

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Location-Based Routing
For Wireless 911 Calls

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PS Docket No. 18-64

REPLY COMMENTS OF AT&T

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AT&T Services, Inc., on behalf of itself and its affiliates (collectively, “AT&T”), submits these reply comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) *Notice of Inquiry* exploring how the delays that arise from misrouting of wireless 911 calls can be avoided, possibly resulting in faster response times, via the implementation of location-based routing solutions.¹

I. INTRODUCTION AND SUMMARY

AT&T shares the Commission’s concerns about the misrouting² of wireless 911 calls. Response times are critical to saving lives, and every second counts in an emergency. Delays that arise from the misrouting of wireless 911 calls can have devastating consequences, but any delays that result in callers hanging up and re-dialing 911 are equally bad. AT&T is committed

¹ *Location-Based Routing for Wireless 911 Calls*, Notice of Inquiry, PS Docket No. 18-64, FCC 18-32 (rel. Mar. 23, 2018) (“*NOP*”).

² In this instance, we are referring to routing 911 calls at the cell sector level versus the caller’s actual location. Wireless cell sectors must route 911 calls to a single PSAP, but sector coverage does not always align with PSAP boundaries. Thus, a wireless 911 call can be placed from a sector that covers two PSAPs, with a risk that the call is routed to the PSAP that is unable to provide emergency response to the caller. Although such a call is not misrouted from the network perspective, it is not routed to the PSAP serving the boundary in which the caller is located.

to ensuring that wireless 911 calls are promptly and properly routed to an appropriate Public Safety Answering Point (“PSAP”) so that help can quickly be on its way.

The *Notice of Inquiry* seeks comment on the frequency and effect of 911 call misrouting, and whether recent advances in location-based routing technologies can reduce the number of misrouted 911 calls.³ In considering these issues, the Commission should tailor any remedies to the source of the misrouting problem—areas where cell sectors traverse PSAP jurisdictional boundaries. In such areas, the Commission should focus in the first instance on encouraging PSAPs and service providers to utilize solutions that exist today,⁴ without resorting to new technology or regulatory requirements. The agency should also reject proposed solutions that would introduce too much delay in 911 call routing. The trade-off between increased delay and improved call routing is not warranted because the majority of 911 calls are not affected by misrouting and additional delay may result in users hanging up and redialing 911.

The Commission’s evaluation of the misrouting problem and potential solutions should also account for location-based routing options in a Next Generation 911 (“NG911”) environment. NG911 systems afford PSAPs the discretion to leverage alternative capabilities to mitigate misrouting. Further, making location-based routing part of the NG911 transition

³ *NOI* at ¶ 3.

⁴ In the *Indoor Location Accuracy Order*, the Commission correctly observed that “accurate and reliable delivery of E911 location information depends on the willingness and readiness of PSAPs and CMRS providers to work together,” and AT&T submits that the same cooperative approach is appropriate to resolve call-routing issues. *Wireless E911 Location Accuracy Requirements*, Fourth Report & Order, 30 FCC Rcd. 1259, ¶ 142 (2015) (“*Indoor Location Accuracy Order*”).

provides PSAPs an incentive to transition to NG911, which Commissioners Carr and O’Rielly have identified as a paramount priority.⁵

Although location-based routing solutions hold potential to reduce wireless 911 call misroutes, regulatory requirements are premature. Instead, the Commission should encourage further study of potential handset-based solutions, which send location information directly to the routing element. Given their superior speed, such solutions are preferable to network-based solutions. Furthermore, the Commission should allow for intelligent designs that would allow location-based routing in areas/instances where it is required rather than mandating a specific solution. As it sits today, this would likely occur within the Mobile Positioning Center (“MPC”) or Gateway Mobile Location Center (“GMLC”), and in NG911, in the Emergency Services Routing Proxy (“ESRP”).

Moreover, location information should continue to be delivered from the carrier network to the PSAP in a standards-based method. This allows handset manufacturers and operating system providers to develop enhanced solutions, while still operating seamlessly with the 911 network.

