

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

In the Matter of)	
)	
Expanding Access to Broadband and Encouraging)	GN Docket No. 13-114
Innovation through Establishment of an Air-Ground)	RM-11640
Mobile Broadband Secondary Service for)	
Passengers Aboard Aircraft in the 14.0-14.5 GHz)	
Band)	

NOTICE OF PROPOSED RULEMAKING

Adopted: May 9, 2013

Released: May 9, 2013

Comment Date: (45 days after date of publication in the Federal Register)

Reply Comment Date: (75 days after date of publication in the Federal Register)

By the Commission: Chairman Genachowski and Commissioners Clyburn, Rosenworcel and Pai issuing separate statements; Commissioner McDowell not participating.

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I. INTRODUCTION

1. By this *Notice of Proposed Rulemaking (Notice)*, the Commission proposes to further increase the availability of broadband services onboard airplanes by establishing an air-ground mobile broadband service by which passengers aboard civil and government aircraft can connect to a full range of communications services while flying over the contiguous United States.¹ Consumers increasingly demand ubiquitous broadband connectivity, even on airplanes. Demand continues to rise, with

¹ For the purposes of this rulemaking, the “contiguous United States” or “CONUS” is the United States excluding Alaska, Hawaii, and island territories.

predictions that the number of aircraft offering broadband service will rise from approximately 3000 in 2012 to 15,000 by 2021.² Establishment of air-ground mobile broadband service could help satisfy this demand. This air-ground mobile broadband service would operate in the 14.0-14.5 GHz band, on a secondary, non-interference basis with Fixed-Satellite Service (FSS) Earth-to-space communications. The key to such band sharing is spatial diversity, with FSS earth station antennas oriented to the south and above the horizon, air-ground mobile broadband base stations oriented to the north, and air-ground mobile broadband aircraft stations oriented below the horizon. Air-ground mobile broadband would be required to protect primary FSS in the band from harmful interference, and would be required to accommodate other Federal and non-Federal users in the band. We ground our proposals in this proceeding in part on the service proposed by Qualcomm, Inc. (Qualcomm) in a Petition for Rulemaking filed on July 7, 2011.³ We believe our proposal would significantly increase the amount of spectrum available for the provision of wireless broadband to airborne aircraft, helping to meet rising demand for such services.

II. EXECUTIVE SUMMARY

2. In this *Notice*, we propose to establish a new, terrestrial-based air-ground mobile broadband service with aircraft in the 14.0-14.5 GHz band. The service would provide multi-gigabit broadband connectivity to aircraft flying within the contiguous United States. The service is intended for the business and personal use of passengers aboard aircraft, and will have no role in aeronautical operations or as a safety of life and property service.

3. The Qualcomm Petition asks the Commission to add a secondary mobile allocation in the 14.0-14.5 GHz band and adopt service rules to support air-ground mobile broadband operations. Qualcomm presents with its plan for air-ground mobile broadband in the band an engineering study for avoiding harmful interference to primary and co-secondary services in the band, and proposed technical and licensing rules. In this *Notice*, we propose an allocation, service rules, and technical rules for air-ground mobile broadband, based largely on the Qualcomm Petition.

4. The 14.0-14.5 GHz band is allocated on a primary basis to the FSS as an uplink (Earth-to-space) band for geostationary orbit (GSO) FSS operations. The air-ground mobile broadband service would operate on a secondary basis to GSO satellite systems and future non-geostationary orbit (NGSO) satellite systems, and on a co-secondary basis with the National Aeronautics and Space Administration (NASA) Tracking and Data Relay Satellite System (TDRSS) that operates under a Federal Fixed Service (FS) and Mobile Service (MS) allocation. In addition to coordinating with NASA TDRSS in the 14.0-14.2 GHz band, we propose that air-ground mobile broadband would also be required to coordinate with Radio Astronomy Service (RAS) users in the 14.47-14.5 GHz band, in accordance with the procedures set forth for other services in this band. To implement this service, we propose to amend Part 2 of the rules to add a secondary allocation in the non-Federal Aeronautical Mobile Service (AMS) for air-ground mobile broadband in the 14.0-14.5 GHz band.

5. We propose that under the rules we implement for the 14.0-14.5 GHz band to support the new allocation, we would require a licensee to use this spectrum for air-ground mobile broadband only. We also seek comment regarding the appropriate regulatory framework for the proposed provision of service. We seek comment on our proposal to classify the services as Commercial Mobile Radio Service (CMRS) given the proposed air-ground use of the spectrum. With respect to whether and how to apportion the spectrum, we seek comment on Qualcomm's proposal to create two 250 megahertz licenses as well as on alternate approaches such as licensing the entire 500 megahertz of spectrum to a single licensee or dividing the spectrum into more than two blocks. Given the proposed air-ground use of the band, we

² See J. Meyers, *Next in spectrum wars: Broadband for airplanes*, Politico, Jan. 28, 2013, at www.politico.com/story/2013/01/next-in-spectrum-wars-broadband-for-airplanes-86843.html (visited Mar. 12, 2013).

³ Qualcomm, Petition for Rulemaking, RM-11640, filed July 7, 2011 (Qualcomm Petition).

propose to license the spectrum on a nationwide basis.⁴ We also seek comment on whether to adopt an open eligibility standard and whether to adopt any specific aggregation limits applicable to the initial licensing of the band.

6. Taking into consideration the air-ground mobile broadband service being proposed for the band, we seek comment on a proposal to require a new licensee to meet a substantial service performance requirement at the end of a proposed ten-year license term. We believe that, given the need for seamless broadband service to aircraft and the necessary operation of a large number of base stations, a ten-year period is appropriate. In order to provide licensees with guidance in terms of how to satisfy their substantial service obligations, we propose that a licensee will be able to satisfy substantial service if it constructs and operates base stations that provide robust, uninterrupted service on routes serving at least 50 airports classified as large or medium hubs. We seek comment on this safe harbor and alternatives that may represent more appropriate safe harbors.

7. To the extent that we adopt a geographic licensing scheme for the 14.0-14.5 GHz band, and permit the filing of mutually exclusive applications, we seek comment on a number of proposals relating to competitive bidding. We propose that the Commission conduct an auction in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules, and seek comment regarding bidding credits for small businesses.

8. We propose technical rules based on the technical description of FSS systems and Qualcomm's proposed air-ground mobile broadband system found in the Qualcomm Petition. The goal of these technical rules is to ensure that any air-ground mobile broadband system that we may authorize in the 14.0-14.5 GHz band will not cause harmful interference to FSS systems. For the same reason, we propose requirements for air-ground mobile broadband to coordinate its operations with Federal FS and MS licensees, and with TDRSS sites and RAS observatories in the 14.0-14.5 GHz band.

9. Because Canada is the country most likely to be affected by air-ground mobile broadband base or aircraft stations, we propose to require aircraft flying in Canadian airspace to terminate operations while they are in Canadian airspace, until such time as Canada may authorize air-ground mobile broadband or authorize aircraft in Canadian airspace to use U.S.-licensed air-ground mobile broadband. We do not address any other country, such as Mexico, because air-ground mobile broadband base stations will not radiate sufficient signal into any other country such that the service could operate successfully. Thus, air-ground mobile broadband will not be able to operate in the airspace of any other country. We also propose to permit non-U.S. registered aircraft to contract with air-ground mobile broadband licensees for air-ground mobile broadband equipment and service, to be used when they are over the contiguous United States. Finally, we address the applicability of the Communications Assistance to Law Enforcement Act (CALEA) to air-ground mobile broadband licensees.

III. BACKGROUND

A. Qualcomm's Petition for Rulemaking

10. The Qualcomm Petition asks the Commission to initiate a proceeding to establish a new, terrestrial-based air-ground mobile broadband service in the 14.0-14.5 GHz band, providing multi-gigabit broadband connectivity to aircraft flying within the contiguous United States.⁵ Qualcomm seeks a secondary mobile allocation in the U.S. Table of Allocations that would support a commercial, bi-directional air-ground mobile broadband service, as well as rules under which such a service would operate. It proposes that the Commission conduct an auction of two 250 megahertz licenses at 14.0-14.25 GHz and 14.25-14.50 GHz, but not restrict a single entity from purchasing both licenses to construct a single, more robust 500 megahertz system.

⁴ In this *Notice*, "nationwide" refers to the contiguous United States as defined in note 1.

⁵ Qualcomm Petition.

11. Twelve parties filed comments in response to the Qualcomm Petition, and four parties filed reply comments.⁶ On May 15, 2012, the Commission's International Bureau issued a Public Notice seeking further comment on the Qualcomm Petition.⁷ Four parties filed comments in response to this Public Notice, and two parties filed reply comments.⁸ In addition, Commission staff held a series of meetings with Qualcomm and satellite industry representatives on potential interference from an air-ground mobile broadband service into the FSS, as well as the potential risk that FSS users might cause harmful interference to air-ground mobile broadband users.⁹

B. Spectrum Needs

12. The Commission has recognized the need for more broadband spectrum in the United States. The *National Broadband Plan* called for an additional 500 megahertz of spectrum to be made available for broadband by the year 2020.¹⁰ To meet this goal and the growing demand for broadband, the Commission has been aggressively seeking new ways to make additional spectrum available by taking actions including reallocating services, encouraging current services to adopt more spectrum-efficient methods of communication, and taking advantage of technical innovations to increase the ability of multiple users to share spectrum.

13. One technical method by which otherwise incompatible services can share spectrum bands is spatial diversity, a method by which two or more services share spectrum by covering different areas, or by designing antennas to point in different directions, among other techniques. Spatial diversity allows more re-use of spectrum and serves as a spectrum multiplier. The Commission has taken advantage of spatial diversity to allow spectrum sharing in several cases.¹¹

C. The 14.0-14.5 GHz Band

14. The 14.0-14.5 GHz band is an uplink (Earth-to-space) band for FSS operations, paired with the 11.7- 12.2 GHz band for downlink (space-to-Earth) FSS communications. GSO FSS systems operate

⁶ Alcatel-Lucent; American Airlines, Inc. (American Airlines); the American Petroleum Institute (API); Boeing Company (Boeing); Delta Air Lines, Inc. (Delta); Gogo, Inc. (Gogo); Panasonic Avionics Corporation (Panasonic); Qualcomm; Row 44, Inc. (Row 44); the Satellite Industry Association (SIA); United Airlines (United); and Virgin America, Inc. (Virgin America) filed comments in response to the Qualcomm Petition (hereafter cited as PR Comments). Panasonic, Qualcomm, Row 44, and Honeywell filed reply comments (hereafter cited as PR Replies).

⁷ *International Bureau Seeks Further Comment on Qualcomm Petition for Rulemaking*, RM-11640, Public Notice, DA 12-767, 27 FCC Rcd 5223 (2012).

⁸ The Committee on Radio Frequencies of the National Academy of Science (CORF), the National Radio Astronomy Observatory (NRAO), Qualcomm, and Row 44 filed comments in response to the Public Notice (hereafter cited as PN Comments), and Boeing and Qualcomm filed reply comments (hereafter cited as PN Replies).

⁹ See, e.g., letters from John W. Kuzin, Senior Director, Government Affairs-Regulatory, Qualcomm, to Secretary, FCC, RM-11640, May 4, 2012; Sep. 14, 2012; Oct. 2, 2012; Jan. 18, 2013; letters from Patricia Cooper, President, SIA, to Secretary, FCC, RM-11640, Aug. 31, 2012; Feb. 8, 2013.

¹⁰ See *National Broadband Plan*, § 5.4.

¹¹ See, e.g., *Amendment of Parts 2, 25 and 97 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz*, ET Docket No. 98-142, Report and Order, 17 FCC Rcd 2658, 2678, ¶144 (2002); *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, ET Docket 98-206, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd 4096, 4193, ¶259 (2000).

on a primary basis in the 14.0-14.5 GHz band.¹² Generally, U.S.-licensed GSO FSS space stations operating in this band are spaced approximately two degrees apart along the geostationary orbit.¹³ Two-degree spacing (rather than the three-degree spacing used by other nations) required the adoption of stringent limits on the off-axis gain of an earth station antenna pointed toward space stations other than the target space station. There are also non-U.S. licensed satellites adjacent to U.S.-licensed satellites in the GSO arc that may serve the U.S. market or other regions in the Americas.¹⁴ Traditionally, to meet the technical constraints necessary in a two-degree orbital spacing environment, earth stations have utilized narrow-beam transmissions and carefully pointed at the space stations with which they communicate.¹⁵ Earth stations in the GSO FSS operate from fixed positions (or from fixed points within a specified area) or on a mobile basis. Over the past several years, the band has been cleared of all non-Federal terrestrial services, which has allowed the FSS to innovate in an environment free of interference from other services with different operational and technical characteristics.¹⁶

15. The primary FSS allocation in the 14.0-14.5 GHz band also permits earth stations, both gateway earth stations and user terminals, to communicate with NGSO satellite systems, though there are no planned NGSO systems in these bands. Additionally the band is allocated on a secondary basis to the Mobile-Satellite Service (MSS).¹⁷ The 14.4-14.5 GHz segment is further allocated on a secondary basis to the FS and MS, limited to Federal users. Our review of the Federal assignments that authorize operations in this band shows 13 Federal assignments for fixed stations¹⁸ and 12 assignments in the MS.¹⁹

¹² See 47 C.F.R. § 2.106.

¹³ See generally *Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations*, CC Docket No. 81-704, Report and Order, 54 Rad. Reg. 2d (P&F) 577 (1983) (adopting 2° orbital spacing policy to maximize the number of in-orbit satellites operating in the Ku- and C-bands); on reconsideration, 99 F.C.C. 2d 737 (1985). See also *2000 Biennial Regulatory Review – Streamlining and Other Revisions of Part 25 of the Commission’s Rules Governing the Licensing of, and Spectrum Usage By, Satellite Network Earth Stations and Space Stations; Amendment of Part 25 of the Commission’s Rules and Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacings and to Revise Application Procedures for Satellite Communication Services*, IB Docket No. 00-248, CC Docket No. 86-496, Fifth Report and Order in IB Docket No. 00-248 and Third Report and Order in CC Docket No. 86-496, 20 FCC Rcd 5666, 5674, ¶ 17 (2005) (*Streamlining Fifth Report and Order*).

¹⁴ See the Space Station Permitted List at www.fcc.gov/ib/sd/se/permitted.html (visited Apr. 4, 2013) for satellites that may serve the U.S. market.

¹⁵ See, e.g., *Revisions to Part 2 and 25 of the Commission’s Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands*, IB Docket No. 12-376, Notice of Proposed Rulemaking and Report and Order, FCC 12-161, 27 FCC Rcd 16510, ¶ 6 (2012) (*ESAA Report and Order*).

¹⁶ The most recent action occurred in 2012. All licenses for land mobile stations in the 14.2-14.4 GHz band had expired, and therefore the Commission removed Footnote NG184 from the U.S. Table of Allocations. Footnote NG184 had permitted land mobile stations in the band to continue operating until their licenses expired. *ESAA Report and Order*, 27 FCC Rcd at 16522, note 58.

¹⁷ See 47 C.F.R. § 2.106.

¹⁸ These fixed stations are authorized necessary bandwidths of 15 MHz (2 assignments), 18 MHz (3), 22 MHz (4), 28 MHz (2), or 32 MHz (2), and are located in eight locations of various population density: Brooklyn, NY; Oakland, CA; El Paso, TX; Huntsville, AL; Warner Robins, GA; Columbus, NM; Eagle Mountain, CA; and Nevada Test Site, NV.

The 14.0-14.2 GHz segment of the band is used by TDRSS on a secondary basis.²⁰ The 14.47-14.5 GHz segment serves RAS on a permissive basis.²¹

IV. DISCUSSION

A. The Public Interest in Air-Ground Mobile Broadband

16. The demand for mobile broadband connectivity continues to grow rapidly.²² This includes demand for mobile broadband aboard aircraft. To meet this demand, in 2005, the Commission reconfigured the Air-Ground Radiotelephone Service 800 MHz band to provide four megahertz of spectrum for broadband service to passengers aboard aircraft.²³ The WTB recently found that permitting the aggregation and assignment of 800 MHz air-ground spectrum would make more productive use of that band and expand the public's access to wireless telecommunications and broadband service on board aircraft.²⁴ In 2012 we authorized Earth Stations Aboard Aircraft (ESAA) to provide broadband service to passengers aboard aircraft via FSS.²⁵ Unfortunately, current broadband options for aircraft passengers generally carry a premium price and offer substantially lower speeds than terrestrial broadband.²⁶ However, more options for broadband for aircraft passengers are likely to increase competition, improve the quality of service, and lead to lower prices for broadband aboard aircraft.

¹⁹ In the MS, there is one assignment for mobile stations (microwave data links may transmit within 50 km of Miramar, CA, using a necessary bandwidth of 22 MHz), one assignment for surface telemetering mobile stations (vans within 6 km of Edwards, CA, using a bandwidth of 40 MHz), and ten assignments in the Federal aeronautical mobile service (AMS). Seven of the AMS assignments are band assignments that authorize the use of frequencies within the 14.4-14.83 GHz segment (emissions range from 800 kHz to 295 MHz). Specifically, aircraft stations (in the AMS) may transmit: (1) within the listed radius of coordinates in China Lake, CA (463 km); Edwards, CA (240 km); Palmdale, CA (15 km); San Diego, CA (15 km); Dugway Proving Ground, UT (225 km); Patuxent River, MD (200 km); and Smokey Hill, KS (161 km); (2) certain coastal waters of Washington State; and (3) on military reservations in Arizona (UAV testing). Aeronautical (or ground) stations (in the AMS) may transmit within the aforementioned radii of Edwards, Palmdale, and San Diego.

