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

In the Matter of	)	
	)	
Wireless E911 Location Accuracy Requirements	)	PS Docket No. 07-114
	)	

PETITION FOR WAIVER OF GENERAL COMMUNICATION, INC.

General Communication, Inc. ("GCI") hereby petitions the Federal Communications Commission ("FCC") for a waiver of the first Phase II location accuracy benchmark for network-based technologies, as required by 47 C.F.R. § 20.18(h)(1). Specifically, GCI asks that the Commission waive its Phase II location accuracy benchmark schedule for network-based solutions until the sooner of two years or such time as handsets that are compliant with A-GPS control plane protocols sufficiently penetrate GCI's market to achieve the applicable accuracy benchmarks through blended accuracy reporting.

This waiver will enable GCI and its location technology vendor to continue their work in implementing a feasible hybrid A-GPS + network-based location accuracy solution. As discussed below, GCI has experienced difficulty improving its location accuracy due not only to the unique topographical and population distribution challenges in Alaska, but more importantly because it has experienced extreme difficulties in getting location fixes from handsets that are A-GPS class marked. GCI believes that many of these handsets are A-GPS capable only for Secure User Plane Location (SUPL, a common protocol used for many commercial location based services), but not control plane protocols for emergency call location capability. The requested waiver would allow GCI and its vendor to continue upgrading and recalibrating its location

engine as well as to find, purchase, test, and deploy A-GPS handsets that support emergency call location accuracy.

I. INTRODUCTION AND SUMMARY

A. Procedural Background

GCI has made the Commission aware of the particular difficulties presented both by geography and by population distribution in Alaska on the record in this docket. In 2008, GCI recommended that the Commission exclude from the interim and final location accuracy benchmarks a limited number of areas, specifically counties (or, as in Alaska, boroughs) where fewer than three cell sites are deployed as well as any community or part of a community where at least three cell sites are not viewable to a handset.[1] GCI advocated for a further exception for Tier III carriers in Alaska, permitting such carriers "to measure compliance with the interim and final benchmarks only for those areas within a four-mile radius circle that includes at least five cell sites, where the test location within such circle has a usable signal level greater than -104 dBm to all cell sites within the circle."[2] GCI noted that "in the absence of these tailored adjustments, it is unlikely that the additional cell sites necessary to meet the AT&T Proposal's accelerated benchmarks could be installed, as the financials cannot support such additional investment in such high cost, low population areas."[3]

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1 Letter from Tina Pidgeon, Vice-President, Federal Regulatory Affairs, and Brian M. Lowinger, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2 (filed Dec. 9, 2008).

2 Letter from Tina Pidgeon, Vice-President, Federal Regulatory Affairs, and Brian M. Lowinger, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2 (filed Dec. 10, 2008); *Wireless E911 Location Accuracy Requirements*, Second Report and Order, 25 FCC Rcd. 18909, at ¶ 41 (2010) ("*Second Report and Order*").

3 Letter from Tina Pidgeon, Vice-President, Federal Regulatory Affairs, and Brian M. Lowinger, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2 (filed Dec. 9, 2008).

On September 23, 2010, the Commission issued its *Second Report and Order* on wireless location accuracy requirements. That order established that location accuracy compliance would be required on the county or PSAP level.[4] As recommended by GCI and others, the Commission allowed carriers complying with network-based technologies to exclude those counties or portions of counties where triangulation is not possible, either because fewer than three cell sites are deployed or because at least three cell sites are not viewable to a handset.[5] However, the Commission declined to allow Tier III carriers in Alaska more specific adjustments to the Phase II requirements.

The *Second Report and Order* further established that carriers could comply with the network-based location accuracy benchmarks by blending accuracy data from both a network-based solution and a handset-based solution.[6] Such blending will, in fact, be necessary to meet future benchmarks, particularly in low-density service areas that are affected by local topography.[7] Network-based carriers facing these challenges – including GCI – will not be able

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4 *Id.* ¶ 16.

5 *Id.* ¶ 45; *see also* Letter from Tina Pidgeon, Vice-President, Federal Regulatory Affairs, and Brian M. Lowinger, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2 (filed Dec. 9, 2008).