II. ADDRESSING MISROUTING OF 911 CALLS IS AN IMPORTANT PRIORITY FOR AT&T.

AT&T is committed to ensuring that wireless 911 calls are routed promptly to the appropriate PSAP, as emergency call response times are critical to saving lives.⁶ When dialing an emergency call, callers expect prompt connection to an appropriate PSAP. To this end,

⁵ See *NOI* at 21 (Statement of Commissioner Michael O’Rielly); *id.* at 22 (Statement of Commissioner Brendan Carr).

⁶ See, e.g., *Indoor Location Accuracy Order* ¶ 162 (“We conclude that the location accuracy rules we adopt today will improve emergency response times, which, in turn, will improve patient outcomes, and save lives.”).

AT&T has long been engaged in efforts to improve location accuracy for wireless callers. For example, AT&T, the public safety community, telecommunications companies, solution vendors, and the Commission have collaborated on improving 911 service through the Communications Security, Reliability, and Interoperability Council (“CSRIC”). On the CSRIC, AT&T examined the routing of wireless 911 calls and identified and reviewed several location-based routing methods.⁷ AT&T has also scrutinized its network needs and evaluated how to best address the issue of misrouting, including consideration of the costs, benefits, and feasibility of incorporating any new location-based routing solution into AT&T’s network. To further understand the benefits and limitations of new location-based technologies, AT&T has also commissioned trials with West Safety Services and LaaSser Critical Communications.⁸ AT&T has undertaken these efforts in recognition of the fact that response times to 911 calls are critical to saving lives, and applauds the Commission for seeking input on this important issue.

III. THE COMMISSION SHOULD CONSIDER THE NATURE OF THE MISROUTING PROBLEM AND EMERGING NG911 SYSTEMS IN DEVELOPING SOLUTIONS.

AT&T encourages the FCC to pursue targeted, common-sense solutions based on varying jurisdictional needs and consider the impact of emerging NG911 networks on the misrouting problem. Routing emergency calls both quickly and to the appropriate PSAP is vitally

⁷ See CSRIC V, Working Group 1, Evolving 911 Services, Final Report-Task 2: Location-based Routing (Sept. 2016), https://transition.fcc.gov/bureaus/pshs/advisory/csric5/WG1_Task1_Final_Report_0316.docx (“CSRIC V LBR Report”). Specifically, CSRIC V examined possible solutions based on call holding, interim fix, registered or provisioned civic address, device-based hybrid location, and emerging wireless 911 location accuracy technologies.

⁸ The record indicates that many wireless industry stakeholders have begun testing device-based hybrid methods for call routing. See Comments of West Safety Services, Inc., PS Docket No. 18-64, at 7-8 (filed May 7, 2018) (“West Safety Comments”); Comments of RapidSOS, Inc., PS Docket No. 18-64, at 2-3 (filed May 7, 2018); Comments of LaaSser Critical Communications, PS Docket No. 18-64, at 4-5 (filed May 8, 2018) (“LaasSer Comments”).

important. However, misrouting does not uniformly affect all 911 calls.⁹ The areas where misrouting presents the largest concern are readily identifiable by carriers and PSAPs: areas with a higher wireless 911 call volume and where PSAP jurisdictions overlap within a cell sector.¹⁰ The Commission should focus on targeting solutions to these known problem areas before considering network-wide changes that have the potential to continue or even exacerbate the current call routing delays. Moreover, the Commission should consider addressing potential misrouting solutions in an NG911 environment as doing so may create incentives for PSAPs to transition to NG911.