²⁰ See 47 C.F.R. § 2.106.

²¹ See *id.*, Footnote US203.

²² Cisco Systems, Inc. predicts that the demand for mobile broadband will increase eighteenfold between 2011 and 2016. See *Cisco Visual Networking Index: Forecast and Methodology, 2011-2016*, May 30, 2012, available at www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html (visited Apr. 16, 2013).

²³ See *Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services*, WT Docket No. 03-103, Report and Order, FCC 04-287, 20 FCC Rcd 4403 (2005).

²⁴ See *Application of AC BidCo, LLC, Gogo Inc., and LiveTV, LLC, For Consent To Assign Commercial Aviation Air-Ground Radiotelephone (800 MHz band) License, Call Sign WQFX729*, WT Docket No. 12-155, Memorandum Opinion and Order, DA 13-570 (WTB rel. March 29, 2013). The 800 MHz air-ground band is comprised of a 3 MHz block and a 1 MHz block, and is subject to a spectrum aggregation limit which prevents one licensee from holding more than three megahertz. See 47 C.F.R. § 22.853. The Wireless Telecommunications Bureau waived this restriction, finding it in the public interest to permit AC BidCo, LLC (Gogo Inc), the 3 MHz block licensee, to acquire the remaining spectrum block.

²⁵ See *ESAA Report and Order*, 27 FCC Rcd 16510.

²⁶ See, e.g., S. Higginbotham, *Why your in-flight WiFi is slow and expensive: It's all about the pipe*, Sep. 19, 2012, at gigaom.com/2012/09/19/why-your-in-flight-wi-fi-is-slow-and-expensive-its-all-about-the-pipe (visited Mar. 12, 2013).

17. Increased broadband aboard aircraft will lead to improved connectivity for business and leisure travelers alike. Business travelers will have a greater ability to message, research and download information, and send finished products. Leisure travelers will have greater options to use broadband to communicate with friends and family members, use social media, play games, and research their destinations or other areas of interest.

B. Qualcomm's Proposed Air-Ground Mobile Broadband System

18. The air-ground mobile broadband system Qualcomm proposes would use time-division duplex (TDD) communications to provide a link between base stations and aircraft. Within each aircraft, communications would be carried to and from passengers' personal broadband devices by short-range links such as WiFi. Qualcomm claims that 500 megahertz of spectrum at 14.0-14.5 GHz can sustain data rates of 300 gigabits per second.²⁷

19. The air-ground mobile broadband system would rely on spatial diversity to enable it to share the 14.0-14.5 GHz band with FSS. Simply put, because all of the satellite systems currently operating in the 14.0-14.5 GHz band use GSO satellites, which orbit over the equator, all satellite antennas in the United States must point south of an east-west line at each antenna's location. Qualcomm's base stations would all be located at or near the southern points of hexagonal service areas, and their antennas would point north, with a 120-degree arc of radio energy emission. According to Qualcomm, this spatial diversity, coupled with antenna design features to control power so that the base station emits lower power as the vertical angle increases, will allow the base stations to operate without causing harmful interference to satellite reception of signals from FSS earth stations.²⁸ Qualcomm asserts that spatial diversity, as well as other engineering techniques, would also protect FSS satellites from interference from the air-ground mobile broadband stations aboard aircraft. The antennas aboard aircraft would be pointing down, *i.e.*, below the horizon from the aircraft, where FSS earth stations antennas point up, *i.e.*, above the horizon from the FSS earth station. Qualcomm states that this factor, combined with lower power from air-ground mobile broadband stations aboard aircraft than from air-ground mobile broadband base stations, would protect FSS satellites from harmful interference.²⁹ Qualcomm further states that a combination of techniques including beam steering, base station handoff, and assigning frequencies intelligently will mitigate interference from FSS earth stations into air-ground mobile broadband base stations.³⁰

20. Qualcomm also claims that its proposed system will not cause harmful interference to any future NGSO FSS systems that we may license. First, Qualcomm notes that there are no NGSO FSS systems currently operating or planned that would use the 14.0-14.5 GHz band.³¹ Moreover, Qualcomm proposes that air-ground mobile broadband service in the 14.0-14.5 GHz band operate on a secondary basis to GSO satellite systems, future NGSO satellite systems, the NASA TDRSS facilities, and RAS users.³² Qualcomm also states that its proposed system was designed "from the ground up" to avoid harmful interference to both GSO and potential NGSO FSS satellite systems, as well as TDRSS and RAS systems.³³

²⁷ See Qualcomm Petition at 14.

²⁸ See *id.* at 15.

²⁹ See *id.* at 18.

³⁰ See Qualcomm PR Reply at A4-A5.

³¹ See Qualcomm Petition at 17.

³² See *id.* at 13.

³³ See *id.* at 17-18.

21. Qualcomm proposes that air-ground mobile broadband in the 14.0-14.5 GHz band be licensed by auction on a CONUS basis in two frequency blocks, 14.0-14.25 GHz and 14.25-14.5 GHz, but that the Commission allow a single entity to purchase licenses for both blocks if it so chooses, in order to provide a more robust and higher-capacity system.³⁴

22. Qualcomm maintains that the aggregate interference from the proposed air-ground mobile broadband system to GSO FSS satellites would be at most negligible (less than one percent $\Delta T/T$, or rise over thermal).³⁵ It states that interference from the FSS to the air-ground mobile broadband system would occur, but that the air-ground mobile broadband licensee could mitigate that interference through system designs.³⁶

23. Several commenters argue that we should dismiss the Qualcomm Petition. First, commenters assert that we should not take up the possibility of air-ground mobile broadband until we have resolved the issue of whether FSS should be allowed to provide service to aircraft.³⁷ Because we established licensing and technical rules for ESAA last year, this argument is moot.³⁸

24. Several commenters also argue that we should dismiss the Qualcomm Petition because it fails to demonstrate a public interest need for air-ground mobile broadband. These commenters rely on Commission precedent where we denied petitions for rulemaking based on hypothetical scenarios³⁹ or petitioners' failure to present sufficient information to justify the need for rulemaking and to show that there was no risk of harmful interference.⁴⁰ These commenters assert that the rules Qualcomm proposes do not provide a sufficient basis for consideration, citing our rule that petitions for rulemaking shall set forth the text or substance of proposed rules.⁴¹

25. We are not persuaded by these arguments. Qualcomm and other commenters (including Gogo, the current provider of an air-ground service similar to air-ground mobile broadband, the airlines that may be customers of air-ground mobile broadband, and a provider of satellite-based communications to aircraft) all cite extensive research and commentary that indicate the market for mobile broadband is expanding rapidly and passengers aboard aircraft want mobile broadband access in flight.⁴² The information presented makes a threshold case that we should consider the Qualcomm proposal because it offers a means to increase access to in-flight broadband connectivity. Further, Qualcomm has presented a substantial engineering analysis of the potential for harmful interference if we permit air-ground mobile broadband in the 14.0-14.5 GHz band, and of how that potential interference can be mitigated.⁴³ Qualcomm also has presented sufficient technical information to initiate this rulemaking proceeding. Finally, the Qualcomm Petition proposed rules, including proposals for service definitions, an allocation

³⁴ See *id.* at 19.

³⁵ See, e.g., Qualcomm PR Reply at A2-A6; Qualcomm PN Reply at 9-10.

³⁶ See *id.*

³⁷ See Boeing Comments to Petition for Rulemaking (PR Comments) at 4-6; Panasonic PR Comments at 6-7; Row 44 PR Comments at 2-3; SIA PR Comments at 9-10.

³⁸ See *ESAA Report and Order*, 27 FCC Rcd 16510.

³⁹ See SIA PR Comments at 6; Panasonic PR Comments at 2-3.

⁴⁰ See SIA PR Comments at 6; Boeing PR Comments at 2-3.

⁴¹ See SIA PR Comments at 8 (citing 47 C.F.R. § 1.403(c)).

⁴² See Qualcomm PR Comments at 3-6; American Airlines PR Comments at 2; Delta PR Comments at 2; United PR Comments; Virgin America PR Comments; Gogo PR Comments at 5-6; Honeywell PR Reply.

⁴³ See Qualcomm PR Reply at 22 (citing Qualcomm Petition, App. A).

of spectrum, and technical rules to prevent harmful interference.⁴⁴ While these proposed rules are not exhaustive, they lay sufficient groundwork to consider the Qualcomm Petition in this *Notice*.

26. In this *Notice*, we propose to amend our rules to permit two-way air-ground mobile broadband service in the 14.0-14.5 GHz band, which will allow for the provision of broadband data services to passengers aboard aircraft. As discussed below, we propose to amend Part 2 of our rules by adding a secondary allocation for the AMS for non-Federal use in the 14.0-14.5 GHz band and modifying a footnote to the U.S. Table of Allocations. We also propose licensing and technical rules for air-ground mobile broadband.

C. Allocation in the 14.0-14.5 GHz band

27. We propose to authorize air-ground mobile broadband by adding a secondary allocation to the 14.0-14.5 GHz band for the AMS for non-Federal use.⁴⁵ This allocation would be implemented by adding the entry “Aeronautical Mobile” to the 14.0-14.5 GHz band in the U.S. Table of Allocations in Part 2 of the rules.⁴⁶ Secondary status is appropriate for air-ground mobile broadband because of the need to protect FSS in the band. We note that Qualcomm requested secondary allocation status for its proposal, and based its technical analysis of interference potential on secondary status for air-ground mobile broadband. Further, it is essential that we protect FSS in the band from harmful interference. The 14.0-14.5 GHz band is heavily used for satellite applications including television distribution, satellite newsgathering (SNG), freight tracking systems, business enterprise communications using Very Small Aperture Terminals (VSAT), direct to home satellite broadband and mobile applications such as Earth Stations on Vessels (ESV), Vehicle-Mounted Earth Stations (VMES), and ESAA. Many of these services are blanket licensed. The exact number and locations of blanket-licensed earth stations vary, as blanket licensing permits a large number of identical earth stations to operate under the same authorization, and mobile units move around on a frequent basis. The mobility and ubiquity of FSS earth stations in the band necessitate great caution in preventing harmful interference. Because secondary-status services may not cause harmful interference to primary-status services,⁴⁷ and must accept any interference they receive from primary-status services,⁴⁸ we propose that secondary status for air-ground mobile broadband is the appropriate tool for protecting FSS in the band. The 14.0-14.5 GHz band is an Earth-to-space transmission band to the satellites. Because of this, any air-ground mobile broadband receiving station would be subject to interference from satellite earth stations that have the right to be located anywhere. Qualcomm acknowledges this, but has indicated on the record that a system can be built in a way that can accept this interference from the primary satellite service and still provide acceptable service.⁴⁹ In sum, we propose a secondary allocation here, and do not contemplate any way to entertain a future request to elevate the status to primary, because co-primary status for air-ground mobile broadband would likely constrain the ability to blanket license FSS earth stations, and, for example, could prohibit satellite newsgathering trucks from changing locations to cover news events without prior coordination with neighboring co-primary air-ground mobile broadband base stations.⁵⁰ We seek comment on this proposal.

⁴⁴ See Qualcomm Petition, App. B.

⁴⁵ Although Qualcomm suggested an MS allocation, we believe that an AMS allocation for air-ground mobile broadband is the best fit for the service we propose. Our rules define the AMS as, “a mobile service between aeronautical stations and aircraft stations, or between aircraft stations...” 47 C.F.R. § 2.1.

⁴⁶ 47 C.F.R. § 2.106.

⁴⁷ See 47 C.F.R. § 2.104(a)(1).

⁴⁸ See 47 C.F.R. § 2.104(a)(2).

⁴⁹ See Qualcomm Petition at 17-18. See also *infra* Section IV.H.12.

⁵⁰ See also SIA *ex parte* filing (filed May 2, 2013) (SIA May 2, 2013 *ex parte*) at 4 (stating SIA’s concern that an air-ground mobile broadband licensee might seek additional regulatory protection beyond

28. Because we are proposing a secondary non-Federal AMS allocation for air-ground mobile broadband, we request comment on the extent to which authorized Federal FS and MS operations would affect the proposed commercial service and vice versa. We envision that there could be multiple ways for an air-ground mobile broadband licensee to accommodate co-secondary Federal users, including coordination prior to operation and incorporating technical specifications to avoid causing harmful interference to these first-in-time co-secondary users. We invite comment on such procedures, and the extent to which we should codify specific requirements.

29. Additionally, we propose to modify existing Footnote US133, which addresses coordination with RAS and TDRSS stations, to also apply it to air-ground mobile broadband stations. The text of this footnote is included in paragraph 46, *infra*, as well as Appendix B. We seek comment on this proposal.⁵¹

30. This *Notice* does not propose to create the 14.0-14.5 GHz band as the exclusive band for air-to-ground communication or to preclude such services in other licensed or unlicensed bands; the Commission's commitment to entrepreneurship and competition would preclude such an approach.

D. Coordination

31. The proposed air-ground mobile broadband service in this band would operate on a secondary basis in the 14.0-14.5 GHz band. In addition, it would be required to coordinate with secondary and permissive services that operate in segments of the band, as discussed below. We seek comment on our proposed coordination procedures below, the impact of the coordination proposals on the ability to provide air-ground mobile broadband, and any alternate coordination methodologies.

32. We base our proposals for coordination requirements below on the coordination requirements we adopted for mobile applications of the FSS: ESV,⁵² VMES,⁵³ and ESAA.⁵⁴ These services, particularly ESAA, are an appropriate basis for our proposals because they present similar, though not identical, coordination challenges. They operate in the same 14.0-14.5 GHz band, and like air-ground mobile broadband, ESAA operates to and from aircraft in flight. Differences include: (1) that ESV, VMES, and ESAA communications in the 14.0-14.5 GHz band are entirely uplinks to satellites, while the proposed air-ground mobile broadband will feature communication in both directions between aircraft stations and base stations in the 14.0-14.5 GHz band; and (2) that ESV, VMES, and ESAA are secondary status, further eroding the performance and flexibility of existing and future satellite services).

⁵¹ The Utilities Telecom Council and Winchester Cator, LLC filed a Petition for Rulemaking on May 6, 2008, requesting that the Commission allocate the 14.0-14.5 GHz band on a secondary basis to the FS, for use by critical infrastructure entities. *See Utilities Telecom Council and Winchester Cator, LLC, Petition for Rulemaking to Establish Rules Governing Critical Infrastructure Industry Fixed Service Operations in the 14.0 – 14.5 GHz Band*, RM-11429 (UTC-Winchester Petition) (filed May 6, 2008); Consumer and Government Affairs Bureau, Reference Information Center, Petition for Rulemakings Filed, Public Notice, Report No. 2868 (May 27, 2008). *See also* Order Extending Comment Period, RM-11429, 23 FCC Rcd 10497 (2008). The Office of Engineering and Technology, the Wireless Telecommunications Bureau, and the International Bureau will consider this petition separately.

⁵² *See Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands*, IB Docket No. 02-10, Report and Order, FCC 04-286, 20 FCC Rcd 674 (2005) (*ESV Order*); Order on Reconsideration, 24 FCC Rcd 10369 (2009); Second Order on Reconsideration, 27 FCC Rcd 8555 (2012).

⁵³ *See Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service*, IB Docket No. 07-101, Report and Order, 24 FCC Rcd 10414 (2009).

⁵⁴ *See ESAA Report and Order*, 27 FCC Rcd 16510.

applications in the FSS, which enjoys primary status in the 14.0-14.5 GHz band, while, for the reasons discussed in Section IV.C, we propose secondary allocation status for air-ground mobile broadband.

1. Coordination with the Space Research Service in the 14.0-14.2 GHz Band

33. The Space Research Service has a secondary allocation in the 14.0-14.2 GHz sub-band. There currently are two authorized Space Research Service facilities in the United States: the NASA TDRSS receive facilities located in Guam and White Sands, New Mexico, which operate with frequency assignments in the 14.0-14.05 GHz band. In addition to these two existing facilities, NASA plans to establish another TDRSS receive facility at Blossom Point on the Eastern Shore of Maryland. As a condition of its license, a licensee of other mobile applications – ESV, VMES, and ESAA – operating in the 14.0-14.2 GHz sub-band within 125 km of a NASA TDRSS earth station site must coordinate through the National Telecommunications and Information Administration (NTIA) before beginning operations.⁵⁵

34. Qualcomm presents a detailed analysis of how its system would avoid interference to TDRSS sites from both base stations and airborne stations through a combination of technical parameters, siting of air-ground mobile broadband base stations, and avoiding operating in the areas immediately around TDRSS sites.⁵⁶ No other party has commented on protecting TDRSS from harmful interference from air-ground mobile broadband operations.

35. We have established a licensing condition requiring coordination prior to operations for ESV, VMES, and ESAA. The issues of potential harmful interference and coordination are similar with air-ground mobile broadband. Accordingly, we propose to require that air-ground mobile broadband operating in any part of the 14.0-14.2 GHz sub-band within line-of-sight of existing TDRSS sites and the planned Blossom Point facilities coordinate with NTIA as a prerequisite to operation. Specifically, we propose to require air-ground mobile broadband licensees proposing to operate in the 14.0-14.2 GHz sub-band within radio line-of-sight of the White Sands, New Mexico TDRSS receive facility to coordinate through NTIA before beginning operations.⁵⁷ Licensees would be required to notify the Wireless Telecommunications Bureau once they had completed coordination. Such notification would be a prerequisite to commencing operations.

