ''start the work [on location-based routing] during the first quarter of 2023.'' Noelle Phillips, *Verizon agrees to upgrade 911 call-routing in wake of complaints from Denver's East Colfax neighborhood,* Denver Post (Aug. 3, 2022), *https://www.denverpost.com/2022/08/03/verizon-911-call-routing-policy-change-east-colfax-ma-kaing/.*

[39] The National Highway Traffic Safety Administration (NHTSA) National 911 Program reports a gradual increase in the number of PSAPs connected to an ESInet in the past few years. According to the National 911 Program's 2020 National 911 Progress Report, only 2,177 PSAPs in 47 states connect to an ESInet. National 911 Program, National 911 Progress Report: 2020 Data (Feb. 2022) at 64 *https://www.911.gov/projects/national-911-annual-report/* (National 911 Progress Report). For context, the total number of primary PSAPs is 4,627 based on 48 reporting states. *Id.* at 17.

justifiable.'' [40] We note, however, that AT&T has implemented location-based routing across all jurisdictions regardless of the prior frequency of misroutes, without a significant impact on call-routing time compared to legacy E911 routing.[41] We tentatively conclude that any potential time delay associated with location-based routing is likely to be negligible even for sectors that do not have frequent legacy E911 misroutes. In addition, CMRS providers or PSAPs may lack granular data on misroutes, making it difficult to identify which sectors have misroutes most frequently. We seek comment on whether attempting to limit location-based routing to sectors prone to misroutes would be less costly or provide any greater benefits than supporting location-based routing across all jurisdictions. How would the Commission determine which jurisdictions or sectors would benefit most from location-based routing, and what are the constraints on obtaining such information? Are there other approaches the Commission should consider for implementing location-based routing?

Compliance Timeframe. We propose to require nationwide CMRS providers to deploy and commence use of location-based routing for 911 voice calls within six months from the effective date of final rules on location-based routing. The three nationwide CMRS providers have already deployed or are actively working toward deploying location-based routing capabilities on their networks. The six-month implementation timeframe is intended to provide the nationwide providers adequate time to complete the implementation of location-based routing. We seek comment on this proposal and on whether a longer or shorter compliance timeframe should be considered for nationwide CMRS providers.

We propose to provide non-nationwide CMRS providers an additional year (*i.e.,* eighteen months from the effective date of final rules on location-based routing) to deploy and commence use of location-based routing for 911 voice calls. This would give non-nationwide providers additional time to take necessary steps to implement location-based routing on their networks. Additionally, we anticipate that location-based routing solutions will be more readily available to non-nationwide providers on an extended timeframe. We note that no non-nationwide providers submitted comments in response to the Notice of Inquiry or public notice, and we seek comment on whether a longer or shorter compliance period would be appropriate for such providers.

Calls Originating on IP-Based Networks. To reduce potential cost burdens for CMRS providers, we propose to require location-based routing for 911 calls originating on IP-based networks, but not for 911 calls originating on circuit-switched, time-division multiplex (TDM) networks. ATIS assumes for purposes of ATIS–0700042 that location-based routing is only supported on originating networks supporting Long Term Evolution (LTE) and beyond. Intrado asserts that 4G and 5G networks provide a ''much more supportive setting for LBR'' and notes that 4G LTE and newer networks no longer require call holding to implement location-based routing because the routing element has sufficient time to transmit and evaluate confidence and uncertainty information and to query the location server for PSAP routing instructions before the time to route. Nationwide CMRS providers are also in the process of retiring or have completed the retirement of TDM 2G and 3G networks,[42] and some non-nationwide providers have announced dates to sunset their 3G networks in 2022. In light of the technical obstacles and upcoming retirement of these networks, we tentatively conclude that requiring location-based routing for 911 calls originating on TDM-based networks would be unduly burdensome. Accordingly, we propose to require location-based routing only for calls originating on IP-based networks, *i.e.,* 4G LTE, 5G, and subsequent generations of IP-based networks. We seek comment on this proposal and on our analysis.

Default to Best Available Location Information. We propose to require that when location information does not meet one or both requirements for accuracy and timeliness under our rules, wireless providers shall route 911 calls based on the best available location information available at the time the call is routed, which may include cell tower coordinates. We agree with commenters who assert that there is a continued need for cell-sector based routing as a fallback method because accurate location information is not available to support call routing in all scenarios.[43] Our proposed requirement to default to best available location information would be consistent with the ATIS–0500039 report, which assumes that the fallback for location-based routing should be cell sector routing ''for cases wherein no position estimate is available in time to be used for [location-based routing] or the position estimates lack requisite accuracy.'' It also would be consistent with current CMRS provider deployments of location-based routing, which default to legacy E911 routing when location does not meet carriers' standards of accuracy and timely availability.[44] In addition, we agree with commenters who assert that CMRS providers should be able to route based on the best available location information at the time of routing. We believe that our proposal would allow carriers to take full advantage of the location information available at the time of routing while permitting them the flexibility to use other information, including cell tower coordinates, when precise location is not available in time. We seek comment on our proposal. We also seek comment on the percentage of calls that CMRS providers would continue to route using legacy E911 routing rather than location-based routing under our proposed rules.

Disclosure of Location-Based Routing Information. We seek comment on

[40] While BRETSA supports nationwide implementation of location-based routing, BRETSA would also support targeted implementation in areas of high misroutes, even if limited delay of 911 call routing and delivery would occur. BRETSA Reply at 3. BRETSA asserts that wireless providers should use PSAP jurisdictional boundaries when determining the location and orientation of new cell-sites and sectors, that providers should configure their systems to identify calls which are Phase I routed from sites and sectors with high misroutes, and that providers should indicate the percentage of calls misrouted from that location to PSAPs. *Id.* at 8 through 9.

[41] AT&T Comments at 3 through 4 (stating that latency for 95% of location-based routed calls was consistent with latency for legacy E911-routed calls).

[42] AT&T has phased out its 3G network. AT&T, *Get details on the 3G network shut down* (July 14, 2022), *https://www.att.com/support/article/wireless/KM1324171/.* Verizon announced it will finish shutting down its 3G network by December 31, 2022. Verizon, *CDMA [(Code-Division Multiple Access)] Network Retirement, https://www.verizon.com/support/knowledge-base-218813/* (last visited Nov. 29, 2022). T-Mobile announced that it finished shutting down Sprint's 3G CDMA network as of March 31, 2022, and Sprint's 4G LTE network as of June 30, 2022. *T-Mobile Network Evolution, https://www.t-mobile.com/support/coverage/t-mobile-network-evolution* (last visited Nov. 29, 2022). It also announced it shut down T-Mobile's 3G Universal Mobile Telecommunications System (UMTS) network as of July 1, 2022, but has not yet announced a shutdown date for its 2G network. *Id.*

[43] Intrado notes that AT&T's location-based routing solution successfully used location-based routing for 80% of 911 calls. Intrado Comments at 2.

[44] AT&T Comments at 4 (''When location was not available, the process defaults to using sector-based routing so that calls may be completed without excessive delay.''); T-Mobile Comments at 4 (''T-Mobile's policy is to route a 911 call based on the cell-sector location if a routable, non-Phase I location estimate is not generated quickly enough.'').

whether the proposed rules should require CMRS providers to provide information to PSAPs or state or local 911 authorities regarding the routing methodology used for each 911 call. NASNA states that ''it is important for the telecommunicator dispatching the call to know what type of location technology has been used to route a 911 call'' and that it is ''critical'' to provide the type of location technology CMRS providers used to derive the caller's location, such as ''specific LBR technology versus E–911,'' to the PSAP with each call. ATIS states that any method providing location-based routing must be transparent to the emergency services network and the PSAP.[45] NENA notes that there are already NG911 elements that partly meet NASNA's requirements, and that additional standards under development should meet them in full. Given the forthcoming development of additional standards by NENA, we do not propose to add specific disclosure requirements at this time, but we encourage state and local 911 authorities, service providers, and vendors to develop mechanisms to provide PSAPs with information on call routing methodology that could assist them in identifying the caller's location and dispatching emergency response. We also note that our proposed accuracy and timeliness criteria for location-based routing include confidence and uncertainty metrics to ensure that CMRS providers use the best available location information to route the call in each instance. We seek comment on this approach. If we were to adopt disclosure requirements, what information should be disclosed, what would be the public safety benefits, and would such benefits justify the cost to CMRS providers of making such disclosures to PSAPs?

2. Text-to-911

Texting to 911 has become an integral component of emergency response in many jurisdictions. Currently available data indicate that in calendar year 2020, over 3,000 PSAPs in the U.S. supported text-to-911 and that 11 states as well as the District of Columbia and Puerto Rico had jurisdiction-wide text-to-911 coverage.[46] Although the volume of 911 texts in these jurisdictions is typically much lower than the volume of 911 voice calls, it is equally important that all 911 texts as well as voice calls be routed to the appropriate PSAP responsible for dispatch of emergency response to the texting party's location. Therefore, for the same reasons set forth above with respect to 911 voice calls, we propose to require covered text providers to use location-based routing to route all 911 texts originating on IP-based networks, provided that the information used for routing meets the same requirements for accuracy and timeliness that would apply to 911 voice calls. We further propose that when location information for routing texts to 911 does not meet either one or both of these requirements, covered text providers would be required to route texts to 911 on the basis of the best available location information at time of routing. We seek comment on this proposal.

The record indicates that location-based routing for 911 texts is technically feasible and already in use by some providers. AT&T reports that it has used location-based routing for its text-to-911 service since 2016 and that it uses DBH location to route the majority of its text messages. The Massachusetts State 911 Department reports that two wireless carriers in the state provide location information to its NG911 network to route texts to the appropriate PSAP. We also note that no commenter has contended that location-based routing for 911 texts is not technically feasible or expressed opposition to using location-based routing for 911 texts as well as voice calls.

We seek comment on the technical feasibility of location-based routing for 911 texts and whether there are any considerations specific to 911 texting that would warrant adopting different location-based routing requirements from those applicable to 911 voice calls. If so, how should the requirements for text to 911 differ? Can providers use DBH to support location-based routing of both voice and text? Are there routing solutions besides DBH available to covered text providers to route 911 texts? We seek comment and specific data on the benefits of requiring covered text providers to implement location-based routing for texts originating on IP-based networks, as well as the costs involved in such a requirement.

We propose to require covered text providers to deploy and commence use of location-based routing for 911 texts within eighteen months from the effective date of final rules on location-based routing. This proposed implementation timeframe is intended to provide the diverse set of covered text providers, which includes nationwide and non-nationwide CMRS providers offering text service as well as other providers, adequate time to take necessary steps to complete the implementation of location-based routing on their networks. We seek comment on this proposed timeframe and on whether a longer or shorter compliance period should be considered.

3. Definitions

We propose to adopt a definition of ''location-based routing'' that requires routing based on the location of the calling device, as opposed to the location of network elements such as cell site or sector. We therefore propose to define ''location-based routing'' as ''the use of information on the location of a device, including but not limited to device-based location information, to deliver 911 calls and texts to point(s) designated by the authorized local or state entity to receive wireless 911 calls and texts, such as an Emergency Services internet Protocol Network (ESInet) or PSAP, or to an appropriate local emergency authority.'' We propose to define ''device-based location information'' as ''[i]nformation regarding the location of a device used to call or text 911 generated all or in part from on-device sensors and data sources.''

We seek comment on this proposed definition. Specifically, we seek comment on whether the proposed definition of ''device-based location information'' adequately encompasses current DBH location technologies, such as Apple's HELO and Android's ELS, as well as possible future location technologies that can determine the location of the calling device. We seek comment on whether we should include other specific location technologies as examples in our definition, such as Assisted-Global Navigation Satellite System (A–GNSS) or Wi-Fi.[47] We note

[45] *ATIS–0700042* at 16. ATIS states that ''the CMRS network may acquire a routable location and use it to route to the appropriate emergency services network. A NENA i3 ESRP may query for routing location and that routing location may be returned. However, when the PSAP queries for location to support dispatch (*i.e.,* [emergency dispatch]) it should receive the estimated location of the caller.'' *Id.*

[46] FCC, Thirteenth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges at 79 through 83, paragraph 59 (2021), *https://www.fcc.gov/sites/default/files/13th-annual-911-fee-report-2021.pdf* (Thirteenth 911 Fee Report). Eleven states have indicated statewide text-to-911 capability in response to the Commission's annual 911 fee reporting questionnaire: Arizona, Connecticut, Delaware, Hawaii, Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, Rhode Island, and Vermont. *Id.* at 8 through 10, 80, Tbl. 22 (first showing the total number of PSAPs per jurisdiction, and then showing how many PSAPs are text-to-911 capable per jurisdiction). Puerto Rico and the District of Columbia also indicate that they provide jurisdiction-wide text-to-911 services. *Id.*

[47] ATIS defines DBH as an ''estimation method that typically utilizes either a selection or a combination of location methods available to the

that the Commission also uses the term ''device-based location information'' in its existing rule on delivery of 911 text messages and intend that our proposed definition would also apply to that rule.

We also seek comment on our proposal to explicitly identify ESInets as an example of an end point that state or local 911 authorities can designate for delivery of calls where location-based routing is used. Because ESInets are an important component of NG911 networks, we believe it is appropriate to identify them as a potential delivery point. We also note that this proposed definition is not intended to modify CMRS providers' obligation under § 9.10 of the Commission's rules, which requires such providers to transmit all wireless 911 calls to a PSAP, designated statewide default answering point, or appropriate local emergency authority. Thus, under our proposed definition, state and local 911 authorities would retain the authority to specify the delivery point for location-routed calls, whether the delivery point is an ESInet, a legacy selective router, or some other designated facility. We seek comment on this proposal.