6 Second Report and Order, ¶ 47.

7 *See, e.g.*, Comments of T-Mobile USA, Inc., PS Docket No. 07-114, WC Docket No. 05-196, at 5 (filed Jan. 19, 2011); Comments of T-Mobile USA, Inc., and the Rural Cellular Association on the 911 Location Accuracy Remand, PS Docket No. 07-114, at 3 (filed Oct. 6, 2008); Letter from Brian Fontes, CEO, NENA; Robert Gurss, Director, Legal & Gov't Affairs, APCO; and Robert W. Quinn, Jr., SVP Federal Regulatory, AT&T, to the Hon. Kevin Martin, Chairman, Federal Communications Commission (filed Aug. 25, 2008); Ex Parte, AT&T Services, Inc., PS Docket No. 07-114, CC Docket No. 94-102 at 1 (filed Sept. 5, 2008).

to meet the E911 accuracy requirements at the county level without deploying a hybrid approach that utilizes A-GPS handsets.[8]

B. Legal Requirements

Section 1.925(b)(3)(ii) of the Commission's Rules establish that a request for waiver may be granted when the "unique or unusual factual circumstances" at issue would render application of the rule "inequitable, unduly burdensome, or contrary to the public interest, or [when] the applicant has no reasonable alternative." The Commission further articulated its requirements for waivers in the E911 context in its *Fourth Memorandum Opinion and Order* on E911.[9] In that Order, the Commission noted that it expects E911 waiver requests to be "specific, focused and limited in scope, and with a clear path to full compliance."[10] The Commission also required that requesting carriers "should undertake concrete steps necessary to come as close as possible to full compliance . . . and should document their efforts aimed at compliance in support of any waiver requests."[11]

The Commission declined in the *Second Report and Order* to "adopt any changes to the Commission's existing waiver criteria" and extend specific waiver criteria for Tier III carriers.[12] It noted that "carriers facing unique circumstances may seek waiver relief based on certain

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[8] *See* Letter from Brian Fontes, CEO, NENA; Robert Gurss, Director, Legal & Gov't Affairs, APCO; and Robert W. Quinn, Jr., SVP Federal Regulatory, AT&T, to the Hon. Kevin Martin, Chairman, Federal Communications Commission (filed Aug. 25, 2008); Ex Parte, AT&T Services, Inc., PS Docket No. 07-114, CC Docket No. 94-102 at 1 (filed Sept. 5, 2008).

[9] Revision Of The Commission's Rules To Ensure Compatibility With Enhanced 911 Emergency Calling Systems, Fourth Memorandum Opinion and Order,15 FCC Rcd. 17442, 17457-58, ¶¶42-45 (2000) ("Fourth Memorandum Opinion and Order").

[10] *Id.* at 17458, ¶ 44.

[11] *Id.*

[12] Second Report and Order, ¶ 56.

factors"[13] and that it would continue to address particular circumstances on a case-by-case basis.[14] The Commission specifically noted that it would consider factors such as financial considerations[15] as well as a carrier's particular circumstances and the potential impact to public safety[16] in a waiver request.

II. GCI HAS INVESTED HEAVILY IN PHASE II COMPLIANCE EFFORTS OVER THE LAST THREE YEARS.

GCI's attempts to reach the E911 Phase II handset-based location accuracy benchmarks warrant grant of a waiver because of the "unique and unusual factual circumstances" of providing CMRS service in Alaska. GCI has worked diligently over the last several years to implement the necessary technologies to make a Phase II compliant location accuracy solution possible, and it has documented those efforts. Unfortunately, GCI's will not achieve the 67-percent benchmark for 60 percent of counties and 70 percent of POPs by the first benchmark deadline.

A. Alaska Presents Particular Challenges for Location Accuracy

GCI initiated facilities-based service in Alaska beginning in 2008. At that time, it committed to providing a network-based Phase II location accuracy solution for its GSM facilities.[17] GCI selected Polaris Wireless ("Polaris") as its vendor for the location engine, and selected TeleCommunications Systems ("TCS") to provide call routing services and PSAP coordination.[18] GCI has maintained regular, often weekly, communication with its vendors and

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[13] *Second Report and Order*, 25 FCC Rcd. at 18913, ¶ 12.

[14] *Id.* ¶ 56.

[15] *Id.* at ¶ 16

[16] *Id.* at ¶ 27.

[17] Phase II Implementation Report (filed Sept. 26, 2008).

[18] Id.

with PSAP officials to ensure that all parties communicate and are aware of each other's interface needs and concerns.[19] GCI estimates that, by the end of 2011, it will have spent more than [redacted], not to mention thousands labor hours of personnel time, implementing its Phase II location accuracy solution.