36. We observe that the International Bureau has notified ESV, VMES, and ESAA licensees in the 14.0-14.2 GHz sub-band that they will be required to cease operations within 125 kilometers of the new Blossom Point facilities, when these facilities have become operational, unless and until the operator has reached a coordination agreement with NASA that has been approved by both the Commission and NTIA.⁵⁸ We propose to adopt a similar requirement for air-ground mobile broadband licensees. Therefore, once NTIA notifies the Commission that the Blossom Point facilities are about to become operational, the Wireless Telecommunications Bureau would issue a notice announcing the specific date for the commencement of operations of the Blossom Point facilities and requiring each air-ground mobile broadband operator in the 14.0-14.2 GHz sub-band to cease operations within radio line-of-sight of the new Blossom Point facilities until the air-ground mobile broadband operator has completed a coordination agreement with NASA, acceptable to both NTIA and the Commission, for the new TDRSS site. We seek comment on this proposal.

⁵⁵ See 47 C.F.R. § 2.106 Footnotes US203, US342; see also 47 C.F.R. §§ 25.227(c) (ESAA), 25.226(c) (VMES), 25.222(c) (ESV).

⁵⁶ See Qualcomm Petition at A37-A41.

⁵⁷ There is a second TDRSS receive facility in Guam. If permitted, air-ground mobile broadband will not have coverage in Guam.

⁵⁸ *International Bureau Announces New NASA TDRSS Station Site, Report No. SPB-221*, Public Notice, DA 07-4028, 22 FCC Rcd 17321 (Int'l Bur., 2007). See also 47 C.F.R. §§ 25.227(c) (ESAA), 25.226(c) (VMES), 25.222(c) (ESV).

37. Finally, we recognize that while ESV, VMES, and ESAA are applications in the FSS, which has primary status in the 14.0-14.5 GHz band, we propose secondary status for air-ground mobile broadband in the band. Thus, while the coordination procedures and technical standards applicable to ESV, VMES, and ESAA coordination with TDRSS are exceptions to the general rule that secondary status licensees must accept any interference they receive from primary status licensees,⁵⁹ air-ground mobile broadband licensees, by virtue of their secondary status, would already be obligated to avoid causing harmful interference to primary or earlier-licensed secondary services.⁶⁰ Nevertheless, we believe that it would be beneficial to apply the ESV, VMES, and ESAA coordination procedures to air-ground mobile broadband. Doing so would provide consistent treatment of all these services. It also would provide a certainty that air-ground mobile broadband licensees would not be permitted to cause harmful interference to the co-secondary TDRSS facilities planned for Blossom Point without regard to which operations came first.

38. We seek comment on these proposals. Are they sufficient to protect TDRSS from receiving harmful interference from the air-ground mobile broadband service? If not, what further or alternate measures would be more effective in protecting TDRSS while enabling air-ground mobile broadband? What would be the effect on air-ground mobile broadband operations of these measures?

2. Coordination with Radio Astronomy Service Stations in the 14.47-14.5 GHz Band

39. As discussed below, we propose to require air-ground mobile broadband licensees in the 14.47-14.5 GHz sub-band within line-of-sight of RAS facilities to coordinate with the National Science Foundation (NSF) before beginning operations.

a. Coordination Procedure

40. The RAS operates in the 14.47-14.5 GHz sub-band on a permissive basis within the United States, consistent with its worldwide secondary allocation in the International Table of Frequency Allocations, but does not enjoy formal secondary status in the United States.⁶¹ Nonetheless, we appreciate the importance of the RAS. Our rules require ESV, VMES, and ESAA licensees planning to operate within the 14.47-14.5 GHz sub-band within line-of-sight of RAS facilities to coordinate with the NSF before beginning operations.⁶²

41. To protect RAS facilities from harmful interference, Qualcomm recommends requiring air-ground mobile broadband licensees to operate under the interference protection rules for the RAS found in footnotes US203 and US342 to the U.S. Table of Allocations.⁶³ NRAO states that coordination would be used to establish exclusion zones around RAS sites during periods of RAS operations, and expressed its approval for such coordination. Nonetheless, NRAO warned that coordination would be more challenging for air-ground mobile broadband than for ESAA or VMES because air-ground mobile broadband operations will include downlinks (aircraft-to-base station), while relevant ESAA and VMES operations are entirely uplinks, and because air-ground mobile broadband base stations would also need

⁵⁹ See 47 C.F.R. § 2.104(d)(3)(i-ii).

⁶⁰ See 47 C.F.R. § 2.104(d)(3)(iii).

⁶¹ Internationally, the RAS is allocated on a secondary basis in the 14.47-14.5 GHz band. In the United States, Footnote US203 of the U.S. Table of Allocations permits RAS use of the 14.47-14.5 GHz frequencies at certain sites. 47 C.F.R. § 2.106 Footnotes US203, US342.

⁶² See 47 C.F.R. § 2.106 Footnotes US203, US342; *see also* 47 C.F.R. §§ 25.222(d) (ESV), 25.226(d) (VMES), 25.227(d) (ESAA).

⁶³ See Qualcomm Petition at A42 (citing 47 C.F.R. § 2.106, Footnotes US203, US342).

to be coordinated with the RAS.⁶⁴ CORF agrees with NRAO, and also points out that the speed of aircraft and the long lines of sight resulting from aircraft altitudes add to the challenges of coordination with the air-ground mobile broadband service.⁶⁵

42. We seek comment on the feasibility of coordination between air-ground mobile broadband and RAS operations to preclude harmful interference to the RAS. First, we propose that, as a prerequisite to operation, air-ground mobile broadband operations in the 14.47 -14.5 GHz band be coordinated with the NSF to resolve any potential concerns regarding radio astronomy facilities. Second, we note that RAS observations do not occur continually and are usually scheduled in advance. We propose to encourage NSF and air-ground mobile broadband licensees to negotiate coordination requirements based upon the actual use of a RAS facility.

43. We propose that licensees authorized to provide air-ground mobile broadband services must file the applicable NSF-licensee coordination agreement with the Commission through the Universal Licensing System as a prerequisite to commencing operations. We seek comment on these proposals, and any alternate proposals that could ensure that air-ground mobile broadband services take all practicable steps to coordinate with RAS facilities.

b. Existing RAS Facilities

44. We seek comment on requiring air-ground mobile broadband licensees planning to operate in the 14.47-14.5 GHz sub-band and planning to travel within radio line-of-sight of the radio astronomy observatories listed in Footnote US203 to coordinate their proposed operations to resolve any potential interference concerns. In this regard, we also observe that footnote US342 of the U.S. Table of Allocations states that, in making assignments to stations in the 14.47-14.5 GHz sub-band, among other bands, we shall take all practicable steps to protect the RAS from harmful interference.

3. Coordination with Other Federal Secondary Services (Fixed and Mobile) in the 14.4-14.5 GHz Band

45. We seek comment on the extent to which the 14.4-14.5 GHz band Federal assignments are operational and on any technical characteristics of such operations. As discussed above, air-ground mobile broadband licensees, by virtue of their secondary status, would be obligated to avoid causing harmful interference to earlier-deployed secondary services.⁶⁶ Is it necessary to adopt any technical requirements or coordination procedures to provide these services with appropriate interference protections? If so, we invite parties to propose such technical or coordination requirements.

4. Proposed Footnotes to the U.S. Table of Allocations

46. In order to implement these proposals, we propose to modify existing footnote US133 to the U.S. Table of Allocations to apply to the proposed new AMS allocation for air-ground mobile broadband. The existing footnote sets forth coordination procedures for ESAA operations. We request comment on this proposal, particularly on whether this footnote is adequate to accomplish our goals.

US133 In the bands 14.0-14.2 GHz and 14.47-14.5 GHz, the following provisions shall apply to the operations of Earth Stations Aboard Aircraft (ESAA) and to the Aeronautical Mobile Service (AMS):

(a) In the band 14.0-14.2 GHz, ESAA and AMS licensees planning to operate within radio line-of-sight of the coordinates specified in 47 CFR 25.227(c) are subject to prior coordination with

⁶⁴ See NRAO PN Comments at 1-2.

⁶⁵ See CORF PN Comments at 4-5.

⁶⁶ See 47 C.F.R. 2.104(d)(3)(i-iii).

NTIA in order to minimize harmful interference to the earth stations of NASA's Tracking and Data Relay Satellite System (TDRSS).

(b) In the band 14.47-14.5 GHz, operations within radio line-of-sight of the radio astronomy stations specified in 47 CFR 25.226(d)(2) are subject to coordination with the National Science Foundation in accordance with 47 CFR 25.227(d).

E. Regulatory Issues

1. Permitted Uses

47. The Balanced Budget Act of 1997⁶⁷ amended the Communications Act to add section 303(y), which grants the Commission the authority to create multiple allocations within a given spectrum band, “so as to provide flexibility of use,”⁶⁸ if: “(1) such use is consistent with international agreements to which the United States is a party; and (2) the Commission finds, after notice and an opportunity for public comment, that (A) such an allocation would be in the public interest; (B) such use would not deter investment in communications services and systems, or technology development; and (C) such use would not result in harmful interference among users.”⁶⁹ We seek comment on whether our proposal to provide a new allocation for the Aeronautical Mobile Service in the 14.0-14.5 GHz band meets the requirements of Section 303(y).

48. In addition to increasing the number of allocations in a band under Section 303(y) of the Act, the Commission has also used other public interest mandates prescribed in Communications Act⁷⁰ to increase the flexibility of spectrum use (by, *e.g.*, establishing flexible service rules within the established allocations for the band). Such measures help ensure that spectrum is put to its most efficient and beneficial use.⁷¹ We are mindful, however, that the need to accommodate incumbent services in the 14.0-14.5 GHz band may limit the flexibility we are able to offer with respect to additional or future uses of the band.

49. To the extent that we find that air-ground mobile broadband is feasible in this spectrum, we seek comment on whether we should limit any new operations to air-ground mobile broadband. We are aware that the addition of traditional terrestrial services, particularly mobile services, is likely not appropriate for the 14.0-14.5 GHz band due, for example, to potential interference and poor propagation for terrestrial mobile services at higher frequencies. Indeed, the range of incumbent uses in the 14.0-14.5 GHz band requires us to be prudent when considering additional services in this band, as any new users cannot go forward without ensuring the protection of primary FSS operations and first-in secondary operations, as well as accounting for permitted uses.⁷²

⁶⁷ Pub. L. No. 105-33, 111 Stat. 251, 268-69.

⁶⁸ 47 U.S.C. § 303(y).

⁶⁹ Balanced Budget Act of 1997, 47 U.S.C. § 303(y), Pub. L. No. 105-33, 111 Stat. 251, 268-69.

⁷⁰ See, *e.g.*, 47 U.S.C. § 303(b) (authorizing the Commission, as the public convenience, interest or necessity requires, to “[p]rescribe the nature of the service to be rendered by each class of licensed stations and each station within any class”).

⁷¹ See, *e.g.*, *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Notice of Proposed Rulemaking, FCC 02-305, 17 FCC Rcd 24135, 24139-40, ¶ 10 (1999) (*AWS-1 NPRM*), citing *Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, Spectrum Policy Statement, 14 FCC Rcd 19868, 19870, ¶ 9 (1999).

⁷² Footnotes US203 and US342 of the U.S. Table of Allocations provide that practicable steps shall be taken to avoid or remedy harmful interference to radio astronomy. See 47 C.F.R. § 2.106 Footnotes US203, US342.

50. Accordingly, we do not propose to add any new allocation to the 14.0-14.5 GHz band other than one for AMS, and we propose that within this allocation, our new service-specific rules limit a licensee's spectrum use to air-ground mobile broadband. We seek comment on whether this spectrum should be restricted in this way. If commenters believe that additional uses of this spectrum are warranted, they should describe why and quantify the costs and benefits of that approach. Commenters should discuss trade-offs between restricting use in this way and increased flexibility and investment in technology and new services that might otherwise occur.

51. We also note that when the Commission revised its rules governing the four megahertz of dedicated spectrum in the 800 MHz commercial air-ground spectrum band, it limited the spectrum to air-ground use, choosing not to permit a licensee to provide ancillary land mobile or fixed services in the 800 MHz air-ground spectrum.⁷³ The Commission reasoned that the available dedicated spectrum was limited and that the public interest would be best served, at that time, by ensuring that the limited spectrum was devoted to the provision of air-ground services.⁷⁴ We seek comment on whether limited availability of spectrum for air-ground use is a reason to limit the 14.0-14.5 GHz band to air-ground mobile broadband use only.⁷⁵

2. Regulatory Framework

52. In this *Notice*, we seek comment concerning the appropriate regulatory framework for the proposed provision of air-ground mobile broadband services in the 14.0-14.5 GHz spectrum band. One option is to regulate these services by creating a subpart for 14.0-14.5 GHz within Part 27 of our rules. Part 27 does not prescribe the extensive set of licensing and operating rules found in rule parts applicable to specific services. Rather, for the services and spectrum bands licensed under it, Part 27, for the most part, collectively defines permissible uses and limitations, details technical parameters necessary to prevent harmful interference, and specifies basic licensing requirements. It does not contain detailed service rules that are contained in other rule parts, such as Part 22, which may not be needed for air-ground mobile broadband service.⁷⁶ We seek comment regarding whether the proposed services should be regulated pursuant to our Part 27 regulatory framework and, if so, what additional rule provisions should be included in Part 27 or incorporated by reference.

53. We note that existing air-ground services in the 800 MHz spectrum band are governed by Part 22 of the Commission's rules.⁷⁷ Given that we are proposing to limit use to air-ground service, another option is to administer the proposed 14.0-14.5 GHz air-ground use under Part 22. We seek comment on whether the 14.0-14.5 GHz band should be governed by Part 27 or Part 22, or by some other existing part of our rules. We request that commenters specify how the rule part they advocate should be modified to accommodate the proposed air-ground service, and explain how such rule part would best serve licensees and the public. Alternatively, we seek comment on whether services in this band should be governed by their own newly created rule part, and if so, how such a new part would differ from existing rule parts, and why the proposed service cannot be accommodated under an existing regulatory framework.⁷⁸ We

⁷³ See *Amendment of Part 22 of the Commission's Rules to Benefit Consumers of Air-Ground Telecommunications Services, Biennial Regulatory Review – Amendment of Parties 1, 22, and 90 of the Commission's Rules*, WT Docket No. 03-103, WT Docket No. 05-02, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 4403, 4431, ¶ 53 (2005).

⁷⁴ See *id.*

⁷⁵ See also Section IV.F.4 *infra* (ownership restrictions).

⁷⁶ We note that the Commission's more recent wireless services are governed under Part 27's broader regulatory framework.

⁷⁷ See 47 C.F.R. Part 22, Subpart G.

seek comment on the appropriate approach and ask that commenters discuss the costs and benefits of their proposed licensing approach.⁷⁹

3. Regulatory Status

54. Regardless of which rule part is used to license applicants in the 14.0-14.5 GHz band, we propose that we should classify the services we adopt as CMRS if we adopt the proposal to license the band for air-ground mobile broadband.⁸⁰ We seek comment on this proposal. We note that existing 800 MHz air-ground service is classified as CMRS.⁸¹ However, we seek comment as to whether we should permit an air-ground mobile broadband licensee to specify its regulatory status similar to provisions found in section 27.10 of the Commission's rules.⁸² The Commission's current mobile service license application requires an applicant for mobile services to identify the regulatory status of the services(s) it intends to provide (CMRS, Private Mobile Radio Service, or both)⁸³ because service offerings may bear on eligibility and other statutory and regulatory requirements.⁸⁴ In applying that model, Part 27 permits an applicant to choose between providing common carrier and non-common carrier services, or a combination thereof, and prospective air-ground mobile broadband licensees may benefit from a similar approach. We seek comment on the merits of this licensing approach and ask that commenters discuss the costs and benefits of this and other licensing approaches.

55. If the Commission permits a licensee to choose its regulatory status, we propose that, similar to the provisions of section 27.10, applicants and licensees in the 14.0-14.5 GHz band must identify their regulatory status on the FCC Form 601. We also propose that if a licensee changes the service it offers such that it would be inconsistent with its regulatory status, the licensee must notify the Commission.⁸⁵ Further, we propose that licensees must file the notice within 30 days of a change made without the need for prior Commission approval, except that a different time period may apply where the change results in the discontinuance, reduction, or impairment of the existing service.⁸⁶ We seek comment on alternative proposals regarding changes to a licensee's regulatory status and the costs and benefits of such proposals.

F. Licensing and Operating Rules

1. Assignment of Licenses

56. In this *Notice*, we propose to adopt a geographic area licensing scheme for the 14.0-14.5 GHz band that permits the filing and acceptance of mutually exclusive applications.⁸⁷ Section 309(j) of the Act requires that the Commission assign initial licenses through the use of competitive bidding when mutually exclusive applications for such licenses are accepted for filing, except in the case of certain specific

⁷⁸ The designation of our proposed rules to govern air-ground mobile broadband as Part 22 rules in Appendix B is for administrative convenience only, and does not reflect a proposal or preference for regulating air-ground mobile broadband under Part 22.

⁷⁹ Other parts of the Commission's rules will apply to a licensee regardless of the rule part used as the regulatory framework for the proposed services.

⁸⁰ See 47 U.S.C. § 332(c)(1); 47 C.F.R. §§ 20.9, 20.15(a).

⁸¹ 47 C.F.R. § 20.9(a)(8).

⁸² See 47 C.F.R. § 27.10.

⁸³ See FCC Form 601.

⁸⁴ See *infra* Section IV.F.4.

⁸⁵ See, e.g., 47 C.F.R. § 27.10(d).

⁸⁶ See, e.g., 47 C.F.R. § 27.66.

⁸⁷ See *infra* Section IV.F.3 (service areas).

statutory exemptions not applicable here.⁸⁸ Consistent with the Commission's policy that competitive bidding places licenses in the hands of those that value the spectrum most highly, we believe that it would be in the public interest to adopt a licensing scheme which allows the filing of mutually exclusive applications that, if accepted, would be resolved through competitive bidding. Accordingly, in Section IV.G, we seek comment on proposals regarding competitive bidding rules that would apply to resolve any mutually exclusive applications accepted for the 14.0-14.5 GHz block licenses.