4. Timeliness and Accuracy of Location-Based Routing Information

We propose to require CMRS providers and covered text providers to use location-based routing for 911 calls and texts when they have location information that meets the following specifications for timeliness and accuracy: (i) the information must be available to the provider network at the time the call or text is routed, and (ii) the information must identify the caller's horizontal location within a radius of 165 meters at a confidence level of at least 90%. We discuss the timing and accuracy elements of the proposed rule below and seek comment on each.

Timeliness of Location-Based Routing Information. Location-based routing requires information about the caller's location to be available quickly enough to enable the call to be routed without delaying the normal call set-up process. For location-based routing of 911 voice calls to be feasible without delaying call set-up, caller location information would need to be made available to the CMRS provider's Mobile Switching Center (MSC) within five seconds or less of the call being dialed. At the time of the Notice of Inquiry, commenters questioned whether available technology could generate caller location information this quickly. However, the record indicates that significant technological advances have been made since then and that currently available technology is routinely capable of delivering caller location information in time to route the call without delay, and well within the five-second threshold identified by CSRIC V. Intrado states that 4G LTE and newer networks can obtain device-based location information, calculate confidence and uncertainty, and query the location server for PSAP routing instructions within the normal call set-up interval. Intrado further notes that AT&T's location-based routing solution provides location-based routing ''without any impact to the timeline or the call.'' [48] In a 2019 filing, Apple stated that HELO can normally generate and transmit device location information during call set-up. Google has stated that ELS can obtain a first location of Android devices 3–4 seconds after a call has been started.

Based on these developments, we propose to require CMRS and covered text providers to use location-based routing only if caller location information is available at the time that the provider would otherwise route the call (and if the information meets the proposed accuracy requirements in the rules). Our proposal is intended to avoid delay in transmitting 911 calls and texts because there would be no requirement to hold calls and texts for purposes of obtaining a routing fix. We seek comment on this proposal. For what percentage of calls and texts would caller location-based routing information be available at the time of routing, as contemplated by our proposal? Does the absence of any required holding time protect against the risk of delaying transmission of 911 calls and texts?

Accuracy of Location-Based Information. Location-based routing requires caller location information to be sufficiently accurate and reliable to support a routing decision that directs the call to the correct PSAP for the caller's location and avoids misrouting the call. The *CSRIC V LBR Report* recommends that wireless service providers that deliver 911 calls ''must have metrics and procedures in place to ensure that internal positioning methodologies used are reliable, consistent and performing at expected accuracy and quality requirements.'' ATIS notes that location-based routing solutions ''must consider uncertainty, in addition to the estimated location, in making the decision whether to use'' a location fix for routing purposes.[49]

We note that the location information used for routing a 911 call to the correct PSAP may not need to be as precise as the location information required under our location accuracy rules to support dispatch to the caller's location. For example, AT&T's location-based routing solution uses a horizontal accuracy metric of 165 meters and a 90% confidence threshold, *i.e.,* if device-based location information provided at call set-up establishes the caller's location within a 165-meter radius at a 90% confidence level, AT&T will use the information to route the call. While this is a less granular accuracy threshold than the 50-meter horizontal accuracy metric that CMRS providers must meet for dispatch purposes, Intrado reports that the 165 meter/90% confidence metric has enabled AT&T to use location-based routing for 80% of 911 calls on its network.

Consistent with these developments, we propose to require that CMRS and covered text providers use location-based routing if the location information available at the time of routing identifies the caller's horizontal location within a radius of 165 meters at a confidence level of at least 90%. These metrics are consistent with AT&T's implementation of location-based routing. In addition, our proposed confidence metric is consistent with ATIS' recommendation that uncertainty values for location-based routing ''be standardized to a 90% confidence for effective call handling.'' We seek comment on this proposal. As BRETSA notes, even where location-based routing is used, misroutes may still occur, *e.g.,* when a caller is very near a jurisdictional boundary. Do our proposed accuracy and confidence metrics strike the right balance in terms of maximizing the number of calls that will be successfully routed to the correct PSAP while minimizing the number of potential misroutes? If not, how should we modify those metrics, and what effect would such changes have on our goal to reduce misrouted calls and texts? In addition, for calls that fall outside the accuracy and confidence thresholds, should we provide a minimum standard or standards for the determining the best

handset in a given environment—including crowd-sourced Wireless Fidelity (Wi-Fi), Assisted-Global Navigation Satellite System (A–GNSS), and possibly other handset-based sensors. It also includes an associated uncertainty estimate reflective of the quality of the returned location.'' *ATIS–0700042* at 2.

[48] *See also* Peninsula Fiber Network Comments at 2 (''Most originating service providers can provide accurate location information in less than 5 seconds.'').

[49] *See also* T-Mobile Comments at 4 (cautioning that using low accuracy location information for location-based routing could lead to more call transfers).

available location information for routing the call?

Validation. Several commenters recommend that carriers validate location estimates for location-based routing against positioning information from other sources, such as the originating cell sector.[50] We seek comment on whether we should require validation of caller location information for purposes of location-based routing and, if so, what validation steps we should require CMRS and covered text providers to take. We intend for our proposed confidence and uncertainty requirements to ensure that CMRS providers and covered text providers use accurate device location for routing purposes when it is available. Considering these proposals, do commenters believe that additional validation steps are necessary? We also ask commenters to address the validation process, including what information CMRS providers and covered text providers should use to validate device-based hybrid location information.[51] Are there additional costs associated with validation and, if so, what are they? In addition, we seek comment on which parties should be responsible for validation, at what point in the network validation should occur, and whether requiring validation would introduce any delay.

B. Location-Based Routing of Calls and Texts to Next Generation 911 Networks

In the Notice of Inquiry and the public notice, the Commission sought comment on potential interdependencies between location-based routing and the transition to Next Generation 911. As the Commission observed in the Notice of Inquiry, NG911 call routing differs from legacy E911 call routing because NG911 architecture requires originating service providers to route calls to ESInets rather than to legacy selective routers, and calls are then routed over the ESInet to the appropriate PSAP.[52] In addition, NG911 differs from legacy E911 in that it is configured for originating service providers to deliver 911 calls and associated call routing information in IP-based format. Specifically, in NG911 call flow, the originating service provider uses Session Initiation Protocol (SIP) to embed routing information in the IP data packets that control call initiation and set-up and uses the SIP call routing information to route the call to the appropriate ESInet. Then, the ESInet operator directs the call to the appropriate PSAP by applying geospatial routing policies to the routing information embedded in the call.

In the public notice, we asked how the Commission could help to ensure that the delivery of location information to NG911-capable PSAPs is consistent with NG911 systems and architecture. In response, commenters generally support the end goal of having originating service providers deliver IP-formatted calls and SIP-based call routing information to NG911-capable PSAPs, and some nationwide CMRS providers state that they are already doing so.[53] Some commenters, including NENA, urge the Commission to require carriers to deliver calls and routing information in IP-based format to NG911-capable PSAPs that request it, arguing that this will speed the NG911 transition and reduce transition costs.

We propose to require CMRS and covered text providers to deliver 911 calls, texts, and associated routing information in IP-based format to NG911-capable PSAPs that request it. We seek comment on this proposal. We believe that such a requirement, combined with our proposed location-based routing requirements described above, would help to advance the NG911 transition in several ways. First, it would help to address operational and routing issues for jurisdictions that have implemented NG911. The Task Force on Optimal PSAP Architecture (TFOPA) report in 2016 concluded that a significant impediment to NG911 service was that originating service providers were not prepared to deliver 911 calls via IP technology with location information to NG911 service providers. Some 911 authorities contend that the use of legacy technology by originating service providers continues to be an obstacle to the ability of jurisdictions to transition to NG911.[54]

Second, requiring originating service providers to deliver IP-formatted calls and routing information to NG911-capable PSAPs would alleviate the burden on state and local 911 authorities of maintaining transitional gateways and other network elements to process and convert legacy calls. While some carriers are already delivering IP-based traffic voluntarily to NG911-capable PSAPs, so long as any providers continue to deliver 911 calls and routing information in legacy format, the state or local 911 authority must fund and operate transitional technology to receive the traffic in the ESInet and process it within the NG911 system. We seek comment on the degree to which funding and operating transitional facilities extend the timeline and add to the cost incurred by state and local 911 authorities to transition to NG911.

Third, the proposed IP-based delivery requirement would help jurisdictions realize additional public safety benefits available on NG911 networks, including enhanced policy routing functions, support for communication in multiple languages, and enhanced services to disabled communities. When NG911 systems have access to precise IP-formatted location information for 911 calls, they can use it to support geospatial routing and can more frequently update GIS data. IP-formatted data can also support policy routing that flexibly routes calls to PSAPs based on variables such as call volume, available telecommunicator resources, or the need for specialized response to particular emergencies. In addition, routing on NG911 networks can result in material time savings for telecommunicators. For example, the Massachusetts State 911 Department reports that using location-based routing on its NG911 network has resulted in a reduction of over a half million minutes per year in unwanted transfers.

We seek comment and specific data on the benefits that the public would

[50] Comtech Telecommunications Corp. (Comtech) Comments at 5 through 6 (rec. July 11, 2022) (Comtech Comments) (urging the Commission to ensure that DBH location information is only used to route 911 calls if checked against cell site-based location information); Verizon Comments at 4 (''For DBH-based routing, the handset location fix must be validated against the cell radius with sufficient accuracy, which will occur in many but not all cases.''). These comments are consistent with ATIS' recommendation on the matter. *ATIS–0500039* at 15.

[51] For example, Comtech urges the Commission to ensure that device-based hybrid location information is only used for routing if it has been checked against cell site-based location information. Comtech Comments at 5 through 6.

[52] *See Notice of Inquiry,* 33 FCC Rcd at 3251, paragraph 32. In a legacy E911 environment, CMRS providers route wireless calls using the pre-registered location of the tower and radio antennas through which the 911 call was placed. *Id.* In a fully implemented NG911 environment, CMRS providers deliver device location derived from a Location Information Server (LIS) to the ESInet, and the state or local 911 authority determines how to route a 911 call to the appropriate PSAP. *Id.*

[53] Verizon Comments at 2 (stating that Verizon ''has largely addressed the technical issues necessary to establish connectivity between its wireless network and i3-capable NG911 networks'' and incorporates DBH location into the SIP INVITE to an ESInet); T-Mobile Reply at 2 (stating that T-Mobile has ''converted over 1,900 PSAPs in 24 states from TDM to NG911 SIP''); AT&T Comments at 5 (describing how AT&T calls route to NG911 System Service Providers).

[54] In Massachusetts, the Massachusetts State 911 Department claims that lack of SIP on an end-to-end basis has created operational issues, as only one carrier has connected to the NG911 network via IP for voice calls. Massachusetts State 911 Department Comments at 2 through 3 (rec. July 8, 2022) (Massachusetts 911 Comments) (stating that lack of SIP has sometimes resulted in canceled and redelivered 911 calls, which generate an abandoned call and put the 911 caller further back in the queue).

derive from our proposals, as well as on the costs to nationwide and non-nationwide providers to deliver calls and texts in IP-based format when a state or local 911 authority has requested it. We also seek comment on what level of NG911 readiness PSAPs should have achieved in order to trigger the requirement for providers to begin delivering calls, texts, and location information in IP format. Should individual PSAPs be able to trigger the requirement or should readiness be established at a more aggregated level, *e.g.,* on an ESInet-by-ESInet or state-by-state basis?

Timing of IP Service Delivery. For delivery of IP-formatted calls, texts, and location information by nationwide CMRS and covered text providers, we propose an implementation timeline of six months from the effective date of the location-based routing requirement, or six months after a valid request by a state or local 911 authority, whichever is later. We also propose to provide non-nationwide CMRS providers an extra six months to accommodate these requests. We seek comment on these proposed timeframes for implementation. We also propose to allow 911 authorities and service providers to agree to alternate timeframes for delivery of IP-formatted calls and texts, provided that the CMRS provider or covered text provider notifies the Commission of the alternate timeframe within 30 days of the parties' agreement. We seek comment on this proposal.

Valid Request for IP Service. Because state or local 911 authorities would need to notify CMRS providers and covered text providers of their readiness to receive calls in NG911-compatible formats, we propose a framework for providing such notification. Consistent with our rules for text-to-911,[55] we propose to define a valid request as one made by a local or state entity that certifies that it (1) is technically ready to receive 911 calls and texts in the IP-based format requested, (2) is specifically authorized to accept calls and/or texts in the IP-based format requested, and (3) has provided notification to the CMRS provider or covered text provider via either a registry made available by the Commission or by written notification reasonably acceptable to the CMRS provider or covered text provider. We believe that this approach would minimize miscommunication between carriers and 911 authorities[56] and facilitate the timely delivery of IP-based service once state and local 911 authorities indicate their readiness. For purposes of determining whether a state or local 911 authority could be technically ready to receive calls and texts in an IP-based format, we seek comment on the elements that a state or local 911 authority would need to have in place before making a valid request.[57] In addition, we seek comment on whether we should require separate requests for IP-based call and text delivery.