As a Tier III carrier in Alaska, GCI is intimately familiar with the many challenges of providing Phase II E911 service. Alaska is organized into boroughs that comprise vast, sparsely populated (or unpopulated) areas, difficult terrain, line-of-sight barriers, and public property ownership restrictions. Indeed, because of these characteristics, there are entire boroughs in Alaska where, though GSM service is offered, there are not even the three deployed cell sites necessary for triangulation. Indeed, most population centers are sufficiently served via one (or in some cases two) cell sites, and the distances between population centers in the same borough are so great that multiple site deployments within a single borough will not achieve triangulation. In other boroughs, three or more cell sites might be deployed, but are so far from other cell sites that triangulation is still impossible. The Commission's *Second Report and Order* in this docket recognized that carriers like GCI providing service in rural areas would face challenges in such areas, and thus permitted the exclusion of those counties or portions of counties (or, in the case of Alaska, boroughs or portions of boroughs) where triangulation is impossible.[20]

But Phase II location accuracy is challenged even in areas of Alaska where "triangulation" is possible, largely because of the inherent disadvantages of triangulation methods. While "urban" by Alaska standards, even the State's larger communities are not

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[19] *Id.*

[20] *Second Report and Order*, ¶ 45. For instance, GCI noted in its July exclusion report that it excluded the entirety of the Sitka borough as well as portions of the remaining five boroughs in which it has received requests for Phase II service from PSAPs because triangulation is not possible in those areas. GCI Exclusion Report (July 28, 2011).

densely populated compared with the rest of the country. For example, Anchorage–Alaska's most populous city–contains only 171 persons per square mile, by far the lowest population density of the nation's 275 cities with 100,000 or more residents.[21] By comparison, Anchorage is a *third* less dense than the next densest city, Norman, OK (620 persons per square mile). It is *one-tenth* less dense than Frisco, Texas (1,893 persons per square mile) and *one-hundredth* less dense than, San Francisco (17,404 persons per square mile). The low relative population and large coverage areas (even accounting for the uncovered mountainous and unpopulated areas within the Municipality of Anchorage) do not result in the "urban" population densities sufficient to support the number of cell sites that will produce the required accuracy for network-based solutions. There are fewer cell sites in Alaska's cities than in metropolitan areas elsewhere. Accordingly, it is difficult to meet network-based location accuracy standards even in the more populated communities.

GCI highlighted these issues to the Commission in its requests for specific adjustments for Tier III carriers in Alaska when it asked that the Commission only require such carriers to meet the benchmarks in areas within a four-mile radius circle including at least five cell sites, where the test location within such circle has a usable signal level greater than -104 dBm to all cell sites within the circle.[22] The Commission, however, declined to adopt GCI's

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[21] Population density statistics are as counted in the 2010 U.S. Census, *available at* http://en.wikipedia.org/wiki/List_of_U.S._cities_by_population#cite_note-PopEstBigCities-0, with further information available through the American FactFinder website *at* http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

[22] Letter from Tina Pidgeon, Vice-President, Federal Regulatory Affairs, and Brian M. Lowinger, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2 (filed Dec. 10, 2008).

recommendation. Instead, it suggested that carriers experiencing difficulty meeting the Phase II benchmarks even after the allowed exclusions could seek a waiver.[23]

In the absence of specific adjustments to the rules for Tier III carriers in Alaska, GCI has therefore been working to implement a hybrid A-GPS + network-based solution in order to meet the first benchmark. However, the realities of providing Phase II location accuracy in Alaska – as GCI warned the Commission in 2008 – mean that GCI is unable to do so.

B. GCI's Implementation of A-GPS Has Been Complicated by Vendor and Handset Issues.

GCI retained Polaris as its location accuracy vendor in June 2008, and separately began researching the availability of A-GPS capable handsets at approximately the same time. Polaris's software compares radio parameter values of a user's handset with values in a pre-established and calibrated database, and uses a proprietary algorithm to determine location. Polaris initially deployed its software in September 2008, and conducted initial drive testing. Polaris's predicted location accuracy using just its software solution ranged from [redacted] meters to [redacted] meters in the five Alaska boroughs with Phase II coverage.

In 2009, GCI committed to be a test bed for Polaris as they deployed their first hybrid A-GPS WLS solution, anticipating that the addition of A-GPS capabilities would improve that accuracy to allow it to meet the first Phase II benchmarks. Use of A-GPS capable handsets on a network using Polaris' hybrid solution should allow the software to further pinpoint location, improving accuracy of the caller's location. Unfortunately, despite ongoing efforts, that has not yet turned out to be the case.

GCI has continued to work closely with Polaris to re-measure network performance and optimize the location engine algorithm as new cell sites are added. GCI has regularly updated its

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[23] Second Report and Order, ¶ 48.

location engine software with new releases from Polaris. Polaris has recently undertaken efforts to improve performance and by accommodating certain network changes, including down tilts and power changes, recalibrated the GCI's network by updating and retuning its location algorithms to maximize the network based accuracy results. GCI worked expeditiously with Polaris to implement its just released and latest location engine software version before the end of 2011. This improved the results, but failed to meet the necessary benchmark.

