Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Connect America Fund—Alaska Plan	)	WC Docket No. 16-271
	)	
	)	
	)	
	)	
	)	
	)	

ORDER AND REQUEST FOR COMMENT

Adopted: May 5, 2022 **Released: May 5, 2022**

Comments Due By: [[14 days after publication in the Federal Register]]
Reply Comments Due By: [[21 days after publication in the Federal Register]]

By the Chief, Wireless Telecommunications Bureau:

TABLE OF CONTENTS

I. INTRODUCTION

1. In the Order portion of this document, the Wireless Telecommunications Bureau (Bureau) adopts a drive-test model and parameters for the drive tests that are required of certain mobile providers participating in the Alaska Plan.[1] The Bureau will use these drive-test data to determine whether mobile providers that receive more than $5 million in annual support for the deployment of mobile voice and broadband service in remote areas of Alaska have met their performance commitments. In the Request for Comment portion of this document, we seek comment on a proposal to require mobile-provider participants subject to the drive-test requirement to submit new drive-test data consistent with the drive-test model and parameters if they fail to meet a buildout milestone and later seek to cure a compliance gap.

II. BACKGROUND

2. Unique circumstances in Alaska make deploying communications infrastructure particularly challenging in that state.[2] In the 2016 *Alaska Plan Order*, the Commission adopted an Alaska-specific, 10-year universal service plan to address these unique circumstances.[3] The *Alaska Plan Order* froze mobile-wireless service-provider participants' preexisting support at December 2014 levels (frozen support)[4] and sought to have those providers commit to expand Fourth-Generation, Long-Term Evolution (4G LTE) service at speeds of at least 10/1 Mbps in eligible areas, subject to certain exceptions (such as where middle-mile infrastructure capability is limited).[5] In areas with limited middle-mile infrastructure, providers were allowed to make a lesser commitment until better middle-mile infrastructure became available.[6]

3. *Provider Commitments*. Eight mobile providers chose to participate in the Alaska Plan and submitted for Bureau approval performance plans in which they committed to provide mobile voice

[1] *See Connect America Fund et al*., WC Docket No. 16-271, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 10139, 10173, para. 103 (2016) (*Alaska Plan Order*) (requiring providers that receive more than $5 million in annual support to conduct drive tests).

[2] For example, the average census block in Alaska (14.7 square miles) is more than 50 times the size of the average census block in the other 49 states and the District of Columbia (0.28 square miles), based on 2010 census data. *See Connect America Fund et al.*, WC Docket No. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17788, para. 347 & n.587 (2011), *aff'd sub nom. In re: FCC 11-161*, 753 F.3d 1015 (10th Cir. 2014).

[3] *See Alaska Plan Order*, 31 FCC Rcd at 10140, para. 1.

[4] 47 CFR § 54.317(d); *Alaska Plan Order*, 31 FCC Rcd at 10164, para. 75.

[5] *Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86, 102 (creating additional obligations for those mobile providers that did not commit to providing 10/1 Mbps 4G LTE and are dependent on satellite backhaul). The ongoing payments of frozen support amounts can only be used to provide mobile voice and broadband service in census blocks in remote Alaska where, as of December 31, 2014, less than 85% of the population was covered by 4G LTE service of providers that were either unsubsidized or not eligible for frozen support in Alaska. *Id.* at 10167, para. 87.

[6] *Id.* at 10167, 10172-73, paras. 86 (requiring 4G LTE unless middle-mile infrastructure was constrained), 102 (requiring submission of new performance plans when new middle-mile infrastructure becomes commercially available and where the provider did not commit to at least 10/1 Mbps 4G LTE).

and broadband services to delineated populations in remote eligible areas of Alaska.[7] Providers, as part of their performance plans, were required to identify both the last-mile mobile technology (e.g., 3G, 4G LTE) that they would use to serve delineated populations and the type of middle-mile connectivity (e.g., fiber, satellite) on which they would rely to provide mobile services.[8] Where Alaska Plan participants could provide fiber-based 4G LTE,[9] their speed commitments in those areas were greater than or equal to speed commitments with other technology combinations, consistent with the deployment standard set forth in the *Alaska Plan Order* (4G LTE at speeds of at least 10/1 Mbps).[10] For those areas where the provider had to provide service over a performance-limiting satellite backhaul connection, the Bureau permitted providers to commit to previous-generation last-mile technologies and slower speeds.[11]

4. Each participating mobile provider committed to meet buildout requirements at the end of year five (ending December 31, 2021) and year 10 (ending December 31, 2026) of the Alaska Plan and to certify that it met the obligations contained in the performance plan at each of these buildout milestones.[12] The Commission stated that it would rely on participating providers' FCC Form 477 data—which report *inter alia* mobile wireless broadband coverage by technology and minimum advertised or expected speed[13]—in determining whether the providers' five-year and 10-year milestones have been met.[14] The Commission delegated authority to the Bureau to require additional information necessary to establish clear standards for determining whether providers have met their five and 10-year commitments.[15]

5. *Drive Tests*.[16] Mobile participants that receive more than $5 million annually in Alaska Plan support must accompany their milestone certifications with drive-test data.[17] The drive-test data must show mobile transmissions to and from the network that meet or exceed the minimum speeds set out

[7] *See id.* at 10171, para. 97; *Wireless Telecommunications Bureau Approves Performance Plans of the Eight Wireless Providers That Elected to Participate in the Alaska Plan*, WC Docket No. 16-271, Public Notice, 31 FCC Rcd 13317, 13320-23, Appx. A (WTB 2016) (*Wireless Commitments Public Notice*) (approving the eight participants' initial performance plans).

[8] *See, e.g.*, *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85.

[9] *See, e.g.*, *Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (adopting speed commitments across all providers where a delineated population served by fiber-based 4G LTE had speed commitments higher than or equal to the providers' other speed commitments).

[10] *Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86, 102; *see also Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (requiring equal to or higher speed commitments from the higher technology tiers, on a provider by provider basis, in order of fiber-based 4G LTE, microwave-based 4G LTE, satellite-based 4G LTE, 3G, and 2G).

[11] *See Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (providing the original performance plans of the eight Alaska Plan mobile participants and showing that populations with fiber-based 4G LTE generally had higher speed commitments than other combinations of middle-mile and last-mile technologies); *see also Alaska Plan Order*, 31 FCC Rcd at 10167, para. 86.

[12] 47 CFR § 54.321; *Alaska Plan Order*, 31 FCC Rcd at 10166-67, 10173, paras. 85, 103; *Wireless Commitments Public Notice*, 31 FCC Rcd at 13318 (stating that the disbursement of Alaska Plan support would start on January 1, 2017, making the five-year and ten-year milestones December 31, 2021, and December 31, 2026, respectively).

[13] *See, e.g.*, FCC, FCC Form 477, *Local Telephone and Broadband Reporting, Instructions for Filings as of December 31, 2019 and Beyond* at 25, https://us-fcc.app.box.com/v/Form477Instructions.

[14] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[15] *Id.* at 10166-67, para. 85.

[16] In this Order and Request for Comment, we generally use the term "drive test" and "speed test" interchangeably, unless otherwise specified.

[17] 47 CFR § 54.321; *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

in the approved performance plans in the areas where support was received.[18] The *Alaska Plan Order* specifies that these participants "may demonstrate coverage of an area with a statistically significant number of tests in the vicinity of residences being covered."[19] Given the unique terrain and lack of road networks in remote Alaska, providers may conduct drive tests by means other than automobiles (such as snow-mobiles or other vehicles appropriate to local conditions).[20] Two of the eight mobile participants—GCI Communications Corp. (GCI) and Copper Valley Wireless (CVW)—exceed the $5 million annual support threshold, and accordingly, they must provide drive-test data supporting the speed certifications consistent with their performance plan commitments.[21]

6. *Alaska Drive-Test Parameters and Model*. In the *Alaska Drive Test Public Notice*, the Bureau proposed a model for conducting the drive testing (Alaska Drive-Test Model), which included the drive-test information to be submitted and the format in which it should be submitted.[22] The parameters proposed in the *Notice* included, for example, the submission of latitude and longitude coordinates to identify the location of the test, a timestamp for the time the test was taken, the type of device and related software used for the test, last-mile technology tested, and recorded download and upload speeds.[23]

7. The proposed Alaska Drive-Test Model was designed to ensure that the service providers required to conduct drive testing would obtain a "statistically significant number of tests in the vicinity of residences being covered."[24] The proposed Alaska Drive-Test Model uses stratified random sampling to

[18] 47 CFR § 54.321(a) ("For Alaska Plan participants receiving more than $5 million annually in support, this certification shall be accompanied by data received or used from drive tests analyzing network coverage for mobile service covering the population for which support was received and showing mobile transmissions to and from the carrier's network meeting or exceeding the minimum expected download and upload speeds delineated in the approved performance plan."); *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[19] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103. The *Alaska Plan Order* did not provide a methodology for determining how many people the Commission would consider covered with mobile service in census blocks that are partially covered according to FCC Form 477 mobile coverage data. To address this, the Bureau adopted the Alaska Population-Distribution Model, which is a "methodology for estimating the number of Alaskans who receive mobile service within census blocks in remote areas of Alaska." *Connect America Fund—Alaska Plan*, WC Docket No. 16-271, Order, 35 FCC Rcd 10373, 10373, para. 1 (WTB 2020) (*Alaska Population Distribution Order*). The model integrated feedback from the Alaska Plan's mobile provider participants, including from GCI and CVW. *Alaska Population Distribution Order*, 35 FCC Rcd at 10375-76, paras. 6-8; *see also* Alaska Telecom Association (ATA) Comments at 1, 3 (filed Apr. 7, 2020) (filing on behalf of its members); Letter from Christine O'Connor, Executive Director, ATA, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271, at 1, Attach. (filed Feb. 8, 2019) (ATA Feb. 8, 2019 *Ex Parte* Letter) (suggesting edits to the proposed Alaska population-distribution methodology).

[20] *See Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[21] *See id.* at 10173, para. 103; *see also Wireless Telecommunications Bureau Approves GCI's Revised Performance Plan Pursuant to the Alaska Plan Order*, WC Docket No. 16-271, Public Notice, 35 FCC Rcd 9539, 9539-41, Appx. (WTB 2020) (*GCI's Second Revised Performance Plan*) (accepting GCI's current performance plan); *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A (providing CVW's current performance plan).

[22] *Wireless Telecommunications Bureau Seeks Comment on Drive Test Parameters and Model for Alaska Plan Participants*, WC Docket No. 16-271, Public Notice, 36 FCC Rcd 11279, 11283-89, Appx. A (WTB 2021) (*Alaska Drive Test Public Notice* or *Notice*). While the Bureau drew on prior Commission guidance in other contexts, we note that the parameters in Appendix A are to be used for the distinct purpose of assessing Alaska Plan performance commitments and are without prejudice to decisions to use different or additional parameters in any other Commission proceedings. *See, e.g.*, *Establishing the Digital Opportunity Data Collection*, Order, DA 22-241, at 2, para. 2 (WTB/OEA/OET Mar. 9, 2022) (*BDC Mobile Requirements Order*) (adopting parameters that must be collected for on-the-ground speed test data in the Broadband Data Collection proceeding). The Broadband Data Collection was formerly known as the Digital Opportunity Data Collection, or DODC.

[23] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11283-89, Appx. A.

[24] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103; *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11280.

determine test locations within a grid system based on the service provider's reported coverage area.[25] Under the proposal, the Commission would begin with the populated areas contained in the performance plans for each type of technology and backhaul[26] and then overlay a one-square kilometer grid system to create a frame around the covered populated area corresponding with the performance commitments.[27] Staff would then stratify the frame into sets of grids determined by statistical formulae based on theoretical population of the grid cells (e.g., lowest population grid cells would be in the first stratum; highest population grid cells would be in the highest-numbered stratum) and would select a random sample of grid cells for testing from each stratum within the frame.[28] The Bureau proposed that, within each grid cell, a service provider would conduct a minimum of 20 tests, consisting of download and upload components, no less than 50% of which would be conducted from a vehicle while in-motion.[29] To be considered valid, each test would have to be conducted between the hours of 6:00 a.m. and 10:00 p.m. within the selected grid cell, and the test data would have to report all relevant parameters.[30] Staff would construct a confidence interval for the drive-test results that would be used to verify that a provider's commitments have been met or to determine the percentage by which the provider has failed to meet its commitments.[31]

8. The Bureau sought comment on the parameters and proposed Alaska Drive-Test Model and on any alternatives that it should consider.[32] GCI filed comments, and both GCI and CVW made *ex parte* presentations to staff about the proposed Alaska Drive-Test Model.[33] No other party filed comments or made such presentations. Based on concerns that were expressed about the initial

[25] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III. Stratified random sampling is a process whereby a population is subdivided into nonoverlapping groupings, or strata, and a simple random sample is taken from each stratum. *See* William G. Cochran, Sampling Techniques ch. 5 (3d ed. 1977).

[26] *Alaska Population Distribution Order*, 35 FCC Rcd at 10376, para. 9 ("To assess a participating provider's satisfaction of its service commitments at the 5 and 10-year performance benchmarks, we will use 2010 block-level population census data and the provider's Form 477 data, in conjunction with the Alaska Population-Distribution Model, to estimate the number of Alaskans in remote parts of the state who are covered by the provider's network (using the technology identified in the commitment).").

[27] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290, Appx. B, Sec. II.

[28] *Id.* at 11292, 11293, Appx. B, Secs. III, IV.

[29] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11293, Appx. B, Sec. V. The *Alaska Plan Order* further specifies that, as with Tribal Mobility Fund Phase I, these drive tests may be conducted by means other than in automobiles on roads due to the unique terrain and lack of road networks in remote areas of Alaska. *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[30] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11293, Appx. B, Sec. V.

[31] *Id.* at 11295, Appx. B, Sec. VII.

[32] *Id.* at 11280.

[33] *See, e.g.*, GCI Comments; Letter from Jonathan Reeves, on behalf of CVW, to Marlene Dortch, Secretary, FCC, WC Docket No. 16-271 (filed July 21, 2021) (CVW July 21, 2021 *Ex Parte* Letter); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Aug. 5, 2021) (GCI Aug. 5, 2021 *Ex Parte* Letter); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Aug. 27, 2021) (GCI Aug. 27, 2021 *Ex Parte* Letter); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Oct. 5, 2021) (GCI Oct. 5, 2021 *Ex Parte* Letter); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Oct. 21, 2021) (GCI Oct. 21, 2021 *Ex Parte* Letter); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Nov. 22, 2021); Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271 (filed Dec. 17, 2021) (GCI Dec. 17, 2021 *Ex Parte* Letter).

deadline,[34] the Bureau extended the drive-test data-submission deadline, moving it from March 1, 2022 to September 30, 2022.[35]

III. DISCUSSION

9. We adopt the proposed parameters and the proposed Alaska Drive-Test Model with the modifications specified below. We will use data derived from these parameters, combined with FCC Form 477 coverage data and complementary middle-mile data, to verify that covered service providers have met their commitments. The submission of the drive test data that we discuss in this Order shall include a certification by a corporate officer of the mobile-provider participant of the data's accuracy, consistent with the obligations of 47 CFR § 54.321(a).[36]

A. Drive-Test Parameters

10. We adopt a modified version of the drive-test parameters proposed in the *Alaska Drive Test Public Notice* (attached as Appendix A). These parameters specify the categories of data to be collected as well as the data structure and format in which the data must be reported. In addition to the parameters the Bureau proposed, the Bureau adopts other changes to the parameters; most notably, we have altered the parameters in Appendix A with respect to the data to be collected for 2G/Voice.[37] In the *Notice*, the Bureau proposed that, for 2G, a data rate of 22.8 kbps or higher for download and upload tests would be appropriate because that should be a minimally sufficient speed to provide a serviceable voice call.[38] GCI expressed concern that speed-test data would not accurately represent the ability to place a

[34] *See* GCI Comments at 2; GCI Aug. 5, 2021 *Ex Parte* Letter (expressing concern about the timing of the tests); GCI Aug. 27, 2021 *Ex Parte* Letter; GCI Oct. 5, 2021 *Ex Parte* Letter at 1-3.

[35] *Connect America Fund—Alaska Plan*, WC Docket No. 16-271, Order, DA 21-1394, at 1, para. 1 (WTB Nov. 8, 2021) (*Alaska Drive Test Extension Order*). The Commission will continue to monitor the situation and will remain flexible where warranted.

[36] When submitting the drive test data, a corporate officer of the mobile-provider participant must submit this certification: "I certify that I am an officer of the reporting carrier; my responsibilities include ensuring the accuracy of certifications which are required to be reported pursuant to 47 CFR § 54.321(a). The reporting carrier certifies that the data received or used from drive tests analyzing network coverage for mobile service pursuant to 47 CFR § 54.321(a) are complete, accurate, and free from misrepresentation." Originally, the drive test data were to be submitted as part of the certification required in 47 CFR § 54.321(a) that the providers receiving more than $5 million annually from the Alaska Plan have met their commitments. Because we granted an extension allowing the providers to submit the drive test data after that certification date, we require renewed certification language for submission of the drive test data. *Alaska Drive Test Extension Order* at 1, para. 1; *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85. The Commission staff will provide details to GCI and CVW on how to submit the drive test data.

[37] *Compare infra* Appendix A *with Alaska Drive Test Public Notice*, 36 FCC Rcd at 11283, Appx. A. We have made these changes because they will better aid our understanding of the drive test data. We also note that these alterations will keep the Alaska Plan data specifications closely aligned with the data specifications for mobile speed tests adopted in other contexts, such as the recently adopted specifications in the Broadband Data Collection proceeding. *See BDC Mobile Requirements Order*, Appx. A; *see also Alaska Drive Test Public Notice*, 36 FCC Rcd at 11280 & n.11 (stating that the proposed Alaska Plan parameters "draw on prior Commission guidance" and were designed to be "consistent with the requirements the Commission has established for mobile speed test data collected in other contexts"). Furthermore, we anticipate that using similar data specifications in the Alaska Plan proceeding will make the process administratively easier and will also simplify any work that the carriers may have to do to conform their data. *See BDC Mobile Requirements Order*, Appx. A. No one commented on the mobile speed test data specifications.