To facilitate notification, we seek comment on whether the Commission should make available a registry or database that would allow state and local 911 authorities to notify CMRS providers and covered text providers of readiness to receive calls and texts in IP-based format with associated location information. Such a registry could simplify the request process for state and local 911 authorities as well as CMRS providers and covered text providers. State and local 911 authorities are already familiar with the process of requesting text-to-911 and RTT services via a similar process.[58] We seek comment on the granularity of such a registry, including whether to organize it by PSAP, state, ESInet, or other level of specificity. Should it be combined with our existing Master PSAP Registry and Text-to-911 Registry? If so, what features would be required in such a combined registry?

Timing Requirements for NG911 Routing. As previously noted, in NG911 architecture, device-based location information embedded in IP-formatted 911 calls is first used to route the call to an ESInet, and the ESInet operator then applies NG911 network routing policies to the embedded information to route the call to the appropriate PSAP. Some commenters express concern that delay in making device location information available to the ESInet operator could inhibit or prevent the full application of these routing functions within NG911 networks, thus depriving 911 authorities of the potential benefits of location-based routing in the NG911 environment. T-Mobile, however, asks the Commission not to impose mandates on carriers with respect to the use of location-based routing in NG911 systems, as such deployments rely on multi-stakeholder processes. We do not propose such mandates, but we seek comment on whether there are factors that could impact the length of time between the completion of the initial device location fix by an originating service provider and the availability of device location information to an NG911 network. Does our proposal to require delivery of IP-formatted calls and texts address commenters' concerns about making location information available in time for routing within NG911 networks?

Appropriate Requesting Entities. Under our proposed rule, the local or state entity with authority and responsibility to designate the point(s) to receive wireless 911 calls or texts would be the appropriate authority to request IP-based service from CMRS providers and covered text providers. However, statewide, regional, or county governmental entities may deploy shared resources such as an ESInet, and an ESInet may provide services for multiple PSAPs or public safety entities. There are also still many PSAPs serving a single jurisdiction managed by a city, county, or police or fire department. Should the proposed rule include PSAPs, appropriate local emergency authorities, state or local 911 authorities, and/or other specified authorities as entities that may initiate a valid request for IP-based service? We seek comment on the appropriate requesting entity or entities we should include in our rule given the varied governance of ESInet deployments.

C. Monitoring and Compliance

We seek comment on whether the Commission should implement any new data collections to assist in monitoring compliance with our proposed location-based routing rules. For example, should we require CMRS providers and/or covered text providers to provide performance data on location-based routing, such as relative percentages of calls or texts routed using location-based routing versus other routing methods such as cell tower location? Should reporting on routing be included as an additional component of the 911 live call data reports that CMRS providers already file pursuant to our

[55] *See* 47 CFR 9.10(q)(10)(iii) (defining a valid request for text-to-911 service).

[56] *See* Massachusetts 911 Comments at 2 through 3 (describing lack of support for IP connection by some carriers); T-Mobile Reply at 2 through 3 & n.3 (noting that multiple carriers are i3 compliant).

[57] As an example of possible readiness elements, we note that TFOPA created a ''NG9–1–1 Readiness Scorecard'' that categorizes components of NG911 implementation. TFOPA, Working Group 2: NG9–1–1 Readiness Scorecard at 17 through 21 (2016), *https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf.*

[58] *See* PSAP Text-to-911 Readiness and Certification Registry (Text-to-911 Registry), *https://www.fcc.gov/general/psap-text-911-readiness-and-certification-form#:~:text=the%20format%20requested.-,Text%2Dto%2D911%20Registry.,requested%20format%20within%20six%20months* (last visited Nov. 22, 2022).

wireless location accuracy rules?[59] If reporting would be helpful, what specific information should providers include and how frequently should we require them to report? Should we require CMRS and covered text providers to report information on misrouted 911 calls and texts? Would a separate data collection from NG911 service providers be helpful, as Peninsula Fiber Network suggests? If so, what information should the Commission seek in such a data collection? We also seek comment on measures the Commission could take to limit the burden of reporting on location-based routing. To what extent could the Commission limit the burden of any reporting requirements by providing increased flexibility for non-nationwide CMRS providers or businesses identified as small by the Small Business Administration?[60] As an alternative to reporting, should the Commission require providers to certify that they are in compliance with requirements for location-based routing and/or delivery of calls and texts in IP format?

Peninsula Fiber Network suggests that the Commission ''establish a reporting system where 9–1–1 system service providers and local agencies can report non-compliance information, and the Commission can levy forfeiture orders to the providers for non-compliance.'' To the extent Peninsula Fiber Network suggests establishment of a separate reporting system for location-based routing information, we do not believe such a reporting system is necessary. Public safety entities and members of the public seeking to report non-compliance with the proposed rules would be able to file informal complaints via the Public Safety and Homeland Security Bureau's Public Safety Support Center or the Commission's Consumer Complaint Center, or formal complaints under the Commission's enforcement rules.[61] We tentatively conclude that these existing mechanisms should be sufficient for addressing potential violations of the proposed location-based routing rules. We seek comment on this tentative conclusion.

D. Additional Proposals

Further Study. Some commenters assert that the Commission should facilitate additional study of various aspects of location-based routing,[62] and Comtech asserts that the problem of misrouted emergency wireless calls is not yet fully understood or sufficiently documented to justify regulatory changes. APCO, on the other hand, states that there is a general public safety consensus that misroutes are a problem and that the Commission should not delay action while waiting for additional data. As discussed above, we believe that misroutes resulting from legacy E911 routing are a well-documented occurrence and impact a significant percentage of 911 calls.[63] The record also indicates that nationwide location-based routing would reduce misrouted 911 calls and save 911 telecommunicators hundreds of thousands of hours a year. Therefore, we do not propose to postpone regulatory changes pending further study or documentation of misrouted emergency calls as Comtech advocates. We seek comment on this approach.

Additional Measures to Decrease Call Transfer Times. Some commenters recommend that the Commission encourage measures that would decrease call transfer times.[64] We encourage PSAPs and relevant state and local 911 authorities to pursue these additional capabilities, but at this time do not propose to undertake additional regulatory steps to do so. We seek comment on this approach.

E. Promoting Digital Equity and Inclusion

The Commission, as part of its continuing effort to advance digital equity for all,[65] including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations[66] and benefits, if any, that may be associated with the proposals and issues discussed herein. Specifically, we seek comment on how our proposals may promote or inhibit advances in diversity, equity, inclusion, and accessibility.

F. Summary of Benefits and Costs for Location-Based Routing

Benefits of Location-Based Routing. Any solution to the problem of misrouted 911 calls and texts, no matter how effective, must withstand the test of feasibility and functionality relative to cost. We therefore seek comment on whether the implementation of location-based routing for calls and texts can improve upon the speeds at which emergency personnel and services relying on a legacy 911 system can reach the caller, with a resulting improvement in the health and safety of the caller and preservation of property, and the magnitude of this presumed benefit. The record indicates that location-based routing may correct for a substantial percentage of calls that would otherwise be misrouted using legacy E911 routing,[67] thereby minimizing transfers

[59] Wireless location accuracy live call data reporting requirements may be found at 47 CFR 9.10(i)(3)(ii).

[60] For example, the Commission's requirements for live call data reporting provide a reduced reporting schedule for non-nationwide CMRS providers. *See* 47 CFR 9.10(i)(3)(ii)(D).

[61] The Public Safety Support Center is a web-based portal that enables PSAPs and other public safety entities to request support or information from the Public Safety and Homeland Security Bureau and to notify it of problems or issues impacting the provision of emergency services. *See Public Safety and Homeland Security Bureau Announces Opening of Public Safety Support Center,* public notice, 30 FCC Rcd 10639 (PSHSB 2015); FCC, *Public Safety Support Center, https://www.fcc.gov/general/public-safety-support-center* (last visited Nov. 29, 2022). The Consumer Complaint Center handles consumer inquiries and complaints, including consumer complaints about access to 911 emergency services. FCC, *Consumer Complaint Center, https://consumercomplaints.fcc.gov/hc/en-us* (last visited Nov. 29, 2022).

[62] T-Mobile Reply at 5 (asking the Commission to task the next iteration of the CSRIC with a refreshed study of location-based routing or encourage ATIS to undertake additional study of the technology); BRETSA Reply at 9 (asserting that further analysis should be completed to determine whether uncertainty and confidence levels can be correlated with the likelihood of calls being misrouted).

[63] *See, e.g., CSRIC V LBR Report* at 9; *ATIS–0500039* at 4 n.3 (one GMLC estimates that 12% of its wireless calls are misrouted); Intrado Comments at 3 n.8 (estimating that approximately 12.96% of a sample set of five million wireless calls were misrouted). Some jurisdictions report even higher numbers of misrouted calls. *See, e.g.,* Fayetteville Police Department Comments.

[64] *See* CTIA Reply at 5 through 6 (rec. July 25, 2022) (CTIA Reply) (urging the Commission to encourage PSAPs to pursue solutions to minimize call-transfer times). *See also* NENA Comments at 4 through 10 (suggesting the implementation of both standards-based and non-standards based solutions to decrease call transfer times); BRETSA Reply at 4 through 5 (recommending inter-CAD transfer capabilities and updating CAD systems with maps beyond PSAPs' jurisdictional boundaries).

[65] Section 1 of the Communications Act of 1934 as amended provides that the FCC ''regulat[es] interstate and foreign commerce in communication by wire and radio so as to make [such service] 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.'' 47 U.S.C. 151.

[66] The term ''equity'' is used here consistent with Executive Order 13985 as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. *See* Exec. Order No. 13985, 86 FR 7009, Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Jan. 20, 2021).

[67] *See* AT&T Comments at 4. Approximately 10% of all 911 wireless calls on AT&T's network would

and saving time required to transfer calls.

The potential benefits of location-based routing are very large. Our proposed rules are directed at eliminating the estimated 23 million misrouted 911 calls which occur annually.[68] Moreover, NENA, APCO, and Peninsula Fiber Network assert that a ''typical'' transfer takes about a minute.[69] Thus, by eliminating the need for transfer, the proposed rules would shorten response time for these calls. As discussed above, routing these calls accurately would reduce confusion, speed emergency response, and save lives and property. The Commission has previously relied on a study of emergency response incidents in Salt Lake City (Salt Lake City Study) to estimate the reduction in mortality attributable to measures that would decrease the total response time to a 911 call.[70] The Commission found that the Salt Lake City Study demonstrates that faster response time in response to a 911 call lowers mortality risk. The Salt Lake City Study shows a one-minute decrease in ambulance response times reduced the likelihood of 90-day mortality from approximately 6% to 5%, representing a 17% reduction in the total number of deaths.[71] Using this analysis, the Commission in the *Indoor Location Accuracy Fourth Report and Order* estimated that wireless location accuracy for purposes of dispatching first responders would save approximately 10,120 lives annually when fully implemented. We apply a comparable analysis here to estimate that implementation of location-based routing would save 13,837 lives annually.[72] Despite some implementation of location-based routing on CMRS provider networks, most of this life-saving benefit has not yet been realized because routing for most wireless calls is still heavily reliant on cell tower locations. Beyond saving lives, other benefits will also accrue, including better health outcomes, less property loss, and savings of PSAP resources. In all, we find these benefits to be sufficiently large to justify the costs the proposed rules will entail.

Estimating the dollar value of these benefits raises certain challenges. While we do not attempt to place a value on human life, regulators have estimated the value that consumers place on mortality risk reduction by their willingness to purchase safety features on cars and other products. The U.S. Department of Transportation (DOT) has created such an estimate, which concludes that consumers, as a group, show a willingness to pay $11.8 million to reduce risk sufficiently that one life would likely be saved.[73] Therefore, to reduce expected mortalities by 13,837, the DOT estimate of value would be 13,837 x $11.8 million or approximately $163 billion. This estimate is conservative. First, it excludes the value of reduced human suffering and property destruction occurring due to a delayed arrival of first responders. In addition, it does not include the benefits of location-based routing for text messages.

The record indicates that location-based routing solutions are expected to benefit PSAPs by resulting in time savings for telecommunicators.[74] In addition, the proposal to require service providers to deliver 911 calls, texts, and location information in IP-based format to NG911-capable PSAPs could enable

have been misrouted (and would have required a transfer) but instead are routed to the correct PSAP in the first instance as a result of AT&T's location-based routing solution. *Id.*

[68] *See* NENA Comments at 2 (estimating that of the approximately 240 million calls to 911 that are placed each year, 80% of all calls or approximately 192 million are placed on wireless devices, and that around 12% of wireless calls or 23 million are misrouted).

[69] This conforms with anecdotal evidence in the record that each transfer introduces about a minute of delay. APCO Comments at 2 (''[I]t's possible that a misrouted call will introduce a delay of a minute or longer.''); NENA Comments at 4 (''[T]he general anecdotal consensus was that a call transfer typically takes 'about a minute.' ''); Peninsula Fiber Network Comments at 1 (''[E]ach transfer takes between 15 to 90 seconds to set up and complete.'').