2. Spectrum Blocks

57. Our goal is to assign the spectrum in a way that offers the best opportunity to use the spectrum efficiently and effectively, and to promote the provision of wireless broadband services that best meet the needs of passengers aboard aircraft. We also seek to craft an approach that will permit licensees to deploy a variety of current and future technologies within the allocated spectrum and permissible uses.

58. With these goals in mind, we seek comment on how best to apportion the spectrum, if at all, and seek comment on band plans for the 14.0-14.5 GHz band at issue. For example, Qualcomm proposes that the Commission auction two 250 megahertz licenses at 14.00-14.25 GHz and 14.25-14.50 GHz to enable two separate air-ground mobile broadband systems.⁸⁹ Qualcomm states that under this proposal, the aggregate throughput for each system would be approximately 150 gigabits per second ("Gbps"), which would enable licensees to offer advanced data services.⁹⁰ We seek detailed comment on Qualcomm's proposal to create two 250 megahertz licenses, including the costs and benefits of that proposal. While it appears that a throughput of 150 Gbps for a single 250 megahertz system would enable multiple users on multiple aircraft to receive typical broadband services comparable to terrestrial usage,⁹¹ we seek specific comment on whether a 250 megahertz block is an appropriate amount of spectrum for a licensee to provide the anticipated air-ground mobile broadband service, particularly considering system constraints that may be needed to protect other services in the band.

59. Another approach to apportioning the spectrum is for the Commission to license the entire 500 megahertz of spectrum, from 14.0-14.5 GHz, to a single licensee. We seek comment on licensing the entire 500 megahertz as a single block, and specifically regarding whether and in what ways a 500-megahertz system is materially preferable to a 250-megahertz system. Commenters should discuss whether licensing two 250 megahertz blocks or a single 500 megahertz block would result in increased competition, innovation, and investment in the provision of air-ground mobile broadband.⁹²

60. We also seek comment on other ways to license the 14.0-14.5 GHz spectrum band, including the advantages and disadvantages of each approach and as compared to the previously discussed proposals. Specifically, we seek comment regarding whether the envisioned air-ground mobile broadband service offerings would be possible should the Commission divide the spectrum into more than two blocks. Commenters should discuss the costs and benefits of any alternative proposal, including its effects on competition, innovation, and investment in the provision of air-ground broadband services.

⁸⁸ See 47 U.S.C. § 309(j)(1), (2).

⁸⁹ See Qualcomm Petition at 1.

⁹⁰ See *id.* at 14.

⁹¹ Globally, the average mobile network connection speed for tablets in 2012 was 3,683 kbps, up from 2,030 kbps in 2011 and expected to increase to 11.660 mbps by 2017. Source: Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012-2017, dated February 6, 2013, available at http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf. (visited Mar. 15, 2013).

⁹² See also spectrum aggregation discussion in Section IV.F.4 *infra*.

61. We note that any approach to apportioning the band should take into account the need for air-ground mobile broadband licensees to accommodate other users of the band. We therefore request comment on how existing uses of the band, as well as any potential coordination or other interference mitigation measures the Commission may adopt to accommodate those uses, affect how we should apportion the 14.0-14.5 GHz band.⁹³ For example, if the licensing of the service to one or two nationwide licensees facilitates coordination and makes it more effective,⁹⁴ would such advantages outweigh any benefits of licensing this spectrum in smaller blocks of spectrum? Does the type and density of the incumbent users make any particular portion of the band more or less suitable for air-ground mobile broadband use? Should we license contiguous blocks of spectrum or are there environmental or incumbency issues that would make it useful to assign licensees spectrum from throughout the band? If so, what would be the appropriate size of such noncontiguous blocks? More generally, what band plan options would strike the best balance that enables incoming air-ground mobile broadband licensees to co-exist with incumbent existing operations in the band while optimizing the efficiency of air-ground mobile broadband use of spectrum?

3. Service Areas

62. *Geographic Area Licensing.* We propose to adopt a geographic area licensing scheme (as opposed to a site-by-site model) for the 14.0-14.5 GHz band because a geographic approach is well-suited for the proposed air-ground mobile broadband services. We would expect that geographic licensing in this instance would provide licensees with flexibility to respond to market conditions and reduce regulatory burdens and transaction costs associated with site-by-site approvals. This is especially appropriate where spectrum is likely to be used for a service that requires ubiquity and flexibility in siting over wide areas, such as with this air-ground mobile broadband proposal. Additionally, geographic area licensing is consistent with the Commission's licensing approach for the Advanced Wireless Services (AWS), Broadband PCS, and 700 MHz bands.⁹⁵ We seek comment on this proposal, including the costs and benefits of adopting a geographic licensing scheme.

63. In the event that commenters do not support geographic area licensing for the 14.0-14.5 GHz band proposal, commenters should explain their positions and identify any alternative licensing proposals that they support, including the costs and benefits associated with such alternative proposals.

64. *Service Area Size.* Assuming that we utilize a geographic area approach for licensing this band, we must determine the appropriate size of the service area on which the license or licenses should be based. Traditionally, the Commission has endeavored to adopt optimal spectrum block and geographic area sizes, while simultaneously allowing parties to aggregate, disaggregate, or partition their licenses through secondary market mechanisms as necessary. Ideally, the size of the service area would complement the business plans of the initial licensees. Here, taking into consideration the proposed air-ground mobile broadband use for this band, we propose to license this spectrum on a nationwide basis. We note that the 800 MHz commercial aviation air-ground service is licensed on a nationwide basis.⁹⁶ We seek comment on this proposal.

65. We seek comment on whether specifying a smaller service area size for initial licensing, such as Regional Economic Area Groupings (REAGs), is more appropriate for this band. Are there service areas smaller than REAGs that would accommodate the proposed air-ground mobile broadband? We ask commenters to compare the advantages and disadvantages of nationwide licensing to those of smaller services areas, such as REAGs, including financial considerations. We ask commenters to discuss and

⁹³ See *supra* Section IV.D.

⁹⁴ Larger spectrum blocks may permit air-ground mobile broadband licensees to offset their operations away from TDRSS and RAS frequencies, thereby reducing the risk of harmful interference.

⁹⁵ See, e.g., 47 C.F.R. §§ 24.202, 27.6(b), (h).

⁹⁶ See 47 C.F.R. § 22.857.

quantify the economic, technical, and other public interest considerations of any particular geographic scheme for this band. We are particularly interested in how to accommodate systems licensed to different users at the border of such geographic areas.

4. Ownership Restrictions

66. *Foreign Ownership Reporting.* We propose to apply provisions similar to ownership reporting requirements found in Parts 22, 24, and 27 to applicants for licenses in the proposed 14.0-14.5 GHz band.⁹⁷ Sections 22.7, 24.12, and 27.12⁹⁸ each implement section 310 of the Act, including foreign ownership and citizenship requirements that restrict the issuance of licenses to certain applicants.⁹⁹ An applicant requesting authorization to provide services in this band other than broadcast, common carrier, aeronautical en route, and aeronautical fixed services would be subject to the restrictions in section 310(a), but not to the additional restrictions in section 310(b). An applicant requesting authorization for broadcast, common carrier, aeronautical en route, or aeronautical fixed services would be subject to both sections 310(a) and 310(b). We do not believe that applicants for the proposed 14.0-14.5 GHz band should be subject to varied reporting obligations. Thus, we propose that all applicants must provide the same foreign ownership information, which covers both sections 310(a) and 310(b).¹⁰⁰ We request comment on this proposal, including any costs and benefits.

67. *Eligibility and Spectrum Aggregation Limits.* We propose to adopt an open eligibility standard¹⁰¹ for the proposed 14.0-14.5 GHz band. It does not appear that open eligibility in this band will result in significant likelihood of substantial harm to competition, and therefore it does not appear that an eligibility restriction in this band is warranted. We believe that such an open eligibility approach should encourage efforts to provide new technologies, products, and services, while helping to ensure efficient use of this spectrum.¹⁰² An open eligibility standard is consistent with the Commission's past practice for mobile wireless spectrum allocations.¹⁰³ We note that an open eligibility approach does not affect citizenship, character, or other generally applicable requirements that may apply. We seek comment on this proposal. Commenters should discuss the costs and benefits of the open eligibility proposal on competition, innovation, and investment.

68. With regard to spectrum aggregation, we note that the Commission reviews the impact of an increase in spectrum holdings on competition, innovation, and the efficient use of spectrum, generally on a case-by-case basis.¹⁰⁴ In our recently initiated proceeding to review policies toward mobile spectrum

⁹⁷ See 47 C.F.R. § 27.12.

⁹⁸ 47 C.F.R. §§ 22.7, 24.12, 27.12.

⁹⁹ See 47 U.S.C. § 310.

¹⁰⁰ That said, by establishing parity in reporting obligations, however, we do not propose a single, substantive standard for compliance. For example, we would not expect to deny a license to an applicant requesting to provide exclusively services that are not subject to section 310(b), solely because its foreign ownership would disqualify it from receiving a license if the applicant had applied for authority to provide services subject to section 310(b).

¹⁰¹ Under an "open" or unrestricted eligibility approach for licensing spectrum, the Commission does not exclude any potential applicants because of the amount of spectrum they already control, as such exclusions in these instances are deemed to be unnecessary for ensuring competition.

¹⁰² See 47 U.S.C. § 309(j)(3).

¹⁰³ See, e.g., *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Second Report and Order, 22 FCC Rcd 15289, 15381-84, ¶¶ 253, 256, note 573 (2007).

¹⁰⁴ See, e.g., *Applications of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC and Cox TMI, LLC For Consent to Assign AWS-1 Licenses*, WT Docket No. 12-4, Memorandum Opinion and

holdings, the Commission stated that it would continue to apply its case-by-case approach to evaluate mobile spectrum holdings in initial spectrum licensing.¹⁰⁵ Regarding the 14.0-14.5 GHz band, we seek comment generally on whether and how to address any spectrum aggregation concerns and effects on competition in the provision of mobile broadband services to passengers on aircraft. While we do not propose adopting any specific aggregation limits applicable to the initial licensing of this band, we seek comment on whether any such limits are necessary or appropriate. In particular, parties advocating such limits should discuss whether we should limit the amount of spectrum in this band that one entity may acquire at auction and through secondary market transactions. For example, to the extent we establish multiple spectrum blocks for this band, we seek comment on whether one entity should be permitted to acquire more than one block.

69. We note that, if implemented, the proposed air-ground mobile broadband service in the 14.0-14.5 GHz band would compete domestically with ESAA service providers (satellite-based) in the 11.7-12.2 GHz and 14.0-14.5 GHz bands¹⁰⁶ and air-ground service providers (terrestrial-based) in the 800 MHz band. Most of the ESAA licensees have blanket authority to use one gigahertz of spectrum, 500 megahertz for transmitting, and 500 megahertz for receiving.¹⁰⁷ We seek comment on whether there are any competitive concerns with our licensing proposals for the 14.0-14.5 GHz band given the current marketplace for air-ground broadband services. In light of the increase in the number of entities authorized to provide broadband services to aircraft, we propose not to restrict a single entity from purchasing both licenses to construct a single 500 megahertz system.¹⁰⁸ Commenters should provide data and analysis supporting their positions. Those commenters that support aggregation limits should also address with specificity what the limitations should be, what competitive problems the proposed limits are

Order and Declaratory Ruling, 27 FCC Rcd 10698, 10716, ¶ 48 (2012); *Applications of AT&T Mobility Spectrum LLC, New Cingular Wireless PCS, LLC, Comcast Corporation, Horizon Wi-Com, LLC, NextWave Wireless, Inc., and San Diego Gas & Electric Company For Consent to Assign and Transfer Licenses*, WT Docket No. 12-240, Memorandum Opinion and Order, 27 FCC Rcd 16459, 16467, ¶ 20 (2012).

¹⁰⁵ See *Policies Regarding Mobile Spectrum Holdings*, WT Docket No. 12-269, Notice of Proposed Rulemaking, 27 FCC Rcd 11710, 11718, ¶ 16, note 59 (2012).

¹⁰⁶ See *Panasonic Avionics Corporation*, Order and Authorization, 26 FCC Rcd 12557 (Int'l Bur. and OET 2011) (blanket license for a network of up to 50 earth stations aboard foreign-flagged commercial aircraft operated by Lufthansa transmitting in the 14.0 GHz-14.5 GHz band and receiving in the 11.7-12.2 GHz band); *Row 44, Inc.*, Order and Authorization, 24 FCC Rcd 10223 (Int'l Bur. and OET 2009) (blanket license for a network with up to 1,000 technically identical earth stations aboard aircraft transmitting in 14.05-14.47 GHz and receiving in 11.7-12.2 GHz); *ViaSat, Inc.*, Order and Authorization, 22 FCC Rcd 19964 (Int'l Bur. and OET 2007) (blanket license for a network with up to 1,000 technically identical earth stations aboard aircraft transmitting in 14.0-14.5 GHz and receiving in 11.7-12.2 GHz); *ARINC Incorporated*, Order and Authorization, 20 FCC Rcd 7553 (Int'l Bur. and OET 2005) (blanket license for up to 1,000 technically identical earth stations aboard aircraft transmitting in 14.0-14.5 GHz and receiving in 11.7-12.2 GHz); and *Boeing Company*, Order and Authorization, 16 FCC Rcd 5864 (Int'l Bur. and OET 2001) (blanket license for up to 800 technically identical receive only earth stations aboard aircraft); Order and Authorization, 16 FCC Rcd 22645 (Int'l Bur. and OET 2001) (modifying prior receive only authorization to provide blanket license for up to 800 technically identical earth stations aboard aircraft transmitting in 14.0-14.5 GHz and receiving in 11.7-12.2 GHz). Most recently, Gogo received blanket license for up to 1,000 technically identical earth stations aboard aircraft transmitting in the 14.0-14.5 GHz and receiving in 11.7-12.2 GHz. Gogo LLC, *Application for Blanket Authority for Operation of 1,000 Technically Identical Ku-Band Transmit/Receive Earth Stations in the Aeronautical Mobile Satellite Service*, IBFS File Nos. SES-LIC-20120619-00574, SES-AMD-20120731-00709, SES-AFS-20121008-00902, granted May 1, 2013. Gogo holds an authorization for the terrestrial-based Air-Ground network, Call Sign WQFX728 (granted on October 31, 2006).

¹⁰⁷ See *supra* note 106.

¹⁰⁸ See Qualcomm Petition at 14.

designed to solve, and how their proposals will address these problems without imposing undue costs or inefficiencies. Commenters should discuss and quantify any costs and benefits associated with alternative proposals on spectrum aggregation policies for the 14.0-14.5 GHz band on competition, innovation, and investment.

70. We seek comment on the potential impact of all of our proposals on competition; specifically, how any proposal a commenter supports may enhance competition and result in the rapid deployment of competitive mobile broadband services to consumers. Commenters should also discuss the costs and benefits of these proposals and any alternative proposals. Further, to the extent possible, commenters should provide specific data and information, such as actual or estimated dollar figures for each specific cost or benefit addressed, along with a description of how the data or information was calculated or obtained, and any supporting documentation or other evidentiary support.

5. License Term, Performance Requirements, Renewal Criteria, and Permanent Discontinuance of Operations

71. *License Term.* We propose to establish a ten-year term for licenses in the proposed 14.0-14.5 GHz band. The Act does not specify a license term limit for the proposed services.¹⁰⁹ The Commission has adopted ten-year license terms for most wireless radio services licenses, including the 800 MHz commercial air-ground service.¹¹⁰ Because we continue to believe that a ten-year term is appropriate,¹¹¹ and in the interest of maintaining consistency among wireless services, we propose a ten-year term here. We seek comment on this proposal, including any costs and benefits of the proposal. Further, we invite commenters to submit alternative proposals for appropriate license terms, which should similarly include a discussion regarding the costs and benefits.

72. We note that under our license term proposal, if a license is partitioned or disaggregated as proposed *infra*, any partitionee or disaggregatee would be authorized to hold its license for the remainder of the original license term.¹¹² We emphasize that nothing in our proposal is intended to enable any partitionee or disaggregatee to obtain rights in excess of those previously possessed by the underlying licensee. We seek comment on these proposals, including the costs and benefits thereof.

73. *Performance Requirements.* The Commission establishes performance requirements to facilitate the efficient deployment of wireless services, and promote the efficient and effective use of the spectrum.¹¹³ Historically, the Commission has applied various performance and construction requirements to different spectrum bands. For example, within four years of license grant, an AWS-4 licensee must provide reliable signal coverage and offer service to at least forty percent of its total population; and within seven years, the licensee must provide coverage and offer services to at least seventy percent of the population in each license area.¹¹⁴ Similarly, for licensees in the 2.3 GHz Wireless Communications Services (WCS) band, the Commission adopted population-based and fixed links construction requirements as well as reporting obligations.¹¹⁵ For the 700 MHz band, the Commission

¹⁰⁹ The only statutory limit on license terms is eight years for licenses in the broadcast services. See 47 U.S.C. § 307(c)(1); see also 47 C.F.R. § 73.1020(a).

¹¹⁰ See, e.g., 47 C.F.R. §§ 24.15, 27.13(a).

¹¹¹ See, e.g., *Service Rules for Advanced Wireless Services in the 2155-2175 MHz*, Notice of Proposed Rulemaking, 27 FCC Rcd 17035, 17086, ¶ 104 (2007) (noting that a ten-year license term will help to provide a stable regulatory environment).

¹¹² See *infra* Section IV.F.6 (partitioning and disaggregation).

¹¹³ See 47 U.S.C. § 309(j).