The Commission should first consider how to reduce the risk of misroutes and the impact of misrouted calls by encouraging practical solutions under the current cell sector-based routing framework. Although it would be impractical to require CMRS providers to consider PSAP jurisdictional boundaries in network system design,¹¹ there are solutions available under the existing routing framework that would advance the Commission's goal of reducing the number of emergency calls that must be transferred from one PSAP to another due to misrouting. First, in areas of known PSAP jurisdictional overlap, PSAPs should have protocols in place to identify

⁹ See Comments of the Texas 9-1-1 Entities, PS Docket No. 18-64, at 5-6 (filed May 7, 2018) (“[T]he sector-by-sector percentages and numbers varied considerably, with approximately 70% of cell sectors indicating no misroutes and approximately 10% of sectors having greater than 50% misroutes, with certain enclave areas or cities surrounded by another area of city often being materially impacted by misroutes.”). In addition, the record reflects variance in the percentage of total calls that are misrouted. The *NOI* cites studies estimating that approximately 20% of all wireless calls are misrouted, while other reports indicate the number is more likely in the low-to-mid teens. See *NOI* at 2, n.2, 4; LaaSer Comments, at 2.

¹⁰ West Safety Comments at 5.

¹¹ See Comments of The Boulder Regional Emergency Telephone Service Authority, PS Docket No. 18-64, at 8-9 (filed May 7, 2018).

the PSAP with jurisdiction and quickly execute a call transfer.¹² Second, mapping information should be transferred when the PSAP relays the caller's location information to the PSAP with jurisdiction.¹³ Third, the Commission should encourage further sharing of information by PSAPs with the wireless carriers whose cell sectors are susceptible to misrouting.¹⁴ Through this information sharing, the pre-agreed cell-sector-to-PSAP arrangements may be adjusted, if necessary, which could reduce the number of misroutes. These simple techniques can be implemented immediately, have minimal costs, and will provide significant benefits to wireless 911 callers. In fact, PSAPs should incorporate these techniques into processes to review the cell-site data at regular intervals to ensure optimal routing as wireless networks and PSAP boundaries continue to change.

The Commission also should consider whether location-based routing solutions would be better suited for, and more easily implemented in, an NG911 environment. Many commenters note that the rollout of NG911 could help reduce the instances of misrouting.¹⁵ But deploying NG911 alone will not solve the root of the misrouting problem. The generation of accurate location data is the most critical step for connecting a caller with the appropriate PSAP in an

¹² See Comments of CTIA, PS Docket No. 18-64, at 7 (filed May 7, 2018) ("CTIA Comments").

¹³ *Id.*

¹⁴ *Id.* at 8.

¹⁵ See, e.g., Comments of the National Emergency Number Association, PS Docket No. 18-64, at 3 (filed May 7, 2018) ("Implementation of NG9-1-1 will lessen delays from misroutes as interconnected NG9-1-1 networks support automatic call transfer within the NG9-1-1 system service territory and among neighboring NG9-1-1 systems within their service territories."); Comments of T-Mobile USA, Inc., PS Docket No. 18-64, at 2 (filed May 7, 2018) ("T-Mobile Comments") ("[T]he continued deployment of NG911 will obviate many of the issues addressed in the [CSRIC V LBR Report] and the Commission's Notice of Inquiry on location-based routing.").

emergency. The first step of an NG911 call is obtaining a location with sufficient accuracy to select the correct PSAP for routing. Indeed, NG911 networks and Emergency Services IP Networks (“ESInets”) are “not designed to assist with the generation of location information for routing 9-1-1 calls” but are rather “consumers of location data.”¹⁶

While the transition to NG911 alone will not solve the misrouting problem, it does provide certain advantages and the Commission should consider how any new location-based routing solutions may be implemented in an NG911 environment. On an NG911 platform, a PSAP would have the discretion to use either location-based routing or cell sector-based routing for any given call.¹⁷ Having the option to select from the best available location data will give PSAPs an incentive to deploy NG911.¹⁸ This is also consistent with the preferences of Commissioners Carr and O’Rielly who have expressed concern about evaluating location-based routing without also considering NG911.¹⁹

IV. LOCATION BASED ROUTING HOLDS POTENTIAL FOR REDUCING THE NUMBER OF MISROUTED CALLS, BUT REGULATORY REQUIREMENTS ARE PREMATURE.

Several location-based routing technologies have potential for reducing instances of misrouted calls, but it would be premature to adopt new regulatory requirements. AT&T agrees with the Commission that “it is [] important to examine the feasibility of various solutions, including whether and how they could be implemented, and at what cost.”²⁰ Specifically, the

¹⁶ West Safety Comments at 17.