[70] *See Wireless E911 Location Accuracy Requirements,* PS Docket No. 07–114, Fourth Report and Order, 80 FR 11806 (March 4, 2015), 30 FCC Rcd 1259, 1317, paragraph 160 (2015) (*Indoor Location Accuracy Fourth Report and Order*), *corrected by* Erratum (PSHSB Mar. 3, 2015). The Commission has also relied on a 2002 Pennsylvania study of 911 calls to provide a basis for estimating the reduction in mortality attributable to faster 911 service. *Improving 911 Reliability and Continuity of Communications Networks, Including Broadband Technologies,* PS Docket Nos. 13–75 and 11–60, Report and Order, 79 FR 3123 (Jan. 17, 2014), 28 FCC Rcd 17476, 17501, paragraphs 74 through 75 (2013) (*Reliability Report and Order*); *see also* Susan Athey & Scott Stern, *The Impact of Information Technology on Emergency Health Care Outcomes,* 33(3) Rand J. Econ. 399 through 432 (2002), *https://pubmed.ncbi.nlm.nih.gov/12585298/* (assessing the impact of E911 on health outcomes using Pennsylvania ambulance and hospital records between 1194 and 1996 and showing that E911 reduces mortality and hospital costs).

[71] *See Wireless E911 Location Accuracy Requirements,* PS Docket No. 07–114, 79 FR 17820 (March 28, 2014), 29 FCC Rcd 2374, 2388 through 89, paragraph 7 (*Indoor Location Accuracy Third Further Notice*). The Salt Lake City study, which was cited in the *Indoor Location Accuracy Fourth Report and Order* and the *Indoor Location Accuracy Third Further Notice,* examined 73,706 emergency incidents during 2001 in the Salt Lake City area and found that, on average, a decrease in ambulance response times reduced the likelihood of 90-day mortality from approximately 6% to 5%, *i.e.,* a 17% reduction in the total number of deaths. *See* Wilde, Elizabeth Ty, ''Do Emergency Medical System Response Times Matter for Health Outcomes?,'' 22 Health Econ. 7, 790 through 806 at 794 (2013), *https://pubmed.ncbi.nlm.nih.gov/22700368/* (Salt Lake City Study); *Indoor Location Accuracy Fourth Report and Order,* 30 FCC Rcd at 1317, paragraph 160; *Indoor Location Accuracy Third Further Notice,* 29 FCC Rcd. at 2388 through 89, paragraph 7 & n.70. Because the regression in the Salt Lake City Study is linear, this result implies that a one-minute reduction in response time also saves lives at the same rate of 17%. *Indoor Location Accuracy Third Further Notice,* 29 FCC Rcd. at 2388, paragraph 7 n.70. In the Salt Lake City sample, the study suggested that a one-minute reduction in response times would have resulted in an annual saving of 746 lives. *Id.* at paragraph 7.

[72] The Salt Lake City Study estimated a mean 90-day mortality rate of 5.95% (4,386 mean number of deaths in the 90 days following the 911 call divided by 73,706 emergency incidents during the study period). Salt Lake City Study at 794. NENA estimates that 80% or more of the total calls to 911 annually are from wireless devices. NENA, 9–1–1 Statistics, *https://www.nena.org/page/911Statistics#:~:text=An%20estimated%20240%20million%20calls,more%20are%20from%20wireless%20devices* (last accessed Nov. 29, 2022). According to the National Association of State Emergency Medical Services Officials (NASEMSO), local Emergency Medical Services (EMS) agencies respond to nearly 28.5 million 911 dispatches each year. NASEMSO, *National Association of State EMS Officials releases stats on local agencies, 911 Calls* (April 10, 2020), *https://www.ems1.com/ambulance-service/articles/national-association-of-state-ems-officials-releases-stats-on-local-agencies-911-calls-LPQTHJrK2oIpxuR1/.* Assuming that 80% of these calls are from wireless devices yields an estimate of 22.8 million wireless calls for 911 dispatch annually. For purposes of this analysis, we estimate that 12% of the 22.8 million annual wireless calls for dispatch (or 2,736,000 calls) would be misrouted. *See* ATIS–0500039 at 4. We also estimate that location-based routing with a horizontal uncertainty value of 300 meters would resolve approximately 50% of these misroutes. *See id.* at 13. Accordingly, we estimate that 1,368,000 calls would avoid the need for a transfer due to a misroute, reducing the response time for these calls by one minute. Applying the original mortality rate of 5.95% to this set of calls yields an estimate of the original total mortality for calls in need of transfer due to a misroute, or 81,396 lives per year. Reducing the original total mortality (81,396 lives) by 17%, representing the expected benefits of a one minute reduction in response time, results in a revised mortality estimate of 67,559 lives. The difference between the original and revised mortalities (81,396 minus 67,559) yields the estimated number of lives saved annually due to implementation of location-based routing, or 13,837 lives.

[73] *See* U.S. Department of Transportation, *Departmental Guidance on Valuation of a Statistical Life in Economic Analysis (Mar. 4, 2022), https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis.*

[74] *E.g.,* NENA Comments at 4 (''NENA estimates over 200,000 hours per year of excess 9–1–1 professional labor is consumed due to call transfer events'' (emphasis omitted)). *See also* Texas 911 Entities at 2 through 4 (noting that the implementation of location-based routing has had a noticeably positive impact on PSAPs with misrouted 911 calls); Intrado Comments at 6 (recounting feedback from Palm Beach County, Florida, that PSAPs have experienced improvements in operations after location-based routing, including immediate access to granular device information).

state and local 911 authorities avoid the cost and inefficiency of maintaining legacy and NG911 systems simultaneously.[75] We therefore seek additional specificity on the time and cost savings to PSAPs and state and local 911 authorities under these proposed rules. We also seek comment on the reasonableness of the underlying assumptions in our above analysis of lives expected to be saved under the proposed rules. Further, we ask commenters to identify other benefits, such as a reduction in both human suffering and property damage, that have been or could be accrued from adoption of location-based routing or other provisions in our proposed rules.

Costs of Implementation. In order to determine whether the proposed requirements are reasonable, we must determine whether they are feasible and do not impose costs that exceed their benefits. Because three nationwide carriers are already providing location-based routing and IP-based service to PSAPs now, or plan to do so in the near future, we tentatively conclude that the proposed rules are feasible. We seek comment on this tentative conclusion. With respect to costs, the record does not currently contain detailed information on costs required for nationwide and non-nationwide CMRS providers and covered text providers to implement location-based routing and IP-based service delivery. We therefore seek comment on whether the implementation of location-based routing and IP-based service delivery as proposed under our rules would result in significant hardware, software, services, GIS, testing, or other costs to CMRS and covered text providers, NG911 services providers, or state and local 911 authorities. We seek comment on the amount of those costs and ask commenters to provide sufficiently detailed information to allow accurate cost calculations.

T-Mobile asserts that implementing location-based routing may involve procedural and technical complexities and that not all carriers are prepared to implement location-based routing on their networks using DBH location. We seek additional detailed information on whether the providers referenced by T-Mobile are unable to implement location-based routing, and if so, an explanation of why they are unable to do so. T-Mobile also notes that it worked closely with Operating System (OS)-based location providers to generate DBH location quickly for location-based routing. Do other carriers need to make similar investments or efforts in working with OS-based location providers? If yes, what would be the timeline and cost to do so? We seek additional detailed information on the costs for nationwide and non-nationwide carriers and covered text providers to implement the required software, hardware, and service upgrades to comply with our proposed rules. Where specifically would these upgrades need to occur on the end-to-end network, *e.g.,* on the device, on specific CMRS providers' network elements, or on specific 911 network elements? How many software, hardware, and service upgrades would be required for nationwide and non-nationwide carriers and covered text providers? How many work-hours would be necessary to implement these upgrades and what kind of workers would be required to implement these upgrades?

We are especially interested in cost data on existing deployments of location-based routing. We also seek information on planned or expended costs by CMRS providers and covered text providers that have voluntarily implemented or plan to implement location-based routing to any extent on their networks. To what extent would non-nationwide CMRS providers and covered text providers be able to leverage costs already incurred by nationwide CMRS providers, such as costs to develop and test location-based routing solutions, to reduce their own costs to comply with our proposed rules? Intrado maintains that CMRS providers would need to make ''appropriate investments'' and rigorously test location-based routing solutions before implementation, but that once these steps are taken ''there should be insignificant cost and administrative effort for nationwide deployment[.]'' Are costs to implement location-based routing significantly different for different network operators? If so, why? We seek comment on the details and the amount of these investments as well as the anticipated cost of testing location-based routing solutions. We also seek information on what equipment and software CMRS providers and covered text providers would need to test, how these tests would be performed, and CMRS providers' and covered text providers' plans for testing.

We also seek comment on whether there are differences for CMRS and covered text providers with respect to investments required to implement location-based routing when the receiving jurisdiction is legacy or NG911-capable, and, if so, a detailed explanation of costs associated with each scenario. Would the implementation of location-based routing require public safety investment? APCO comments that ''[l]ocation-based routing can and should be implemented without imposing additional costs on [PSAPs],'' and AT&T states that a PSAP ''does not need to take any action to receive 911 calls that utilize location-based routing when the wireless call originates on AT&T's network.'' However, T-Mobile appears to disagree with APCO's assertion that location-based routing should not impose costs on public safety, noting that ''the single most useful milestone for location-based routing would be widespread implementation of NG911,'' and only supports location-based routing for certain PSAPs.[76] What are the comparative costs of CMRS provider or covered text provider implementations of location-based routing for NG911-capable versus legacy jurisdictions? Are additional investments required for CMRS providers and covered text providers to implement location-based routing when the receiving jurisdiction has not implemented NG911 components? If so, what are these investments and what are their costs? If these investments are services from third-party service providers, are these services available for all CMRS providers and covered text providers?

We also seek comment on the specific costs to nationwide and non-nationwide CMRS providers and covered text providers to deliver IP-based 911 calls, texts, and SIP-formatted location information to requesting state and local 911 authorities within the specified timeframes under our proposed rules. What specific investments would be required for hardware, software, and services for CMRS providers and covered text providers to deliver IP-based service? Verizon states that it will formally launch end-to-end i3 call delivery during 2022. T-Mobile says it has converted over 1,900 PSAPs from TDM to SIP. Are other CMRS providers and covered text providers planning to implement IP-based delivery? Is there additional cost to requiring IP-based delivery within six months? Would a longer timeframe for IP-based delivery result in lower costs to CMRS and

[75] NENA Comments at 8 (''Routing in NG9–1–1 is more efficient and requires much less physical hardware. Many NG9–1–1 systems are forced to operate in a transitional environment. The 9–1–1 authority is forced to operate both an ESInet and a legacy E9–1–1 system that supports Selective Routers. NG9–1–1 transitional environments are very costly and inefficient.'').

[76] T-Mobile Reply at 2 through 3. In addition, T-Mobile has stated that it deploys location-based routing ''where jurisdictions are ready.'' *Id.* at 2.

covered text providers? What specific upgrades would be required to comply with the requirement to deliver IP-based service under our proposed rules, and what would such upgrades cost?

We seek information on the costs of nationwide and non-nationwide CMRS providers providing text service and other covered text providers to implement location-based routing for texts as described under our rules, including hardware, software, and service upgrade costs. AT&T states that it has already implemented nationwide location-based routing for texts. What costs would non-CMRS text providers incur to comply with our proposed rules? What costs would non-CMRS text providers incur for hardware, software, and service upgrades, as well as any other types of upgrades? What other types of costs, such as testing, would covered text providers incur?

In the absence of a detailed record on costs, we provide estimates below, and ask commenters to provide information to improve these estimates if necessary. To be conservative in our approach, we seek to provide upper-bound estimates, so that actual costs will be at or below these levels. First, we separate the costs into material costs and labor costs. T-Mobile states that it deployed location-based routing to some PSAPs and not others, so we rely on this statement in tentatively concluding that CMRS providers implement location-based routing at the PSAP level and CMRS providers incur material costs on a per-PSAP basis. We seek comment on this tentative conclusion. The record also suggests that material costs may require the use of additional software features [77] and changes to legacy components if the PSAP has not yet upgraded to NG911. There is little in the record to suggest what the average material cost of software features or component upgrades would be, so as a starting point, we set the total material costs for each CMRS provider at $10,000 per PSAP as an upper bound.[78] We ask commenters to provide cost information to inform our estimate of per-PSAP costs.

Our proposed upper bound on material costs for CMRS providers is then $10,000 per PSAP times the total number of CMRS providers communicating to PSAPs. AT&T states that it has already deployed location-based routing to its network, so our proposed rules will not impose any additional material costs on AT&T. The news media report that Verizon plans to implement location-based routing in the future, so it is unclear the extent to which Verizon plans to implement location-based routing on its network at this time. T-Mobile states that it has deployed location-based routing to 770 PSAPs and intends to deploy it to another 62, for a total of 832 PSAPS for which our proposed rules will impose no additional material costs.[79] There are approximately 5,728 PSAPs nationally, which would mean that T-Mobile may have to implement location-based routing for another 4,896 PSAPs. Staff analysis of Form 477 data suggests that when that when there is a fourth non-nationwide wireless provider in any particular location, it is usually the only one.[80] Thus an upper bound for the number of PSAPs non-nationwide wireless providers must upgrade would be the full national set of 5,728 PSAPs. Including the 4,896 PSAPs T-Mobile does not already plan to upgrade, our upper bound of PSAPs is 10,624, and the implied material cost upper bound is approximately $106 million.[81]

We propose to calculate labor costs in line with the *2016 Weather Alerts Order,*[82] the *2017 Blue Alerts Order,*[83] and the *2022 Comprehensible Alerts Order.*[84] The Office of Management and Budget approved an estimate of $25 per hour of labor cost for an EAS Participant to fill out the Commission online report form for EAS National Tests in 2011.[85] We find that the labor cost of employing software workers would be similar and adjust the labor cost upward to $35.25 to reflect inflation since 2011.[86] While some workers may be involved in physical labor to install equipment or run trials, they are likely to be compensated less than software workers, so assuming they are compensated at $35.25 would be an overestimate of their labor costs. AT&T reports that their rollout of location-based routing nationwide took two months, following several months of trials.[87] We therefore assume that a reasonable upper bound of the time to implement the upgrades with trials is 6 months (26 weeks) and workers have a forty hour work week, or 1040 hours per worker.[88] It is unclear how many workers are required to implement the upgrades, but we find 10 simultaneous workers at a time on average is a generous upper bound, resulting in 10,400 labor hours per CMRS provider. Multiplying this by the hourly labor cost of $35.25, the labor cost per CMRS provider is $366,600. Our proposed estimates of labor cost for the 58 non-nationwide CMRS providers [89] plus T-Mobile is then $366,600 × 59, or $21,629,400, which we round up to $22 million as a labor cost upper bound.[90]

The proposed upper bound of total material and labor costs we estimate is therefore $128 million, which is easily justified by the thousands of lives

[77] AT&T's implementation of location-based routing uses Intrado's ''Locate Before Route'' feature and ''implemented several timer changes in the GMLC housing AT&T [Location Information Server (LIS)].'' AT&T Comments at 2, 5.