¹¹⁴ See 47 C.F.R. § 27.14.

¹¹⁵ See 47 C.F.R. § 27.14(p).

required licensees to provide service coverage to a specific percentage of the population of the applicable market or to cover a certain percentage of the geographic market area by their interim and final construction deadlines.¹¹⁶

74. In other instances, where population- or geography-based requirements are not optimal or appropriate, the Commission has adopted substantial service requirements for licensees. For example, in the 800 MHz commercial aviation air-ground service, the Commission found that a five-year substantial service construction requirement was appropriate for new licensees and was consistent with our statutory mandate “to prevent stockpiling or warehousing by licensees, and to promote investment in and rapid deployment of new technologies and services.”¹¹⁷ In that case, the Commission defined substantial service as “service that is sound, favorable, and substantially above a level of mediocre service that would barely warrant renewal.”¹¹⁸ A licensee would be viewed as meeting the substantial service requirement if it met one of two safe harbors: (1) if the licensee constructs and operates 20 base stations, with at least one base station in each of the FAA regions,¹¹⁹ at the five-year benchmark; or (2) if the licensee constructs and operates base stations capable of serving the airspace of at least 25 of the 50 busiest airports, as measured by annual passenger boardings, at the five-year benchmark.¹²⁰

75. In light of the air-ground mobile broadband being proposed for this band, we believe that a substantial service requirement similar to that adopted for the licensees in the 800 MHz commercial air-ground service is appropriate here in light of the difficulties in applying specific population- or geography-based requirements.

76. We tentatively conclude that a new licensee or licensees in the 14.0-14.5 GHz band should be required to meet substantial service at the end of its proposed ten-year license term. Consistent with past practice, we propose to define substantial service as service that is sound, favorable, and substantially above a level of mediocre service that would barely warrant renewal. We believe that a ten-year performance period is appropriate given the extensive nationwide configuration likely required for a successful, robust air-ground system. Given the need for ubiquitous service over large areas of the country, we expect that any nationwide air-ground mobile broadband system would necessarily require the deployment of a relatively large number of base stations. We assume, however, that a successful service would require the operation of a large percentage of the anticipated total number of a system’s base stations. We believe that a time period of ten years is reasonable for the deployment and operation of a nationwide air-ground mobile broadband system that provides the anticipated seamless broadband services to aircraft.¹²¹ We seek comment on our proposal to impose a ten-year performance deadline. We note that in proposing a ten-year benchmark, we do not suggest that licensees may delay construction and service until the end of the term. To the contrary, our goal is the rapid deployment and delivery of broadband mobile service to aircraft, and we expect licensees to make concerted efforts to begin service as early as possible. To that end, we believe that imposing interim performance or reporting requirements may help to ensure that a licensee is making timely and quantifiable progress on its obligations to construct and provide service. We therefore request comment on whether we should adopt an interim

¹¹⁶ See 47 C.F.R. § 27.14(g)-(i).

¹¹⁷ 47 U.S.C. § 309(j)(4)(B).

¹¹⁸ *Id.*

¹¹⁹ See Federal Aviation Administration, Regions and Aeronautical Center Operations, www.faa.gov/about/office_org/headquarters_offices/arc/ (visited April 3, 2013).

¹²⁰ See Federal Aviation Administration, Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports, www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/ (visited April 3, 2013).

¹²¹ This construction period also accommodates applicable FAA certification and approval processes.

requirement, and what such requirement should include. We could, for example, require licensees to submit a report demonstrating that meaningful efforts—such as the filing of requisite FAA certification applications, pursuing network engineering planning, or taking affirmative steps to procure equipment and sites—have been made in constructing their air-ground mobile broadband systems. We seek comment on this or other interim requirements designed to ensure that licensees are taking early and proactive steps to deploy their networks. We also request comment on what, if any, penalties should be applied for failure to take meaningful steps towards construction. Commenters should discuss the advantages and costs associated with an interim requirement.

77. We request comment on the appropriate safe harbor or safe harbors that will satisfy the proposed substantial service obligation. We propose the following safe harbor, which is crafted to reflect major domestic air travel routes:

- The construction and operation of base stations that provide robust, uninterrupted service to all routes within the contiguous United States between 50 or more airports classified as large or medium hubs (as measured by the most recent FAA data for annual passenger enplanements) within ten years of license grant.¹²²

78. We note that service to large and medium hubs accounts for approximately 88 percent of primary airport traffic, with the top 50 airports representing approximately 83 percent of such air traffic.¹²³ We propose this safe harbor in an effort to foster the efficient deployment of a robust nationwide air-ground mobile broadband system that will satisfy demand for continuous broadband service aboard aircraft. A successful service will necessarily require a number of operational base stations sufficient to provide uninterrupted broadband service to both cross country and shorter, regional routes. We believe that the proposed safe harbor will help to ensure the requisite deployment of necessary facilities.

79. We seek comment on the feasibility of the proposed safe harbor and whether other alternatives represent more appropriate safe harbors. We encourage specific comment regarding whether our proposed safe harbor or other safe harbors adequately reflect meaningful buildout in the context of the proposed uses of this band. Commenters should discuss and quantify how any supported safe harbors will affect investment and innovation as well as discuss and quantify other costs and benefits associated with the proposal. We note that safe harbors are intended to provide licensees with a measure of certainty in determining whether they are providing substantial service, but are not intended to be the only means of demonstrating substantial service. Licensees may choose to show substantial service by other means. Importantly, however, we tentatively conclude that a licensee, whether it chooses to meet an established safe harbor or make an alternative showing, must demonstrate that it has constructed and is actually providing service to aircraft. The actual provision of service to aircraft could, for example, be evidenced by a contract with at least one major airline covering the requisite routes. We seek comment on these proposals. Finally, in the event we permit partitioning and disaggregation in this band, we propose requiring a partitionee or disaggregatee to be bound by any construction requirements that we may adopt in this proceeding. We seek comment on how construction requirements, including the proposed safe harbor, should be applied to any partitionees and disaggregatees.¹²⁴

¹²² “Large” hubs are defined as airports that have passenger boardings equal to or greater than one percent of total annual passenger enplanements, while “medium” hubs have at least 0.25 percent but less than one percent of the total annual passenger boardings. See 49 U.S.C. § 47102.

¹²³ Percentages are based on calendar year 2011 enplanements. See Federal Aviation Administration, CY 2011 Passenger Boarding and All-Cargo Data: Enplanements at Primary Airports (by Rank), www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy11_primary_enplanements.pdf, (visited April 3, 2013).

¹²⁴ See Section IV.F.6 *infra*.

80. We also seek comment on the appropriate procedures to apply if a licensee does not comply with the performance requirements. We tentatively conclude that we should apply the procedures set forth in section 1.946(c) of the Commission's rules to licensees that fail to meet their performance requirements.¹²⁵ This section states that the license will automatically terminate, without specific Commission action, on the date the construction or coverage period expires.¹²⁶ We seek comment on our proposal that we apply this rule to licensees in the 14.0-14.5 GHz band. In addition, if a geographic area licensee loses its license for failure to comply with coverage requirements, we seek comment on whether the licensee should be precluded from regaining the license.

81. Finally, we propose that licensees file a notification within 15 days of the ten-year benchmark demonstrating that they have met the applicable performance requirement. Further, we propose that each construction notification include electronic coverage maps and supporting documentation, which must be truthful and accurate and must not omit material information that is necessary for the Commission to determine compliance with its construction requirement.

82. *Renewal Criteria.* We propose to adopt renewal requirements for licensees in the 14.0-14.5 GHz band based on the Commission's model for the 700 MHz commercial licensees.¹²⁷ Under this three-part approach: (1) renewal applicants must file a detailed renewal showing, demonstrating that they are providing service to the public (or, are using the spectrum for private, internal communication to the extent permitted by the Commission), and substantially complying with the Commission's rules (including any applicable performance requirements) and policies of the Act; (2) competing renewal applications are prohibited; and (3) if a license is not renewed, the associated spectrum is returned to the Commission for reassignment.¹²⁸

83. In the *700 MHz First Report and Order*, the Commission determined that 700 MHz licensees must file a renewal application pursuant to section 1.949, demonstrating that they have provided substantial service during their past license term.¹²⁹ The Commission explained that the substantial service showing made in support of a renewal application is distinct from any substantial service performance showing under the Commission's service rules.¹³⁰ The Commission emphasized that "a licensee that meets the applicable performance requirements might nevertheless fail to meet the substantial service standard at renewal."¹³¹

¹²⁵ See 47 C.F.R. § 1.946(c).

¹²⁶ See *id.*

¹²⁷ We note that our proposal here is consistent with the Commission's goal in the pending rulemaking to harmonize the Commission's varying requirements for the renewal of Wireless Radio Services licenses. See *In the Matter of Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 to Establish Uniform Licensee Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, Notice of Proposed Rulemaking and Order, 25 FCC Rcd 6996 (2010). In that proceeding, the Commission proposes to revise renewal requirements for Wireless Radio Services based on the model for the 700 MHz Commercial Services band licensees. *Id.*, 25 FCC Rcd at 7002.

¹²⁸ See *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064, 8093, ¶¶ 75-77 (2007) (*700 MHz First Report and Order*) (subsequent history omitted).

¹²⁹ See *700 MHz First Report and Order*, 22 FCC Rcd at 8093 ¶ 75.

¹³⁰ See *id.*

¹³¹ *Id.* In this regard, section 27.14(e) of the Commission's rules, adopted in the 700 MHz proceeding, provides that a renewal applicant "must make a showing of substantial service, independent of its performance requirements, as a condition for renewal at the end of each license term." 47 C.F.R. §

84. The Commission also explained that “[s]ubstantial service in the renewal context . . . encompasses Commission consideration of a variety of factors including [1] the level and quality of service, [2] whether service was ever interrupted or discontinued, [3] whether service has been provided to rural areas, and [4] any other factors associated with a licensee’s level of service to the public.”¹³² We tentatively conclude that these same factors should be considered by the Commission when evaluating renewal showings for the proposed 14.0-14.5 GHz band. We request comment regarding our proposed renewal requirements.

85. *Permanent Discontinuance of Operations.* We seek comment on the Commission’s rules concerning the permanent discontinuance of operations, which are intended to afford licensees operational flexibility to use their spectrum efficiently while ensuring that spectrum does not lay idle for extended periods. Pursuant to section 1.955(a)(3) of the Commission’s rules, an authorization will automatically terminate, without Commission action, if service is “permanently discontinued.”¹³³ For the 14.0-14.5 GHz spectrum discussed herein, we propose to define “permanently discontinued” as a period of 180 consecutive days during which a licensee is not providing service to aircraft or subscribers. The 180-day period would apply regardless of the rule part used to license applicants. Licensees would not be subject to this requirement until the date of their performance deadline(s).

86. In addition, consistent with section 1.955(a)(3) of the Commission’s rules, we propose that, if a licensee in the 14.0-14.5 GHz band permanently discontinues service, the licensee must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 and requesting license cancellation. An authorization will automatically terminate without specific Commission action if service is permanently discontinued even if a licensee fails to file the required form. We seek comment on these proposals, including the associated costs and benefits.

6. Secondary Markets

87. *Partitioning and Disaggregation.* Geographic partitioning refers to the assignment of geographic portions of the license to another licensee along geopolitical or other boundaries. Spectrum disaggregation refers to the assignment of discrete amounts of spectrum under the license to another entity. These practices are intended to facilitate efficient use of the spectrum and economic opportunity for a wide variety of applicants, including small business, rural telephone, minority-owned, and women-owned applicants.¹³⁴

88. While we propose to license this spectrum on a nationwide basis, we recognize that it is possible that a licensee may opt to deploy an air-ground mobile broadband system in a service area smaller than a nationwide market. Further, we recognize that a licensee may find that it is not necessary to utilize all of its licensed bandwidth in order to deploy a broadband air-ground system, and may wish to disaggregate its excess capacity. Given the positive effects on competition of encouraging opportunities for secondary market transactions,¹³⁵ coupled with natural market constraints on the apportioning of spectrum rights in a manner that would undermine the economic viability of the service, we do not believe that there is any need at this time to adopt rules restricting an air-ground mobile broadband licensee’s marketplace decisions regarding partitioning or disaggregation. Accordingly, we propose to

27.14(e).

¹³² 700 MHz First Report and Order, 22 FCC Rcd at 8093, ¶ 75.

¹³³ 47 C.F.R. § 1.955(a)(3).

¹³⁴ See 47 U.S.C. § 1.946(c).

¹³⁵ See *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, 20624-26, ¶¶ 42-45 (2003) (*Secondary Markets Report and Order and Further Notice*) (discussion of benefits of secondary markets); *Erratum*, 18 FCC Rcd 24817 (2003).

permit partitioning and disaggregation by an air-ground mobile broadband licensee in the 14.0-14.5 GHz band.¹³⁶ We invite comment on adopting air-ground mobile broadband partitioning or disaggregation provisions similar to section 27.15 of the Commission's rules, which provides that a licensee may apply to partition their licensed geographic service areas or disaggregate their licensed spectrum at any time following the grant of their licenses.¹³⁷ We also seek comment on the costs and benefits of allowing partitioning and disaggregation for air-ground mobile broadband, and whether it promotes the public interest.

89. We propose to require that each party to a partitioning, disaggregation, or combination thereof in the 14.0-14.5 GHz band service individually meet any applicable service performance requirements (both construction and actual provision of service) that the Commission imposes upon its partitioned and/or disaggregated license.¹³⁸ This approach is intended to ensure that spectrum is used intensively in the public interest, while affording licensees significant flexibility to structure their coverage areas and spectrum use according to their business plans. We seek comment on our proposal to adopt an independent construction requirement for each party to a geographic partitioning or spectrum disaggregation. Commenters should discuss and quantify the costs and benefits of these proposals with respect to competition, innovation, and investment. Similarly, we seek comment on whether parties to a partitioning or disaggregation should be required to individually comply with any coordination requirement that the Commission may adopt.

90. *Spectrum Leasing.* In 2003, in order to promote more efficient use of terrestrial wireless spectrum through secondary market transactions while also eliminating regulatory uncertainty, the Commission adopted a comprehensive set of policies and rules to govern spectrum leasing arrangements between terrestrial licensees and spectrum lessees.¹³⁹ These policies and rules enable terrestrially based Wireless Radio Service licensees holding "exclusive use" spectrum rights to lease some or all of the spectrum usage rights associated with their licenses to third party spectrum lessees, which then are permitted to provide wireless services consistent with the underlying license authorization.¹⁴⁰

91. We propose that the general spectrum leasing policies and rules be applied to the 14.0-14.5 GHz band in the same manner that those policies apply generally to other services.¹⁴¹ We seek comment on this proposal. Commenters should discuss the effects on competition, innovation and investment, and of extending our secondary spectrum leasing policies and rules to the 14.0-14.5 GHz band. Are there considerations specific to the proposed air-ground mobile broadband service that requires the Commission to depart from the Commission's general spectrum leasing policies? For example, to the extent that we adopt coordination requirements, we invite comment on how to apply such requirements to different categories of spectrum lessees.

¹³⁶ We note that partitionees and disaggregatees would be limited to air-ground mobile broadband operations should we adopt the proposal to limit this service to air-ground use.

¹³⁷ See 47 C.F.R. § 27.15.

¹³⁸ See *supra* Section IV.F.5 (performance requirements).

¹³⁹ See *Secondary Markets Report and Order and Further Notice*, 18 FCC Rcd 20604, *Erratum*, 18 FCC Rcd 24817 (2003).

¹⁴⁰ See *id.* In 2004, the Commission expanded the leasing framework by establishing immediate approval procedures for certain categories of spectrum leasing arrangements and extending the spectrum leasing policies to additional Wireless Radio Services. See *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503 (2004).

¹⁴¹ See *id.* See, e.g., 47 C.F.R. ¶ 1.9005(j).

7. Other Operating Requirements

92. Regardless of which part the Commission concludes is most appropriate for these licenses, licensees in this band may be required to comply with rules contained in other parts of the Commission's rules by virtue of the particular services they provide. For example:

- Applicants and licensees would be subject to the application filing procedures for the Universal Licensing System, set forth in Part 1 of our rules.¹⁴²
- Licensees would be required to comply with the practices and procedures listed in Part 1 of our rules for license applications, adjudicatory proceedings, *etc.*
- Licensees would be required to comply with the Commission's environmental provisions, including section 1.1307.¹⁴³
- Licensees would be required to comply with the antenna structure provisions of Part 17 of our rules.
- To the extent a licensee provides a CMRS, such service would be subject to the provisions of Part 20 of the Commission's rules along with the provisions in the rule part under which the license was issued.¹⁴⁴ Part 20 applies to all CMRS providers, even though the stations may be licensed under other parts of our rules.
- The application of general provisions of Parts 22, 24, 27, or 101 such as those relating to citizenship, equal employment opportunity, or maintenance of station records.

93. We seek comment regarding whether we need to modify any of these rules to ensure that the 14.0-14.5 GHz licensees are covered under the necessary provisions. We seek specific comment as to any rules that would be affected by our proposal to apply elements of the framework of these parts, whether separately or in conjunction with other requirements.

G. Procedures for 14.0-14.5 GHz Band Licenses Subject to Assignment by Competitive Bidding

94. If we adopt our proposed geographic area licensing approach that would permit the filing and acceptance of mutually exclusive applications, we will be required to resolve such applications through competitive bidding consistent with the mandate of Section 309(j) of the Communications Act.¹⁴⁵ Accordingly, we seek comment on a number of proposals relating to competitive bidding for licenses for spectrum in the 14.0-14.5 GHz band.