¹⁷ Comments of Verizon, PS Docket No. 18-64, at 3 (filed May 7, 2018) (“Verizon Comments”).

¹⁸ *Id.*

¹⁹ See CTIA Comments at 6; *NOI* at 21 (Statement of Commissioner Michael O’Rielly); *id.* at 22 (Statement of Commissioner Brendan Carr).

²⁰ *NOI* at 13.

Commission should weigh the potential benefits of location-based routing solutions against the potential safety impact if such technologies require additional time to route calls.

In evaluating routing solutions, the Commission should understand how emergency call routing works today, and the constraints within which any new technology will have to operate. Today, wireless providers route 911 calls based on the cell site and sector where the call originated, pursuant to a pre-agreed cell-sector-to-PSAP arrangement. Wireless 911 calls “typically take 10-12 seconds from when the caller presses send to when the 911 telecommunicator answers the call.”²¹ The voice portion of the call is routed by the Mobile Switching Center (“MSC”) “no later than 6 seconds from when the caller presses ‘send’”²² and the caller begins to hear ringing. As cell-based routing is based on a simple database look-up, any additional delay waiting for a calculated location (device-based location) has the potential to extend the timing of the caller receiving ringing. And each additional second it takes to complete route location information is an additional second 911 callers must wait to connect with a 911 call dispatcher.

Such delays may also cause consumers to hang up and re-dial 911—adding further delay and taxing 911 system resources. While callers wait for connection to the PSAP, they expect to hear ringing, which typically occurs 5-7 seconds after dialing. This feedback gives callers reassurance that their call is progressing to the PSAP. But if this feedback is delayed, callers may believe the call is not going through, and hang up and re-dial. This practice consumes network and PSAP resources and could ultimately delay emergency response.²³

²¹ West Safety Comments at 5.

²² *CSRIC V LBR Report* at 8.

²³ Of course, these are just the delays with the technical components of the 911 network that may be expected while operating in a vacuum. The Commission should not take lightly the

The timing of every component within the wireless 911 call flow is critical for emergency calls, as changes to any component of the call flow could result in call connection delays. Indeed, the optimal location-based routing solution will be one that disrupts call flows the least. With that in mind, the Commission should also carefully factor in the following principles before rushing to adopt any new routing requirements.

Call Holding. AT&T cautions against pursuing call “holding” solutions (*i.e.*, waiting to route the 911 call until the caller’s location has been established using location-based routing) without appropriate time limits. Commenters agree that call holding durations should be limited.²⁴ Waiting for location information before routing a call will unnecessarily add time to the period between when a caller dials and when the correct PSAP answers. Delayed routing may encourage callers to hang up and dial again, which will only impede emergency response times. This is particularly true if the caller must wait before they even hear ringing. Call holding should be permitted, if ever, only when in areas of above-average misroutes and only in the network—never in the handset. Call holding in the handset would unnecessarily delay all calls, when misrouting does not impact the majority of 911 calls. Further, if call holding is permitted, it should be limited to no more than two seconds.

Handset-Based Location Solutions. Handset-based location solutions have a slight timing advantage over network-based solutions. Network-initiated location technologies are not

implications of *additional* delays that occur frequently under real-world conditions. For example, while the NENA guidelines specify that 90% of 911 calls should be answered within 10 seconds, the unfortunate reality is that PSAPs frequently struggle to achieve this guideline, whether due to spikes in call-volumes, the lack of available call-takers, or other reasons. Such additional delays will inevitably increase the number of 911 callers that hang up and re-dial.

²⁴ See West Safety Comments at 6 (recommending limiting call holding to a 1-3 second delay); T-Mobile Comments at 9 (calling for further study on how much tolerance callers have for delays before they will hang up and re-dial).

activated until the call reaches the MPC/GMLC, which can take 1-2 seconds²⁵ from the time the caller hits send. And since we recommend no longer than a 2 second delay for location-based routing, this makes network-based location solutions impractical for location based routing.