[78] Estimate based on staff expertise in absence of a record on costs. This may be a very high estimate of costs as Intrado states that conditional on nationwide VoLTE there is ''insignificant cost and administrative effort'' to implement location-based routing. Intrado Comments at 10.

[79] T-Mobile states it deploys location-based routing and NG911 to ''jurisdictions when ready.'' Thus, it is a conservative overestimate to assume deployment at all deployments at PSAPs not yet completed or planned are induced by the Rulemaking. T-Mobile Reply at 2 & n.6.

[80] FCC, *Mobile Deployment Form 477 Data* (Jul. 29, 2022), *https://www.fcc.gov/mobile-deployment-form-477-data.*

[81] 5,728 PSAP upgrades for non-nationwide CMRS providers plus 4,896 PSAP upgrades for T-Mobile equals 10,624. Multiplying this figure by the cost per PSAP of $10,000 = $106,240,000.

[82] *Amendment of Part 11 of the Commission's Rules Regarding Emergency Alert System,* PS Docket No. 15–94, Report and Order, 81 FR 53039 (Aug. 11, 2016) (*Weather Alerts Order*).

[83] *Amendment of Part 11 of the Commission's Rules Regarding Emergency Alert System,* PS Docket No. 15–94, Report and Order, 83 FR 2557 (Jan. 18, 2018) (*Blue Alerts Order*).

[84] *Amendment of Part 11 of the Commission's Rules Regarding Emergency Alert System,* PS Docket No. 15–94, Report and Order, 87 FR 67808 (Nov. 10, 2022) (*Comprehensible Alerts Order*).

[85] *See* FCC, Public Information Collections Approved by the Office of Management and Budget (OMB), 76 FR 68756 through 01 (Nov. 7, 2011).

[86] The average hourly earnings of private employees increased 40.5% from November 2011 to October 2022, according to estimates provided by the Bureau of Labor Statistics. We therefore find a 41% increase in wages ($25 × 1.41 = $35.25) to be an appropriate adjustment from the OMB-approved labor cost from November 2011. Federal Reserve Bank of St. Louis, *Average Hourly Earnings of All Employees, Total Private (CES0500000003], https://fred.stlouisfed.org/series/CES0500000003* (last visited Nov. 29, 2022) (using statistics from the U.S. Bureau of Labor Statistics).

[87] The AT&T Snohomish County (Washington) trial occurred from October 2021 to January 2022 and the West Palm Beach County (Florida) trial occurred from February 2022 to March 2022. The rollout occurred from May 2022 to June 2022. AT&T Comments at 2 through 4.

[88] With available NG911, conversion to location-based routing would likely be much less work intensive because it would only require reconfiguration of the existing software rather that a full upgrade. We assume full upgrade to generate an upper bound on costs.

[89] The June 2021 Voice Telephone Services Report lists 61 wireless carriers in total. FCC Office of Economics and Analytics, Industry Analysis Division, Voice Telephone Services: Status as of June 30, 2021 at 10 (2022) at 10 & Tbl. 2, *https://www.fcc.gov/document/oea-releases-voice-telephone-services-report-june-2021.*

[90] We lack information in the record to pin down how the number of required workers would vary between T-Mobile and non-nationwide carriers. Non-nationwide carriers may require less work for upgrades because they have smaller networks, but may require more work because they have less specialized expertise on staff. T-Mobile may require less work because it has already deployed LBR to some PSAPs. We therefore tentatively assume a constant rate of workers for all carriers.

projected to be saved by location-based routing of 911 calls. Because our conservative estimate of benefits of the proposed rules is in the billions of dollars, the prospective benefits to be realized by the proposed rules will well exceed their cost even under the conservative upper-bound assumptions we make here. We seek comment on the reasonableness of the above methodology, assumptions, and estimates.

Procedural Matters

Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this *NPRM.* Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines in the *NPRM.*

A. Need for, and Objectives of, the Proposed Rules

In the *NPRM,* we propose requirements for Commercial Mobile Radio Service (CMRS) providers and covered text providers to implement location-based routing for 911 calls and texts nationwide. In 2018, the Commission released a Notice of Inquiry that sought to determine the best way to avoid misrouted 911 calls.[91] We recently refreshed the record on location-based routing with a public notice that sought to update the record on developments since the release of the Notice of Inquiry, including technological improvements in location-based routing and the extent to which CMRS providers have deployed location-based routing in their networks. Developments since the Notice of Inquiry and comments in response to the public notice indicate that location-based routing is both feasible and reliable and that implementing it on a nationwide basis would provide significant public safety benefits. Based on the record, we determine that our proposed rule changes are necessary to reduce emergency response time because implementation of location-based routing will significantly reduce misrouted 911 calls and the delays associated with transferring misrouted calls from one public safety answering point (PSAP) to another. Consistent with our authority in the Communications Act of 1934, as amended, we propose to amend our rules to ensure that more people will receive better 911 service.

We propose rules in the *NPRM* that will require CMRS providers and covered text providers to implement location-based routing for 911 calls and texts nationwide, including calls and texts originating in both legacy and Next Generation 911 (NG911) jurisdictions. More specifically, we propose the following steps to advance location-based routing of wireless calls and texts:

- Require all Commercial Mobile Radio Service (CMRS) providers to (1) deploy technology that supports location-based routing on their internet Protocol (IP)-based networks (*i.e.,* 4G LTE, 5G, and subsequent generations of IP-based networks) and (2) use location-based routing to route all 911 voice calls originating on their IP-based networks when caller location information available during origination of the 911 call meets certain requirements for accuracy and timeliness. Nationwide CMRS providers would have six months from the effective date of final rules to meet these requirements. Non-nationwide CMRS providers would have an additional year (*i.e.,* eighteen months from the effective date of final rules) to meet the same requirements.
- Require covered text providers to (1) deploy technology that supports location-based routing and (2) use location-based routing to route all 911 texts originating on their IP-based networks when location information available during origination of the 911 text meets certain requirements for accuracy and timeliness. Covered text providers would have eighteen months from the effective date of final rules to meet these requirements.
- Establish baseline requirements with respect to the accuracy and timeliness of location information used for location-based routing. When location information does not meet one or both of these requirements, CMRS providers and covered text providers would be required to route 911 calls and texts based on the best available location information, which may include latitude/longitude coordinates of the cell tower.

To help ensure that public safety jurisdictions transitioning to NG911 can realize the benefits of location-based routing in an efficient and cost-effective manner, we also propose to:

- Require CMRS providers and covered text providers to deliver 911 calls, texts, associated routing information in IP format upon request of 911 authorities who have established the capability to accept NG911-compatible IP-based 911 communications. Nationwide CMRS providers and covered text providers would be subject to this requirement six months from the effective date of final rules on location-based routing or within six months of a valid request for IP-based service from a local or state public safety authority, whichever is later. Non-nationwide CMRS providers would have an additional six months to comply with this requirement.

We believe that the above proposals for location-based routing of 911 calls and texts will promote the safety of life and property by helping to ensure that those in need of emergency assistance can receive the help they need in a more timely manner.

B. Legal Basis

The proposed action is authorized under Sections 1, 2, 4(i), 10, 201, 214, 222, 251(e), 301, 302, 303, 307, 309, 316, and 332, of the Communications Act of 1934, as amended, 47 U.S.C. 151, 152(a), 154(i), 160, 201, 214, 222, 251(e), 301, 302, 303, 307, 309, 316, 332; the Wireless Communications and Public Safety Act of 1999, Public Law 106–81, 47 U.S.C. 615 note, 615, 615a, 615b; and Section 106 of the Twenty-First Century Communications and Video Accessibility Act of 2010, Public Law 111–260, 47 U.S.C. 615c.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted. The RFA generally defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under the Small Business Act. A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.

Small Businesses, Small Organizations, Small Governmental Jurisdictions. Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe, at the outset, three broad groups of small entities that could be directly affected herein. First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility

[91] *Notice of Inquiry,* 33 FCC Rcd at 3240 paragraph 6 (2018).

analysis, according to data from the SBA's Office of Advocacy, in general a small business is an independent business having fewer than 500 employees. These types of small businesses represent 99.9% of all businesses in the United States, which translates to 32.5 million businesses.

Next, the type of small entity described as a ''small organization'' is generally ''any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.'' The Internal Revenue Service (IRS) uses a revenue benchmark of $50,000 or less to delineate its annual electronic filing requirements for small exempt organizations.[92] Nationwide, for tax year 2020, there were approximately 447,689 small exempt organizations in the U.S. reporting revenues of $50,000 or less according to the registration and tax data for exempt organizations available from the IRS.[93]

Finally, the small entity described as a ''small governmental jurisdiction'' is defined generally as ''governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.'' U.S. Census Bureau data from the 2017 Census of Governments[94] indicate there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[95] Of this number, there were 36,931 general purpose governments (county,[96] municipal, and town or township[97]) with populations of less than 50,000 and 12,040 special purpose governments—independent school districts[98] with enrollment populations of less than 50,000.[99] Accordingly, based on the 2017 U.S. Census of Governments data, we estimate that at least 48,971 entities fall into the category of ''small governmental jurisdictions.''[100]

1. Telecommunications Service Providers

a. Wireless Telecommunications Providers

Pursuant to 47 CFR 9.10(a), the Commission's 911 service requirements are only applicable to ''CMRS providers, excluding mobile satellite service operators, to the extent that they: (1) Offer real-time, two way switched voice service that is interconnected with the public switched network; and (2) Use an in-network switching facility that enables the provider to reuse frequencies and accomplish seamless hand-offs of subscriber calls. These requirements are applicable to entities that offer voice service to consumers by purchasing airtime or capacity at wholesale rates from CMRS licensees.''

Below, for those services subject to auctions, we note that, as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Also, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated.

All Other Telecommunications. This industry is comprised of establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Providers of internet services (*e.g.* dial-up ISPs) or voice over internet protocol (VoIP) services, via client-supplied telecommunications connections are also included in this industry. The SBA small business size standard for this industry classifies firms with annual receipts of $35 million or less as small. U.S. Census Bureau data for 2017 show that there were 1,079 firms in this industry that operated for the entire year. Of those firms, 1,039 had revenue of less than $25 million.[101] Based on this data, the Commission estimates that the majority of ''All Other Telecommunications'' firms can be considered small.

Advanced Wireless Services (AWS)—(1710–1755 MHz and 2110–2155 MHz bands (AWS–1); 1915–1920 MHz, 1995–2000 MHz, 2020–2025 MHz and 2175–2180 MHz bands (AWS–2); 2155–2175 MHz band (AWS–3); 2000–2020 MHz and 2180–2200 MHz (AWS–4)). Spectrum is made available and licensed in these bands for the provision of various wireless communications services. Wireless Telecommunications

[92] The IRS benchmark is similar to the population of less than 50,000 benchmark in 5 U.S.C. 601(5) that is used to define a small governmental jurisdiction. Therefore, the IRS benchmark has been used to estimate the number small organizations in this small entity description. *See* Annual Electronic Filing Requirement for Small Exempt Organizations—Form 990–N (e-Postcard), ''Who must file,'' *https://www.irs.gov/charities-non-profits/annual-electronic-filing-requirement-for-small-exempt-organizations-form-990-n-e-postcard.* We note that the IRS data does not provide information on whether a small exempt organization is independently owned and operated or dominant in its field.

[93] *See* Exempt Organizations Business Master File Extract (E.O. BMF), ''CSV Files by Region,'' *https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf.* The IRS Exempt Organization Business Master File (E.O. BMF) Extract provides information on all registered tax-exempt/non-profit organizations. The data utilized for purposes of this description was extracted from the IRS E.O. BMF data for businesses for the tax year 2020 with revenue less than or equal to $50,000 for Region 1-Northeast Area (58,577), Region 2-Mid-Atlantic and Great Lakes Areas (175,272), and Region 3-Gulf Coast and Pacific Coast Areas (213,840) that includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

[94] The Census of Governments survey is conducted every five (5) years compiling data for years ending with ''2'' and ''7''. *See* Census of Governments, *https://www.census.gov/programs-surveys/cog/about.html.*

[95] *See* U.S. Census Bureau, 2017 Census of Governments—Organization Table 2. Local Governments by Type and State: 2017 [CG1700ORG02], *https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html.* Local governmental jurisdictions are made up of general purpose governments (county, municipal and town or township) and special purpose governments (special districts and independent school districts). *See also* tbl.2. CG1700ORG02 Table Notes_Local Governments by Type and State_ 2017.