Additionally, GCI has developed and implemented a custom software upgrade to take advantage of the serving sector/cell signal strength measurement (leveraging a unique Ericsson switch-based feature that allows for the correction of downlink power control in the handset's measurement of the serving sector signal strength, allowing it to also be used in the location algorithm), and has added A-GPS capabilities to its location engine to take advantage of the increased accuracy promised by A-GPS capable handsets. Despite these efforts, however, location accuracy has not improved sufficiently to achieve the FCC's first interim accuracy benchmark in any of the Alaska Phase 2 markets.

As many carriers have suggested and as the Commission's rules recognize, network-based solutions alone will not produce the required location accuracy without sufficient penetration of A-GPS capable handsets. But, like many Tier III carriers, GCI has had difficulty obtaining A-GPS capable handsets in sufficient quantities or at reasonable prices. Handset availability is a known issue for many Tier III and rural carriers, one that GCI and others have warned the Commission will create problems for Phase II compliance.[24]

Furthermore, as GCI continues to roll out 3G and recently 4G service, it is attempting to increase its lineup of high end smartphones, most of which state that they come equipped with

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[24] Letter from Christopher Nierman, Director, Federal Regulatory Affairs, GCI, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 2-3 (filed July 29, 2010).

A-GPS capabilities. However, as GCI began testing these handsets, it discovered that, in most cases, while the handsets were class-marked as A-GPS capable, they were capable only for Secure User Plane Location (SUPL, a common protocol used for many commercial location based services), but not control plane protocols for emergency call location, as specified by 3GPP standard specification, 3GPP TS 44.031, Location Services (LCS); Mobile Station (MS) - Serving Mobile Location Centre (SMLC) Radio Resource LCS Protocol (RRLP). As a result, GCI has seen an extremely low A-GPS fix yield (percentage of A-GPS class marked phones that provide GPS fixes), which has failed to produce the expected increase in location accuracy.[25]

The result of these challenges is that, as of January 13, 2012, GCI cannot meet the first Phase II location accuracy benchmark in the non-excluded areas of any borough where a PSAP has requested Phase II service. Current results are listed below:

Borough	Calls with <100m error
Anchorage	[redacted]
Fairbanks	[redacted]
Kenai	[redacted]
Juneau	[redacted]
Matanuska Susitna Valley	[redacted]

[25] GCI has also explored means to improve location accuracy testing without having to consistently bother the various PSAPs with repeated tests. It approached TCS, its emergency call routing vendor, about adding enhancements to a TCS tool that GCI currently uses to make high volume 911 call tests without sending the test calls to the PSAP. The enhancements would allow GCI's use of the tool to match certain capabilities that already exist for CDMA 2000 customers. TCS, however, has informed GCI that substantial custom modifications would need to be made to the service, requiring a financial investment nearly equal to the initial cost of the tool, and estimating that development would take up to two years.

III. GCI'S CLEAR PATH TO COMPLIANCE REQUIRES ADDITIONAL TIME TO IMPLEMENT.

GCI is continuing to work closely with Polaris as well as investigating other options for improving location accuracy in its Phase II areas in Alaska. As GCI continues to deploy more macro network sites, this will further improve accuracy of its network-based solution, as increased cell site density a key ingredient to accuracy improvement. GCI is also investigating the technical and economic viability and potential improvement of 3G/4G network-based solutions.

Ultimately, however, it is unlikely that GCI will find a solution that does not rely heavily on A-GPS handsets that are capable of utilizing not only user plane location protocols, but also the control plane location protocols necessary to for emergency location accuracy. GCI is actively attempting to identify, purchase, and test such handsets. Estimating an A-GPS fix yield of 90 %, GCI believes that it will need to attain handset penetrations between 40% and 60% to meet the first benchmarks with blended results. With the roll out of 3G and 4G networks, and more capable smartphones, GCI believes that it can achieve such market penetrations within two years.

IV. CONCLUSION

GCI has been working diligently to implement Phase II location accuracy in Alaska since 2008. Those efforts have included working closely for the last three years with its location accuracy vendor, Polaris, as well as with its call routing vendor, TCS, to implement and deploy a network-based location engine. GCI has also been incorporating A-GPS capabilities throughout its network since April 2009, though those efforts have been hampered by handset availability and especially by "A-GPS" handsets that use a user plane protocol, but not the control plane protocol necessary to determine emergency call location. Despite GCI's heavy investment of

time and money in pursuit of the first Phase II benchmarks, it will be unable to comply by the January18, 2012, deadline. In view of the foregoing, GCI respectfully requests a waiver of the first Phase II location accuracy benchmark for network-based solutions until the sooner of two years or such time as handsets that are compliant with A-GPS 3GPP radio resource location services protocol ("RRLP") sufficiently penetrate GCI's market to achieve the applicable accuracy benchmarks through blended accuracy reporting.

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