[38] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11294, Appx. B, Sec. VI, n.15.

voice call over a 2G network, particularly for non-GSM standards such as CDMA or UMTS.[39] GCI proposed that, instead, providers demonstrate voice coverage by placing voice calls between five and 30 seconds in duration to a telephone number established for test calls.[40]

11. We find GCI's suggestion to be a reasonable approach, and therefore we will require it instead of the approach we proposed in the *Notice*. Because GCI is the only provider subject to drive testing that has a 2G commitment and GCI's particular 2G requirement is voice only, we agree with GCI that a test assessing the availability of voice service would be appropriate.[41] Accordingly, GCI must use voice calls to demonstrate its "Voice/2G" coverage in areas that it is required to drive test,[42] and Appendix A now includes parameters for voice-only testing.[43] This change from the original proposal enables GCI to enter information that records a successful call completion using 2G technology,[44] regardless of data rate, consistent with the voice-only commitment. The new fields for GCI's voice-only testing are the voice originating, voice terminating, rxlev, and rxqual fields. The voice originating field is a field for providing information for outbound calling and the voice terminating field is for receiving inbound calls for the testing. The rxlev and rxqual fields represent data elements that are necessary to determine the signal quality and strength and corresponding quality of the network for voice calls.

12. We also adopt other modifications to the proposed data specifications for mobile speed tests. As set forth in more detail in Appendix A, we modify the proposed data specifications to add new drive-test parameters within existing categories—specifically, device Type Allocation Code (TAC), warmup duration, warmup bytes transferred, spectrum band, and success flag.[45] Most of the parameters that we altered—device TAC, warmup duration, warmup bytes transferred, and spectrum band—resulted from the Bureau's experience constructing the Broadband Data Collection but will also aid understanding of the data derived from the Alaska Plan drive tests. The device TAC provides the type of device used in the testing and helps us better understand the results, particularly if results indicate a problem with a network that may be attributable to the type of device.[46] The warmup bytes and duration are the bits recorded during the testing ramp-up time, and collecting ramp-up bits as a separate field is required to ensure we are accurately measuring the network's maximum transmission data rate.[47] The spectrum band

[39] GCI Comments at 10 (noting that a data rate of at least 22.8 kbps is the only test for GSM technology, "but some of GCI's 2G areas actually employ CDMA or UMTS technology, as shown on GCI's Form 477 submissions"); GCI Dec. 17, 2021 *Ex Parte* Letter.

[40] GCI Comments at 10-11.

[41] GCI labeled its 2G commitment as "Voice/2G" and committed to provide this service at speeds of "<.2 Mbps." *GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.

[42] CVW did not have any voice-only commitments, so this provision would only apply to GCI. *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A (providing CVW's current performance plan); *GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx. (accepting GCI's current performance plan).

[43] *See infra* Appendix A.

[44] GCI made voice-only commitments where it provides 2G GSM and CDMA. *See GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx. (providing "Voice/2G" commitments with speeds of <.2 Mbps).

[45] *Compare infra* Appendix A *with Alaska Drive Test Public Notice*, 36 FCC Rcd at 11283, Appx. A.

[46] *BDC Mobile Requirements Order* at 7, para. 13.

[47] *See id.* at 9-10, para. 17 & nn.63-64 (sharing Ookla's concern that "averaging the number of bits received over the entire duration of a throughput test may negatively affect the accuracy of any calculation, as that may not exclude an internet connection's known and expected 'ramp-up time'" and noting that Ookla defined "ramp-up time" as "the time period in which a congestion control algorithm—such as Transmission Control Protocol ('TCP') slow start—gradually increases the amount of data transmitted over a connection until the algorithm finds the network's maximum carrying capacity."). The Bureau defines ramp-up bits as "the initial bits received during the initial warm-up time" and will apply to the following formula to remove the negative impact of ramp-up bits: "[(total bits received – ramp up bits) divided by (total test time – ramp up time)]." *Id*. at 10, para. 17 & n.64.

records the spectrum band or bands utilized during the drive test, which can affect wireless performance.[48] Finally, because the drive tests need to exceed the minimum commitments in the mobile-provider participants' performance plans, the success flag field was added to record where the data indicate that the tests were successful to that end (or not).[49]

B. Alaska Drive-Test Model

13. We adopt the proposed Alaska Drive-Test Model (attached as Appendix B), with limited clarifications and modifications. The Alaska Drive-Test Model uses a stratified random sample of a frame.[50] A frame consists of the complete set of units within a commitment eligible to be sampled, which for the purposes of the Alaska Plan drive testing are one-square kilometer grids in which a provider has at least 100,000 square meters of covered populated area.[51] The construction of this frame is a multi-part process. First, we will create a set of "eligible populated areas."[52] Census blocks eligible for frozen-support funding would be included,[53] and these census blocks would be merged with the populated areas of the Alaska Population-Distribution Model.[54] Second, staff will merge the FCC Form 477 reported coverage areas (for which a provider committed to deploy and that are subject to testing) with the eligible populated areas to create a set of "covered populated areas."[55] Third, Commission staff will overlay a grid of 1 km x 1 km squares onto the covered populated areas.[56] Lastly, any grid cell that contains fewer than 100,000 square meters of covered populated area, or 10% of the grid cell, will be excluded from the frame.[57]

14. The frame is divided into subsets of similar characteristics, called strata.[58] This methodology allows fewer grid cells to be selected for testing while producing a statistically equivalent level of accuracy as sampling the entire frame, thus reducing the burden of testing.[59] We will use the cumulative square root of the frequency (CSRF) method[60] to define the breaks between strata based on a scale along the cumulated square root of the frequency of grid cells belonging to equal intervals of the

---

[48] *BDC Mobile Requirements Order* at 10, para. 18.

[49] *See, e.g.*, GCI Comments at 11 (noting "call completion success/failure" should be collected and reported).

[50] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290-92, Appx. B, Sec. II.

[51] *See id.* at 11290-91, Appx. B, Sec. II.

[52] *See id.* at 11290, Appx. B, Sec. II.

[53] *See id.* (citing *Alaska Population Distribution Order*, 35 FCC Rcd at 10378, para. 15 and Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271, Attach. (filed Nov. 29, 2016)).

[54] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290, Appx. B, Sec. II (citing *Alaska Population Distribution Order*, 35 FCC Rcd at 10373).

[55] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290, Appx. B, Sec. II.

[56] *See id.* at 11290, Appx. B, Sec. II. Staff will use this particular type of grid because census blocks are not of uniform geographic size, which could require a different number of speed tests for each block, and, in turn, could increase the testing burden on providers. Grids of smaller sizes and shapes are less likely to provide easily accessible areas for testing, given the nature of roads and population distribution in remote Alaska, and grids of larger sizes and shapes would provide more heterogeneous wireless performance, which would require more cumbersome rules for actually conducting drive testing to ensure geographic diversity of the sample within each grid.

[57] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11291, Appx. B, Sec. II.

[58] *See id.* at 11292, Appx. B, Sec. III.

[59] *See id.*

[60] *See infra* Appendix B, Sec. III.

stratification variable.[61] Using the CSRF method will help to ensure that grid cells with low population are confined to a single stratum within each frame.[62] The number of strata for a frame depends on the number of grid cells in that frame and the distribution of the populations within the frame.[63] Two to eight strata are likely to be necessary per frame.[64]

1. Commitment-Based Frames

15. Frames are based on providers' commitments. In particular, Commission staff will create separate frames where a provider committed to different speeds based on different middle-mile or last-mile technologies in its Bureau-approved performance plan.[65] CVW is subject to one frame because it committed to 10/3 Mbps 4G LTE in all of the areas where it receives Alaska Plan support.[66] GCI is subject to five frames, as GCI committed to five different speeds based on various combinations of middle-mile and last-mile technologies:[67]

- Fiber-based 4G LTE at a minimum speed of 10/1 Mbps;
- Microwave-based 4G LTE at a minimum speed of 2/.8 Mbps;
- Satellite-based 4G LTE at a minimum speed of 1/.256 Mbps;
- 3G or better at a minimum speed of .2/.05 Mbps; and
- Voice/2G.

16. GCI argues that, instead of basing frames on middle-mile and last-mile technologies, we should assign frames based only on the speeds a provider reports via its FCC Form 477 filings.[68] GCI

---

[61] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III.

[62] *But see* GCI Comments at 11-14 (expressing concern that the drive test model would require GCI to test a substantial number of grid cells that are very sparsely populated).

[63] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III.

[64] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III. GCI argues that this approach to testing is overly complicated and may not fairly represent its compliance with its commitments, and it would like to "have the option to submit drive tests for its entire Alaska Plan coverage area." GCI Comments at 18-19. GCI argues that the proposed sampling methodology might not accurately reflect a provider's compliance with its commitments and is too burdensome because some commitment areas that must be tested do not have roads. GCI Comments at 1, 18-19. GCI fails to explain, however, how it would drive test its "entire" coverage area. In reality, GCI's entire coverage area would have an infinite number of points to test; such a feat would be impossible without some sort of methodology or sampling of GCI's "entire" coverage area. Thus, GCI's offer to test its entire coverage area is implicitly an offer to provide a sampling of its network—as it is not offering to provide a census of coverage data both geographically and temporally—without indicating how it would demonstrate coverage of an area with a statistically significant number of tests in the vicinity of residences being covered. *See* GCI Comments at 18-19 (proposing that a provider should have the option to test "its entire Alaska Plan service area"). As GCI is actually suggesting another sampling methodology, it needs to, but does not, provide details of how it would (i) provide a statistically significant number of tests and (ii) select test locations under its alternative approach. *See* GCI Comments at 18-19; GCI Oct. 5, 2021 *Ex Parte* Letter at 3. Given that GCI has failed to explain how its proposed approach would satisfy the requirements of the *Alaska Plan Order*, we direct GCI and CVW to implement the Alaska Drive-Test Model.

[65] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11291-92, Appx. B, Sec. II.

[66] *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A (providing CVW's current performance plan).

[67] *GCI Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.; *see infra* Appendix C.

[68] GCI Comments at 3, 6 ("A clarification that cells will be assigned to frames based on Form 477 *speed* data would better reflect how GCI has performed on its five-year commitments.") (italics in original), 7 ("[I]nstead of assigning these cells in the first instance to the 'LTE fiber' frame (or whatever frame would apply to that cell under the

(continued….)

asserts that a speed-only approach better reflects the intent of the *Alaska Plan Order*[69] and that the Commission intended to use information about middle-mile and last-mile technologies only to determine whether mobile carriers' proposed speed commitments were reasonable.[70] Pointing to language in the *Alaska Plan Order*, which states that drive tests must show mobile transmissions that meet or exceed "the speeds delineated in the approved performance plans," GCI contends that the Bureau's drive-test proposal "changes the yardstick by which providers will be measured."[71]

17. We disagree. The Alaska Drive-Test Model's integration of middle-mile and last-mile technologies is consistent with the *Alaska Plan Order*, the Commission's rules, the provider performance plans that the Bureau approved, and the policy undergirding the Alaska Plan.[72] In 2016, the Commission sought to advance, to the extent possible, the number of locations in Alaska that have access to at least 10/1 Mbps 4G LTE.[73] It permitted the Bureau to approve lesser commitments "in particular circumstances" if a provider's ability to achieve 10/1 Mbps 4G LTE was limited, for example, by a lack of access to middle-mile infrastructure.[74] In areas where such limitations did not exist, providers were expected to extend 4G LTE service,[75] which was the latest mass-market technology available at the time the Commission adopted the Alaska Plan.[76] Additionally, if backhaul becomes newly available in an area where a provider has not committed to provide 10/1 Mbps 4G LTE, then that provider must submit revised commitments that take into account the new backhaul option.[77] While GCI argues that the Commission only intended to use information about middle-mile and last-mile technologies to determine whether mobile providers' proposed speed commitments were reasonable,[78] GCI does not address how the Commission could determine whether a mobile provider has met those commitments without also collecting information about its speeds for each specified technology and middle-mile facility.

18. Contrary to GCI's assertions, we have not "change[d] the yardstick by which providers

(Continued from previous page)
Proposal), these cells should be assigned to the frame that reflects the speeds shown in the Form 477 data for that area."), 19, 23; GCI Oct. 5, 2021 *Ex Parte* Letter at 3-6; GCI Oct. 21, 2021 *Ex Parte* Letter at 1.

[69] GCI Comments at 1-3, 7 ("Whether Alaskans are experiencing improved speeds says much more about whether the purposes of the Alaska Plan are being met than whether the inputs for that speed involve a particular technology or type of middle mile."), 19.

[70] GCI Oct. 5, 2021 *Ex Parte* Letter at 4-5.

[71] GCI Comments at 23; *see also* GCI Oct. 5, 2021 *Ex Parte* Letter at 3 (citing *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103).

[72] 47 CFR §§ 54.317(f), 54.320(d); *Alaska Plan Order*, 31 FCC Rcd at 10166-67, 10172-73, paras. 85-86, 102; *GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.; *Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A.

[73] *Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86 (contemplating deployment of 4G LTE by mobile wireless service providers participating in the Alaska Plan but allowing for older-generation technologies where middle-mile infrastructure does not adequately support 4G LTE), 102 (requiring additional filings from those not committing to at least 10/1 Mbps 4G LTE).

[74] *Id.* at 10167, para. 86; *see also id.* at 10172-73, para. 102.

[75] *Id.* at 10167, 10172-73, paras. 86, 102.

[76] *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 15-191, 2016 Broadband Progress Report, 31 FCC Rcd 699, 731, 734-35, paras. 78, 82-83 (2016) (assessing Americans' access to mobile broadband services by analyzing the deployment of services using 4G LTE technology with minimum speeds of 10/1 Mbps).

[77] *Alaska Plan Order*, 31 FCC Rcd at 10172-73, para. 102.

[78] GCI Oct. 5, 2021 *Ex Parte* Letter at 4 ("In context, it is clear that the Commission intended to use the information about middle mile and technology to inform its judgment about whether the speeds in the proposed performance plans were reasonable and whether a reasonable amount of population would experience improved service.").

will be measured."[79] To implement the framework described above, the Commission required providers to identify in their performance plans the populations that they proposed to cover at the five- and 10-year milestones, "broken down for each type of middle mile, and within each type of middle mile, for each level of data service offered."[80] This approach is mirrored in the Commission's rules, which require mobile providers to build out to the "population covered by the specified technology, middle mile, and speed of service in the carrier's approved performance plan, by the interim milestone."[81] In addition, every performance plan that providers submitted and the Bureau approved—including GCI's original plan and updated plans—identifies the providers' speed commitments based on available middle- and last-mile technology employed.[82]

19. The Alaska Drive-Test Model, by taking into account middle- and last-mile technologies, will allow CVW and GCI to show that they have met the speed commitments delineated in their approved performance plans.[83] While GCI is correct that the drive-test data will demonstrate network throughput (i.e., speeds), the minimum speeds it is required to show are—and must be—"delineated" in its approved plan in terms of populations covered by specific combinations of middle- and last-mile technologies.[84] GCI's suggested reading of the Commission's rules, in contrast,[85] would require us to ignore the rules' repeated references to middle- and last-mile technologies in describing how providers are required to identify and meet their commitments.[86] The Commission could have required in the *Alaska Plan Order* that providers base their commitments solely on speed criteria, but it explicitly required the inclusion of middle-mile and last-mile technology for the population served as part of the performance plans,[87] consistent with the Commission's goal of expanding Alaskans' access to 10/1 Mbps 4G LTE technology

[79] GCI Comments at 23.

[80] *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85.

[81] 47 CFR § 54.320(d); *see also id.* § 54.317(f); *Alaska Plan Order*, 31 FCC Rcd at 10166-67, paras. 85-86.

[82] *See, e.g.*, *GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9539-40, 9541, Appx. (accepting GCI's current performance plan); *Wireless Telecommunications Bureau Approves ASTAC's and GCI's Revised Performance Plans Pursuant to the Alaska Plan Order*, WC Docket No. 16-271, Public Notice, 34 FCC Rcd 12183, 12184, 12186, Appx. (WTB 2019) (*GCI's First Revised Performance Plan*) (approving GCI's first revised performance plan); *Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (providing the original performance plans of the Alaska Plan's eight mobile-carrier participants).

[83] *See* 47 CFR § 54.321(a), (b) (requiring drive test data to "show[] mobile transmissions to and from the carrier's network meeting or exceeding the minimum expected download and upload speeds *delineated in the approved performance plan*" (emphasis added); *accord Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[84] 47 CFR § 54.317(f) (stating that the performance plan must delineate the minimum speeds that the provider will offer to a specified population "[f]or each level of wireless service offered (2G/Voice, 3G, and 4G LTE) and each type of middle mile used in connection with that level of service"); *accord Alaska Plan Order*, 31 FCC Rcd at 10166-67, 10172-73, paras. 85-86, 102-03; *see GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9539-41, Appx. (accepting GCI's current performance plan). Indeed, GCI itself has referred to its provision of service at specific speeds using specific combinations of middle-mile and last-mile technologies as "commitments." *See, e.g.*, GCI Comments at 5 (stating that, in its first performance plan revision, "GCI noted that some areas were newly served by fiber" and that "GCI *committed* to provide 10/1 Mbps over LTE to 4,213 pops previously served by satellite LTE at 1/.256 Mbps and to 1,230 pops previously served by satellite 2G at <.2 Mbps" (emphasis added)).

[85] *See* GCI Oct. 5, 2021 *Ex Parte* Letter at 3 (arguing that drive test data should be used to confirm speeds shown on GCI's Form 477 submissions).

[86] *See, e.g.*, 47 CFR § 54.320(d)(1)(i) (defining an Alaska Plan mobile-carrier participant's compliance gap in terms of the "population covered by the specified technology, middle mile, and speed of service in the carrier's approved performance plan, by the interim milestone"); *see also* 47 CFR §§ 54.317(f), 54.320(d)(1)(ii)-(iv).