[96] *See id.* at tbl.5. County Governments by Population-Size Group and State: 2017 [CG1700ORG05], *https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html.* There were 2,105 county governments with populations less than 50,000. This category does not include subcounty (municipal and township) governments.

[97] *See id.* at tbl.6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06], *https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html.* There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

[98] *See id.* at tbl.10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10], *https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html.* There were 12,040 independent school districts with enrollment populations less than 50,000. *See also* tbl.4. Special-Purpose Local Governments by State Census Years 1942 to 2017 [CG1700ORG04], CG1700ORG04 Table Notes_ Special Purpose Local Governments by State_ Census Years 1942 to 2017.

[99] While the special purpose governments category also includes local special district governments, the 2017 Census of Governments data does not provide data aggregated based on population size for the special purpose governments category. Therefore, only data from independent school districts is included in the special purpose governments category.

[100] This total is derived from the sum of the number of general purpose governments (county, municipal and town or township) with populations of less than 50,000 (36,931) and the number of special purpose governments—independent school districts with enrollment populations of less than 50,000 (12,040), from the 2017 Census of Governments—Organizations tbls.5, 6 & 10.

[101] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see https://www.census.gov/glossary/#term_ReceiptsRevenueServices.*

Carriers (except Satellite) is the closest industry with a SBA small business size standard applicable to these services. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year.[102] Of this number, 2,837 firms employed fewer than 250 employees.[103] Thus, under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

According to Commission data as December 2021, there were approximately 4,472 active AWS licenses.[104] The Commission's small business size standards with respect to AWS involve eligibility for bidding credits and installment payments in the auction of licenses for these services. For the auction of AWS licenses, the Commission defined a ''small business'' as an entity with average annual gross revenues for the preceding three years not exceeding $40 million, and a ''very small business'' as an entity with average annual gross revenues for the preceding three years not exceeding $15 million. Pursuant to these definitions, 57 winning bidders claiming status as small or very small businesses won 215 of 1,087 licenses. In the most recent auction of AWS licenses 15 of 37 bidders qualifying for status as small or very small businesses won licenses.

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Competitive Local Exchange Carriers (LECs). Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to local exchange services. Providers of these services include several types of competitive local exchange service providers.[105] Wired Telecommunications Carriers is the closest industry with a SBA small business size standard. The SBA small business size standard for Wired Telecommunications Carriers classifies firms having 1,500 or fewer employees as small. U.S. Census Bureau data for 2017 show that there were 3,054 firms that operated in this industry for the entire year. Of this number, 2,964 firms operated with fewer than 250 employees.[106] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 3,956 providers that reported they were competitive local exchange service providers. Of these providers, the Commission estimates that 3,808 providers have 1,500 or fewer employees. Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

Incumbent Local Exchange Carriers (Incumbent LECs). Neither the Commission nor the SBA have developed a small business size standard specifically for incumbent local exchange carriers. Wired Telecommunications Carriers is the closest industry with an SBA small business size standard. The SBA small business size standard for Wired Telecommunications Carriers classifies firms having 1,500 or fewer employees as small. U.S. Census Bureau data for 2017 show that there were 3,054 firms in this industry that operated for the entire year. Of this number, 2,964 firms operated with fewer than 250 employees.[107] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 1,227 providers that reported they were incumbent local exchange service providers. Of these providers, the Commission estimates that 929 providers have 1,500 or fewer employees. Consequently, using the SBA's small business size standard, the Commission estimates that the majority of incumbent local exchange carriers can be considered small entities.

Broadband Personal Communications Service. The broadband personal communications services (PCS) spectrum encompasses services in the 1850–1910 and 1930–1990 MHz bands. The closest industry with a SBA small business size standard applicable to these services is Wireless Telecommunications Carriers (except Satellite). The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[108] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

Based on Commission data as of November 2021, there were approximately 5,060 active licenses in the Broadband PCS service.[109] The Commission's small business size standards with respect to Broadband PCS involve eligibility for bidding credits and installment payments in the auction of licenses for these services. In auctions for these licenses, the Commission defined ''small business'' as an entity that, together with its affiliates and controlling interests, has average gross revenues not exceeding $40 million for the preceding three years, and a ''very small business'' as an entity that, together with its affiliates and controlling interests, has had average annual gross revenues not exceeding $15 million for the preceding

[102] *See* U.S. Census Bureau, *2017 Economic Census of the United States, Employment Size of Firms for the U.S.: 2017,* Table ID: EC1700SIZEEMPFIRM, NAICS Code 517312, *https://data.census.gov/cedsci/table?y=2017&n=517312&tid=ECNSIZE2017.EC1700SIZEEMPFIRM&hidePreview=false.*

[103] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[104] Based on a FCC Universal Licensing System search on December 10, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = AD, AH, AT, AW; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[105] Competitive Local Exchange Service Providers include the following types of providers: Competitive Access Providers (CAPs) and Competitive Local Exchange Carriers (CLECs), Cable/Coax CLECs, Interconnected VOIP Providers, Non-Interconnected VOIP Providers, Shared-Tenant Service Providers, Audio Bridge Service Providers, Local Resellers, and Other Local Service Providers.

[106] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[107] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[108] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[109] Based on a FCC Universal Licensing System search on November 16, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = CW; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

three years. Winning bidders claiming small business credits won Broadband PCS licenses in C, D, E, and F Blocks.

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Narrowband Personal Communications Services. Narrowband Personal Communications Services *(Narrowband PCS)* are PCS services operating in the 901–902 MHz, 930–931 MHz, and 940–941 MHz bands. PCS services are radio communications that encompass mobile and ancillary fixed communication that provide services to individuals and businesses and can be integrated with a variety of competing networks. Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with a SBA small business size standard applicable to these services. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[110] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

According to Commission data as of December 2021, there were approximately 4,211 active *Narrowband PCS* licenses.[111] The Commission's small business size standards with respect to *Narrowband PCS* involve eligibility for bidding credits and installment payments in the auction of licenses for these services. For the auction of these licenses, the Commission defined a ''small business'' as an entity that, together with affiliates and controlling interests, has average gross revenues for the three preceding years of not more than $40 million. A ''very small business'' is defined as an entity that, together with affiliates and controlling interests, has average gross revenues for the three preceding years of not more than $15 million. Pursuant to these definitions, 7 winning bidders claiming small and very small bidding credits won approximately 359 licenses. One of the winning bidders claiming a small business status classification in these *Narrowband PCS* license auctions had an active license as of December 2021.[112]

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Offshore Radiotelephone Service. This service operates on several UHF television broadcast channels that are not used for television broadcasting in the coastal areas of states bordering the Gulf of Mexico.[113] Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with a SBA small business size standard applicable to this service. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[114] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small. Additionally, based on Commission data, as of December 2021, there was one licensee with an active license in this service.[115] However, since the Commission does not collect data on the number of employees for this service, at this time we are not able to estimate the number of licensees that would qualify as small under the SBA's small business size standard.

Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment. The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small. U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year. Of this number, 624 firms had fewer than 250 employees.[116] Thus, under the SBA size standard, the majority of firms in this industry can be considered small.

Rural Radiotelephone Service. Neither the Commission nor the SBA have developed a small business size standard specifically for small businesses providing Rural Radiotelephone Service. Rural Radiotelephone Service is radio service in which licensees are authorized to offer and provide radio telecommunication services for hire to subscribers in areas where it is not feasible to provide communication services by wire or other means. A significant subset of the Rural Radiotelephone Service is the Basic Exchange Telephone Radio System

[110] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[111] Based on a FCC Universal Licensing System search on December 10, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = CN; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[112] Based on a FCC Universal Licensing System search on December 10, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = CN; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[113] This service is governed by subpart I of part 22 of the Commission's Rules. *See* 47 CFR 22.1001–22.1037.

[114] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[115] Based on a FCC Universal Licensing System search on December 10, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = CO; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[116] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

(BETRS).[117] Wireless Telecommunications Carriers (*except* Satellite), is the closest applicable industry with a SBA small business size standard. The SBA small business size standard for Wireless Telecommunications Carriers (*except* Satellite) classifies firms having 1,500 or fewer employees as small. For this industry, U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated for the entire year. Of this total, 2,837 firms employed fewer than 250 employees.[118] Thus under the SBA size standard, the Commission estimates that the majority of Rural Radiotelephone Services firm are small entities. Based on Commission data as of December 27, 2021, there were approximately 119 active licenses in the Rural Radiotelephone Service.[119] The Commission does not collect employment data from these entities holding these licenses and therefore we cannot estimate how many of these entities meet the SBA small business size standard.

Wireless Communications Services. Wireless Communications Services (WCS) can be used for a variety of fixed, mobile, radiolocation, and digital audio broadcasting satellite services. Wireless spectrum is made available and licensed for the provision of wireless communications services in several frequency bands subject to part 27 of the Commission's rules. Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with an SBA small business size standard applicable to these services. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[120] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

The Commission's small business size standards with respect to WCS involve eligibility for bidding credits and installment payments in the auction of licenses for the various frequency bands included in WCS. When bidding credits are adopted for the auction of licenses in WCS frequency bands, such credits may be available to several types of small businesses based average gross revenues (small, very small and entrepreneur) pursuant to the competitive bidding rules adopted in conjunction with the requirements for the auction and/or as identified in the designated entities section in part 27 of the Commission's rules for the specific WCS frequency bands.[121]

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Wireless Telecommunications Carriers (except Satellite). This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless internet access, and wireless video services. The SBA size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms in this industry that operated for the entire year. Of that number, 2,837 firms employed fewer than 250 employees.[122] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 797 providers that reported they were engaged in the provision of wireless services. Of these providers, the Commission estimates that 715 providers have 1,500 or fewer employees. Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

Wireless Telephony. Wireless telephony includes cellular, personal communications services, and specialized mobile radio telephony carriers. The closest applicable industry with an SBA small business size standard is Wireless Telecommunications Carriers (except Satellite). The size standard for this industry under SBA rules is that a business is small if it has 1,500 or fewer employees. For this industry, U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[123] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 407 providers that reported they were engaged in the provision of cellular, personal communications services, and specialized mobile radio services. Of these providers, the Commission estimates that 333 providers have 1,500 or fewer employees. Consequently, using the SBA's small business size standard, most of these providers can be considered small entities.

700 MHz Guard Band Licensees. The 700 MHz Guard Band encompasses spectrum in 746–747/776–777 MHz and 762–764/792–794 MHz frequency bands. Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with a SBA small business size standard applicable to licenses providing services in these bands. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[124] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

According to Commission data as of December 2021, there were approximately 224 active 700 MHz Guard Band licenses.[125] The

[117] BETRS is defined in 47 CFR 22.757, 22.759.

[118] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[119] Based on a FCC Universal Licensing System search on December 27, 2021. *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = CR; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[120] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[121] The Designated entities sections in Subparts D through Q each contain the small business size standards adopted for the auction of the frequency band covered by that subpart.

[122] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[123] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[124] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[125] Based on a FCC Universal Licensing System search on December 14, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/*

Commission's small business size standards with respect to 700 MHz Guard Band licensees involve eligibility for bidding credits and installment payments in the auction of licenses. For the auction of these licenses, the Commission defined a ''small business'' as an entity that, together with its affiliates and controlling principals, has average gross revenues not exceeding $40 million for the preceding three years, and a ''very small business'' an entity that, together with its affiliates and controlling principals, has average gross revenues that are not more than $15 million for the preceding three years. Pursuant to these definitions, five winning bidders claiming one of the small business status classifications won 26 licenses, and one winning bidder claiming small business won two licenses. None of the winning bidders claiming a small business status classification in these 700 MHz Guard Band license auctions had an active license as of December 2021.[126]

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Lower 700 MHz Band Licenses. The lower 700 MHz band encompasses spectrum in the 698–746 MHz frequency bands. Permissible operations in these bands include flexible fixed, mobile, and broadcast uses, including mobile and other digital new broadcast operation; fixed and mobile wireless commercial services (including FDD- and TDD-based services); as well as fixed and mobile wireless uses for private, internal radio needs, two-way interactive, cellular, and mobile television broadcasting services. Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with a SBA small business size standard applicable to licenses providing services in these bands. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees.[127] Thus under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

According to Commission data as of December 2021, there were approximately 2,824 active Lower 700 MHz Band licenses.[128] The Commission's small business size standards with respect to Lower 700 MHz Band licensees involve eligibility for bidding credits and installment payments in the auction of licenses. For auctions of Lower 700 MHz Band licenses the Commission adopted criteria for three groups of small businesses. A very small business was defined as an entity that, together with its affiliates and controlling interests, has average annual gross revenues not exceeding $15 million for the preceding three years, a small business was defined as an entity that, together with its affiliates and controlling interests, has average gross revenues not exceeding $40 million for the preceding three years, and an entrepreneur was defined as an entity that, together with its affiliates and controlling interests, has average gross revenues not exceeding $3 million for the preceding three years. In auctions for Lower 700 MHz Band licenses seventy-two winning bidders claiming a small business classification won 329 licenses, twenty-six winning bidders claiming a small business classification won 214 licenses, and three winning bidders claiming a small business classification won all five auctioned licenses.