1. Application of Part 1 Competitive Bidding Rules

95. We propose that the Commission would conduct any auction for 14.0-14.5 GHz licenses in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules, and substantially consistent with the competitive bidding procedures that have been employed in previous auctions.¹⁴⁶ Specifically, we propose to employ the Part 1 rules governing competitive bidding design, designated entity preferences, unjust enrichment, application and payment procedures, reporting requirements, and the prohibition on certain communications between auction applicants.¹⁴⁷ Under this proposal, such rules would be subject to any modifications that the Commission may adopt for its Part 1

¹⁴² See 47 C.F.R. Part 1, Subpart F.

¹⁴³ 47 C.F.R. § 1.1307.

¹⁴⁴ See 47 C.F.R. Part 20; *see also* 47 C.F.R. § 27.3(g).

¹⁴⁵ 47 U.S.C. § 309(j)(1).

¹⁴⁶ See 47 C.F.R. §§ 1.2101-1.2114.

general competitive bidding rules in the future. In addition, consistent with our long-standing approach, auction-specific matters such as the competitive bidding design and mechanisms, as well as minimum opening bids and/or reserve prices, would be determined by the Wireless Telecommunications Bureau pursuant to its delegated authority.¹⁴⁸ We seek comment on this approach, including the costs and benefits of this approach. We also seek comment on whether any of our Part 1 rules would be inappropriate or should be modified for an auction of licenses in the 14.0-14.5 GHz band.

2. Provisions for Designated Entities

96. In authorizing the Commission to use competitive bidding, Congress mandated that the Commission “ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services.”¹⁴⁹ In addition, Section 309(j)(3)(B) of the Communications Act requires that in establishing eligibility criteria and bidding methodologies, the Commission promote “economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.”¹⁵⁰ One of the principal means by which the Commission furthers these statutory goals is the award of bidding credits to small businesses. The Commission defines eligibility requirements for small business bidding credits on a service-specific basis, taking into account the capital requirements and other characteristics of the particular service.¹⁵¹

¹⁴⁷ See, e.g., *Amendment of Part 1 of the Commission’s Rules—Competitive Bidding Procedures*, WT Docket No. 97-82, Order, Memorandum Opinion and Order and Notice of Proposed Rule Making, 12 FCC Rcd 5686 (1997); Third Report and Order and Second Further Notice of Proposed Rule Making, 13 FCC Rcd 374 (1997) (*Part 1 Third Report and Order*); Order on Reconsideration of the Third Report and Order, Fifth Report and Order, and Fourth Further Notice of Proposed Rule Making, 15 FCC Rcd 15293 (2000), *aff’d in part and modified in part*, Second Order on Reconsideration of the Third Report and Order, and Order on Reconsideration of the Fifth Report and Order, 18 FCC Rcd 10180 (2003); Seventh Report and Order, 16 FCC Rcd 17546 (2001); Eighth Report and Order, 17 FCC Rcd 2962 (2002); Second Order on Reconsideration of the Part 1 Fifth Report and Order, 20 FCC Rcd 1942 (2005); *Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission’s Competitive Bidding Rules and Procedures*, WT Docket 05-211, Report and Order, 21 FCC Rcd 891 (2006) (*CSEA/Part 1 Report and Order*), *recons. pending*; Second Report and Order and Second Further Notice of Proposed Rule Making, 21 FCC Rcd 4753 (2006) (*CSEA/Part 1 Designated Entity Second Report and Order and Second FNPRM*), *recons. pending*; Order on Reconsideration of the Second Report and Order, 21 FCC Rcd 6703 (2006) (modified by *Erratum and Notice of Office of Management and Budget Approval of Information Collections*, 21 FCC Rcd 6622 (WTB 2006)), *petition for review dismissed sub nom. Council Tree Communications, Inc. v. FCC*, 503 F.3d 284 (3d Cir. 2007); Second Order on Reconsideration of the Second Report and Order, 23 FCC Rcd 5425 (2008), *vacated in part, Council Tree Communications, Inc. v. FCC*, 619 F.3d 235 (3d Cir. 2010); *Order*, 27 FCC Rcd 908 (2012).

¹⁴⁸ See 47 C.F.R. §§ 0.131(c), 0.331; see also *Amendment of Part 1 of Commission’s Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, Third Report and Order and Second Further Notice of Proposed Rule Making, 13 FCC Rcd 374, 448-49, 454-55 (1997) (directing the Bureau to seek comment on specific mechanisms relating to auction conduct pursuant to the BBA) (*Part 1 Third Report and Order*).

¹⁴⁹ See 47 U.S.C. § 309(j)(4)(D). Such entities are collectively described as “designated entities.” See 47 C.F.R. § 1.2110(a).

¹⁵⁰ 47 U.S.C. § 309(j)(3)(B).

97. We propose to make small business bidding credits available for the 14.0-14.5 GHz air-ground mobile broadband service. In the past, the Commission has declined to adopt provisions for designated entities for certain nationwide services, such as the direct broadcast satellite (DBS) service and the digital audio radio service (DARS), where applicants faced extremely high implementation costs¹⁵² and it was unclear whether small businesses could attract the capital necessary to implement and provide a nationwide service.¹⁵³ Moreover, the legislative history of the designated entity provisions of Section 309(j) demonstrates that Congress did not necessarily intend that the Commission adopt special measures for designated entities in nationwide services.¹⁵⁴ Our proposal to offer small business bidding credits here is based on our belief that deployment and operational costs may be significantly lower than for other previously-authorized nationwide services. For example, a licensee may be able to initiate the proposed air-ground mobile broadband system along primary flight paths and then gradually phase in service at lower cost than was required for services such as DBS and DARS. We believe that the operation of an air-ground mobile broadband service may require relatively lower capital expenditures than those nationwide satellite-based services, because the necessary infrastructure may be less costly.¹⁵⁵ We also believe that the capital requirements of providing commercial air-ground mobile broadband service in the 14.0-14.5 GHz band may generally be similar to the capital requirements of providing commercial air-ground service in the 800 MHz band, a nationwide service for which the Commission decided to offer bidding credits.¹⁵⁶ Thus, we seek comment on whether small businesses may be able to attract the necessary capital to provide air-ground mobile broadband service, particularly if they are assisted by bidding credits.

98. While small businesses may be able to provide air-ground mobile broadband service, we nonetheless recognize that such operations may be very capital-intensive relative to other services provided to smaller geographic areas. We therefore propose to use the same small business definitions we have adopted for other capital-intensive services that serve large geographic areas. Specifically, we propose to define a small business as an entity with average annual gross revenues for the three preceding years not exceeding \$40 million, and to define a very small business as an entity with average annual

¹⁵¹ 47 C.F.R. § 1.2110(c)(1); see also *Part 1 Third Report and Order*, 13 FCC Rcd at 388 ¶18; *Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, Second Memorandum Opinion and Order, 9 FCC Rcd at 7269, ¶ 145 (1994).

¹⁵² See *Revision of Rules and Policies for the Direct Broadcast Satellite Service*, Report and Order, 11 FCC Rcd 9712 (1995) (*DBS Auction Order*); *Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Band*, Report and Order, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754 (1997) (*DARS Auction Order*).

¹⁵³ See *DBS Auction Order*, 11 FCC Rcd at 9799, ¶ 217; *DARS Auction Order*, 12 FCC Rcd at 5824-25, ¶¶ 174-76.

¹⁵⁴ The House Report to the Omnibus Budget Reconciliation Act of 1993 states that "[t]he characteristics of some services are inherently national in scope, and are therefore ill-suited for small businesses." H.R. Rep. No.103-111, at 254 (1993).

¹⁵⁵ Air-ground mobile broadband service may also require fewer base stations than other terrestrial services that are provided on a nationwide basis, such as broadband PCS.

¹⁵⁶ See *Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services, Biennial Regulatory Review-- Amendment of Parts 1, 22, and 90 of the Commission's Rules, Amendment of Parts 1 and 22 of the Commission's Rules to Adopt Competitive Bidding Rules for Commercial and General Aviation Air-Ground Radiotelephone Service*, WT Docket Nos. 03-103, 05-42, Order on Reconsideration and Report and Order, 20 FCC Rcd 19663, 19679, ¶ 32 (2005) (*Air-Ground Reconsideration Order and Report and Order*).

gross revenues for the three preceding years not exceeding \$15 million.¹⁵⁷ We also propose a 15 percent bidding credit for small businesses and a 25 percent bidding credit for very small businesses, as set forth in our standardized schedule at 47 C.F.R. § 1.2110(f)(2). These are the same tiered small business definitions and bidding credits that we adopted for licenses for the 800 MHz commercial Air-Ground Radiotelephone Service,¹⁵⁸ and for EAG-based licenses in the upper and lower 700 MHz bands.¹⁵⁹

99. We request comment on these proposals. In particular, we invite commenters to discuss the expected capital requirements and other characteristics of the commercial air-ground mobile broadband operations that may be provided using the proposed licenses, and the relationship of such requirements and characteristics to small business definitions and bidding credits. We invite commenters to provide comparisons with other services for which the Commission has established bidding credits. To the extent commenters support a different bidding credit regime than the one proposed here, or no bidding credit regime, they should support their proposals with relevant information. Such comments should provide information on, for example, the technology that an air-ground mobile broadband licensee is likely to employ, the cost of deployment, and other factors that may affect capital requirements for commercial air-ground mobile broadband operations.

100. We also seek comment on whether our proposed designated entity provisions, if applied to an air-ground mobile broadband service, would promote participation by businesses owned by minorities and by women, as well as participation by rural telephone companies. To the extent that commenters propose additional provisions to enhance participation by minority-owned or women-owned businesses, commenters should address how we should craft such provisions to meet the relevant standards of judicial review.¹⁶⁰

H. Technical Rules

1. Air-Ground Mobile Broadband System Parameters and Assumptions

101. We propose technical rules for air-ground mobile broadband based largely on Qualcomm's proposal. Nevertheless, we strive to establish technology neutral rules that allow for competing technologies and changes in technology over time without the need to change our rules. Through these rules, we aim to protect the primary-status FSS and promote spectrum sharing with the other users in the 14.0-14.5 GHz band and we seek comment on how to provide flexibility for potential future air-ground mobile broadband licensees to deploy technologies that meet the goals of air-ground mobile broadband. We propose the following technical rules based on the technical assumptions presented in the Qualcomm Petition and summarized *infra* in Table 1, and we seek comment on alternative rules that might allow technical flexibility in air-ground mobile broadband without increased harmful interference.¹⁶¹ For example, although Qualcomm has based its proposal on a TDD system design, would it be possible to deploy a FDD system to provide air-ground mobile broadband service that provides sufficient protection to existing licensees and services and, if so, are the proposed technical rules sufficiently robust to allow this?

¹⁵⁷ We are coordinating these size standards with the U.S. Small Business Administration.

¹⁵⁸ See *Air-Ground Reconsideration Order and Report and Order*, 20 FCC Rcd at 19679, ¶ 33.

¹⁵⁹ See *Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)*, Report and Order, 17 FCC Rcd 2153 (2002); *Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions of Part 27 of the Commission's Rules*, First Report and Order, 15 FCC Rcd 25495 (2000). Economic Area Groupings (EAGs) are quite large geographic areas, as the country is divided into only six EAGs.

¹⁶⁰ See *United States v. Virginia*, 518 U.S. 515 (1996); *Adarand Constructors v. Peña*, 515 U.S. 200 (1995).

¹⁶¹ See also Qualcomm Petition, Appendix A.

102. We summarize in Table 1 the system parameters used by Qualcomm to propose technical rules for air-ground mobile broadband in the 14.0-14.5 GHz band. We present these assumptions to assist commenters in understanding the proposals for technical rules set out in this *Notice*, and to guide commenters in proposing changes to the technical rules they think will better reflect the realities of the various communications systems in the 14.0-14.5 GHz band. We request comment on whether these assumptions are accurate, or whether we need other values as the basis for technical rules governing air-ground mobile broadband.

Table 1. Air-Ground Mobile Broadband system parameters used for developing technical rules

System Parameters	Assumptions	Remarks/Comments
Spectrum bands	250 megahertz (14.0-14.5 GHz)	air-ground mobile broadband base station (BS) parameter
Number of BSs	150/250	air-ground mobile broadband BS parameter
BS Equivalent Isotropic Radiated Power in 50 megahertz	39.5 dBW/50 megahertz	air-ground mobile broadband BS parameter
Number of beams/BS	4	air-ground mobile broadband BS parameter
BS antenna roll-off Front to back ratio	-37 dB	air-ground mobile broadband BS parameter
Aircraft EIRP per beam in 2 megahertz	3.00 dBW/2.0 megahertz	air-ground mobile broadband aircraft parameter
Aircraft antenna Average roll-off toward GSO arc	-15 dB	air-ground mobile broadband aircraft parameter
Average FSS Satellite receiver gain-to-noise temperature (G/T)	2.0 decibels/°Kelvin (dB/°K)	FSS satellite receiver performance parameter

2. Protecting GSO FSS Satellite Systems from Harmful Interference from Air-Ground Mobile Broadband

103. Qualcomm has provided technical information seeking to demonstrate that the aggregate rise over thermal noise ($\Delta T/T$) from all of its air-ground mobile broadband base stations and all air-ground mobile broadband airborne stations into the uplink of GSO satellites operating in the 14.0-14.5 GHz band would be less than one percent.¹⁶² We generally seek comment on the accuracy and validity of Qualcomm's calculations and assumptions. For example, Qualcomm derived this $\Delta T/T$ based on its assumption of an average GSO satellite receive gain-to-noise temperature (G/T) of 2.0 dB/°K. We seek comment on the validity of Qualcomm's proposed one percent $\Delta T/T$ based on a 2.0 dB/°K "averaged" G/T instead of a "maximum" value from the currently deployed satellites. If the 2.0 dB/K does not represent the "maximum" G/T value for deployed or planned FSS satellites for the typical CONUS beams, we request that commenters provide the actual values from currently-deployed satellite specifications. We also request that commenters address the validity of Qualcomm's calculation of the aggregated interference from its air-ground mobile broadband system, with a projected $\Delta T/T$ of 0.5 percent based on 150 air-ground mobile broadband base stations and 2 dB/°K averaged G/T. As satellite receivers become more sensitive, would the air-ground mobile broadband service impede innovation in GSO FSS operations?

104. Qualcomm also asserts that the $\Delta T/T$ (or rise in aggregate noise floor) due to interference from its air-ground mobile broadband system-equipped aircraft should be less than 0.5 percent based on its assumptions of 2 dB/°K GSO satellite G/T and -15 dB average aircraft antenna roll-off toward the GSO satellite, as shown in Table 1 above. We request comment on the assumptions Qualcomm used in its analysis and the resulting $\Delta T/T$ values, as well as Qualcomm's claim that its TDD scheme would ensure

¹⁶² According to ITU-R Recommendation S.1432, one percent of $\Delta T/T$ is the recommended limit for all sources of interference from non-primary services.

that total aggregated interference into the GSO arc would be less than 0.5 percent. We seek comment on the appropriate interference protection criteria or additional technical measures we should consider to protect current and future GSO FSS operations from secondary systems, such as the one proposed in the *Notice*, in the 14.0-14.5 GHz band.¹⁶³ Commenters should support their proposed criteria with technical information.

3. Potential Interference into NGSO Satellites from an Air-Ground Mobile Broadband System

105. Noting that there are currently no NGSO operations in 14.0-14.5 GHz band, Qualcomm nonetheless asserts that its air-ground mobile broadband system would not cause harmful interference to a possible future NGSO system, supporting this claim with technical assumptions such as 50 spot beams, 1000 km altitude, -7 dB/K satellite G/T, 500K noise temperature, 17.34 degree beamwidth with 300 km beam diameter, and a frequency reuse factor of 3. Qualcomm concludes that the $\Delta T/T$ would be less than one percent. We seek comment on the assumed NGSO system and its characteristics. We also seek comment on any NGSO applications and services that may be in the planning stage in the 14.0-14.5 GHz band, including the appropriate spectrum sharing criteria of such planned NGSO applications and services with currently deployed FSS systems, particularly whether we should establish shut-off criteria for any air-ground mobile broadband system, and whether those criteria should be based on the one percent $\Delta T/T$ limit or some other limit. We seek comment on whether these or some other criteria could be established to provide some certainty to existing air-ground mobile broadband systems at the time future NGSO operations begin, and help ensure the success of both services. We acknowledge that any future NGSO operation will have priority over air-ground mobile broadband, and we seek to ensure that both services are able to operate in the future by providing guidance to both classes of users as to what might constitute interference from air-ground mobile broadband into NGSO.

4. Technical Rules to Protect TDRSS

106. The Space Research Service has a secondary allocation in 14.0-14.2 GHz portion of the band and NASA uses the allocation for TDRSS operations. Qualcomm states that its system will meet the interference power density threshold necessary to afford TDRSS systems protection from harmful interference. TDRSS protection limits are summarized in Table 2 below for the White Sands, NM (WSC) site and the future Blossom Point, MD (BP) site.¹⁶⁴

Table 2: TDRSS Interference Threshold Limits

Frequency band	Interference threshold limit measured at antenna output	Reference percentage of time
14.0-14.05 GHz	-146 dBW/megahertz	Never to be exceeded

The TDRSS earth station sites and satellite locations are depicted in Table 3 below.

¹⁶³ See, e.g., SIA May 2, 2013 *ex parte* at 3 (stating that, by increasing the aggregate noise floor, Qualcomm's proposal, over time, would limit the ability of the satellite industry to continue to innovate toward mobility and miniaturization in response to market demand).

¹⁶⁴ See Qualcomm Petition, App. A.