[87] *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85.

to the greatest extent possible, unless an exception was warranted.[88]

20. Moreover, failing to account for last-mile and middle-mile technologies in the Alaska Drive-Test Model could allow participants to skirt their commitments.[89] For example, speed tests conducted in close proximity to a tower providing 3G service using microwave backhaul could produce test results of 10/1 Mbps or better.[90] If that grid cell's population is credited toward a provider's fiber-fed 4G LTE performance obligation, this would offset the need for the provider to demonstrate 10/1 Mbps 4G LTE service in another area that should otherwise receive this level of service based on fiber-based middle-mile facilities.

21. Finally, we note that, under the Alaska Plan, approval of a provider's plan to maintain lower levels of technology "in particular circumstances . . . to a subset of locations" is limited to those locations; it is not a fungible token to provide lower levels of service anywhere in the provider's service area.[91] In other words, a provider may not underperform in areas where it committed to 10/1 Mbps 4G LTE, even if it overperforms in areas where it was allowed a lesser commitment due to "unique limitations" in those areas.[92] To the extent "unique limitations" no longer prevent a provider from achieving 10/1 Mbps 4G LTE in an area, the appropriate course of action would be for the provider to update its performance plan, as required under the terms of the *Alaska Plan Order*.[93]

2. Grid Cells with No Roads

22. Some parts of remote Alaska lack any roads, and some large areas have a low population density.[94] Nonetheless, providers committed to serve many of these areas, and they receive support from the Alaska Plan to do so. As discussed further below, we cannot ignore these areas when evaluating CVW's and GCI's performance commitments, and thus we find it necessary to include in the testing

[88] *See, e.g.*, *Alaska Plan Order*, 31 FCC Rcd at 10167, para. 86 ("We expect that Alaska Plan participants will work to extend 4G LTE service to populations who are currently served by 2G or 3G.").

[89] *See* 47 CFR § 54.320(d).

[90] *See, e.g.*, GCI Comments at 16 (observing that tests taken closer to the cell tower would produce faster speed results).

[91] *Alaska Plan Order*, 31 FCC Rcd at 10167, para. 86.

[92] *Id.* at 10166-67, 10172-73, paras. 85 ("*minimum* download and upload speeds at each technology level by each type of middle mile") (emphasis added), 86 (permitting lesser commitments where there is limited middle mile), 102 (requiring updated commitments where commitments are less than 10/1 Mbps LTE where new middle mile becomes commercially available), 103 (requiring "minimum download and upload speeds as stated in the approved performance plans"); *see also, e.g.*, *Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (providing the original performance plans of the Alaska Plan's eight mobile-carrier participants, which show that populations with fiber-based 4G LTE generally had higher speed commitments than populations served by other combinations of middle-mile and last-mile technologies).

[93] *See, e.g.*, *Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86 (instructing the Bureau to approve lesser commitments if "unique limitations" prevent a provider from extending 4G LTE), 102 (requiring additional obligations for those providers unable to commit to 4G LTE at 10/1 Mbps in their performance plans). GCI argues against the Alaska Drive-Test Model in an *ex parte* filing by noting that "an area served with 'short hop' microwave and LTE technology might receive 10/1 Mbps, but under the *Proposal* that area would not count toward GCI's 10/1 Mbps commitments because the area is not served by fiber." GCI Oct. 5, 2021 *Ex Parte* Letter at 3. The Bureau permitted GCI to serve an area with microwave backhaul with a lesser speed commitment than 10/1 Mbps based on the implicit claim in GCI's performance plan that it needed relief from the 10/1 Mbps requirement due to the difficulty resulting from non-fiber (i.e., more limited) middle-mile infrastructure. *See Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86, 102. If GCI did not (and does not now) need the exception provided for lesser speed commitments, then it should raise its speed commitments in microwave areas to 10/1 Mbps—as otherwise required by the *Alaska Plan Order*. *See Alaska Plan Order*, 31 FCC Rcd at 10167, 10172-73, paras. 86, 102.

[94] *See Alaska Plan Order*, 31 FCC Rcd at 10162-63, para. 72.

sample grid cells with no roads as well as grid cells with low populations, consistent with the *Alaska Plan Order* and our proposals in the *Alaska Drive Test Public Notice*.[95] While we cannot ignore these areas when evaluating CVW's and GCI's performance commitments,[96] we note that the Alaska Drive-Test Model includes a number of design features that should limit the areas without roads or with little population that the two providers must test, as we detail below.

23. We acknowledge that remote Alaska has unique challenges, including roadless areas,[97] and these unique challenges are the reason the Commission created a separate universal service support mechanism for Alaska.[98] Some of the roadless remote areas, however, are in the vicinity of covered residences[99] and must be tested to achieve statistically significant testing of each provider's coverage sufficient to enable the Bureau to determine whether a provider has satisfied its commitments.[100] A quality communications network is all the more essential where the local population lacks roads, and to the extent that providers have received universal service support to cover such populated areas, they are required to demonstrate their claimed coverage.[101]

24. We also find it necessary to include in the testing sample grid cells with a modeled population of less than one person—including such grid cells with no roads—consistent with the *Alaska Plan Order* and our proposals in the *Alaska Drive Test Public Notice*. Providers committed to cover delineated eligible populations in their performance plans,[102] including some areas that are sparsely

[95] *See id.* at 10173, para. 103 (indicating that providers may demonstrate coverage "with a statistically significant number of tests in the vicinity of residences being covered.") To the extent that providers ask that drive testing of roadless grid cells not be required, we find that such request is an untimely request for reconsideration of the Commission's decision to require a statistically significant number of tests in the vicinity of residences being covered. *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103 (requiring statistically significant number of tests); *Alaska Population Distribution Order*, 35 FCC Rcd 10373 (adopting a "methodology for estimating the number of Alaskans who receive mobile service within census blocks in remote areas of Alaska"); *but see* ATA Feb. 8, 2019 *Ex Parte* Letter, Attachs (suggesting changes to the Alaska Population-Distribution Model on behalf of all of its members, including GCI and CVW); GCI Comments at 14 (suggesting "the Bureau modify the sampling methodology to eliminate grid cells with less than one pop."); CVW July 21, 2021 *Ex Parte* Letter at 1-2 (expressing concern over testing areas where "there are no roadways" and discussing a plan to resolve such situations should they arise). The failure to test roadless grid cells would not result in a statistically valid sample.

[96] *See Alaska Plan Order*, 31 FCC Rcd at 10159, 10162-63, 10173, paras. 66, 72, 103.

[97] *Id.* at 10159, 10162-63, 10167, 10173, paras. 66, 72, 86, 103.

[98] *Id.* at 10140, 10159, 10162-63, 10169, paras. 1, 66, 72, 91.

[99] For mobile-provider participants, the *Alaska Plan Order* does not make a distinction between covered population and residences. *Compare* 47 CFR § 54.321(a) ("[T]his certification shall be accompanied by data received or used from drive tests analyzing network coverage for mobile service covering the population for which support was received . . . ."), *with Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103 (stating that "[p]roviders may demonstrate coverage of an area with a statistically significant number of tests in the vicinity of residences being covered"). The Alaska Population-Distribution Model combines census population data with other data of residences to model where people are likely to reside in remote Alaska. *Alaska Population Distribution Order*, 35 FCC Rcd at 10373, 10374-76, 10376-77, paras. 1, 4-6, 9-12 (using census population, residential address data, and aerial imagery of buildings to determine where the population resides); *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. II (proposing to rely on the Alaska Population-Distribution Model for construction of frames used in the drive tests).

[100] *See Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103. The more complete the universe that is eligible for sampling, the more the risk of sampling bias is reduced. Reducing such bias is necessary to achieve statistical significance. Therefore, we do not exclude roadless grid cells, regardless of population, as such areas comprise the universe that is eligible for sampling.

[101] *Id.* at 10173, para. 103.

[102] *Id.* at 10166, para. 85.

populated.[103] While providers only test populated areas,[104] in some instances, the number of grid cells within the populated area of a census block can outnumber the people. Where the aggregate number of grid cells in a covered populated area exceed the number of people in that area, such grid cells will appear to have less than one person. However, to "demonstrate coverage of an area with a statistically significant number of tests in the vicinity of residences being covered," these areas are necessary to test as part of the coverage that the provider committed to and receives support to provide mobile service.[105]

25. GCI argues that it should not be required to test sparsely populated grid cells, and both GCI and CVW express concern that testing in grid cells with no roads will be extremely difficult.[106] But the Alaska Drive-Test Model has design features that should help address concerns about these grid cells. The model stratifies each frame using CSRF based on grid-level estimates of covered population.[107] This includes creating a single stratum within each frame of all grid cells with a population of less than one person. Further, the sample is apportioned across a frame using Neyman allocation, a technique that draws more samples from more highly populated strata relative to lower populated strata.[108] Accordingly, the stratum containing grid cells with a population of one person or more will have a greater number of grid cells compared to strata containing grid cells of population less than one,[109] and more samples will be drawn from the higher populated strata. This has a compounding effect that limits the number of grid cells with a population less than one that will be selected for testing.[110] In addition, the Alaska Population-Distribution Model distributes population near roadways for census blocks that contain roads, making it more likely that areas near roads will be covered populated areas and selected for testing.[111]

---

[103] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290, Appx. B, Sec. I ("Remote Alaska is extraordinarily sparsely populated; virtually all its county-level geographies have population densities of three or fewer people per square mile. Accordingly, testing every location for a provider's coverage would be unduly burdensome, and testing a sample of locations is required."); *see also Alaska Plan Order*, 31 FCC Rcd at 10162, para. 72 (noting the remoteness of communities and low population bases as part of the need for the Alaska Plan).

[104] *Alaska Population Distribution Order*, 35 FCC Rcd at 10373, 10374-75, 10377, paras. 1, 5-6, 10-12; *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85 (requiring performance plans for delineated eligible populations).

[105] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[106] GCI Comments at 11-14; CVW July 21, 2021 *Ex Parte* Letter at 1.

[107] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III.

[108] *Id.* at 11293, Appx. B, Sec. IV.

[109] Only the first stratum of each frame will have grids with less than one person. *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III (explaining the proposed approach "ensures that grid cells that have a high population within a given stratum are tested; this should prevent the testing results of the stratum from being skewed by outlier results from low-weighted grid cells").

[110] GCI raises a separate concern regarding grid cells that are removed from testing. GCI asks the Bureau to confirm that grid cells that are removed from testing are not removed as attributable to the commitments. GCI Comments at 17-18. The Alaska Drive-Test Model provides a statistically significant representation of overall deployment for the committed populations; excluding some grid cells from the testing frame does not remove them from attribution to commitments. *See infra* Appendix B: Sec. II and Sec. VII.

[111] *Alaska Population Distribution Order*, 35 FCC Rcd at 10375, para. 5. The Alaska Population-Distribution Model indicates where the providers are respectively accountable for testing. *Id.* The Alaska Plan's mobile-provider participants, including CVW and GCI, had an opportunity to provide feedback on the Alaska Population-Distribution Model, and in fact, they did provide feedback to account for the population in certain areas. *See* ATA Feb. 8, 2019 *Ex Parte* Letter at 1 (recommending changes to the Alaska Population-Distribution Model "on behalf of its members that are participating in the Alaska Plan as mobile carriers," including CVW and GCI); *see also Wireless Telecommunications Bureau Seeks Comment on Population Distribution Model and Eligible Census Block List to be Applied in the Alaska Plan*, WC Docket No. 16-271, Public Notice, 35 FCC Rcd at 1520, para. 1 (WTB 2020) (*Alaska Population-Distribution Public Notice*) (seeking comment on the Alaska Population Distribution

(continued….)

26. GCI claims that many testable grid cells are too sparsely populated for worthwhile testing.[112] GCI's analysis of the Alaska Drive-Test Model claims that 53% of the grid cells would have less than one person and that based on GCI's analysis, 48% of grid cells would have less than one person per grid cell and no roads.[113] GCI argues that grid cells with less than one person should be eliminated from testing and grid cells with no roads should be required sparingly, given the burdens of conducting drive testing.[114] Similarly, CVW notes that some grid cells would be inaccessible mountains or islands with no public access.[115] GCI evaluated the grid cells in its coverage areas and determined that 59% of the grid cells would have no roads,[116] that 49% of the grid cells would be more than a mile from the nearest road, and that 12% of the grid cells would be more than ten miles from the nearest road.[117]

27. GCI has not presented its data or the methodology underlying its calculations, and we were not able to reproduce it. However, for several reasons, we believe that GCI's calculations result in significant over-estimates. First, the Alaska Drive-Test Model's *de minimis* population standard has the effect of reducing the number of grid cells without roads that would otherwise be included in the testing frame.[118] Second, as noted above, we designed the sample and stratification so that there would be substantially more grid cells that are populated compared with grid cells with population less than one in the sampling methodology to increase the probability that a populated grid cell would be selected for testing compared with a grid cell with population less than one. Third, because there is a high correlation between populated grid cells and grid cells with roads, our sampling methodology should not only increase the percentage of populated grid cells that are tested but also increase the percentage of tested

(Continued from previous page)
Model); ATA Comments at 1 (filed Apr. 7, 2020) (affirming its previously recommended changes to the Alaska Population-Distribution Model with no further recommended changes).

[112] *See* GCI Comments at 11-14.

[113] *Id.* at 12.

[114] *Id.* at 11-14. GCI states that these areas are much more expensive to test as well. *Id*. at 13-14.

[115] CVW July 21, 2021 *Ex Parte* Letter at 1.

[116] GCI Comments at 12.

[117] *Id.* at 13.

[118] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11291, Appx. B, Sec. II. *De minimis* grid cells are grid cells excluded from the frame based on their having fewer than 100,000 square meters of covered populated area—i.e., 10% of the grid cell. *Id.* In the Alaska Population-Distribution Model, the covered population is modeled as being evenly distributed from 100 meters of each side of a road. *Alaska Population Distribution Order*, 35 FCC Rcd at 10375, para. 5. As one side of a grid cell is 1,000 meters long, removing from testing those grid cells with fewer than 100,000 (100 x 1,000) square meters of covered populated area ensures that a grid cell with only a road running parallel to its border would not be selected, nor would many grid cells with even less proximity to roads. Removing these *de minimis* grid cells reduces the burden on testers, but does not (and should not) eliminate all roadless grid cells from testing, as providers have committed to serve (and receive support to serve) populations in areas with challenging terrain and no roads. *See, e.g*., *Alaska Plan Order*, 31 FCC Rcd at 10167, 10173, paras. 86, 103. The Alaska Population-Distribution Model says that in census blocks where there is some population but no roads, the Bureau will distribute the population throughout the entire area of the block. *See Alaska Population Distribution Order*, 35 FCC Rcd at 10375, para. 5. The model also allowed essentially an exception to four areas, which amounted to over 100 census blocks where roads may not have been used in the determination of the location of populations. *See id.* at 10377, para. 12 (adopting an exception for the Copper Valley area, among others, because "alternate data sources better reflect the location of population than the Alaska Population-Distribution Model"). CVW, which serves this Copper Valley area, submitted census blocks indicating where the populations in their coverage area lived. ATA—on behalf of all mobile-provider participants of the Alaska Plan—submitted a list of census blocks accompanied with manually modified population polygons where local data was superior to relying on Alaska Population-Distribution Model methodology, including for census blocks in areas covered by CVW and GCI. ATA Feb. 8, 2019 *Ex Parte* Letter, Attachs.

grid cells that have roads. Accordingly, for all of these reasons, we believe that GCI's calculations result in over-estimates.

28. We also disagree with GCI that the burdens of testing in these areas outweigh the benefits of testing in areas where GCI is receiving universal service support.[119] If we excluded such grid cells in the sampling, GCI would continue to receive Alaska Plan support in remote areas of Alaska without adequate means to verify coverage, which runs contrary to the principles outlined in the *Alaska Plan Order*.[120] Low population density and areas with no roads are features in many parts of remote Alaska—a fact of which CVW and GCI were aware when they elected to participate in the Alaska Plan—yet these providers nonetheless committed to covering these remote areas using universal service support. For these reasons, we decline to eliminate testing for grid cells with no roads, including those grid cells with a population of less than one. Although CVW and GCI must drive test some grid cells that do not have roads, the Commission foresaw this potential issue and accounted for it by allowing drive tests to be conducted "by means other than in automobiles on roads."[121] We provide further relief for the providers by allowing use of unmanned aircraft systems (UASs), subject to the waivers we describe below.

a. Grid Cells with No Roads and Population of One or Greater

29. For the reasons described above, we find it necessary to require testing of grid cells with no roads and population of one or greater. To the extent a grid cell with a population of one or greater does not include an accessible road, the accommodation to use off-road vehicles should improve testability.[122] If there are instances where a mobile-provider participant claims that it cannot use on-the-ground, off-road vehicles to test such a grid cell,[123] it may seek a waiver from the Bureau to use a UAS to test that particular grid cell.[124] This waiver request should provide a statement regarding why good cause exists to waive the on-the-ground testing requirement for that grid cell, contain evidence supporting that claim, and be filed in WC Docket No. 16-271.[125] UASs should mirror on-the-ground vehicles to the extent possible, matching on-the-ground vehicle speed (for example, matching nearby speed limits) and flying at the lowest, safest possible elevation, to best reflect on-the-ground usage. Additionally, UASs performing drive tests must: (1) at all times operate at less than 200 feet above ground in remote areas of Alaska where road-based testing is impractical/impossible; (2) limit power to the minimum necessary to accomplish testing; and (3) upon receipt of a complaint of interference from a co-channel licensee, notify the Commission and either remedy the interference or cease operations.

30. To the extent that a mobile provider seeks to use UASs to conduct testing, it may do so if the allocation and service rules permit airborne use of the spectrum that will be used to provide the mobile

---

[119] *See* GCI Comments at 11-14.