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Upper 700 MHz Band Licenses. The upper 700 MHz band encompasses spectrum in the 746–806 MHz bands. Upper 700 MHz D Block licenses are nationwide licenses associated with the 758–763 MHz and 788–793 MHz bands. Permissible operations in these bands include flexible fixed, mobile, and broadcast uses, including mobile and other digital new broadcast operation; fixed and mobile wireless commercial services (including FDD- and TDD-based services); as well as fixed and mobile wireless uses for private, internal radio needs, two-way interactive, cellular, and mobile television broadcasting services.[129] Wireless Telecommunications Carriers (*except* Satellite) is the closest industry with a SBA small business size standard applicable to licenses providing services in these bands. The SBA small business size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of that number, 2,837 firms employed fewer than 250 employees.[130] Thus, under the SBA size standard, the Commission estimates that a majority of licensees in this industry can be considered small.

According to Commission data as of December 2021, there were approximately 152 active Upper 700

searchAdvanced.jsp. Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = WX; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[126] Based on a FCC Universal Licensing System search on December 14, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = WX; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[127] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[128] Based on a FCC Universal Licensing System search on December 14, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = WY, WZ; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[129] *See* Federal Communications Commission, Economics and Analytics, Auctions, Auction 73: 700 MHz Band, Fact Sheet, Permissible Operations, *https://www.fcc.gov/auction/73/factsheet.* We note that in Auction 73, Upper 700 MHz Band C and D Blocks as well as Lower 700 MHz Band A, B, and E Blocks were auctioned.

[130] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

MHz Band licenses.[131] The Commission's small business size standards with respect to Upper 700 MHz Band licensees involve eligibility for bidding credits and installment payments in the auction of licenses. For the auction of these licenses, the Commission defined a ''small business'' as an entity that, together with its affiliates and controlling principals, has average gross revenues not exceeding $40 million for the preceding three years, and a ''very small business'' an entity that, together with its affiliates and controlling principals, has average gross revenues that are not more than $15 million for the preceding three years. Pursuant to these definitions, three winning bidders claiming very small business status won five of the twelve available licenses.

In frequency bands where licenses were subject to auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time we are not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

Wireless Resellers. Neither the Commission nor the SBA have developed a small business size standard specifically for Wireless Resellers. The closest industry with a SBA small business size standard is Telecommunications Resellers. The Telecommunications Resellers industry comprises establishments engaged in purchasing access and network capacity from owners and operators of telecommunications networks and reselling wired and wireless telecommunications services (except satellite) to businesses and households. Establishments in this industry resell telecommunications and they do not operate transmission facilities and infrastructure. Mobile virtual network operators (MVNOs) are included in this industry. Under the SBA size standard for this industry, a business is small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that 1,386 firms in this industry provided resale services during that year. Of that number, 1,375 firms operated with fewer than 250 employees.[132] Thus, for this industry under the SBA small business size standard, the majority of providers can be considered small entities.

b. Equipment Manufacturers

Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment. The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small. U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year. Of this number, 624 firms had fewer than 250 employees.[133] Thus, under the SBA size standard, the majority of firms in this industry can be considered small.

Semiconductor and Related Device Manufacturing. This industry comprises establishments primarily engaged in manufacturing semiconductors and related solid state devices. Examples of products made by these establishments are integrated circuits, memory chips, microprocessors, diodes, transistors, solar cells and other optoelectronic devices. The SBA small business size standard for this industry classifies entities having 1,250 or fewer employees as small. U.S. Census Bureau data for 2017 show that there were 729 firms in this industry that operated for the entire year. Of this total, 673 firms operated with fewer than 250 employees.[134] Thus under the SBA size standard, the majority of firms in this industry can be considered small.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

The *NPRM* proposes and seeks comment on implementing new location-based routing requirements for 911 voice calls and text messages, that if adopted, may impose new or modified reporting or recordkeeping, and other compliance obligations on small entities. Some of our proposed requirements contain written notification and certification requirements that will be applicable to small entities. For example, in the *NPRM* we propose to require that not later than six months from the effective date of final rules on location-based routing, or within six months of a valid request for delivery of IP-formatted calls, texts, and location information by a local or state authority, whichever is later, CMRS providers and covered text providers must deliver 911 calls, texts, and associated routing information in IP-based format to NG911-capable PSAPs that request it. Non-nationwide providers would have an additional six months to comply with this requirement. CMRS and covered text providers and state or local 911 authorities would be allowed to agree to alternate timeframes for delivery of IP-formatted calls, texts, and associated routing information as long as the CMRS or covered text provider notifies the Commission of the alternate timeframe within 30 days of the parties' agreement.

Regarding CMRS or covered text providers' receipt of a ''valid request,'' the criteria we proposed to constitute a valid request includes certification from a requesting local or state entity that is technically ready to receive calls and/or texts in the IP-based format requested, that it is specifically authorized to accept calls and/or texts in the IP-based format requested, and that has provided notification to the CMRS or covered text providers via either a registry made available by the Commission or any other written notification reasonably acceptable to the CMRS provider or covered text provider.

In the *NPRM,* we seek comment on whether to implement any new data collections to assist in monitoring performance and compliance with the proposed location-based routing rules. For example, we ask: (1) whether to require CMRS providers or covered text providers to provide performance data on location-based routing, such as relative percentages of calls or texts routed using location-based routing versus other routing methods such as

[131] Based on a FCC Universal Licensing System search on December 14, 2021, *https://wireless2.fcc.gov/UlsApp/UlsSearch/searchAdvanced.jsp.* Search parameters: Service Group = All, ''Match only the following radio service(s)'', Radio Service = WP, WU; Authorization Type = All; Status = Active. We note that the number of active licenses does not equate to the number of licensees. A licensee can have one or more licenses.

[132] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[133] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

[134] The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

cell tower location, (2) if so, whether to do so as part of their existing live call data reports or as a new and separate reporting process, and (3) if reporting would be helpful, what specific information should providers include and at what frequency should we require them to report it. We also seek information on whether the proposed rules should include requirements for disclosures to the PSAP or other state or local 911 authority in connection with location-based routing.

Our inquiry into the potential reporting obligations that may be necessary to complement our proposed location-based routing rules includes requesting comment on measures the Commission could take to limit the burden of reporting on location-based routing. In particular, we seek information on the extent that the Commission could limit the burden of any reporting requirements by providing increased flexibility for non-nationwide CMRS providers or businesses identified as small by the SBA. We also assess whether we need to adopt requirements and systems for reporting non-compliance with the proposed location-based routing rules. While we tentatively conclude that our existing mechanisms (which would allow public safety entities and members of the public seeking to report non-compliance with the proposed rules to file complaints via the Public Safety and Homeland Security Bureau's Public Safety Support Center or the Commission's Consumer Complaint Center) should be sufficient to address any potential violations, we seek comment on this tentative conclusion.

The record in this proceeding does not currently contain detailed information on the costs required for nationwide and non-nationwide carriers, covered text providers, and other parties to implement location-based routing and wireless IP-based service delivery. Therefore, at this time, the Commission is not in a position to determine whether implementation of location-based routing and IP-based service delivery as proposed in the *NPRM* would result in significant costs for small CMRS and covered text providers, NG911 services providers, or state and local 911 authorities, or require small entities to hire professionals to comply, if our proposals are adopted. To help the Commission more fully evaluate the cost of compliance, we seek additional detailed information on various cost issues implicated by our proposed rules.

Specifically, we have requested information on the costs for nationwide and non-nationwide CMRS providers and covered text providers to implement the required software, hardware, and service upgrades to comply with our proposed rules, and specifically where the required upgrades need to occur on the end-to-end network, *e.g.,* on the device, on specific CMRS providers' network elements, or on specific 911 network elements. We have also requested information on planned or expended costs by CMRS providers that have voluntarily implemented or plan to implement location-based routing to any extent on their networks, and to what extent would non-nationwide providers be able to leverage already incurred costs by nationwide CMRS providers, such as costs to develop and test location-based routing solutions, to reduce their own costs to comply with our proposed rules. Further, we inquire whether the costs to implement location-based routing are significantly different for different network operators, and if so, why, and we seek information on the details, and the amount of these investments, as well as the anticipated cost of testing location-based routing solutions. Additionally, we seek information on what equipment and software CMRS providers would need to test, how the testing would be performed, and what plans CMRS providers have for testing. We expect the information that we receive in response to our requested cost inquiries will to help the Commission identify and the evaluate compliance costs and burdens for small entities that may result from the proposals and inquiries we make in the *NPRM* to implement location-based routing.

E. Steps Taken To Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for such small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.

The proposals in the *NPRM* are intended to be cost effective and minimally burdensome for small and other entities impacted by the rules. There are significant public safety benefits to be achieved from requiring all CMRS and covered text providers to implement location-based routing for 911 calls and texts originating on IP-based networks on a nationwide basis. The record indicates a substantial number of wireless 911 calls are misrouted, which is a significant problem for public safety.[135] The longer it takes for a 911 call or text to be properly routed, the longer it will take for the 911 caller to reach and receive the emergency services they may need. By taking action to require CMRS and covered text providers to implement location-based routing for 911 calls and texts originating on IP-based networks, the Commission can help save lives when individuals in need of emergency services place 911 calls using wireless devices.

In this proceeding the record suggests that in jurisdictions where CMRS providers have implemented location-based routing, PSAPs are experiencing fewer misroutes, fewer transfers, and faster dispatch times.[136] The record also indicates that nationwide implementations of location-based routing may be technically feasible for nationwide carriers, and high accuracy, low latency location information from consumer handsets is generally available to carriers for routing. Moreover, the National Emergency Number Association (NENA) estimates that universal implementation of location-based routing would reduce misrouted wireless calls by 85% from 23 million to 3.45 million per year. Public safety entities and some technology providers urge the Commission to require all CMRS providers to support location-based

[135] *See, e.g.,* Intrado Comments at 3, n.8 (citing a 12.96% average rate of misroutes for a sample set of five million wireless calls in 2018); NENA Comments at 3 (estimating 23 million 911 calls are misrouted annually); Intrado Comments at 4 through 5 (reporting that 20–50% of wireless calls may misroute along PSAP boundaries in Palm Beach County, Florida); Fayetteville Police Department Comments (noting that as many as 30% of wireless 911 calls it receives are misroutes from neighboring jurisdictions); *see also ATIS–0500039* at 4 (estimating a 12% national average rate for sub-optimally routed wireless 911 calls in 2019).

[136] *See* Texas 911 Entities Comments at 2, 4 (showing that average percentage of 911 call transfers for two out of three PSAPs in initial beta sites decreased by roughly 4 to 5% after T-Mobile implemented location-based routing; the remaining PSAP showed a slight increase in transfers of less than 1%); *see also* Intrado Comments at 5 through 6 (rec. July 11, 2022). In a pilot implementation in Palm Beach County, Florida, AT&T's location-based routing solution resulted in a better route for approximately 14% of calls, representing a routing correction for over 1,500 calls. *Id.*

routing.[137] It appears to be technologically feasible for CMRS providers to implement location-based routing for a significant percentage of wireless 911 calls. Below we discuss proposals in the *NPRM* which could minimize any significant economic impact on small entities and the alternatives we considered.

Location-Based Routing Requirements. To reduce potential cost burdens for small and other wireless providers, our location-based routing proposal would apply only to calls and texts originating on IP-based networks (*i.e.,* 4G LTE, 5G, and subsequent generations of IP-based networks). The record indicates that while nationwide CMRS providers are in the process of retiring or have completed the retirement of circuit-switched, time-division multiplex (TDM) 2G and 3G networks, and some non-nationwide providers have announced dates to sunset their 3G networks in 2022, the transition from these networks which are less compatible with location-based routing is not universally complete. In the *NPRM,* we therefore tentatively conclude that requiring location-based routing for 911 calls or texts originating on TDM-based networks would be unduly burdensome, especially for non-nationwide providers who would bear the greatest burden, even if given additional time to comply with such a requirement. Moreover, although we considered requiring location-based routing for all 911 calls, we ultimately proposed to require location-based routing only for 911 calls originating on IP-based networks, *i.e.,* 4G LTE, 5G, and subsequently deployed IP-based networks. The limited scope of this requirement will minimize some burdens and economic impact for small entities, particularly those that are non-nationwide providers.

Our proposed location-based routing rules provide flexibility to small and other entities to route 911 calls or texts based on best available location information, which may include cell tower coordinates or other information, when the location information available at time of routing does not meet either one or both of the requirements for accuracy and timeliness under our rules, rather than adopting a rigid location-based routing requirement. We recognize the continued need for cell-sector based routing, at least as a fallback method, because accurate device location information is not available in all scenarios. Further, our proposed requirement to default to best available location would be consistent with the *ATIS–0700042* standard for location-based routing, which assumes that the fallback for location-based routing should be cell sector routing for cases where no position estimate is available in time to be used for location-based routing or the position estimate lacks requisite accuracy, as well as with current CMRS provider deployments of location-based routing, which default to legacy E911 routing when location does not meet CMRS providers' standards of accuracy and timeliness.[138]

The Commission has also taken steps to minimize the economic impact of our proposed location-based routing requiring requirements on small and other entities, by proposing definitions relevant to the rules, that are consistent with industry standards and existing Commission definitions. For example, we propose to define ''location-based routing'' as ''use of information on a caller's location, including but not limited to device-based location information, to deliver 911 calls and texts to point(s) designated by the authorized local or state entity to receive wireless 911 calls and texts, such as an ESInet or PSAP, or to an appropriate local emergency authority.'' We also propose to define ''device-based location information'' as ''information regarding the location of a device used to call or text 911 generated all or in part from on-device sensors and data sources.'' Having definitions and requirements for location-based routing that are consistent with industry standards and existing Commission rules should lessen the chance that small entities and other providers will be burdened by conflicting requirements. To avoid such a conflict, in the *NPRM,* the Commission seeks comment on whether the proposed definition of ''device-based location information'' would adequately encompass current device-based hybrid (DBH) location technologies currently on the market, as well as possible future location technologies that can determine the location of the calling device. We also propose to interpret the definition of ''device-based location information'' to apply to our existing rule on delivery of 911 text messages, which includes that term.