Table 3: TDRSS Earth Station and Satellite Locations

Earth station site	Peak antenna gain (dBi)	Latitude/Longitude	TDRSS satellite longitude degrees East
White Sands	66.4	N32 30' 18.686"/ W106 36' 37.153"	-174, -171, -167.5, -150 -79, -62, -49, -47, -41
Blossom Point	66.7	N38 25' 44"/ W77 05' 02"	-12, -41, -47, -49, -62, -79

The TDRSS earth station antenna pattern is modeled by

$$\begin{array}{ll}
 49 \text{ dBi for off axis angles} & 0.095^\circ \leq \varphi < 0.21^\circ \\
 32 - 25\log_{10}(\varphi) & 0.21^\circ \leq \varphi \leq 48^\circ \\
 -10 \text{ dBi} & \varphi > 48^\circ
 \end{array}$$

where φ is the angle in degree from the main-lobe axis, as specified by the International Telecommunication Union.¹⁶⁵

107. Based on these TDRSS earth station parameters, Qualcomm acknowledges that the aggregate interference from an air-ground mobile broadband aircraft station could exceed -146 dBW/megahertz while the aircraft is in the boresight of the TDRSS beam. Even though the interference event would last a very short time (less than a second), this level of interference may not be acceptable to TDRSS operations. Qualcomm also conducted an analysis of the separation required between a TDRSS site and an air-ground mobile broadband base station to avoid harmful interference from the air-ground mobile broadband base station to TDRSS. The result showed that air-ground mobile broadband base stations should be located farther than 70 km from the TDRSS sites, or that base stations within 70 km of TDRSS sites should be restricted from using the lower portions of the band (14.0-14.05 GHz). We seek comment on this analysis, and whether it varies depending on the air-ground mobile broadband system design. We also propose to allow air-ground mobile broadband licensees to negotiate smaller coordination zones where feasible to continue to protect TDRSS sites.

108. We also observe that, in addition to the EIRP density mask requirements, ESV, VMES, and ESAA licensees must meet specific EIRP density requirements towards the horizon in the 14.0-14.2 GHz sub-band while within the coordination distance of a TDRSS site. These additional EIRP density requirements towards the horizon are intended to control potential interference to NASA's TDRSS earth stations and must be met regardless of the power transmitted in any other direction. We propose to place similar specific EIRP density requirements towards the horizon on air-ground mobile broadband systems. We seek comment on this proposal, and whether a different requirement may be appropriate for air-ground mobile broadband.

¹⁶⁵ "Radiation Patterns for Earth Station Antenna to be used when they are not published", ITU Radio Regulations, Volume 2, Appendix 8, Annex 3 (2008).

5. Technical Rules to Promote Sharing With RAS

109. The RAS does not have an allocation in the 14.0-14.5 GHz band in the United States, but footnote US342 permits RAS observations and encourages services allocated in the 14.47- 14.5 GHz band to take all practicable steps to avoid causing harmful interference to RAS observations.¹⁶⁶ While the RAS does not have the protected status of an allocation, RAS operations are of scientific importance and merit the regulatory requirement that licensees with an allocation take all practicable steps to accommodate RAS uses of spectrum. To this end, consistent with the requirements in footnotes US203 and US342, we propose to require air-ground mobile broadband to take all practicable steps to avoid interference to those observations. We note that Qualcomm has stated that it can design its air-ground mobile broadband system not to be used within a 500 km radius of RAS sites when radio astronomy systems are operating. We seek comment on other possible system designs, and other methodologies for ensuring that air-ground mobile broadband licensees take all practicable steps to avoid interference to RAS.

6. Emission Power Reduction in Air-Ground Mobile Broadband Base Stations Near the Southern Border of the United States

110. According to Qualcomm, air-ground mobile broadband base stations close to the southern U.S. border or coastline would reduce emission power to ensure that signal levels are not high enough to cause harmful interference to GSO FSS satellites. In the southern border or coastline area, the elevation angle of air-ground mobile broadband base station antennas tends to be higher than the elevation angles of air-ground mobile broadband base station antennas located further north, and gives rise to higher potential for interference into the GSO arc. Reducing emission power would reduce the likelihood of interference into the GSO arc from southern air-ground mobile broadband base station antennas emitting power at higher elevation angles than typical for more northerly air-ground mobile broadband base stations. This appears to be a situation that would apply to any air-ground mobile broadband system design. We seek comment on this analysis. Based on this analysis, we seek comment on what power limits for base stations close to the southern border or coastline would be adequate to protect GSO FSS satellites from harmful interference. How should we define the areas that would have to meet this requirement? For example, would it apply below a certain latitude? Is there a range of latitudes where emission power should be scaled to provide the appropriate level of protection to FSS without unnecessarily hindering air-ground mobile broadband operations? We also seek comment on other alternatives that may prove better to protect FSS, while providing flexibility to air-ground mobile broadband licensees.

7. EIRP Density Limits Along the GSO Arc from 45° W.L. to 150° W.L.

111. We seek comment on whether the one percent aggregate $\Delta T/T$ from all air-ground mobile broadband aircraft and base stations, as proposed by Qualcomm, is the appropriate protection level given the assumption of the 2 dB/K GSO satellite receiver G/T. If 2 dB/K is not the “maximum” GSO satellite G/T value for uplinks in the 14.0-14.5 GHz band, then the one percent $\Delta T/T$ should be scaled to the appropriate value. We further note that ITU-R Recommendation S.1432 recommends that no more than one percent aggregate interference into primary FSS services come from “other” sources that are not primary (*e.g.*, secondary).¹⁶⁷

112. We note that Qualcomm’s proposal suggests that, for 600 beams in an air-ground mobile broadband system (150 base stations with four beams each), EIRP density from a single beam into the GSO arc must be less than -74.5 dBW/Hz, and/or aggregate EIRP density into the GSO arc from all beams must not be greater than -46.7 dBW/Hz, which is Qualcomm’s proposed limit. Under this

¹⁶⁶ 47 C.F.R. §2.106 Footnote US342.

¹⁶⁷ See ITU-R Recommendation S.1432.

proposal, if the licensee increases the number of air-ground mobile broadband base stations from 150 to 250, EIRP density from a single beam and the aggregated EIRP density into any point in the GSO arc would be proportionately reduced to -76.7 dBW/Hz and -48.9 dBW/Hz respectively. We seek comment on this proposal. We note that it is unlikely that all air-ground mobile broadband base stations in a system will operate at the same levels simultaneously. We seek comment on whether air-ground mobile broadband licensees would benefit from the flexibility to distribute the power density of base stations, according to traffic patterns and to optimize coordination with other, co-secondary, 14.0-14.5 GHz licensees. We also seek comment whether we should consider changing the maximum GSO satellite G/T from 2 dB/K to 6dB/K, and if so, if we should limit EIRP density into the GSO arc, assuming 600 beams, of -78.5 dBW/Hz per beam and -50.7 dBW/Hz total, respectively.

8. Aircraft Antenna Power Limits and Pointing Toward the GSO Arc

113. Qualcomm bases its proposed air-ground mobile broadband system on aircraft antenna transmit power of less than 3 dBW per beam, aircraft antenna average roll-off toward the GSO arc of greater than 15 dB, and GSO satellite average G/T over CONUS of 2 dB/K, as shown in Table 1. Based on these assumptions, Qualcomm states that the aggregate EIRP from all air-ground mobile broadband-equipped aircraft should be less than -47 dBW/Hz, which would ensure a $\Delta T/T$ of less than 0.5 percent. We seek comment on the validity of these assumptions and conclusions, and whether they may differ across possible air-ground mobile broadband technologies. We seek comment whether, if we base an EIRP limit on this analysis, such a limit should be defined in terms of an individual transmitter or the aggregate EIRP.

114. We also seek comment on the effect of aircraft roll and the resultant pointing of aircraft antennas toward the GSO arc. Qualcomm states that in a worst-case aircraft roll of five degrees, the aircraft antenna roll-off toward the GSO arc will be at least 20 dB and the $\Delta T/T$ will be no greater than 0.14 percent. We request comment on this analysis, how it may differ among different air-ground mobile broadband technologies, and on what roll angle would be appropriate for requiring shutoff of the aircraft station transmitter in order to prevent harmful interference to FSS from aircraft antennas pointing toward the GSO arc.

9. Compensation for Rain Fade

115. We propose to allow air-ground mobile broadband base stations to increase power up to six dB to compensate for “rain fade,” which occurs when water droplets in the air scatter and attenuate radiofrequency signals, particularly at frequencies above 10 GHz, provided the EIRP density to the GSO arc from an individual base station is less than -68.5 dBW/Hz for the air-ground mobile broadband system with 150 base stations. In compensation for the increase in power, however, we seek comment on whether we should require air-ground mobile broadband base stations to reduce the number of beams they emit in order to protect FSS operations. For example, in order to increase power three dB, air-ground mobile broadband base stations will have to reduce the number of beams they emit from four to two, and to increase power six dB, air-ground mobile broadband base stations would be required to reduce the number of beams they emit from four to one. We request comment on this proposal, and on any other measures we should require or permit to allow licensees to compensate for rain fade. We seek comment on whether reducing the number of beams would create service outages, the effect of the rain fade on signal energy towards the GSO arc, and whether air-ground mobile broadband base stations needing more power to compensate for rain could be accommodated by reducing power at other base stations as long as the required $\Delta T/T$ is not exceeded at the GSO arc.

10. Off-Axis EIRP Density in Directions Other than Along the GSO Arc

116. Qualcomm did not address off-axis EIRP density in its proposal. We request comment on what standards, if any, we should adopt for off-axis EIRP density in directions other than the GSO arc. Such standards would only come into force in the event that a NGSO FSS system is launched and begins

operation. We note, however, that Qualcomm calculated an aggregate $\Delta T/T$ from air-ground mobile broadband aircraft and base stations to the NGSO based on the assumption that the average NGSO satellite G/T is -7 dB/K. The result showed that the interference to the NGSO satellite would be less than one percent $\Delta T/T$. This figure is within the ITU recommendation for all non-primary sources of interference. We seek comment on what would be an appropriate limit for air-ground mobile broadband interference into NGSO FSS. We also seek comment on alternate operational limitations, such as rules requiring air-ground mobile broadband transmitter shut off if an NGSO satellite is in the line of sight of the system or rules requiring power reduction based on orbital ephemeris information on NGSO satellite locations. As we do above, we seek comment on whether criteria could be established to provide some certainty to existing air-ground mobile broadband systems at the time future NGSO operations begin.

11. Out-of-Band Emissions for Two Adjacent Air-Ground Mobile Broadband Systems

117. We propose that if two separate licensees deploy air-ground mobile broadband systems within separate portions of 14.0-14.5 GHz band, the power level of any emission outside either licensee's own frequency band shall be attenuated below $43 + 10\log(P)$ dB at the frequencies one megahertz from the edges of the licensee's authorized band.¹⁶⁸ We propose that compliance with this rule must be measured by instruments employing a resolution bandwidth of 1 megahertz or greater, except that in the one megahertz bands immediately adjacent to the licensee's frequency band of operation, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (that is, one megahertz or one percent of the emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least 26 dB below the transmit power level. We seek comment on whether this out-of-band emission limit is adequate to protect adjacent air-ground mobile broadband systems and users of spectrum blocks adjacent to the 14.0-14.5 GHz band.

12. Mitigating the Effects of Interference into Air-Ground Mobile Broadband Operations

118. As mentioned above, the air-ground mobile broadband service is proposed to be secondary. In its filings on the Qualcomm Petition, SIA argues that the primary FSS operations in the 14.0-14.5 GHz band will interfere with the proposed secondary air-ground mobile broadband service and argues that a non-robust service should not be permitted, even on a secondary basis.¹⁶⁹ We recognize SIA's concerns. However we believe that, even with its secondary regulatory status, there may be technical approaches that can be built into air-ground mobile broadband systems (frequency selection, amount of bandwidth, error correction, incremental redundancy protocols, ability to handoff, etc.) to mitigate any effects of interference that these systems may receive from primary systems in the band.¹⁷⁰

¹⁶⁸ In the event that one entity holds both air-ground mobile broadband licenses, the licensee must meet this limit at one megahertz from the upper and lower edges of the full band.

¹⁶⁹ See, e.g., SIA PR Comments at 8; SIA PN Comments at 6-9; SIA Feb. 8, 2013 *ex parte* at 3; SIA May 2, 2013 *ex parte* at 4.

¹⁷⁰ For example, Qualcomm states that its system design includes features such as beam steering, base station handoff, and frequency assignment that can, in addition to the spatial diversity inherent in the system, mitigate harmful interference to the point where service slowdowns should be infrequent and of short duration. See Qualcomm PR Reply at A4-A5. See also Qualcomm *ex parte* filing, Oct 2, 2012 at 39-44 (describing mechanisms such as frequency hopping, incremental redundancy and hybrid automatic repeat request (HARQ), adaptive coding and modulation (AMC), and error correction coding across a 100

Given the range of technical approaches, we believe that air-ground mobile broadband systems may be robust enough in the event that interference from a primary system is received such that there will not be any detrimental effect on users. We seek comment on this analysis. Are there any mitigation techniques that air-ground mobile broadband providers should be required to use, or robustness requirements that air-ground mobile broadband providers should be required to meet, to maintain reliable links in the anticipated spectral environment?

I. Regulation of Air-Ground Mobile Broadband Operations on U.S.-Registered and Non-U.S.-Registered Aircraft

119. We propose rules to ensure that air-ground mobile broadband does not cause harmful interference to services in other countries. Qualcomm's system design is such that the country most likely to be affected by air-ground mobile broadband base or aircraft stations is Canada. To address this issue, we propose initially that any air-ground mobile broadband-equipped aircraft whose flight path takes it into Canadian airspace must terminate operations while it is in Canadian airspace, until and unless the government of Canada devises rules for air-ground mobile broadband, or permits aircraft in Canadian airspace to use the system we propose to permit. Outside of Canadian airspace, we simply propose to require shutoff of air-ground mobile broadband aircraft stations when their aircraft are outside the CONUS or the U.S. territorial waters adjacent to the CONUS. In that regard, we seek comment on what countries may be affected by air-ground mobile broadband operations, and how we might mitigate any potential interference into those countries from air-ground mobile broadband.

120. Air-ground mobile broadband base stations will also radiate signals into Canadian airspace. We request comment on how and to what extent we should limit the transmission of air-ground mobile broadband signals into Canadian airspace, in order to minimize the potential for harmful interference.

121. At some point, other countries may establish air-ground mobile broadband-like services. Such services may radiate signals into U.S. airspace, particularly air-ground mobile broadband-like services in Mexico or Caribbean countries. We request comment on what measures we should take to coordinate with air-ground mobile broadband-like services in the 14.0-14.5 GHz band, should such services be implemented.

122. Should Canada or other countries establish air-ground mobile broadband or permit the use of air-ground mobile broadband emanating from the United States, we propose that air-ground mobile broadband aircraft stations must obey the technical and operational rules of those countries when flying within those countries' airspace or over those countries' national waters.

123. Finally, we propose that any non-U.S. registered aircraft may contract for air-ground mobile broadband equipment and service from any air-ground mobile broadband licensee. Any non-U.S. registered aircraft using air-ground mobile broadband must adhere to any rules and restrictions imposed by its country of registry as well as any international agreements that may be necessary to cover the operations. We seek comment on these proposals.

J. Communications Assistance to Law Enforcement Act

124. Congress enacted CALEA¹⁷¹ on October 25, 1994, in order to preserve the ability of law enforcement agencies to conduct electronic surveillance by requiring that telecommunications carriers and manufacturers of telecommunications equipment modify and design their equipment, facilities, and services to ensure that they have necessary surveillance capabilities.¹⁷² Since that time, the Commission has taken several actions and released numerous orders implementing CALEA requirements. In the *CALEA First Report and Order*, we concluded that CALEA applies to facilities-based broadband Internet (MHz band).

¹⁷¹ Pub. L.No.103-414, 108 Stat. 4279 (codified as amended in sections of 18 U.S.C. and 47 U.S.C.).

access providers and providers of interconnected voice over Internet protocol (VoIP) service. Because air-ground mobile broadband licensees will be such providers, the provisions of CALEA will apply to them.¹⁷³

V. CONCLUSION

125. The proposed air-ground mobile broadband service offers the potential for improved broadband service to passengers in flight. Taking advantage of spatial diversity and careful design to share spectrum with satellite operations, this proposal could increase the value of the 14.0-14.5 GHz band to the public.

VI. PROCEDURAL MATTERS

1. Regulatory Flexibility Act

126. As required by the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) regarding the possible significant economic impact on a substantial number of small entities of the proposals addressed in this *Notice*. The IRFA is set forth in Appendix B. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines for comments on the *Notice*, and they should have a separate and distinct heading designating them as responses to the IRFA.

2. Paperwork Reduction Act of 1995

127. This document contains proposed new information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

3. *Ex Parte* Rules

128. This proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules. Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within 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 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

¹⁷² See 47 U.S.C. § 1002(a)(1-4). Jurisdiction to implement CALEA's provisions is shared by the Attorney General of the United States, who consults with state and local law enforcement agencies, and the Federal Communications Commission. Effective implementation of CALEA's provisions relies to a large extent on shared responsibility among these governmental agencies and the service providers and manufacturers subject to the law's requirements.

¹⁷³ See *Communications Assistance for Law Enforcement Act and Broadband Access and Services*, ET Docket No. 04-295, First Report and Order and Further Notice of Proposed Rulemaking, FCC 05-153, 20 FCC Rcd 14989, 15001, ¶ 24 (2005).

deemed to be written *ex parte* presentations and must be filed consistent with section 1.1206(b) of the Commission's rules.¹⁷⁴ In proceedings governed by section 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.