[120] *Alaska Plan Order*, 31 FCC Rcd at 10159-60, 10162-63, 10173, paras. 66, 68, 72, 103.

[121] *Id.* at 10173, para. 103.

[122] *Id.*

[123] *See, e.g.*, CVW July 21, 2021 *Ex Parte* Letter at 1 (arguing that some grid cells are inaccessible for testing because they consist of mountains, islands, or areas without public access).

[124] We require on-the-ground testing for grid cells with a population of one or greater, as these grid cells are more likely to have habitable terrain, and on-the-ground testing is more reflective of the user experience. *Alaska Plan Order*, 31 FCC Rcd at 10166-67, para. 85 (delegating authority to the Bureau "to require additional information, . . . from individual participants that it deems necessary to establish clear standards for determining whether or not they meet their five- and 10-year commitments").

[125] *See* 47 CFR § 1.3 (providing that the Commission may waive its rules for "good cause shown"). The waiver request must meet the two-part standard by (1) "show[ing] special circumstances warranting a deviation from the general rule"; and (2) "show[ing] that such a deviation will serve the public interest." *Ne. Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

service to be tested as part of the drive tests.[126] Otherwise, the provider must additionally obtain a waiver from the Commission (pursuant to section 1.925) of any airborne limitations.[127]

b. Grid Cells with No Roads and Population of Less than One

31. For the reasons described above, we also find it necessary to require testing of certain grid cells with no roads and population of less than one. However, as an alternative to testing with an automobile or other terrestrial off-road vehicle (e.g., snowmobile or all-terrain vehicle), we will allow use of UASs for the first, and least densely populated, stratum without requiring the waiver that we will require GCI and CVW to obtain to use UASs for testing grid cells with one or more people. GCI and CVW both express concern with drive testing where no roads exist.[128] This additional UAS option is provided to address their concerns. Of the two to eight strata per frame, the first stratum contains the grid cells with less than one person per grid cell and no roads.[129] As these grid cells are likely the most logistically difficult to test and may contain uninhabitable or untraversable terrain, the added flexibility offered by a UAS without a waiver should make the testing easier for these areas.[130] UAS performing drive tests must: (1) at all times operate at less than 200 feet above ground in remote areas of Alaska where road-based testing is impractical/impossible; (2) limit power to the minimum necessary to accomplish testing; and (3) upon receipt of a complaint of interference from a co-channel licensee, notify the Commission and either remedy the interference or cease operations. We note that while we will not require a waiver for use of UASs for testing these grid cells, we will require a waiver for use of any allocation or service rules that prohibit airborne use of the spectrum that will be used to provide the mobile service to be tested as part of the drive tests (consistent with the requirement we adopt above for use of UAS to test grid cells with no roads and a population of one or more people).[131]

---

[126] For example, 47 CFR part 22 imposes a prohibition on the airborne use of 800 MHz Cellular service. *See* 47 CFR § 22.925; *see also* 47 CFR § 90.1205(c) (limiting or prohibiting aeronautical operations in some public safety bands); 47 CFR § 2.106, Table of Frequency Allocations (restricting aeronautical use in underlying allocation at 1670-1675 MHz, 1695-1710 MHz, 2305-2310 MHz, 2500-2655 MHz, and 3550-3700 MHz).

[127] 47 CFR § 1.925. For spectrum bands with airborne restrictions, the waiver would necessarily need to specify the spectrum bands where UAS testing would occur and for which the waiver is sought, provide the grid cell at issue, and give a point of contact available at all times during testing. *See* 47 CFR §§ 1.3, 1.925. A licensee may seek waiver of service rules limiting airborne operations by filing a license modification application in the Bureau's Universal Licensing System pursuant to Section 1.913, including a waiver showing as required by Section 1.925. 47 CFR §§ 1.913, 1.925. For waivers in the Cellular Radiotelephone Service, the UAS operator must notify all other co-channel Cellular Radiotelephone Service licensees authorized within 50 miles and include the dates and location of testing. *See* 47 CFR § 22.925 (prohibiting airborne operation of cellular telephones).

[128] GCI Comments at 11-14; CVW July 21, 2021 *Ex Parte* Letter at 1 ("[T]here are still remote mountain and island areas that would fall within these requirements and could still be identified as eligible blocks for testing, even though there are no roadways or access to the areas. The access limitations could be due to the nature of the area rugged, inaccessible mountains, or no public access.").

[129] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. III (explaining stratification which "ensures that grid cells that have a high population within a given stratum are tested"); *see also Uniendo a Puerto Rico Fund and the Connect USVI Fund et al*., WC Docket No. 18-143 et al., Report and Order and Order on Reconsideration, 34 FCC Rcd 9109, 9173, para. 128 (2019) (allowing drone testing).

[130] We require no waiver for the use of UASs in these grid cells with no roads and less than one person in recognition that these grid cells are more likely to be uninhabitable and untraversable; by contrast, grid cells with no roads but at least one person are more likely to be inhabitable and traversable, unless the provider demonstrates otherwise through its waiver request. *See Alaska Plan Order*, 31 FCC Rcd at 10166-67, para. 85 (delegating authority to the Bureau to require additional information).

[131] *See supra* paragraphs 29-30. Additionally, mobile-provider participants must use UASs consistent with all federal and state laws. *See, e.g*., 49 U.S.C. §§ 44711, 44801-10. These laws include all applicable FAA rules. *See, e.g*., 14 CFR, pt. 107; *see also* FCC, Report on Section 374 of the FAA Reauthorization Act of 2018, submitted to the Senate Committee on Commerce, Science, and Transportation; House of Representatives Committee on Energy

(continued….)

3. Distant Communities

32. GCI expresses concern that the number of "communities" that it needs to travel to is the biggest driver of its testing costs.[132] GCI notes that there are 205 communities within its footprint and that, while GCI may be able to drive to some communities, "given the distances between communities and the lack of interconnected roads, [GCI's testing teams must] often [travel to these communities] by small aircraft."[133] To the extent GCI has to charter a flight to many of these communities, this would increase the costs and complexities associated with drive testing all of its assigned grid cells.[134]

33. To help reduce the burdens of traveling to many different communities, we have added an optimization to the sampling process that will likely reduce the number of incorporated and census designated places[135] where GCI and CVW would have to travel.[136] Given that GCI did not provide a definition of "communities,"[137] we believe incorporated and census designated places are the closest proxy, as there are 284 incorporated and census designated places in GCI's footprint, and incorporated and census designated places are integrated into census data, which are used throughout this modeling.[138] We implement these additional steps in direct response to GCI's concerns and describe this additional process in Appendix B, *infra*.[139]

4. In-Motion Testing Requirement

34. We adopt the proposal to require at least 50% of drive tests to be conducted while in motion.[140] Requiring that 50% of the drive tests be conducted while in motion strikes a balance of ensuring that the drive tests are a sufficient representation of how consumers use their mobile devices, which is both in a stationary and in-motion environment. Requiring some in-motion tests also helps ensure that tests are conducted in multiple locations within the grid cell.[141]

(Continued from previous page)
and Commerce; and House of Representatives Committee on Transportation and Infrastructure (Aug. 20, 2020); Alaska, Unmanned Aircraft Systems, https://dot.alaska.gov/uas/; Alaska UAS Legislative Task Force, Drone/UAS Operator Safety Guidelines and FAQs about Privacy (2015), https://www.commerce.alaska.gov/web/Portals/6/pub/UAS%20Operator%20Guidelines%2010-1-15.pdf.

[132] GCI Comments at 18 ("The biggest driver of costs in GCI's experience is the number of communities that must be tested."); *id.* at 18-19 ("The use of a sampling methodology will reduce the number of specific areas that must be tested, but if it does not also reduce the number of communities that must be planned out and traveled to, the testing burden is not substantially less.").

[133] *Id.* at 18, 20.

[134] *Id.* at 18-20.

[135] *See* Census, Places, https://www2.census.gov/geo/pdfs/reference/GARM/Ch9GARM.pdf.

[136] *See infra* Appendix B.

[137] *See* GCI Comments at 20 (noting that there are 205 communities within GCI's areas of Alaska).

[138] *See infra* Appendix B, Secs. II, III.

[139] *See infra* Appendix B. We set forth specific proposals for the Alaska Drive-Test Model in the *Notice* and sought comment on those proposals. *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11280. As noted, GCI raised concerns that our proposals related to sampling did not go far enough to reduce the burden of testing, given that its greatest cost relates to the number of communities GCI would have to test. GCI Comments at 18-19. This approach attempts to address GCI's concern without overhauling the methodology we proposed in the *Notice*.

[140] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11293, Appx. B, Sec. V.

[141] Testers should "attempt to conduct a mobile test within a single grid cell as much as is reasonably safe and possible;" where it is not possible (e.g., where the testing area is too small), the drive test may conclude outside of the test area. *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11293, Appx. B, Sec. V. As we explain in Appendix B, mobile tests "should initiate when moving away from the location of a stationary test after having reached the
(continued….)

35. We disagree with GCI that the proposed in-motion requirement is unnecessary.[142] The *Alaska Plan Order* referred to these as "drive tests," which suggests some degree of motion consistent with a driving experience.[143] The drive testing data to be submitted is to "show[ ] mobile transmissions to and from the network meeting or exceeding the speeds delineated in the approved performance plans."[144] Mobile service, as defined in the Communications Act and the Commission's rules, supports an in-motion requirement for at least some drive tests.[145] Moreover, requiring drive tests in motion is also consistent with the in-vehicle mobile propagation modeling that mobile broadband service providers must submit as part of the Broadband Data Collection, which providers could verify through on-the-ground data submitted in response to cognizable challenges and/or verification inquiries initiated by Commission staff.[146] The Commission also explained for the Broadband Data Collection that it was important for consumers to be able to challenge mobile broadband service providers' coverage in both stationary and in-vehicle (i.e., in-motion) environments.[147] Because mobile service assumes a service that works with mobile stations that are designed to move and ordinarily do move,[148] in-motion tests are necessary to ensure that mobile service is being provided.

36. GCI contends that in-motion tests from a non-standard road or a trail could be hazardous with little daylight and winter weather.[149] The concerns posed by drive testing during winter weather are no longer relevant because we have moved the deadline for the data from March 1, 2022, to September 30, 2022.[150] GCI further argues that an in-motion requirement is unnecessary because many grid cells lack roads and may not reasonably accommodate in-motion tests and, similarly, that many grid cells with roads have small populated areas, which makes it difficult to conduct a sufficient number of in-motion tests.[151] As noted previously, where roads are insufficient, the drive test model allows tests to be

(Continued from previous page)
speed of the surrounding traffic," which would result in tests occurring in different locations within the grid cell. *See infra* Appendix B, Sec. V.

[142] GCI Comments at 14 & n.22 ("GCI suggests that the requirement for a specific percentage of tests to be done while in motion is not necessary and should not be included.").

[143] *See Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[144] *See id.*

[145] *See, e.g.*, 47 U.S.C. § 153(33)-(34) ("The term 'mobile service' means a radio communication service carried on between mobile stations[—'radio-communication station[s] capable of being moved and which ordinarily do[ ] move'—]or receivers and land stations, and by mobile stations communicating among themselves . . . ."); 47 CFR § 2.1 (defining "mobile station" as "[a] station in the mobile service intended to be used while in motion or during halts at unspecified points").

[146] *See BDC Mobile Requirements Order* at 24-25, 28-29, 79, paras. 38, 47, Appx. A & n.7; *see also, e.g.*, T-Mobile USA, *Methodology for T-Mobile Drive Tests to Verify Compliance with T-Mobile/Sprint Merger Commitments*, at 11 (Jan. 8, 2020) (describing T-Mobile's commitment to perform one mobile test for each stationary test in the relevant grids (i.e., 50% in-motion tests)), https://www.fcc.gov/sites/default/files/t-mobile-drive-test-methodology-01082021.pdf.

[147] *Establishing the Digital Opportunity Data Collection; Modernizing the FCC Form 477 Data Program,* WC Docket Nos. 19-195, 11-10, Third Report and Order, 36 FCC Rcd 1126, 1166, para. 102. In implementing the challenge process, the Bureau, OEA, and the Office of Engineering & Technology explained that it was important for the mobile challenge process to consider the environments that consumers use mobile service, which is why they maintained an in-vehicle challenge process for consumers. *See BDC Mobile Requirements Order*, at 24, para. 38.

[148] 47 U.S.C. § 153(33)-(34).

[149] GCI Comments at 14 n.22.

[150] *Alaska Drive Test Extension Order* at 2-3, paras. 5-6.

[151] GCI Comments at 14 & n.22.

conducted by vehicles other than automobiles on roads.[152] Further, we have limited the grid cells with small testing areas by removing from drive testing the *de minimis* grid cells with less than 100,000 square meters of covered populated area.[153]

5. Early Upgraded Areas

37. Mobile service providers participating in the Alaska Plan are free to upgrade areas early with technologies beyond what they have committed to, notwithstanding the commitments set out in their performance plans. In the *Alaska Drive Test Public Notice*, the Bureau stated, for instance, that where providers have deployed 5G-NR, it would be included in the "LTE" frame.[154] Moreover, GCI updated its performance plan twice based on commercial availability of new middle-mile infrastructure, consistent with the *Alaska Plan Order* requirements,[155] but it did not commit to improve those areas by the five-year milestone (positioning itself to be able to upgrade those areas by the final, 10-year milestone instead).[156]

38. GCI has noted that, in some areas, it "has deployed a more advanced technology but does not yet provide the speed associated with that technology or frame. For example, "an area served with fiber may have LTE technology, but the locations more distant from the tower . . . do not receive 10/1 Mbps."[157] GCI claimed it "never expected that pops served with less than 10/1 Mbps would count toward the number of pops served at 10/1 Mbps but also never expected the Commission to disregard them completely for the purpose of assessing the number of pops served with 2/.8 Mbps or lower speeds."[158] GCI also claimed that, if it believed all fiber areas upgraded to 4G LTE were required to have 10/1 Mbps or better, it would have delayed some of its 4G LTE deployments until year six or later and excluded those areas as appearing on its FCC Form 477 submission as having 4G LTE.[159]

39. We agree with GCI that we should not punish providers for deploying 4G LTE to some areas earlier than they committed to in their performance plan at the five-year milestone. Accordingly, where 4G LTE is indicated on FCC Form 477 at less than 10/1 Mbps in fiber-based areas, those areas will be included in the 3G frame (3G or better frame) and will be attributed to 3G commitments. If we were to include these areas (which may not yet be engineered to achieve 10/1 Mbps) in the fiber-based 4G LTE frame, then it could lead to higher fail rates in the frame. These higher fail rates would make GCI appear as if it had not met its commitments in places where GCI actually met (or exceeded) its five-year commitments. The approach we adopt will therefore avoid punishing GCI where it deployed 4G LTE early but was not ready to add those areas to its five-year commitments of 10/1 Mbps fiber-based LTE service. We will follow a similar approach for 4G LTE areas that would be included in the microwave and satellite 4G LTE frames. For example, if GCI deployed 4G LTE to a microwave-based area, as indicated by FCC Form 477 and corresponding middle-mile data, but GCI's FCC Form 477 filing shows minimum expected speeds as less than 2/.8 Mbps for such areas, then those areas will be included in the

[152] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[153] *See supra* Section III.B.2.

[154] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11291, Appx. B, Sec. II.

[155] *Alaska Plan Order*, 31 FCC Rcd at 10172-73, para. 102.

[156] *See GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.; *GCI's First Revised Performance Plan*, 31 FCC Rcd at 12186, Appx.

[157] GCI Comments at 7.

[158] GCI Comments at 7.

[159] *Id.* at 8.

3G or better frame.[160] This clarification should ensure that GCI is being held to its commitments while not being penalized for deploying more advanced technology ahead of schedule.[161]

6. Multiple Last-Mile Technologies in a Grid Cell

40. When multiple technologies overlap within a grid cell, Commission staff will attribute the overlapped area to the frame with the more advanced technology.[162] For example, in grid cells where fiber-based 4G LTE at 10/1 Mbps and 3G completely overlap in a grid cell, staff will attribute the grid cell to the fiber-based 4G LTE frame for satisfaction of the fiber-based 4G LTE commitments. Attribution to the more advanced technology allows the provider to receive due credit where it has built out consistent with its most rigorous performance requirements. Alternatively, in grid cells where fiber-based 4G LTE at 10/1 Mbps only partially overlaps 3G coverage, staff will attribute the grid cell portion covered by fiber-based 4G LTE to the fiber-based 4G LTE frame and the remaining covered area of the grid cell to the 3G frame. In this instance, a grid cell could be contained in multiple frames.[163]

41. GCI claimed that more than half of the cells within its covered populated areas have multiple or overlapping technologies.[164] GCI argued that, where a grid cell is both in a 4G LTE and 3G frame, once it passes for 4G LTE, the grid cell should be removed from the 3G frame so that pops in the 3G frame are not attributed as a "fail."[165]

42. We clarify that if a grid cell is selected for both 4G LTE and 3G testing, staff would evaluate both selections from the same drive tests. If the drive tests show that GCI passes the 4G LTE standard for that grid cell, then GCI will also receive credit for that grid cell passing the 3G standard; thus, GCI would not receive a "fail" for the 3G selection, obviating the need to remove the grid cell from the 3G frame. If, however, the testing threshold only passes for the 3G requirements, then the grid cell would be attributed as a "pass" to 3G but a "fail" as to 4G LTE, consistent with the pass/fail approach described below.

7. Pass/Fail Approach

43. We adopt the pass/fail approach to testing for the Alaska Drive-Test Model proposed in the *Alaska Drive Test Public Notice*.[166] For each grid cell in the sampling frame, the results of the tests will establish whether the provider delivers coverage at the minimum speeds to which it committed.[167] When replicated throughout all of the randomly selected grid cells that are required for testing, the Commission will evaluate the percentage of the provider's coverage area where it has met its

---

[160] GCI's 2G is a voice-only service and will be tested with voice-only calling, as it requested. GCI Comments at 10-11. Consequently, while there is a 3G or better frame for speed tests, there is not a "2G or better" frame, only a "2G frame." Where we discuss a 3G frame, we are referring to the "3G or better" frame.