We have also proposed baseline requirements involving the accuracy and timeliness of location information used for location-based routing which is consistent with industry standards. CMRS and covered text providers would use location-based routing only if the location information is available to the provider network at the time the call or text is routed and the information identifies the caller's horizontal location with a radius of 165 meters at a confidence level of at least 90%. These metrics are consistent with AT&T's implementation of location-based routing. In addition, our proposed confidence metric is consistent with ATIS' recommendation that uncertainty values for location-based routing ''be standardized to a 90% confidence for effective call handling.'' To minimize any significant economic impact on small entities and other impacted providers, when location information does not meet the baseline accuracy and timeliness requirements, CMRS and covered text providers would be required to route based on best available location information, which may include latitude/longitude coordinates of the cell tower, as mentioned in the section above.

Compliance Timelines. We provide flexibility in the proposed compliance timelines for implementation of the requirements that should reduce the economic burden for small entities. First, we propose different implementation deadlines for nationwide and non-nationwide CMRS providers to route all 911 voice calls originating on their IP-based networks using location-based routing, when available location information meets requirements for accuracy and timeliness. Nationwide providers would be required to implement the requirements no later than six months after the effective date of the final rules adopting location-based routing. Non-nationwide providers, which would include a substantial number of small entities, would be required to implement the requirements no later than eighteen months after the effective date of the final rules adopting location-based routing.

Next, when available location information meets requirements for accuracy and timeliness, we propose to require covered text providers to route all 911 texts originating on their IP-based networks using location-based routing, no later than eighteen months after the effective date of the final rules adopting location-based routing. We minimize any significant economic impact on small entities since this requirement is limited to operators of

[137] In a separate docket, APCO also called for a rulemaking to require carriers to implement location-based routing in comments on a petition from NASNA regarding NG911. APCO Comments, PS Docket No. 21–479, 4 (rec. Jan. 19, 2022).

[138] AT&T Comments at 4 (stating that ''[w]hen location was not available, the process defaults to using sector-based routing so that calls may be completed without excessive delay''); T-Mobile Comments at 4 (stating that ''T-Mobile's policy is to route a 911 call based on the cell-sector location if a routable, non-Phase I location estimate is not generated quickly enough'').

IP-based networks when certain requirements are met. In other words, small entities would not be required to comply with this requirement if they do not operate an IP-based network, or if the location information available on the IP-based network does not meet either one or both of the requirements for timeliness and accuracy, in which case, small entities may use the best available location information for routing.

Finally, for the requirements we propose to help ensure that jurisdictions transitioning to NG911 networks can realize the benefits of location-based routing in an efficient and cost-effective manner, we also propose different implementation deadlines for nationwide and non-nationwide CMRS providers and covered text providers. We propose to require nationwide CMRS providers and covered text providers to deliver IP-formatted 911 calls, texts, and associated routing information to the point(s) designated by state and local 911 authorities no later than six months from the effective date of the final rule or within six months of a valid request, whichever is later. For non-nationwide CMRS providers, we propose a deadline of no later than twelve months from the effective date of the final rule or within 12 months of a valid request, whichever is later. We also propose that local and state entities may enter into agreements with CMRS providers and covered text providers that establish an alternate timeframe for meeting these requirements. Regardless of whether a small entity is a nationwide or non-nationwide CMRS provider or covered text provider, the flexibility to negotiate an alternative timeframe which meets their business and financial needs is a significant step by the Commission that could minimize the economic impact for small entities.

Costs of Implementation. In the previous section, we discussed the absence of detailed information in the record on the costs for nationwide and non-nationwide CMRS and covered texts providers to implement the required software, hardware, and service upgrades to comply with our proposed rules. Having data on the costs and economic impact of the proposals to require implementation of located-based routing proposals and other matters discussed in the *NPRM* will allow the Commission to better evaluate options and alternatives to minimize the economic impact on small entities. Based on our request for specific and detailed cost implementation information, and for information on the extent that the Commission could limit the burden of any reporting requirements by providing increased flexibility for non-nationwide CMRS or covered text providers or businesses identified as small by the SBA, we expect to more fully consider the economic impact on small entities following our review of comments filed in response to the *NPRM,* and this IRFA. The Commission's evaluation of this information will shape the final alternatives it considers to minimize any significant economic impact that may occur on small entities, the final conclusions it reaches, and any final rules it promulgates in this proceeding.

F. Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

Ordering Clauses

Accordingly, *it is ordered,* pursuant to Sections 1, 2, 4(i), 10, 201, 214, 222, 251(e), 301, 302, 303, 307, 309, 316, and 332, of the Communications Act of 1934, as amended, 47 U.S.C. 151, 152(a), 154(i), 160, 201, 214, 222, 251(e), 301, 302, 303, 307, 309, 316, 332; the Wireless Communications and Public Safety Act of 1999, Public Law 106–81, 47 U.S.C. 615 note, 615, 615a, 615b; and Section 106 of the Twenty-First Century Communications and Video Accessibility Act of 2010, Public Law 111–260, 47 U.S.C. 615c, that this notice of proposed rulemaking *is adopted.*

It is further ordered that, pursuant to applicable procedures set forth in §§ 1.415 and 1.419 of the Commission's Rules, 47 CFR 1.415, 1.419, interested parties may file comments on the notice of proposed rulemaking on or before 30 days after publication in the **Federal Register**, and reply comments on or before 60 days after publication in the **Federal Register**.

It is further ordered that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, *shall send* a copy of this notice of proposed rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR Part 9

Communications, Communications common carriers, Communications equipment, internet, Radio, Telecommunications, Telephone.

Federal Communications Commission.

Marlene Dortch,

Secretary, Office of the Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR part 9 as follows:

PART 9—911 REQUIREMENTS

■ 1. The authority citation for part 9 continues to read as follows:

Authority: 47 U.S.C. 151–154, 152(a), 155(c), 157, 160, 201, 202, 208, 210, 214, 218, 219, 222, 225, 251(e), 255, 301, 302, 303, 307, 308, 309, 310, 316, 319, 332, 403, 405, 605, 610, 615, 615 note, 615a, 615b, 615c, 615a–1, 616, 620, 621, 623, 623 note, 721, and 1471, and Section 902 of Title IX, Division FF, Pub. L. 116–260, 134 Stat. 1182, unless otherwise noted.

■ 2. Amend § 9.3 by adding the definitions of ''Device-Based Location Information'' and ''Location-Based Routing'' to read as follows:

§ 9.3 Definitions.

* * * * *

Device-Based Location Information. Information regarding the location of a device used to call or text 911 generated all or in part from on-device sensors and data sources.

* * * * *

Location-Based Routing. The use of information on the location of a device, including but not limited to device-based location information, to deliver 911 calls and texts to point(s) designated by the authorized local or state entity to receive wireless 911 calls and texts, such as an Emergency Services Internet Protocol Network (ESInet) or PSAP, or to an appropriate local emergency authority.

* * * * *

■ 3. Amend § 9.10 by adding paragraph (s) to read as follows:

§ 9.10 911 Service.

* * * * *

(s) *Location-Based Routing Requirements.*

(1) By [six months from the effective date of this paragraph (s)(1)], nationwide CMRS providers shall deploy a technology that supports location-based routing on their networks nationwide. At that time, nationwide CMRS providers shall use location-based routing to route all wireless 911 calls originating on their Internet Protocol-based networks, provided that the information used for routing meets the requirements of paragraph (s)(4) of this section.

(2) By [eighteen months from the effective date of this paragraph (s)(2)],

non-nationwide CMRS providers shall deploy a technology that supports location-based routing on their networks throughout their service areas. At that time, non-nationwide CMRS providers shall use location-based routing to route all wireless 911 calls originating on their Internet Protocol-based networks, provided that the information used for routing meets the requirements of paragraph (s)(4) of this section.

(3) By [eighteen months from the effective date of this paragraph (s)(3)], covered text providers as defined in paragraph (q)(1) of this section shall deploy a technology that supports location-based routing. At that time, covered text providers shall use location-based routing to route all 911 texts originating on their Internet Protocol-based networks, provided that the information used for routing meets the requirements of paragraph (s)(4) of this section.

(4) Notwithstanding requirements for confidence and uncertainty described in paragraph (j) of this section, CMRS providers and covered text providers shall use location information that meets the following specifications for purposes of location-based routing under this paragraph (s):

(i) The information reports the horizontal location uncertainty level of the device within 165 meters at a confidence level of at least 90%; and

(ii) The information is available to the provider network at the time of routing the call or text.

(5) When information on a device's location does not meet either one or both the requirements in paragraph (s)(4) of this section or is otherwise unavailable in time for routing, CMRS providers and covered text providers shall route the 911 call or text based on the best available location information, which may include the latitude/longitude of the cell tower.

(6) By [six months from the effective date of this paragraph (s)(6)], or within 6 months of a valid request as defined in paragraph (s)(7) of this section for Internet Protocol-based service by the local or state entity that has the authority and responsibility to designate the point(s) to receive wireless 911 calls or texts, whichever is later:

(i) CMRS providers and covered text providers shall deliver calls and texts, including associated location information, in the requested Internet Protocol-based format to an Emergency Services Internet Protocol Network (ESInet) or other designated point(s).

(ii) Non-nationwide CMRS providers have an additional 6 months to comply with the requirements of this paragraph (s)(6).

(iii) Local and state entities may enter into agreements with CMRS providers and covered text providers that establish an alternate timeframe for meeting the requirements of paragraphs (i) or (ii) of this paragraph (s)(6). The CMRS provider or covered text provider must notify the Commission of the dates and terms of the alternate timeframe within 30 days of the parties' agreement.

(7) Valid request means that:

(i) The requesting local or state entity is, and certifies that it is, technically ready to receive 911 calls and/or texts in the Internet Protocol-based format requested;

(ii) The requesting local or state entity has been specifically authorized to accept 911 calls and/or texts in the Internet Protocol-based format requested; and

(iii) The requesting local or state entity has provided notification to the CMRS provider or covered text provider that it meets the requirements in paragraphs (s)(7)(i) and (ii) of this section. Registration by the requesting local or state entity in a database made available by the Commission in accordance with requirements established in connection therewith, or any other written notification reasonably acceptable to the CMRS provider or covered text provider, shall constitute sufficient notification for purposes of this paragraph (s)(7).

(8) Paragraphs (s)(6) and (s)(7) of this section contain information collection and recordkeeping requirements. Compliance will not be required until after approval by the Office of Management and Budget. The Commission will publish a document in the **Federal Register** announcing that compliance date and revising this paragraph accordingly.

[FR Doc. 2023–00519 Filed 1–13–23; 8:45 am]

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FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 25

[IB Docket Nos. 22–411, 22–271; FCC 22–95; FR ID 121634]

Expediting Initial Processing of Satellite and Earth Station Applications; Space Innovation

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Federal Communications Commission (Commission) seeks comment on changes to our rules, policies, or practices to facilitate the acceptance for filing of satellite and earth station applications. We propose to revise a procedural rule to formally allow consideration of satellite applications and petitions that request waiver of the Table of Frequency Allocations to operate in a frequency band without an international allocation. We also seek comment on typical processing timeframes for satellite applications. This document will help Commission processing stay apace with the unprecedented number of innovative satellite applications in the new space age.

DATES: Comments are due March 3, 2023. Reply comments are due April 3, 2023.

ADDRESSES: You may submit comments, identified by IB Docket Nos. 22–411 and 22–271, by any of the following methods:

- *FCC Website: https://apps.fcc.gov/ecfs.* Follow the instructions for submitting comments.
- *People With Disabilities:* Contact the FCC to request reasonable accommodations (accessible format documents, sign language interpreters, CART, etc.) by email: *FCC504@fcc.gov* or phone: 202–418–0530 or TTY: 202–418–0432.

For detailed instructions for submitting comments and additional information on the rulemaking process, see the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: Clay DeCell, 202–418–0803.

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's notice of proposed rulemaking, FCC 22–95, adopted December 21, 2022, and released December 22, 2022. The full text is available online at *https://docs.fcc.gov/public/attachments/FCC-22-95A1.pdf.* The document is also available for inspection and copying during business hours in the FCC Reference Center, 45 L Street NE, Washington, DC 20554. To request materials in accessible formats for people with disabilities, send an email to *FCC504@fcc.gov* or call the Consumer & Governmental Affairs Bureau at 202–418–0530 (voice), 202–418–0432 (TTY).

Comment Filing Requirements

Interested parties may file comments and reply comments on or before the dates indicated in the **DATES** section above. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS).

- *Electronic Filers.* Comments may be filed electronically using the internet by