Consistent Delivery of Information. To increase the utility, accuracy, and security of improved location information, such information must be transmitted to PSAPs in a format that is compatible both with existing infrastructure and NG911 equipment. Handset-initiated location information should be transmitted to the E911 or NG911 network using standards-based protocols. This practice will provide significant advantages by “allowing the OEMs and handset OS providers to innovate and improve their individual solutions while still delivering location results over a standards-based interface with the 9-1-1 network.”²⁶ Moreover, third party applications that deliver information to the routing element (*i.e.*, apps that enable handsets to deliver location directly) would interfere with the carrier responsibility for routing 911 calls. Rather, wireless carriers should maintain primary control and responsibility for uniform location quality and simplicity.²⁷

Network Implementation. Another important principle for consideration is the impact of implementation of any new solution onto existing networks. 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.

²⁵ Based on measurements in AT&T’s network.

²⁶ West Safety Comments at 15.

²⁷ *See also id.* at 15-16.

V. ALTHOUGH DEVICE-BASED HYBRID TECHNOLOGY MAY REDUCE THE NUMBER OF MISROUTED CALLS, THE COMMISSION SHOULD MANAGE EXPECTATIONS.

Recognizing that device-based routing solutions will face many of the same challenges as Phase II location services, the Commission should proceed cautiously before pursuing regulatory mandates. Location-based routing has the potential to reduce the number of misrouted emergency calls. Studies evaluating location-based routing solutions relying on device-based hybrid location have shown promise. West Safety recently conducted a study to evaluate the location capabilities of current and future location technologies using Google's Android Emergency Location Service and LaaSer/Samsung's advanced 911 technology.²⁸ Significantly, the LaaSer/Samsung test showed that a majority of location information received at MPC/GMLC can be used for routing without adding any delay to the overall call timeline.²⁹ However, as noted by West Safety, this was most likely the result of Samsung as an Original Equipment Manufacturer having complete control of the solution³⁰ and highlights the need for the a fallback to cell-sector based routing for the remaining calls where location is not available. And of note, these solutions would not work for devices without a data plan such as feature phones, non-service initialized handsets, and calls from devices without a data roaming capability.

If the Commission proceeds with a rulemaking on location-based routing, it should articulate clearly achievable objectives and manage expectations. Even the most promising of location-based technologies—device-based hybrid location methods—have limits. For example,

²⁸ *Id.* at 7-8, 12-15 (describing Google ELS and LaaSer/Samsung technology and test results).

²⁹ *Id.* at 14.

³⁰ *Id.*

device-based hybrid location methods require that handsets deliver timely and accurate location information.³¹ Yet many devices lack these capabilities. Device-based hybrid location methods may not work as well where handsets are restricted by poor or no access to GPS and Wi-Fi.³²

Location-based routing implementation should supplement, not replace, cell sector-based routing. For the time being, carriers will need to use cell sector-based routing in certain areas as either a primary or fallback 911 call routing method.³³ Indeed, cell-sector based routing, “while not perfect, has worked consistently for decades, is cost effective, secure, manageable, universal, backward compatible, handset technology independent, and compared to even recent claims, is still faster than any other approach to routing 9-1-1 calls.”³⁴ The Commission should therefore carefully evaluate the challenges and limitations surrounding location-based routing technologies, and not rush to technology mandates where innovative solutions continue to evolve.

VI. CONCLUSION

The FCC should not prescribe any particular location-based technology requirements at this time. Although early studies show promise, the costs and benefits of any solution must be carefully evaluated, particularly if any such solution would delay 911 calls. Instead, the Commission should support the use of existing best practices and encourage common sense reforms—such as increased collaboration—in areas with overlapping jurisdictions to improve and maintain the reliability of cell sector-based routing.

Respectfully submitted,

³¹ See Verizon Comments at 3.

³² See *id.* at 5.

³³ See *id.* at 2-3.

³⁴ Comments of Comtech Telecommunications Corp., PS Docket No. 18-64, at 9 (filed May 7, 2018).

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