[161] Because CVW's five-year milestone commitments are the same as its ten-year milestone commitments and it only has one frame based on having one speed commitment with LTE, this concern and solution does not apply to it. *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A.

[162] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11291, Appx. B, Sec. II.

[163] *See id.* at 11291-92, Appx. B, Sec. II; *see also* GCI Comments at 9.

[164] GCI Comments at 9. CVW committed to provide 4G LTE in all relevant areas at the five-year milestone. *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A (providing CVW's performance plan).

[165] GCI Comments at 9 ("If 85 percent of the tests show speeds at or above the requirement for the LTE frame, then the cell is counted as a passing cell in the LTE frame. Importantly, the cell must be removed at that point from the 3G frame so that the pops are not counted as 'fails' in that frame.").

[166] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11294, Appx. B, Sec. VI.

[167] *Id*.

commitments.[168] To demonstrate coverage in an area with a statistically significant number of tests, the Alaska Drive-Test Model requires the tests to pass at a rate capable of ensuring that the provider has met its milestones.[169]

a. Pass/Fail Testing

44. We adopt the following pass/fail methodology for the Alaska Drive-Test Model: 85% of drive test results in a grid cell must show speeds that meet or are above the minimum committed-to speed for that frame in order for the service to be considered "available" in that grid cell.[170] Successful tests measure whether a mobile-provider participant meets a minimum expected speed in a given grid cell, with "expected" defined as being available at least 85% of the time.[171] It does not mean that 85% of the population of that grid cell can expect to receive the tested speed 100% of the time.[172] Although the *Alaska Plan Order* required mobile-provider participants to commit to a minimum download and upload speed(s),[173] we do not expect mobile-provider participants to meet the minimum speed requirements on every single test, given that the performance of wireless networks is highly variable.[174] Accordingly, we have set the pass rate at 85% to account for this variability.

45. To the extent that GCI may intimate that the 85% pass rate is too high, we do not alter it.[175] The 85% pass rate we adopt for the Alaska Plan drive tests is similar to—but more lenient than—both the propagation modeling standard and the on-the-ground challenge data threshold adopted for the Broadband Data Collection. In the *Second Report and Order* in that proceeding, the Commission defined the parameters that service providers must use when modeling whether broadband is available using technology-specific minimum download and upload speeds with a cell edge probability of at least 90% and assuming minimum 50% cell loading.[176] Additionally, mobile providers that submit on-the-ground speed test data to rebut a challenge to their coverage data are required to meet analogous thresholds to those required of challengers and demonstrate that sufficient coverage exists at least 90% of the time through a challenged area.[177] These defined parameters in the Broadband Data Collection are more stringent than the propagation coverage relied on for the Alaska Plan drive test methodology, which uses the *provider*-defined propagation coverage from Form 477. Given that the provider has more discretion to set coverage parameters more favorably for itself in its Form 477 filings, it would have actually been appropriate for us to adopt a higher pass rate percentage than the Broadband Data Collection; we nonetheless adopt the 85% pass rate here to eliminate all doubt about the fairness of the pass rate.[178]

---

[168] *Id*.

[169] *Id*.

[170] *Id*.

[171] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11294, Appx. B, Sec. VI.

[172] *Id*.

[173] *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85.

[174] *See Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 20-269, Fourteenth Broadband Deployment Report, 36 FCC Rcd 836, 843-44, para. 15 (2021).

[175] *See, e.g.*, GCI Comments at 6 ("GCI is concerned that the Proposal's 85 percent test would ignore substantial improvements that GCI has made."), 7, 9, 15 ("The 85 Percent 'All or Nothing' Threshold is Unreasonable").

[176] *Establishing the Digital Opportunity Data Collection; Modernizing the FCC Form 477 Data Program*, WC Docket Nos. 19-195, 11-10, Second Report and Order and Third Further Notice of Proposed Rulemaking, 35 FCC Rcd 7460, 7477, 7479-80, paras. 39, 44-45 (2020).

[177] *BDC Mobile Requirements Order* at 39-40, para. 64.

[178] In another context in the *Alaska Plan Order*, the Commission used 85% as the threshold to conclude that a population was covered by 4G LTE service. *Alaska Plan Order*, 31 FCC Rcd at 10167, 10168-69, paras. 87, 90 (continued….)

Neither GCI nor CVW propose an alternative percentage as more appropriate for the pass rate as applied by the model.[179] We find compelling reasons to adopt an 85% pass rate, as we proposed, for Alaska Plan drive test data.[180]

46. GCI argues that it should receive partial credit for the percentage of tests recorded above the minimum threshold when that percentage is below 85%.[181] GCI states that "rather than applying the 85 percent pass rate as an 'all or nothing' bar for allowing a cell to be deemed covered, pops could count toward the commitment levels in proportion to the speeds that the speed tests confirm."[182] GCI provides the example that, "if 50 percent of the drive tests show speeds at or above 10/1 Mbps and 50 percent of the tests show speeds of .2/.05 Mbps, then 50 percent of the pops associated with that cell would count toward compliance with the 10/1 Mbps commitments, and 50 percent of the pops would count toward compliance with the <.2/.05 Mbps commitments."[183]

47. We do not find GCI's arguments persuasive. Our statistical framework is designed around grid cells being the smallest unit of testing and is not designed to measure partial grid cells. GCI's example of counting a 50% pass rate as indicative of 50% of the population receiving service is an incorrect interpretation of what testing represents—rather, a 50% pass rate indicates that service is available 50% of the time. Further, GCI's proposal to count failed tests toward a lesser standard is incompatible with random sampling as it would apply results to a standard that was not selected for testing in a given grid cell. This would mean that results are no longer random.

48. Moreover, GCI and CVW committed to provide "*minimum* expected upload/download speeds" in their performance plans.[184] In addition, GCI was the only provider to emphasize in its performance plans that it would be responsible for this minimum speed throughout all of its committed-to coverage area to the edge.[185] Thus, GCI's own commitments emphasize that it needs to provide the minimum speeds throughout the coverage area of the specified commitment and should not receive partial credit to the extent it did not provide its minimum committed-to speed to the edge of such coverage.[186]

49. In addition, GCI's suggested "partial credit" approach would require an alternative drive-test methodology with a corresponding assessment regarding how that methodology would be

(Continued from previous page)
(determining areas eligible for Alaska Plan support based upon an 85% coverage rate of 4G LTE by unsubsidized providers or providers that are not eligible for frozen support); *see also Alaska Drive Test Public Notice*, 36 FCC Rcd at 11294, Appx. B, Sec. VI & n.16 (citing *Alaska Plan Order*, 31 FCC Rcd at 10167-69, paras. 87, 90).

[179] *See generally* CVW July 21, 2021 *Ex Parte* Letter (not discussing the pass rate percentage); GCI Comments at 6-7, 9, 15 (discussing the 85% threshold without proposing an alternative percentage for pass/fail assessment of grid cells). GCI states that it "is concerned that these areas with good LTE service that, for example, show 10/1 Mbps for 65 percent rather than 85 percent of tests will be considered entirely uncovered, even though their service is better than 3G or 2G." GCI Comments at 7. However, this was not an argument for using 65% as the pass rate, nor does GCI attempt to justify using 65% as the pass rate.

[180] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11294, Appx. B, Sec. VI.

[181] GCI Comments at 8-10, 15-17.

[182] *Id*. at 9.

[183] *Id*.; *see also id*. at 15-17; GCI Oct. 5. 2021 *Ex Parte* Letter at 3.

[184] *See Wireless Commitments Public Notice*, 31 FCC Rcd at 13320-23, Appx. A (providing the initial performance plans, all of which use the same or similar language) (emphasis added).

[185] *GCI Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx. (specifying "minimum expected download/upload speeds *at edge*) (emphasis added); *see also GCI's First Revised Performance Plan*, 34 FCC Rcd at 12186, Appx.; *Wireless Commitments Public Notice*, 31 FCC Rcd at 13322, Appx. A.

[186] *See GCI Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx. We accordingly disagree with GCI's suggestion that it should receive partial credit due to locations more distant from the tower having slower speeds. *See* GCI Comments at 16.

"statistically significant."[187] But GCI does not provide a usable alternative methodology to replace the proposed drive test model.[188] GCI's edit to the proposed drive-test methodology lacks a statistical basis from which, based on a limited set of tests, we could infer whether GCI had met its commitments. Partial credit also is inconsistent with the approach adopted in the Broadband Data Collection proceeding.[189]

50. Finally, while we acknowledge that service declines farther away from the cell site, this service quality deterioration can be addressed in a number of ways, including adding more cell sites. GCI receives support to meet its commitments, and if it does not meet them initially, the drive tests can help it understand where improvements are needed in its network, which will help it deliver the services it committed to Alaskans.[190]

b. No Lower Speed Tier Credit for Failed Grid Cells

51. The Alaska Drive-Test Model's use of frames will allow providers to separately test the areas where they committed to different minimum speeds based on middle-mile availability and last-mile technology used, consistent with how the providers delineated these speeds in their performance plans.[191] In doing so, the Alaska Drive-Test Model will ensure that the drive tests yield data that allow Commission staff to assess whether the providers have met their commitments.

52. GCI expresses concern that the Alaska Drive-Test Model disregards data that show improvement, if fewer than 85% of tests in a grid cell are below the minimum speed threshold for a frame.[192] GCI provides the example that, "if 80 percent of tests in a cell reflect speeds of 10/1 Mbps, and 20 percent of tests reflect speeds of 9/1 Mbps, the cell is deemed unserved at any speed—even though all tests reported far faster speeds than required in the next lower speed tier (2/.8 Mbps.)."[193] Where GCI fails a 4G LTE/3G grid cell for 4G LTE, GCI argues that, if the speeds are sufficiently above the 3G commitment, the grid cell should be a "pass" for the 3G frame.[194]

53. Where a grid cell is selected for only 4G LTE testing, we cannot credit the grid cell to 3G if it fails the 4G LTE speed tier. This suggestion, if adopted, would result in an under-sampling for the 4G LTE frame and an oversampling for the 3G frame. Further, this would have the effect of removing population from one frame and adding it to a different frame, thereby disturbing the original distribution of the grid cells across stratum as calculated prior to testing. For example, suppose there is a grid cell for which one of the providers has claimed 100 people are covered by 4G LTE, but for which testing shows only 80% of the results exceed the minimum performance threshold. GCI's proposal would reallocate the

---

[187] *See Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[188] *See* GCI Comments at 18 (advocating for an alternate drive-testing model without elaborating a methodology amounting to "statistically significant number of tests in the vicinity of residences being covered," as required).

[189] *See BDC Mobile Requirements Order* at 39-40, para. 64 ("[W]hen a challenged mobile service provider submits on-the-ground speed test data to rebut a challenge, the provider will be required to meet analogous thresholds to those required of challengers, adjusted to reflect the burden on providers to demonstrate that sufficient coverage exists at least 90% of the time in the challenged hexagon(s)."); *see id*. at 39-41, paras. 64-65.

[190] *See* 47 CFR § 54.320(d)(1)(i)-(v) (withholding support for failures at the interim milestone until the provider reports that it is eligible for Tier 1 status, at which point, all of the withheld funds are restored).

[191] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11290-92, Appx. B, Sec. II; *Alaska Plan Order*, 31 FCC Rcd at 10166, para. 85; *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321-22, Appx. A (providing the initial performance plans); *GCI Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.

[192] GCI Comments at 15.

[193] *Id*. at 15.

[194] *Id*. at 9 ("If fewer than 85 percent of the tests show speeds at or above the requirement for the LTE frame but show speeds at or above the requirement for the 3G frame, then the cell should be counted as a passing cell in the 3G frame and removed from the LTE frame.").

population from the 4G LTE frame (and the stratum within the 4G LTE frame to which that grid cell is assigned) to a different frame and stratum for which the testing would show that the performance benchmarks have been met (in this case, the 3G frame). However, as the stratification and sample allocation processes primarily consider population, this would mean that, after testing was completed, the total populations of the strata would have changed and, accordingly, the strata within each frame would no longer have the correct distribution of grid cells. Additionally, the number of samples optimally selected in each frame would also no longer be correct. This, in turn, would mean that the results could no longer be measured at the specified 90% confidence interval the Alaska Drive-Test Model sets for statistical significance.[195]

c. Waterfall Model

54. For the reasons described above, the Alaska Drive-Test Model does not allow for partial credit where a mobile-provider participant fails a test in a higher performance tier.[196] Frames are created based on the population covered at a particular minimum speed by technology from FCC Form 477 data set plus additional middle-mile data.[197] If, however, the FCC Form 477 data show population coverage beyond what is committed to at the five-year mark, then the testing of that frame could show that the mobile-provider participant covered more people than it committed to in its performance plan.[198] Where this happens, the commitments for the next lower tier last-mile technology will be accredited with the excess covered population of the higher technology tier.[199]

55. GCI suggests that it should receive partial credit for providing service at lower speeds if it does not meet the 85% successful testing standard at the sampled technology, and for support, it cites to the Alternative Connect America Model (ACAM) waterfall methodology.[200] For the ACAM waterfall methodology, a provider must satisfy a particular number of locations at a particular speed tier, and if a provider satisfies more than that, then the credit flows to the satisfaction of the next lower speed tier.[201] For example, if 60 locations need to have 25/3 Mbps performance, 10 locations must have 10/1 Mbps performance, and 30 locations must have 4/1 Mbps performance, and the provider supplies 80 locations

---

[195] *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11295, Appx. B, Sec. VII.

[196] *See id*.

[197] *See id.* at 11290-92, Appx. B, Sec. II.

[198] *See id.* at 11295, Appx. B, Sec. VII.

[199] *See id.* We note that the Commission established a framework that assesses Alaska Plan mobile provider compliance gaps on a per-commitment basis. Section 54.320(d) states that, "in the case of Alaska Plan mobile-carrier participants," performance obligations are based on "population covered by the specified technology, middle mile, and speed of service in the carrier's approved performance plan, by the interim milestone." 47 CFR § 54.320(d)(1)(i)-(iv). For example, if a provider committed to cover 100 people with 10/1 Mbps 4G LTE and covered only 70 of them according to December 31, 2021 FCC Form 477 data, then it would have a 30% compliance gap, and USAC would withhold 25% of the monthly support the service provider receives to serve these 100 people. *See* 47 CFR § 54.320(d)(1)(iii) (requiring 25% of support withheld for a compliance gap that is at least 25% but less than 50%). If the provider also committed to cover an additional 100 people with 2G and data indicate that that population is 100% covered with 2G, then that provider would receive a letter that it has a greater than 30% compliance gap for its 4G LTE commitment, but the monthly support that would be withheld—while still 25% of the 4G LTE support—would be 12.5% its total monthly support. *See* 47 CFR § 54.320(d)(1).

[200] GCI Comments at 15 (citing *Wireline Competition Bureau Provides Guidance Regarding Alternative Connect America Model Final Deployment Obligations*, Public Notice, 34 FCC Rcd 5337, 5343 (WCB 2019) (*ACAM Guidance Notice*)), 16 ("Similarly, in cells with tests reflecting multiple speeds, the results should reflect the speeds that the tests actually show—if 60 percent of tests show speeds of 15/3 Mbps and 40 percent of tests show speeds of 8/1 Mbps, then 60 percent of pops in that cell should be considered to have 10/1 Mbps or better and 40 percent of pops should be considered to have 2/.8 Mbps or better.").

[201] *ACAM Guidance Notice*, 34 FCC Rcd at 5343.

with 25/3 Mbps, then the 25/3 Mbps and 10/1 Mbps speed tier commitments would be fully satisfied, and 4/1 Mbps speed tier would be partially satisfied.[202]

56. The ACAM waterfall methodology does not, as GCI suggests, support allowing failed performance at higher speed tiers and receiving credit for those failed tests in the lower speed tiers. The ACAM waterfall methodology requires complete satisfaction of the higher performance tier, and if the provider connects locations beyond the minimum required in the higher performance tier, the excess coverage would flow down to the next level tier. If the provider does not completely satisfy the higher tier, then no excess is present, and no "waterfall" occurs: the provider needed to deploy to more locations in that tier and does not receive credit in other tiers for this failure.[203] GCI's proposal is thus inconsistent with the ACAM waterfall methodology.

57. The Alaska Drive-Test Model, as originally proposed and adopted here, includes a waterfall methodology similar to the one used in ACAM that is tailored to the drive-test requirement.[204] Specifically, where a provider has committed to multiple tiers of technology (i.e., 2G, 3G, and 4G LTE), any excess coverage would be applied to the next lower tier of technology.[205] In the *Alaska Drive Test Public Notice*, the Bureau provided the example: "if a provider has committed to cover 25,000 people with 4G LTE and the upper limit of the confidence interval shows adequate coverage for 30,000 people, then the remaining 5,000 [population] coverage can be applied to its 3G commitment."[206] The *Alaska Drive Test Public Notice* further stated that "[t]his process is iterative, so any further excess coverage can be applied to its 2G commitment."[207] In other words, the Alaska Drive-Test Model includes a waterfall methodology that would credit lower tier commitments when there is excess performance of the higher tier commitments.

IV. REQUEST FOR COMMENT

58. This Request for Comment seeks comment on an approach for mobile providers that receive more than $5 million annually from the Alaska Plan to address compliance gaps under Section 54.320(d)(1) of the Commission's rules.[208] Section 54.320(d)(1) establishes a framework to assess any compliance gaps for Alaska Plan mobile providers' commitments.[209] To ensure that mobile providers

---

[202] *Id*.

[203] *Id.* at 5338 ("If an A-CAM I carrier has not deployed 25/3 Mbps service to the requisite number of locations, it will have failed to meet its milestone, even if it has deployed 10/1 Mbps service to a number of locations in excess of its requirements. However, if an A-CAM I recipient deployed 25/3 Mbps service to a number of locations in excess of its requirement, those excess locations could be applied to meet the requirement to provide at least 10/1 Mbps service.")

[204] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11295, Appx. B, Sec. VII.

[205] *Id*.

[206] *Id*.

[207] *Id*.

[208] *See* 47 CFR § 54.320(d)(1)(i)-(iv) (requiring mobile-provider participants in the Alaska Plan to demonstrate coverage to a certain population "by the specified technology, middle mile, and speed of service in the [provider's] approved performance plan[] by the interim milestone").

[209] Section 54.320(d)(1) divides compliance gaps into four tiers, based on the percentage of the gap, with the highest gap in compliance being relegated to the highest tier—Tier 1: compliance gap of at least 5% but less than 15%; Tier 2: gap of at least 15% but less than 25%; Tier 3: gap of at least 25% but less than 50%; Tier 4: gap of 50% or more. *See* 47 CFR § 54.320(d)(1)(i)-(iv); *see also Alaska Plan Order*, 31 FCC Rcd at 10184-86. For compliance gaps of 5% or more, the mobile provider must file quarterly reports to identify "the populations to which [it] has extended or upgraded service meeting [its] approved performance plan and obligations." *See* 47 CFR § 54.320(d)(1)(i); *see also id.* § 54.320(d)(1)(ii)-(iv). The provider "must continue to file quarterly reports until [it] reports that it has reduced the compliance gap to less than five percent . . . and [WTB] issues a letter to that effect." 47 CFR § 54.320(d)(1)(i); (continued….)

receiving more than $5 million annually for the Alaska Plan have met their interim milestone commitments, the Commission will analyze the drive test data discussed in this Order, in addition to other data, to determine whether they have any compliance gaps and, if so, the extent of the compliance gap per commitment (i.e., which compliance gap tier the mobile provider falls into). We seek comment on requiring these mobile providers to submit new drive-test data if they fail to demonstrate compliance with their approved performance plan by the five-year interim milestone.[210]

59. To the extent that a mobile-provider participant subject to the drive-test requirement is shown through the results of the testing to have failed to meet its five-year performance requirement, and seeks to cure a compliance gap, we propose to require the provider to submit new drive-test data consistent with the Alaska Drive-Test Model we adopt today.[211] Under this proposal, the provider would submit updated coverage data, including middle-mile data if applicable, whenever it seeks to improve its compliance gap tier[212] until it has less than a 5% compliance gap.[213] Commission staff then would provide new grid cells to test based on this updated coverage data. For example, if a provider that had a compliance gap of 30% (and is thus in Tier 3) reports that it reduced its compliance gap to 10%, which would warrant a move to Tier 1, then the provider would submit its updated coverage and middle-mile data to the Commission. Staff would provide the mobile-provider participant new grid cells to test, consistent with the mobile-provider participant's updated coverage data. The mobile-provider participant would need to provide new drive-test data consistent with the Alaska Drive-Test Model as verifying evidence that it has moved compliance tiers. For a mobile-provider participant with multiple frames (if there is a compliance gap for its fiber-based 4G LTE population, for example), it would need to provide supporting drive-test data for all affected frames. This would ensure that new compliance gaps are not created when other compliance gaps are reduced.[214] We seek comment on this proposal. We also seek comment on whether we should adopt any additional requirements for retesting beyond what is required under the Alaska Drive-Test Model.

A. Digital Equity and Inclusion

60. Finally, as part of the Commission's continuing effort to advance digital equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality, we invite comment on any equity-related considerations and benefits (if any) that may be associated with the issues discussed herein. Specifically, we seek comment on how these matters may promote or inhibit advances in diversity, equity, inclusion, and accessibility.

(Continued from previous page)
see also id. § 54.320(d)(1)(ii)-(iv). Through this quarterly reporting, a mobile provider may move from higher tiers to lower tiers as it comes into compliance with its commitments. *See* 47 CFR § 54.320(d)(1)(i)-(iv).

[210] As the Request for Comment only affects two parties and only deals with one issue—testing after a compliance gap—a 14 day comment cycle and 7 day reply cycle is appropriate here.

[211] *See* 47 CFR § 54.320(d)(1)(i)-(iv) (requiring quarterly progress reports tracking the providers' progress in coming into compliance).

[212] *See* 47 CFR § 54.320(d)(1)(iv)(B) (providing further penalties if the carrier does not report as eligible for Tier 3 or one of the other lower tiers within six months).

[213] 47 CFR § 54.320(d)(1)(i).

[214] If the Bureau determines more frames would be affected, then it would ask for additional drive-test data for the additional frames. However, in the example of a compliance gap for fiber-based 4G LTE, the two remaining frames—microwave-based 4G LTE and satellite-based 4G LTE—are unlikely to be affected as this would entail deploying expensive fiber middle mile to hard to reach locations.

V. PROCEDURAL MATTERS

A. Initial Regulatory Flexibility Certification

61. The Regulatory Flexibility Act of 1980, as amended (RFA),[215] requires that an initial regulatory flexibility analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[216] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[217] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[218] 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 Small Business Administration (SBA).[219]

62. This Request for Comment seeks comment on the drive testing proposals required by the Alaska Plan for those wireless participants receiving more than $5 million in annual Alaska Plan support, excluding the smaller wireless participants that receive less than that in annual support.[220] The proposals, if adopted, would apply to only two entities, one of which does not qualify as a small entity.[221] Therefore, we certify that the proposals in this Request for Comment, if adopted, will not have a significant economic impact on a substantial number of small entities.

63. The Commission will send a copy of the Request for Comment, including a copy of this Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the SBA.[222] This initial certification will also be published in the Federal Register.[223]

B. Final Regulatory Flexibility Certification

64. The Regulatory Flexibility Act of 1980, as amended (RFA),[224] requires that a regulatory flexibility analysis be prepared for notice-and-comment rule making proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[225] The RFA generally defines the term "small entity" as having the same

[215] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601-12, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[216] 5 U.S.C. § 605(b).

[217] 5 U.S.C. § 601(6).

[218] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[219] 15 U.S.C. § 632.

[220] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[221] *See* 13 CFR § 121.201; NAICS Code 517312 (specifying that a wireless telecommunications carrier is a small entity if it has 1500 or fewer employees). GCI has over 2,000 employees. *See* GCI, Executive Team, https://www.gci.com/about/executiveteam (observing that GCI has over 2,000 employees) (last visited Mar. 30, 2022).

[222] 5 U.S.C. § 605(b).

[223] *Id*.

[224] The RFA, *see* 5 U.S.C. §§ 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[225] 5 U.S.C. § 605(b).

meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[226] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[227] 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 Small Business Administration (SBA).[228]

65. An Initial Regulatory Flexibility Certification (IRFC) was incorporated in the *Notice* in this proceeding.[229] In the *Notice*, the Bureau observed that the drive testing proposals required by the Alaska Plan apply only to wireless participants receiving more than $5 million in annual Alaska Plan support, excluding the smaller wireless participants that receive less than that amount in annual support.[230] And, the proposals, if adopted, would apply to only two entities, one of which does not qualify as a small entity.[231] Therefore, we certify that the requirements of the Order will not have a significant economic impact on a substantial number of small entities.

66. The Commission will send a copy of the Order, including a copy of the Final Regulatory Flexibility Certification, in a report to Congress pursuant to the Congressional Review Act.[232] In addition, the Order and this final certification will be sent to the Chief Counsel for Advocacy of the SBA and will be published in the Federal Register.[233]

C. Congressional Review Act

67. The Commission has determined, and the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, concurs, that this rule is "non-major" under the Congressional Review Act, 5 U.S.C. § 804(2). The Commission will send a copy of this Order to Congress and the Government Accountability Office pursuant to 5 U.S.C. § 801(a)(1)(A).

D. Ex Parte Presentations

68. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[234] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two 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

---

[226] 5 U.S.C. § 601(6).

[227] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[228] 15 U.S.C. § 632.

[229] *Alaska Drive Test Public Notice*, 36 FCC Rcd at 11282.

[230] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103.

[231] *See* 13 CFR § 121.201; NAICS Code 517312 (specifying that a wireless telecommunications carrier is a small entity if it has 1500 or fewer employees). GCI has over 2,000 employees. *See* GCI, Executive Team, https://www.gci.com/about/executiveteam (observing that GCI has over 2,000 employees) (last visited July 15, 2021).

[232] *See* 5 U.S.C. § 801(a)(1)(A).

[233] *See* 5 U.S.C. § 605(b).

[234] 47 CFR § 1.1200 *et seq.*

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.

E. Filing Requirements

69. *Comments*. Interested parties may file comments and reply comments on or before the dates indicated on the first page of this document and must reference WC Docket No. 16-271. Comments may be filed using the Commission's Electronic Filing System (ECFS) or by filing paper copies.[235]

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://apps.fcc.gov/ecfs/.
- Paper Filers: 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, 35 FCC Rcd 2788 (2020), https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy.

70. *People with Disabilities*. To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the FCC's Consumer and Governmental Affairs Bureau at (202) 418-0530 (voice).

71. *Additional Information*. For additional information on this proceeding, contact Matthew Warner of the Wireless Telecommunications Bureau, Competition & Infrastructure Policy Division, Matthew.Warner@fcc.gov, (202) 418-2419.

VI. ORDERING CLAUSES

72. Accordingly, IT IS ORDERED, pursuant to the authority contained in sections 1-4, 201, 254, 301, 303, 307, 309, 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151-154, 201, 254, 301, 303, 307, 309, 332 and sections 0.91, 0.131, 0.291, 0.311, 54.317, 54.320, and 54.321 of

[235] *See Electronic Filing of Documents in Rulemaking Proceedings*, GC Docket No. 97-113, Report and Order, 13 FCC Rcd 11322 (1998).

the Commission's rules, 47 CFR §§ 0.91, 0.131, 0.291, 0.311, 54.317, 54.320, and 54.321, and the delegated authority contained in the *Alaska Plan Order*, 31 FCC Rcd 10139, 10160, 10166-67, paras. 67, 85, this Order IS ADOPTED, effective 30 days after publication in the Federal Register, except that the deadline for filing updated coverage data shall be on 10 days after the adoption of the Order in accordance with the Public Notice.

73. IT IS FURTHER ORDERED that, pursuant to the authority contained in sections 1-4, 201, 254, 301, 303, 307, 309, 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151-154, 201, 254, 301, 303, 307, 309, 332 and sections 0.91, 0.131, 0.291, 0.311, 54.317, 54.320, and 54.321 of the Commission's rules, 47 CFR §§ 0.91, 0.131, 0.291, 0.311, 54.317, 54.320, and 54.321, and the delegated authority contained in the *Alaska Plan Order*, 31 FCC Rcd 10139, 10160, 10166-67, paras. 67, 85, NOTICE IS HEREBY GIVEN of the proposals described and tentative conclusions in the Request for Comment.

74. IT IS FURTHER ORDERED that the Office of the Managing Director, Performance Evaluation and Records Management, SHALL SEND a copy of this Order in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, 5 U.S.C. § 801(a)(1)(A).

75. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Order and Request for Comment, including the Initial Regulatory Flexibility Certification and the Final Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Joel Taubenblatt
Acting Chief
Wireless Telecommunications Bureau

APPENDIX A

Mobile Speed Test Data Specification

1. Overview

The Alaska Plan requires certain plan participants to conduct and report speed tests of their networks, as described in this Order and appendices. Appendix A describes the data to be collected and the format in which it is to be reported.

2. Sample Data


```
{
 "submission_type": "Alaska Plan",
 "submissions": [
  {
   "test_id": "1599236609",
   "device_type": "Android",
   "manufacturer": "Google",
   "model": "PIXEL 6",
   "operating_system": "Android 12",
   "device_tac": "35142059",
   "app_name": "FCC Speed Test app",
   "app_version": "2.0.4058",
   "provider_name": "GCI",
   "tests": {
    "download": {
     "timestamp": "2021-07-08T09:02:42-08:00",
     "warmup_duration": 3000622,
     "warmup_bytes_transferred": 31900808,
     "duration": 4997185,
     "bytes_transferred": 97382448,
     "bytes_sec": 19487461,
     "locations": [
      {
       "timestamp": "2021-07-08T09:02:42-08:00",
       "latitude": 63.069168,
       "longitude": -153.248195
      },
      {
       "timestamp": "2021-07-08T09:02:47-08:00",
       "latitude": 63.069168,
       "longitude": -153.248195
      }
     ],
     "cells": [
      {
       "cell_id": 32193025,
       "physical_cell_id": 192,
       "cell_connection": 1,
       "network_generation": "4G",
       "network_subtype": "LTE",
       "rssi": -77.1,
       "rsrp": -95.2,
       "rsrq": -16.5,
       "sinr": 11.9,
       "ec_io": -8.3,
       "rcsp": -84.2,
       "cqi": 10,
       "spectrum_band": 66,
```

```
          "spectrum_bandwidth": 20,
          "arfcn": 66786
         },
         {
          "cell_id": 10283265,
          "physical_cell_id": 101,
          "cell_connection": 2,
          "network_generation": "4G",
          "network_subtype": "LTE",
          "rssi": -77.1,
          "rsrp": -97.2,
          "rsrq": -10.1,
          "sinr": 21.2,
          "ec_io": -8.3,
          "rcsp": -84.2,
          "cqi": 10,
          "spectrum_band": 71,
          "spectrum_bandwidth": 15,
          "arfcn": 68686
         }
        ],
        "success_flag": true
       },
       "upload": {
        "timestamp": "2021-07-08T09:02:51-08:00",
        "warmup_duration": 3000213,
        "warmup_bytes_transferred": 8337402,
        "duration": 5000085,
        "bytes_transferred": 15129062,
        "bytes_sec": 3025761,
        "locations": [
         {
          "timestamp": "2021-07-08T09:02:51-08:00",
          "latitude": 63.069168,
          "longitude": -153.248195
         },
         {
          "timestamp": "2021-07-08T09:02:56-08:00",
          "latitude": 63.069168,
          "longitude": -153.248195
         }
        ],
        "cells": [
         {
          "cell_id": 32193025,
          "physical_cell_id": 192,
          "cell_connection": 1,
          "network_generation": "4G",
          "network_subtype": "LTE",
          "rssi": -77.1,
          "rsrp": -96.2,
          "rsrq": -9.1,
          "sinr": 10.5,
          "ec_io": -8.3,
          "rcsp": -84.2,
          "cqi": 10,
          "spectrum_band": 66,
          "spectrum_bandwidth": 20,
          "arfcn": 66786
         },
         {
          "cell_id": 35988099,
          "physical_cell_id": 192,
```

```
          "cell_connection": 2,
          "network_generation": "4G",
          "network_subtype": "LTE",
          "rssi": -71.1,
          "rsrp": -99.1,
          "rsrq": -6.9,
          "sinr": 9.7,
          "ec_io": -8.3,
          "rcsp": -84.2,
          "cqi": 10,
          "spectrum_band": 41,
          "spectrum_bandwidth": 20,
          "arfcn": 39874
        }
      ],
      "success_flag": true
    }
  }
 ]
}
```


3. Mobile Speed Test Data

This section details the data structure common for all mobile speed test data in the Alaska Plan. This file contains records of each mobile speed test in JavaScript Object Notation (JSON) format matching the specification in the table and sections below:

Field	Data Type	Example	Description / Notes
submission_type	Enumerated	Alaska Plan	Type of data submission. *- Value must be "Alaska Plan".*
submissions	Array [Submission Object]		List of drive-test data submissions. *Note: the specification for the Submission Object is described in **Section a**.*

a. Submission Object

Field	Data Type	Example	Description / Notes
test_id	String	1599236609	Unique identifier used by the app or entity to differentiate tests. *- Value must be unique across all data submitted by the same entity.*
device_type	Enumerated	Android	Type of device. *- Value must be one of the following:* *{iOS|Android|Other}*
manufacturer	String	Google	Name of the device manufacturer.
model	String	PIXEL 6	Name of the device model.
operating_system	String	Android 12	Name and version of the device operating system.

Field	Data Type	Example	Description / Notes
device_tac	String	35142059	8-digit Type Allocation Code of the device. *- Value is not available on iOS and may be null for these device types.* *- Value may be null if the device does not return a valid value or else returns a value of unknown.*
app_name	String	FCC Speed Test app	Name of the mobile speed test app.
app_version	String	2.0.4058	Version of the mobile speed test app.
provider_name	String	GCI	Name of the mobile service provider.
tests	Test Object		Information about the test metrics. *Note: the specification for the Test Object is described in **Section b**.*

b. Test Object

Field	Data Type	Example	Description / Notes
download	Download Test Object		Information about the download test metric. *Note: this object is only required for 3G, 4G LTE, and 5G-NR network generation speed tests and would be omitted for 2G network generation voice tests.* *Note: the specification for the Download Test Object is described in **Section c**.*
upload	Upload Test Object		Information about the upload test metric. *Note: this object is only required for 3G, 4G LTE, and 5G-NR network generation speed tests and would be omitted for 2G network generation voice tests.* *Note: the specification for the Upload Test Object is described in **Section d**.*
voice_ terminating	Mobile Terminating Voice Test Object		Information about the mobile terminating voice test metric. *Note: this object is only required for 2G network generation voice tests and would be omitted for 3G, 4G LTE, and 5G-NR speed tests.* *Note: the specification for the Mobile Terminating Voice Test Object is described in **Section e**.*

Field	Data Type	Example	Description / Notes
voice_ originating	Mobile Originating Voice Test Object		Information about the mobile originating voice test metric. *Note: this object is only required for 2G network generation voice tests and would be omitted for 3G, 4G LTE, and 5G-NR speed tests.* *Note: the specification for the Mobile Originating Voice Test Object is described in **Section f**.*

c. Download Test Object

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:42-08:00	Timestamp of the time at which the test metric commenced. *- Value must match valid ISO-8601 format, including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
warmup_ duration	Integer	3000622	Duration in microseconds that connection took to stabilize (e.g., TCP slow start) before the test metric commenced.
warmup_bytes_ transferred	Integer	31900808	Measured total amount of data in bytes that were transferred during the period the connection took to stabilize (e.g., TCP slow start) before the test metric commenced.
duration	Integer	4997185	Duration that the test metric took to complete in microseconds.
bytes_transferred	Integer	97382448	Measured total amount of data in bytes that the test metric transferred.
bytes_sec	Integer	19487461	Measured number of bytes per second that the test metric transferred.
locations	Array [Location Object]		List of geographic coordinates of the locations measured during the speed test. *Note: the specification for each Location Object element is described in **Section g**.*
cells	Array [Cell Object]		List of cellular telephony information measured during the speed test. *Note: the specification for each Cell Object element is described in **Section h**.*
success_flag	Boolean	true	Boolean flag indicating whether the test completed successfully and without a change in state or connectivity.

d. Upload Test Object

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:51-08:00	Timestamp of the time at which the test metric commenced. *- Value must match valid ISO-8601 format, including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
warmup_ duration	Integer	3000213	Duration in microseconds that connection took to stabilize (e.g., TCP slow start) before the test metric commenced.
warmup_bytes_ transferred	Integer	8337402	Measured total amount of data in bytes that were transferred during the period the connection took to stabilize (e.g., TCP slow start) before the test metric commenced.
duration	Integer	5000085	Duration that the test metric took to complete in microseconds.
bytes_transferred	Integer	15129062	Measured total amount of data in bytes that the test metric transferred.
bytes_sec	Integer	3025761	Measured number of bytes per second that the test metric transferred.
locations	Array [Location Object]		List of geographic coordinates of the locations measured during the speed test. *Note: the specification for each Location Object element is described in **Section g**.*
cells	Array [Cell Object]		List of cellular telephony information measured during the speed test. *Note: the specification for each Cell Object element is described in **Section h**.*
success_flag	Boolean	true	Boolean flag indicating whether the test completed successfully and without a change in state or connectivity.

e. Mobile Terminating Voice Test Object

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:42-08:00	Timestamp of the time at which the test metric commenced. *- Value must match valid ISO-8601 format, including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
duration	Integer	2001681	Duration that the test metric took to complete in microseconds. *- Value must be between 5000000 and 30000000 (i.e., between 5 and 30 seconds).*

Field	Data Type	Example	Description / Notes
locations	Array [Location Objects]		List of geographic coordinates of the location(s) measured during the test. *Note: the specification for each Location Object element is described in **Section g**.*
cells	Array [Cell Objects]		List of cellular telephony information measured during the test. *Note: the specification for each Cell Object element is described in **Section h**.*
success_flag	Boolean	true	Boolean flag indicating whether the test completed successfully and without a change in state or connectivity.

f. Mobile Originating Voice Test Object

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:42-08:00	Timestamp of the time at which the test metric commenced. *- Value must match valid ISO-8601 format, including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
duration	Integer	2005309	Duration that the test metric took to complete in microseconds. *- Value must be between 5000000 and 30000000 (i.e., between 5 and 30 seconds).*
locations	Array [Location Objects]		List of geographic coordinates of the location(s) measured during the test. *Note: the specification for each Location Object element is described in **Section g**.*
cells	Array [Cell Objects]		List of cellular telephony information measured during the test. *Note: the specification for each Cell Object element is described in **Section h**.*
success_flag	Boolean	true	Boolean flag indicating whether the test completed successfully and without a change in state or connectivity.

g. Location Objects

Each element of the "locations" array contains the geographic coordinates of the locations measured at the start and end of the speed test, as well as during the test (if measured).

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:58-08:00	Timestamp of the time at which the location was recorded. *- Value must match valid ISO-8601 format, including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
latitude	Numeric	63.069168	Unprojected (WGS-84) geographic coordinate latitude in decimal degrees of the reported location where the test was conducted. *- Value must have minimum precision of 6 decimal places.*
longitude	Numeric	-153.248195	Unprojected (WGS-84) geographic coordinate longitude in decimal degrees of the reported location where the test was conducted. *- Value must have minimum precision of 6 decimal places.*

h. Cell Objects

Each element of the "cells" array contains telephony information about the cell / carrier.

Field	Data Type	Example	Description / Notes
timestamp	Datetime	2021-07-08T09:02:42-08:00	Timestamp of the time at which the cell information was measured. *- Value must match valid ISO-8601 format including seconds and timezone offset, i.e.: YYYY-MM-DD[T]hh:mm:ss±hh:mm*
cell_id	Numeric	32193025	Measured cell identifier. *- Value is not available on iOS and may be null for these device types.*
physical_cell_id	Integer	192	Measured Physical Cell Identity (PCI) of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is only required for 4G LTE and 5G-NR tests and must be null for 2G or 3G tests.*

Field	Data Type	Example	Description / Notes
cell_connection	Enumerated	1	Connection status of the cell. *- Value must be one of the following codes:* *0 – Not Serving* *1 – Primary Serving* *2 – Secondary Serving* *- Value is not available on iOS and may be null for these device types.* *- Value may be null if the device does not return a valid value or else returns a value of unknown.*
network_ generation	Enumerated	4G	String representing the network generation of the cell. *- Value must be one of the following:* *{2G|3G|4G|5G|Other}*
network_subtype	Enumerated	LTE	String representing the network subtype of the cell. *- Value must be one of the following:* *{1X|EVDO|WCDMA|GSM|HSPA|HSPA+| LTE|NRSA|NRNSA}*
rssi	Decimal	-57.2	Measured Received Signal Strength Indication (RSSI) in dBm of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is required for all network generations and subtypes.*
rxlev	Decimal	-80.2	Measured Received Signal Level in dBm of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is only required for tests with a network generation and subtype of 2G – GSM, and must be null for all other network generations or subtypes.*
rsrp	Decimal	-92.1	Measured Reference Signal Received Power (RSRP) in dBm of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value must be null for 2G or 3G tests.* *- Note: this value represents the Synchronization Signal (SS) for 5G-NR tests and the Channel-specific Reference Signal (CRS) for 4G LTE tests.*

Field	Data Type	Example	Description / Notes
rsrq	Decimal	-12.5	Measured Reference Signal Received Quality (RSRQ) in dB of the cell. *- Value must be null for 2G or 3G tests.* *- Note: this value represents the Synchronization Signal (SS) for 5G-NR tests and the Channel-specific Reference Signal (CRS) for 4G LTE tests.*
sinr	Decimal	21.3	Measured Signal to Interference and Noise Ratio (SINR) in dB of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value may be null for 2G or 3G tests.* *- Note: this value represents the Synchronization Signal (SS) for 5G-NR tests and the Channel-specific Reference Signal (CRS) for 4G LTE tests.*
rxqual	Integer	3	Measured Received Signal Quality of the cell *- Value is not available on iOS and may be null for these device types.* *- Value must be between* 0 and 7. *- Value is only required for tests with a network generation of 2G and network subtype of GSM, and must be null for all other network generations or network subtypes.*
ec_io	Decimal	-8.3	Measured Energy per Chip to Interference Power Ratio in dB of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is only required for CDMA 1X, EVDO, WCDMA, HSPA, and HSPA+ network subtypes, and must be null for all other network subtypes.*
rscp	Decimal	-87.2	Measured Received Signal Code Power in dBm of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is only required for WCDMA, HSPA, and HSPA+ network subtypes, and may be null for all other network subtypes.*

Field	Data Type	Example	Description / Notes
cqi	Integer	11	Measured Channel Quality Indicator (CQI) of the cell. *- Value is not available on iOS and may be null for these device types.* *- Value is only required for WCDMA, HSPA, HSPA+, LTE, and NR network subtypes, and may be null for all other network subtypes.*
spectrum_band	Integer	66	Spectrum band used by the cell. *- Value is not available on iOS and may be null for these device types.* *- Value may be null for 2G or 3G tests.* *- Value may be null if the device does not return a valid value or else returns a value of unknown.* *- Note: the reported band value corresponds to the Operating Bands tables as follows:* *- 4G LTE: 3GPP TS 36.101 section 5.5* *- 5G-NR: 3GPP TS 38.101 table 5.2-1*
spectrum_bandwidth	Numeric	15	Total amount of spectral bandwidth used by the cell in MHz. *- Value is not available on iOS and may be null for these device types.*
arfcn	Integer	66786	Absolute radio-frequency channel number, measured absolute physical RF channel number of the cell. *- Value is not available on iOS and may be null for these device types.*

APPENDIX B

Drive-Test Procedures for Alaska Drive-Test Model—Technical Appendix

I. INTRODUCTION

This technical appendix provides the process for Alaska Plan mobile service providers receiving more than $5 million annually in support to gather drive testing data to include with its performance plan milestone certifications. The Alaska Plan requires such testing to include "a statistically significant number of tests in the vicinity of residences being covered" to demonstrate that plan participants have met the commitments in the performance plans approved by the Wireless Telecommunications Bureau (Bureau).[1]

Remote Alaska is extraordinarily sparsely populated; virtually all its county-level geographies have population densities of three or fewer people per square mile. Accordingly, testing every location for a provider's coverage would be unduly burdensome, and testing a sample of locations is required.

For the sampling required to implement the testing procedures under the Alaska Plan, the Alaska Drive-Test Model uses stratified random sampling.[2] This sampling methodology balances between the statistical significance required by the Alaska Plan and the burden on providers to conduct tests from a sufficient number of locations.

The following sections describe the details of the testing process. These technical details serve as a guide to both the Bureau and the providers doing the testing in determining:

- where, within the geographic boundaries of the coverage map, a provider should conduct testing;
- how many locations a provider must test;
- what speed test measurements will be accepted for staff analysis by the Bureau; and
- how Bureau staff will evaluate the test data and adjudicate whether the provider has passed or failed the testing process.

II. SAMPLE FRAME CONSTRUCTION

To select locations for testing, one must first construct a list (known as a "sampling frame" or "frame") of possible locations to select from. The construction of this frame is a multi-part process. First, we will create a set of "eligible populated areas." Census blocks eligible for frozen-support funding would be included,[3] and these census blocks would be merged with the populated areas of the Alaska Population-Distribution Model.[4] Second, staff will merge the FCC Form 477 reported coverage areas (for which a provider committed to deploy and that are subject to testing) with the eligible populated areas to create a set of "covered populated areas." Third, staff will overlay a grid of 1 km x 1 km squares onto the covered populated areas.[5] Due to the fact that the Alaska Population-Distribution Model uniformly distributes

[1] *Alaska Plan Order*, 31 FCC Rcd at 10173, para. 103; *see also Alaska Population Distribution Order*, 35 FCC Rcd 10373.

[2] William G. Cochran, Sampling Techniques ch. 5 (3rd ed. 1977).

[3] *Alaska Population Distribution Order*, 35 FCC Rcd at 10378, para. 15; Letter from Julie A. Veach, Counsel to GCI, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 16-271, Attach. (filed Nov. 29, 2016).

[4] *Alaska Population Distribution Order*, 35 FCC Rcd at 10373.

[5] Staff will use this particular type of grid because census blocks are not of uniform geographic size, which could require a different number of speed tests for each block, and, in turn, could increase the testing burden on providers. Grids of smaller sizes and shapes are less likely to provide easily accessible areas for testing given the nature of roads and population distribution in remote Alaska, and grids of larger sizes and shapes would provide more heterogeneous wireless performance, which would require more cumbersome rules for actually conducting drive testing to ensure geographic diversity of the sample within each grid.

population within the populated areas of a census block, the covered populated areas of a block likewise have a uniform population distribution. The total population of each grid cell is the sum of the populations of the covered populated areas contained within a given grid cell. For example, if a grid cell contains 25% of the covered populated area of a census block, that grid cell would be credited with 25% of that block's covered population. That same grid cell might also contain 100% of a second census block's covered populated area. So all of that census block's covered population would be credited to that grid cell, and the grid cell's total population will be the sum of these two populations. Lastly, any grid cell that contains fewer than 100,000 square meters of covered populated area, or 10% of the grid cell, will be excluded from the frame.[6] This ensures that all grid cells have a reasonable testable area, reducing burden on providers. Grid cells with smaller levels of covered populated area are less likely to have areas that are publicly accessible or large enough to conduct mobile testing. Figures 1-4 below detail this process.

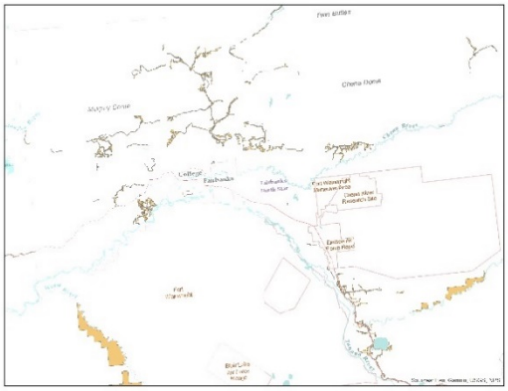

Fig. 1: Eligible Blocks and Populated Areas

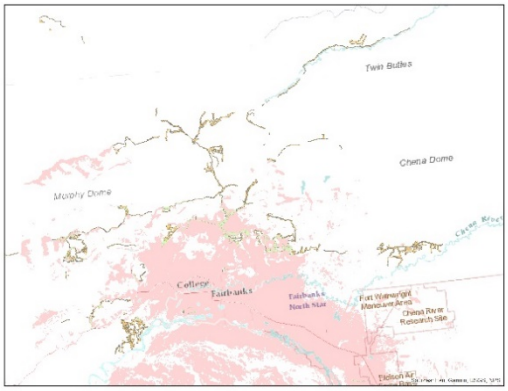

Fig. 2: Eligible Populated Areas and Coverage

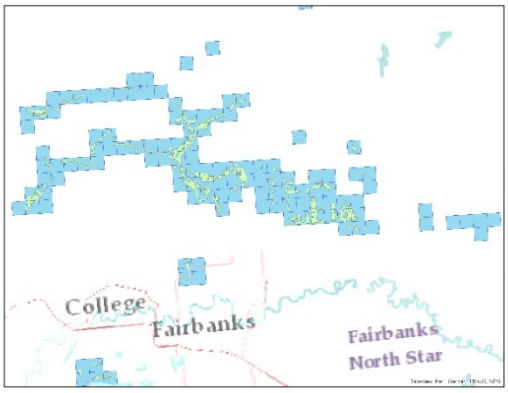

Fig. 3: Covered Populated Areas with Grid

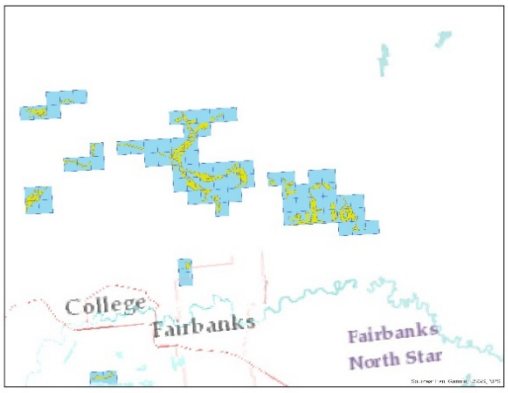

Fig 4: Grid Cells Eligible for Selection

For commitments that do not promise different speeds for different middle-mile technologies, staff will construct the frame based on the reported technology coverage from the provider's FCC Form 477 submission.[7] For areas served by more than one technology, as reported on the FCC Form 477, staff will

[6] For clarification, the population of grid cells with a *de minimis* populated area will be credited towards the commitments represented by the frames from which the respective grid cells were removed. For example, a grid cell that was removed from a frame measuring fiber-based 4G LTE at 10/1 Mbps because it had a testable area of less than 100,000 square meters would have its population credited towards that provider's fiber-based 4G LTE at 10/1 Mbps commitment.

only include the latest generation technology in the frame for any areas covered by multiple technologies. For example, if an area is covered by both 2G and 3G, then the area will only be included in the 3G frame. As no commitments were made for 5G-NR service, any 5G-NR coverage would be included within the LTE frame.[8] Where a provider has committed to different speeds in different areas due to different middle-mile technologies, the frame would rely on additional data[9] submitted by the provider to differentiate the covered areas of a given technology (e.g., LTE) with multiple middle-mile types.

III. FRAME STRATIFICATION

Frame stratification is the process of dividing a frame into subsets of similar characteristics, called strata.[10] This methodology allows fewer grid cells to be selected for testing while producing the statistically equivalent level of accuracy as sampling the entire frame, thus reducing testing burden.

The number of strata for each frame depends on the number of grid cells in a given frame. To create the strata, the Bureau will use the cumulative square root of the frequency (CSRF) method,[11] based on grid-level estimates of covered population. CSRF is a standard stratification method used to define the breaks between strata. It creates equal intervals not on the scale along the stratification variable (in this case, covered population) scale, but rather on the scale along the cumulated square root of the count (frequency) of grid cells belonging to equal intervals of the stratification variable. The first stratum in each frame would contain all grid cells with a population of less than one.

Based on the data staff currently have, each frame will likely contain between two and eight strata. Staff analysis has found that this stratification method produces strata of more equal sizes than other potential stratification methods (e.g., based on census tracts), which reduces the number of grid cells that need to be selected for testing.

(Continued from previous page)

[7] Based upon our recent extension of the drive-test filing deadline from March 1, 2022 to September 30, 2022, staff will analyze December 2021 FCC Form 477 data for the creation of the frame. *See Alaska Drive Test Extension Order* at 1, para. 1.

[8] If a provider's FCC Form 477 submissions show more than one level of speed for a given technology, then only the area of the submission with speeds equaling or exceeding the committed service will be included in that frame, with the rest of the area included in the frame of the lower last-mile technology. For example, if a provider has committed to LTE at 10/1 Mbps speeds, and shows in its FCC Form 477 LTE submission areas that have 10/1 Mbps LTE speeds, and other areas with 5/1 Mbps speeds, only the 10/1 Mbps areas would be included in the LTE frame, while the 5/1 Mbps areas would be instead included in the 3G frame, which could also be described as "3G or better." This will prevent a provider who has begun upgrading an area's service, but that has not yet finished the upgrade, from being penalized by having it tested against a standard of a fully upgraded service area.

[9] *See, e.g.*, E-mail from Julie A. Veach, Counsel to GCI, to Matthew J. Collins, Economist, Wireless Telecommunication Bureau, FCC (Oct. 1, 2018, 10:14 ET), Attach. (providing a census-block-by-census-block list of last-mile technology available at start of plan and middle-mile infrastructure available). In the *Alaska Drive Test Public Notice*, the Bureau allowed submission of updated coverage data within 10 days of adoption of this order, so long as the provider notified the Bureau within the Public Notice comment cycle. *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. II. GCI indicated that it would submit updated data. *See* E-mail from Julie A. Veach, Counsel to GCI, to Matthew Warner and Wesley Platt, Wireless Telecommunications Bureau, FCC (Aug. 12, 2021, 12:10 ET) (Veach Aug. 12, 2021 E-mail). GCI's notification indicated that it would submit data that would "better reflect the December 2021 Form 477 data that it is likely to submit in March 2022" and that it "plans to submit any updates or corrections to the list of census blocks and their associated middle mile types." Veach Aug. 12, 2021 E-mail. The portion regarding the FCC Form 477 data is moot, as the Commission has received the FCC Form 477 data that reflect the providers' networks as of December 31, 2021. However, GCI has up to 10 days after the adoption of this Order to submit any updates or corrections to the list of census blocks and their associated middle mile types in a spreadsheet or shapefile format.

[10] William G. Cochran, Sampling Techniques at 89.

[11] *Id*. at 127-31.

Further, staff will select certain grid cells with probability 1 (grid cells that are called certainties) within each stratum.[12] This ensures that grid cells that have a high population within a given stratum are tested; this should prevent the testing results of the stratum from being skewed by outlier results from low-weighted grid cells.

IV. SAMPLE SIZE CALCULATION AND ALLOCATION AND SAMPLE SELECTION

The Bureau will determine the number of grid cells that the provider has to test (that is, the sample size, n), based on two statistical assumptions. The first is that the variance of the desired estimate of average population served cannot exceed a specified value, V. The second is that the cost of drive testing is constant in every grid cell selected in the sample.[13] Under these assumptions, a theoretical value for the sample size can be calculated as detailed below.

Let L denote the number of strata in the frame and let the index h distinguish these L strata. Further, denote or define the following quantities:

- Number of grid cells in the stratum $= N_h$ (thus, $N = \sum_{h=1L} \quad N_h$)
- Weight of the stratum $= W_h = N_h/N$
- Mean of X in the stratum $= \bar{X}_h = \frac{1}{N_h}\sum_{i=1}^{N_h} X_{h,i}$ where $X_{h,i}$ is the value of committed population X in the ith grid cell of stratum h
- Variance of X in the stratum $= V(X)_h = \frac{\sum_{i=1}^{N_h}(X_{h,i}-\bar{X}_h)^2}{N_h-1}$

Under our proposal, the theoretical minimum sample size is given by:[14]

$$n = \frac{\left(\sum_{h=1}^{L} W_h\sqrt{V(X)_h}\right)^2}{V + (1/N)\sum_{h=1}^{L} W_h V(X)_h}.$$

Once determined, n would be allocated among the different strata. Specifically, if n_h is the number of sample grid cells allocated to the stratum, then:

$$n_h = n\frac{W_h\sqrt{V(X)_h}}{\sum_{h=1}^{L} W_h\sqrt{V(X)_h}} = n\frac{N_h\sqrt{V(X)_h}}{\sum_{h=1}^{L} N_h\sqrt{V(X)_h}}$$

This method of apportioning the sample among the various strata is called Neyman allocation.[15] This method will assign a greater number of sampled grid cells to strata with higher populations rather than lower populations. Note that $n = \sum_{h=1}^{L} n_h$.

---

[12] Sharon L. Lohr, Sampling: Design and Analysis ch. 2 (1999).

[13] The assumption of constant cost is equivalent to deriving the optimal sample size and selecting the number of samples from each stratum based only on the quality of the resulting statistic. The Bureau is de-emphasizing non-statistical concerns (e.g. testing costs) that might otherwise result in a different sample size and allocation of samples across strata. GCI argues that the "cost of drive testing will be substantially more in areas with no roads and in areas that are distant from the nearest road." GCI Comments at 14. The Bureau recognizes that actual drive testing cost per sampling grid may vary. However, as costs will be low in some grids but high in others, we expect that the total cost burden of testing will be comparable to alternative schemes that also consider costs. The Bureau does recognize that testing cost is important, and has taken steps elsewhere in the methodology to limit them, namely in the exclusion of *de minimis* grid cells from being in the sample frames, and in stratifying against population rather than other criteria which required more samples to reach the same level of statistical confidence.

[14] William G. Cochran, Sampling Techniques at 98.

[15] *Id.* at 99.

Guided by the allocation scheme from the previous section, staff will use geographic information systems (GIS) tools or statistical software to randomly select grid cells in each stratum.[16] Staff will then use these tools to conduct a four-step optimization analysis, as follows.

First, we will draw a sample according to the adopted stratified random design. If there are multiple frames for a provider, we will sample independently from each frame. These multiple samples will be subjected to the rest of the optimization steps together as one set. We will then repeat this process at least one hundred times, each time yielding a sample, or group of samples, that are valid under the design.[17]

Second, from this set of valid samples, we will identify the sample or samples with grid cells that contain the least number of incorporated and census-designated places.

Third, if there are multiple samples identified in the previous step, we will then determine which of the remaining samples contains the fewest number of selected grids that are located outside of incorporated and census-designated places.

Fourth, if there remains more than one sample identified in the previous step, we will randomly pick one.

The optimal sample so identified likely will result in a significant reduction in the number of communities that have to be visited for the required testing. The provider subject to testing will be notified of the sample grid cells in which it will be required to conduct on-the-ground speed tests.[18]

V. DRIVE-TESTING DATA COLLECTION

Within each selected grid cell, a carrier must conduct a minimum of 20 tests, no less than 50% of which are to be conducted while in motion from a vehicle. This is the minimum number of tests to support the use of the binomial distribution to approximate the normal distribution that is needed in calculating the gap in coverage based on a one-sided 90% confidence interval, as discussed later in Section VII.[19]

To be considered valid, each test must be conducted between the hours of 6:00 a.m. and 10 p.m. local time, within the selected grid cell, and report all relevant parameters defined in Appendix A. Each component of a test (i.e., download and upload speeds) should have a duration between 5 and 30 seconds. Mobile tests are considered to be located within the grid cell containing the starting location, as a tester

---

[16] *See, e.g.*, ESRI, *Create Random Points*, https://desktop.arcgis.com/en/arcmap/latest/tools/data-management-toolbox/create-random-points.htm (last visited Apr. 14, 2022); SAS Help Center, *The SURVEYSELECT Procedure*, https://documentation.sas.com/doc/en/pgmsascdc/9.4_3.3/statug/statug_surveyselect_syntax01.htm (last visited Apr. 25, 2022); RDocumentation, *sample: Random Samples and Permutations*, https://www.rdocumentation.org/packages/base/versions/3.6.2/topics/sample (last visited Apr. 29, 2022) (describing the statistical software R). We have made the minor change of adding the option to use statistical software (in addition to GIS tools, which we proposed in the *Notice*) to improve the ability for providers to recreate the samples at a later time. The option of using statistical software is necessary in order to conduct the community optimization that responds to GCI's concern about the burden of traveling to many distant communities. *See* GCI Comments at 18-20. Using only GIS software without the option of statistical software may cause unnecessary processing delays, threatening the Bureau's ability to meet the deadlines for providing the samples to be tested. *See Alaska Drive Test Public Notice*, 36 FCC Rcd at 11292, Appx. B, Sec. II ("The Bureau will create a stratified random sample for the provider to test within 15 days of receipt of updated data, or, in the event of no new data submitted, 10 days of the adoption of an Order.").

[17] We have chosen to optimize across at least 100 samples as this is highly likely to produce a sample that lessens the testing burden to carriers by drawing a sample with a substantive reduction in communities tested while also taking into consideration that each additional sample included in the optimization process takes additional time to create. As the Bureau has promised to provide the samples to CVW and GCI under a specified schedule, we must take care that the optimization process is not the cause of any delays in delivering the selected grids to the providers.

[18] If a grid cell that is in multiple frames is randomly selected for testing more than once, the provider only needs to conduct one set of tests for that grid cell. The results can be used for all frames for which the grid cell was selected.

[19] Marco Taboga, Lectures on Probability Theory and Mathematical Statistics ch. 79 (3d ed. 2017).

has full control over the starting location of a test but may not always be able to control the ending location of a test. Testers should, however, attempt to conduct a mobile test within a single grid cell as much as is reasonably and safely possible. A mobile test should initiate when moving away from the location of a stationary test after having reached the speed of the surrounding traffic, or a safe and reasonable operating speed in the event no traffic is present.

VI. STATISTICAL ANALYSIS OF TESTING RESULTS

Upon receipt of drive-testing submissions, the Bureau will perform a statistical analysis of the data to estimate the desired total population covered. Because the sample is selected using stratified random sampling, estimation techniques appropriate for this particular sampling method must be used.

Stratified random sampling requires an aggregate measurement from a sampled grid cell that will be combined with measurements from the other sampled grid cells to calculate stratum-level estimates of total covered population. These estimates will, in turn, be combined to produce an overall estimate of covered population. Drive tests conducted in a sample grid cell will be aggregated based on the following rule:

> Let p be the percentage of drive tests that meet or exceed the applicable minimum. If p is at least 85%, then the full population of the sample grid cell will be deemed as covered; otherwise, 0% will be deemed as covered.

To calculate the stratum-level estimates and the overall estimate of the covered population, the Bureau will use the estimation method appropriate for stratified random sampling, described next.[20]

Let $x_{h,i}$ be the (deemed) covered population in the ith grid cell of stratum h, where $i = 1, \ldots, n_h$. Based on the rule above, $x_{h,i} = X_{h,i}$ if $p \geq 0.85$, and $x_{h,i} = 0$ if $p < 0.85$. The stratum sample mean covered population, $\bar{x}_h$, is calculated as $\bar{x}_h = \sum_{i=1}^{n_h} x_{h,i} / n_h$; the stratum sample total covered population is $N_h \bar{x}_h$; and the stratum sample variance, ${s_h}^2$, is calculated as ${s_h}^2 = \frac{\sum_{i=1}^{N_h} (x_{h,i} - \bar{x}_h)^2}{n_h - 1}$.

Combining these stratum-level estimates, we arrive at the overall covered population mean, $\bar{x}$, calculated as:

$$\bar{x} = \sum_{h=1}^{L} \frac{N_h \bar{x}_h}{N} = \sum_{h=1}^{L} W_h \bar{x}_h$$

with variance:

$$V(\bar{x}) = \frac{1}{N^2} \sum_{h=1}^{L} N_h (N_h - n_h) \frac{{s_h}^2}{n_h}.$$

Finally, the overall covered population total, $\hat{X}$, is estimated as

$$\hat{X} = N\bar{x}.$$

VII. ADJUDICATION OF THE OUTCOME OF THE TESTING PROCESS

Because the estimate of the total covered population $\hat{X}$ comes from a sample, direct comparison of $\hat{X}$ against the committed covered population is not appropriate. Instead, staff will construct a confidence interval that takes into account the variability arising from the estimate $\hat{X}$ and use this confidence interval to adjudicate the outcome of the testing process.

[20] William G. Cochran, Sampling Techniques at 91-96.

Because the Alaska Plan calls for a tiered approach in levying penalties for providers failing the testing process,[21] the Bureau will use a one-sided 90% confidence interval for $\hat{X}$ to quantify the gap in coverage. In particular, the Bureau will use the upper limit of this confidence interval, which is calculated as $\hat{X} + 1.28N\sqrt{V(\bar{x})}$.[22] This will be added to the population of grid cells with a *de minimis* populated area that had been previously removed from the tested frame.

The compliance gap is then calculated as:

$$\text{Gap in Coverage} = \text{Total Population Coverage Commitment} - (\hat{X} + 1.28N\sqrt{V(\bar{x})} + \text{De Minimis Grid Cells}).$$

If the gap in coverage is no more than 5% of the total population of a given commitment, no penalties will apply. Otherwise, penalties will apply according to the tiers adopted by the Commission.[23]

Additionally, it is possible to have a negative gap in coverage if the upper limit of the confidence interval is greater than the total committed population. If a provider has committed to multiple tiers of technology (i.e., 2G, 3G, and 4G LTE), then any excess coverage, as defined by a negative gap in coverage, can be applied to the next lowest tier of technology. For example, if a provider has committed to cover 25,000 people with 4G LTE and the upper limit of the confidence interval shows adequate coverage for 30,000 people, then the remaining 5,000 coverage can be applied to its 3G commitment. This process is iterative, so any further excess coverage can be applied to its 2G commitment. Accordingly, the formula above would be re-written as:

$$\text{Gap in Coverage} = \text{Total Population Coverage Commitment} - (\hat{X} + 1.28N\sqrt{V(\bar{x})} + \text{De Minimis Grid Cells} + \text{Excess Coverage from Higher Technology}).$$

This methodology therefore will not punish carriers for improving coverage beyond what they committed.

[21] *See* 47 CFR § 54.320(d).

[22] William G. Cochran, Sampling Techniques at 95.

[23] 47 CFR § 54.320(d); *see also supra* Request for Comment.

APPENDIX C

Current Performance Plans

I. Copper Valley Wireless[1]

Copper Valley Wireless, LLC

			Note 1		Note 2									
Middle Mile	Population 2010 Census	Spectrum Codes (477 Code)	Population Served 12/31/15	% Base Population Served 12/31/15	Technology Of Transmission (477 Code)	Minimum Expected Upload/ Download Speeds	5 Year Base Population Served	5 Year % Total Population Served	Technology Of Transmission (477 Code)	Minimum Expected Upload/ Download Speeds	10 Year Total Base Population Served	10 Year % Population Served	Technology Of Transmission (477 Code)	Minimum Expected Upload/ Download Speeds
Satellite	NA													
Microwave	2,426	90												
			2,377	98%	83	10MB/3MB	2,377	98%	83	10MB/3MB	2,377	98%	83	10MB/3MB
Fiber	6,708	90												
			202	3%	85	1MB/.8MB								
			6,171	92%	83	10MB/3MB	6,373	95%	83	10MB/3MB	6,373	95%	83	10MB/3MB

Note 1: Population per 2010 Census in service area. Excludes population served by AT&T and/or Verizon at 4G LTE using their infrastructure.
Note 2: Percentage of population served at benchmark speeds as of 12/31/15.
Note 3: Year 1 is 2017

II. GCI[2]

GCI Alaska Plan PerformanceCommitments - Updated July 1, 2020

			Note 1	Note 2	Note 3		Note 4						
Middle Mile	Technology Of Transmission (477 Code)	Population 2010 Census	Population Served 12/31/15	% Base Population Served 12/31/15	5 Year Base Population Served	5 Year % Total Population Served	10 Year Total Base Population Served	10 Year % Population Served	Increase/ (Decrease) by Year 10	10 Year Total Population Served - Revised 7/1/20	10 Year % Population Served - Revised 7/1/20	Minimum Expected Download/ Upload Speeds at Edge	Spectrum Codes (477 Code)
Fiber	83 (LTE)	64,158	13,455	21%	32,079	50%	69,601	100%	-	69,601	100%	10/1 Mbps	90, 91, 93, 94
	80, 81, 82 (3G)		43,882	68%	25,258	39%	-	0%	-	-	0%	.2/.05 Mbps	90, 91, 93, 94
	85, 86 (Voice/2G)		6,821	11%	6,821	11%	-	0%	-	-	0%	<.2 Mbps	90, 91, 93, 94
Fiber Total			64,158	100%	64,158	100%	69,601	100%		69,601	100%		
Microwave	83 (LTE)	50,717	125	0%	125	0%	42,095	83%	402	42,497	83%	2/.8 Mbps	90, 91, 93, 94
	80, 81, 82 (3G)		29,764	59%	41,970	83%	8,622	17%	-	8,622	17%	.2/.05 Mbps	90, 91, 93, 94
	85, 86 (Voice/2G)		20,828	41%	8,622	17%	-	0%	-	-	0%	<.2 Mbps	90, 91, 93, 94
Microwave Total			50,717	100%	50,717	100%	50,717	100%		51,119	100%		
Satellite	83 (LTE)	24,482	-	0%	12,363	50%	8,150	43%	-	8,150	44%	1/.256 Mbps	90, 91, 93, 94
	80, 81, 82 (3G)		-	0%	-	0%	-	0%	-	-	0%	.2/.05 Mbps	90, 91, 93, 94
	85, 86 (Voice/2G)		24,482	100%	12,119	50%	10,889	57%	(402)	10,487	56%	<.2 Mbps	90, 91, 93, 94
Satellite Total			24,482	100%	24,482	100%	19,039	100%		18,637	100%		
Total	83 (LTE)		13,580	10%	44,567	32%	119,846	86%	402	120,248	86%		
Total	80, 81, 82 (3G)		73,646	53%	67,228	48%	8,622	6%		8,622	6%		
Total	85, 86 (Voice/2G)		52,131	37%	27,562	20%	10,889	8%	(402)	10,487	8%		
Grand Total		**139,357**	139,357	100%	**139,357**	100%	**139,357**	100%		**139,357**	100%		

Note 1: Population per 2010 Census in service area. Excludes population served by AT&T and/or Verizon at 4G LTE using their infrastructure.
Note 2: Percentage of population served at benchmark speeds as of 12/31/15.
Note 3: Year 1 is 2017.
Note 4: 10 year figures reflect commitments as revised on July 1, 2019.

[1] *Wireless Commitments Public Notice*, 31 FCC Rcd at 13321, Appx. A.

[2] *GCI's Second Revised Performance Plan*, 35 FCC Rcd at 9541, Appx.