4. Filing Requirements

129. *Comments and Replies.* Pursuant to Sections 1.415 and 1.419 of the Commission's rules,¹⁷⁵ interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS).¹⁷⁶

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, 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.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

130. Written comments by the public on the proposed and/or modified information collections are due on or before 45 days after publication in the Federal Register. Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed and/or modified information collections on or before 60 days after date of publication in the Federal Register. In addition to filing comments with the Secretary, a copy of any comments on the information collection(s) contained herein should be submitted to the Secretary, Federal Communications Commission, Room TW-A325, 445 12th Street, SW, Washington, DC 20554, or via the Internet to jboley@fcc.gov and to Virginia Huth, OMB

¹⁷⁴ See 47 C.F.R. § 1.1206(b).

¹⁷⁵ See *id.* §§ 1.415, 1.419.

¹⁷⁶ See *Electronic Filing of Documents in Rulemaking Proceedings*, GC Docket No. 97-113, Report and Order, FCC 98-56, 13 FCC Rcd 11322 (1998).

Desk Officer, 10236 NEOB, 725 – 17th Street, N.W., Washington, DC 20503 or via the Internet to vhuth@omb.eop.gov.

131. *Availability of Documents.* Comments, reply comments, and *ex parte* submissions will be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 12th Street, S.W., CY-A257, Washington, D.C., 20554. These documents will also be available via ECFS. Documents will be available electronically in ASCII, Word 97, and/or Adobe Acrobat.

132. *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 Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

VII. ORDERING CLAUSES

133. Accordingly, IT IS ORDERED that, pursuant to the authority contained in Sections 4(i), 4(j), 7(a), 302(a), 303(c), 303(e), 303(f), 303(g), 303(j), 303(r), and 303(y) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 154(j), 157(a), 302(a), 303(c), 303(e), 303(f), 303(g), 303(j), 303(r), 303(y), this *Notice of Proposed Rulemaking* in GN Docket No. 13-114 IS ADOPTED.

134. IT IS FURTHER ORDERED pursuant to Sections 4(i) and (j) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), (j), 303(r), and Section 1.407 of the Commission's Rules, 47 C.F.R. § 1.407, that the Petition for Rulemaking filed by Qualcomm, Inc. on July 7, 2011, IS GRANTED to the extent provided in this *Notice*.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A**Initial Regulatory Flexibility Analysis**

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹⁷⁷ the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Notice of Proposed Rulemaking (Notice)* in GN Docket No. 13-114. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines specified in the *Notice* for comments. The Commission will send a copy of the *Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).¹⁷⁸ In addition, the *Notice* and IRFA (or summaries thereof) will be published in the Federal Register.¹⁷⁹

A. Need for, and Objectives of, the Notice

The *Notice* seeks to promote more intensive use of spectrum and spectrum sharing in order to provide passengers aboard aircraft flying over the United States with expanded access to broadband service. The air-ground mobile broadband service proposed would allow terrestrial-based air-ground mobile broadband systems to provide service in the 14.0-14.5 GHz band, while at the same time protecting Fixed-Satellite Service (FSS) operations in the band and accommodating other users of the band, including Federal government licensees in the Fixed and Mobile Services, the Space Research Service, and the Radio Astronomy Service (RAS).

B. Legal Basis

The proposed action is authorized pursuant to Sections 1, 2, 4(i), 301, 302, 303, and 324 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 301, 302, 303, and 324.

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

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.¹⁸⁰ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹⁸¹ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.¹⁸² A small business concern is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any

¹⁷⁷ See 5 U.S.C. § 603. 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).

¹⁷⁸ See 5 U.S.C. § 603(a).

¹⁷⁹ See 5 U.S.C. § 603(a).

¹⁸⁰ 5 U.S.C. § 604(a)(3).

¹⁸¹ 5 U.S.C. § 601(6).

¹⁸² 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in 15 U.S.C. § 632). Pursuant to the RFA, 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 the 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.” 5 U.S.C. § 601(3).

additional criteria established by the Small Business Administration (SBA).¹⁸³ Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

It does not appear that any small entities will be affected by the rules adopted herein.

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

The *Notice* proposes a number of rule changes that could affect the reporting, recordkeeping, and other compliance requirements for small businesses licensed to provide the contemplated new service. Among other things, these proposed rule changes include applying the information requirements and procedures currently in Part 1 of the Commission's rules to applications for air-ground mobile broadband licenses.

Second, the *Notice* invites comment on whether to adopt interim reporting requirements to ensure that licensees are making timely and quantifiable progress on their obligations to construct and provide service. If the Commission adopted a rule requiring interim reporting requirements, the rule would presumably require the licensee to demonstrate in some manner that it has taken efforts to construct its air-ground mobile broadband system.

In addition, the *Notice* proposes requiring licensees to file a notification within 15 days of the end of their ten-year license term demonstrating that they have met their build-out requirements. Specifically, each construction notification would include electronic coverage maps and supporting documentation, which must be truthful and accurate and must not omit material information that is necessary for the Commission to determine compliance with its construction requirement.

Also, the *Notice* proposes requiring applicants for renewal licenses to file a detailed renewal showing, demonstrating that they are providing service to the public or are using the spectrum for private, internal communication to the extent permitted by the Commission, and substantially complying with the Communications Act, and the Commission's rules and policies, including any applicable performance requirements.

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

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.¹⁸⁴

The *Notice* solicits comment on alternatives to the proposed rules for air-ground mobile broadband elevation in the 14.0-14.5 GHz band.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

None.

¹⁸³ Small Business Act, 15 U.S.C. § 632 (1996).

¹⁸⁴ 5 U.S.C. § 603(c)(1), (c)(4).

APPENDIX B**Proposed Rules**

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 2 and 22 as follows:

**PART 2 – Frequency Allocations And Radio Treaty Matters;
General Rules And Regulations**

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:
 - a. Page 49 is revised.
 - b. In the list of United States (US) Footnotes, footnote US133 is revised.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

Table of Frequency Allocations			14-17.7 GHz (SHF)		Page 49
International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
14-14.25 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A Space research			14-14.2 Space research US133	14-14.2 FIXED-SATELLITE (Earth-to-space) NG54 NG183 NG187 Mobile-satellite (Earth-to-space) Space research Aeronautical mobile US133	Public Mobile (22) Satellite Communications (25)
5.504A 5.505 14.25-14.3 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.508A Space research			14.2-14.4	14.2-14.47 FIXED-SATELLITE (Earth-to-space) NG54 NG183 NG187 Mobile-satellite (Earth-to-space) Aeronautical mobile	
5.504A 5.505 5.508 14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite	14.3-14.4 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radionavigation-satellite			
5.504A	5.504A	5.504A			
14.4-14.47 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Space research (space-to-Earth)			14.4-14.47 Fixed Mobile		
5.504A 14.47-14.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy			14.47-14.5 Fixed Mobile	14.47-14.5 FIXED-SATELLITE (Earth-to-space) NG54 NG183 NG187 Mobile-satellite (Earth-to-space) Aeronautical mobile	
5.149 5.504A			US133 US203 US342	US133 US203 US342	
14.5-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research			14.5-14.7145 FIXED Mobile Space research	14.5-14.8	
			14.7145-14.8 MOBILE Fixed Space research		
14.8-15.35 FIXED MOBILE Space research			14.8-15.1365 MOBILE SPACE RESEARCH Fixed US310	14.8-15.1365 US310	

* * * * *

UNITED STATES (US) FOOTNOTES

* * * * *

US133 In the bands 14-14.2 GHz and 14.47-14.5 GHz, the following provisions shall apply to the operations of Earth Stations Aboard Aircraft (ESAA) and to the Aeronautical Mobile Service (AMS):

(a) In the band 14-14.2 GHz, ESAA and AMS licensees planning to operate within radio line-of-sight of the coordinates specified in 47 CFR 25.227(c) are subject to prior coordination with NTIA in order to minimize harmful interference to the earth stations of NASA's Tracking and Data Relay Satellite System (TDRSS).

(b) In the band 14.47-14.5 GHz, operations within radio line-of-sight of the radio astronomy stations specified in 47 CFR 25.226(d)(2) are subject to coordination with the National Science Foundation in accordance with 47 CFR 25.227(d).

* * * * *

PART 22 –Public Mobile Services

3. The authority citation for Part 22 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 222, 303, 309, and 332.

4. Part 22 is amended by adding the following to the end of Subpart B

* * * * *

§ 22.232 14.0-14.5 GHz band subject to competitive bidding.

Mutually exclusive initial applications for 14.0 –14.5 GHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in 47 CFR Part 1, Subpart Q will apply unless otherwise provided in this subpart.

§ 22.233 Designated entities in the 14.0-14.5 GHz bands.

- a) Eligibility for small business provisions:

(1) A small business is an entity that, together with its affiliates, its controlling interests, the affiliates of its controlling interests, and the entities with which it has an attributable material relationship, has average gross revenues not exceeding \$40 million for the preceding three years.

(2) A very small business is an entity that, together with its affiliates, its controlling interests, the affiliates of its controlling interests, and the entities with which it has an attributable material relationship, has average gross revenues not exceeding \$15 million for the preceding three years.

- b) Bidding credits.

A winning bidder that qualifies as a small business as defined in this section or a consortium of small businesses may use the bidding credit specified in § 1.2110(f)(2)(iii) of this chapter. A winning bidder that qualifies as a very small business as defined in this section or a consortium of very small businesses may use the bidding credit specified in § 1.2110(f)(2)(ii) of this chapter.

5. Part 22 is amended by adding the following to the end of the Part:

* * * * *

Subpart K – Air-Ground Mobile Broadband Service

§ 22.1100 Scope.

The rules in this subpart govern the licensing and operation of the air-ground mobile broadband service in the 14.0-14.5 GHz band. The licensing and operation of these stations and systems is also subject to rules elsewhere in this part that apply generally to the public mobile services. However, in case of conflict, the rules in this subpart govern.

§ 22.1101 Definitions Associated With Air-Ground Mobile Service.

Air-Ground Mobile Broadband Service. An air-ground mobile broadband service that operates in the 14.0 to 14.5 GHz band and provides high-data-rate connectivity between terrestrial ground stations and aircraft stations flying above the contiguous United States (“CONUS”).

Air-Ground Mobile Broadband Equipped Aircraft. Aircraft equipped with air-ground mobile broadband communications technology.

Base Stations. Fixed terrestrial-based air-ground mobile broadband communications stations that provide air-ground mobile broadband to air-ground mobile broadband equipped aircraft.

§ 22.1102 Permissible communications.

The 14.0-14.5 GHz band may be used to provide air-ground mobile broadband. Such service shall be provided in a manner consistent with §2.106 of this chapter.

§ 22.1104 Frequencies.

Two channel block(s) are available for assignment in the 14.0-14.5 GHz air-ground mobile broadband service:

A Block: 14.0-XX.XX GHz
[B Block: XX.XX-14.5 GHz]

§ 22.1106 Service Areas.

Service areas for 14.0-14.5 GHz air-ground mobile broadband are available on a nationwide basis. For the purposes of this paragraph, “nationwide” refers to a geographic market area covering the contiguous United States, *i.e.* the United States excluding Alaska, Hawaii, and island territories

§ 22.1110 Regulatory status.

(a) *Single authorization.* Authorization will be granted to provide any or a combination of the following services in a single license: common carrier, non-common carrier, private internal communications, and broadcast services. A licensee may render any kind of communications service consistent with the regulatory status in its license and with the Commission’s rules applicable to that service. An applicant or licensee may submit a petition at any time requesting clarification of the regulatory status for which

authorization is required to provide a specific communications service.

(b) *Designation of regulatory status in initial application.* An applicant shall specify in its initial application if it is requesting authorization to provide common carrier, non-common carrier, private internal communications, or broadcast services, or a combination thereof.

(c) *Amendment of pending applications.* The following rules apply to amendments of a pending application.

- (1) Any pending application may be amended to:
 - (i) Change the carrier regulatory status requested, or
 - (ii) Add to the pending request in order to obtain common carrier, non-common carrier, private internal communications, or broadcast services status, or a combination thereof, in a single license.
- (2) Amendments to change, or add to, the carrier regulatory status in a pending application are minor amendments filed under §1.927 of this chapter.

(d) *Modification of license.* The following rules apply to amendments of a license.

- (1) A licensee may modify a license to:
 - (i) Change the regulatory status authorized, or
 - (ii) Add to the status authorized in order to obtain a combination of services of different regulatory status in a single license.
- (2) Applications to change, or add to, the carrier status in a license are modifications not requiring prior Commission authorization. The licensee must notify the Commission within 30 days of the change. If the change results in the discontinuance, reduction, or impairment of an existing service, the licensee is subject to the provisions of § [discontinuance rule].

§ 22.1111 Eligibility.

Any entity other than those precluded by section 310 of the Communications Act of 1934, as amended, 47 U.S.C. 310, is eligible to hold a license under this part.

§22.1112 License period.

Initial authorizations will have a term not to exceed ten years from the date of initial issuance or renewal.

§ 22.1113 Construction requirements.

Licensees of 14.0-14.5 GHz air-ground mobile broadband, must, as a performance requirement, make a showing of “substantial service” in their license area within the prescribed license term set forth in §[license term rule].

- (a) “Substantial service” is defined as service which is sound, favorable and substantially above a level of mediocre service which just might minimally warrant renewal. Failure by any licensee to meet this requirement will result in forfeiture of the license and the licensee will be ineligible to regain it.
- (b) Each 14.0-14.5 GHz air-ground mobile broadband system subject to the requirements of this section

must demonstrate substantial service within 10 years after grant of the authorization. Substantial service may be demonstrated by, but is not limited to, the following “safe harbor” provision:

(1) The construction and operation of ground stations that provides robust, uninterrupted service on routes serving at least 50 airports classified as large or medium hubs (as measured by the most recent Federal Aviation Administration data for annual passenger enplanements) within ten years of license grant.

§ 22.1114 Renewal Criteria.

Air-ground mobile broadband licensees in the 14.0-14.5 GHz band must file a renewal application in accordance with the provisions set forth in §1.949, and must make a showing of substantial service, independent of its performance requirements, as a condition for renewal at the end of each license term.

§ 22.1115 Geographic partitioning and spectrum disaggregation.

(a) *Eligibility.*

(1) Parties seeking approval for partitioning and disaggregation shall request from the Commission an authorization for partial assignment of a license pursuant to §1.948.

(2) Licensees in 14.0-14.5 GHz air-ground mobile broadband may apply to partition their licensed geographic service area or disaggregate their licensed spectrum at any time following the grant of their licenses.

(b) *Filing Requirements.* Parties seeking approval for geographic partitioning, spectrum disaggregation, or a combination of both must apply for a partial assignment of authorization by filing FCC Form 603 pursuant to § 1.948 of this chapter. Each request for geographic partitioning must include an attachment defining the perimeter of the partitioned area by geographic coordinates to the nearest second of latitude and longitude, based upon the 1983 North American Datum (NAD83). Alternatively, applicants may specify an FCC-recognized service area (*e.g.*, Basic Trading Area, Economic Area, Major Trading Area, Metropolitan Service Area, or Rural Service Area), county, or county equivalent, in which case, applicants need only list the specific FCC-recognized service area, county, or county equivalent names comprising the partitioned area.

(c) *License Term.* The license term for a partitioned license area or disaggregated spectrum license is the remainder of the original licensee's license term.

(d) *Performance Requirements.* Each party to a geographic partitioning, spectrum disaggregation, or a combination of both must individually meet any applicable performance requirements (*i.e.*, construction and operation requirements). If a licensee fails to meet any performance requirements on or before the required date, its authorization will terminate automatically on that date without further Commission action pursuant to §1.946 of this chapter.

(e) *Unjust Enrichment.* Licensees making installment payments or that received a bidding credit, that partition their licenses or disaggregate their spectrum to entities that do not meet the eligibility standards for installment payments or bidding credits, are subject to the unjust enrichment requirements of §1.2111 of this chapter.

§ 22.1116 Initial authorization.

(a) An applicant must file a single application for an initial authorization for all markets won and frequency blocks desired. Initial authorizations shall be granted in accordance with §§[frequencies and service areas rules]. Applications for individual sites are not required and will not be accepted, except where required for environmental assessments, in accordance with §§1.1301 through 1.1319 of this chapter.

(b) Initial authorizations for 14.0-14.5 GHz air-ground mobile broadband shall be for ____ megahertz of spectrum in accordance with §[frequencies rule]. Authorizations will be on a nationwide service area basis as defined in § XX.X06.

§ 22.1118 Discontinuance of Service.

(a) A 14.0-14.5 GHz air-ground mobile broadband licensee's authorization will automatically terminate, without specific Commission action, if it permanently discontinues service. Permanent discontinuance of service is defined as 180 consecutive days during which a licensee is not providing service to aircraft or subscribers

(b) Filing Requirements. A licensee that permanently discontinues service as defined in this section must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 or 605 requesting license cancellation. An authorization will automatically terminate, without specific Commission action, if service is permanently discontinued as defined in this section, even if a licensee fails to file the required form requesting license cancellation.

(c) Extension Request. A licensee may file a request for a longer discontinuance period for good cause. An extension request must be filed at least 30 days before the end of the 180-day discontinuance period. The filing of an extension request will automatically extend the discontinuance period a minimum of the latter of an additional 30 days or the date upon which the Wireless Telecommunications Bureau acts on the request.

§ 22.1120 Protecting GSO Satellite Systems from Harmful Interference from Air-Ground Mobile Broadband.

The aggregate increase in interference ($\Delta T/T$) from all air-ground mobile broadband aircraft and base stations into the uplink of GSO satellites shall not exceed one percent. This one percent $\Delta T/T$ limit may be met by complying with subsections (a), (b) and (c) below:

- a) For a baseline air-ground mobile broadband system consisting of 600 beams (*e.g.*, 150 base station sites and 4 beams per site) operating on a given band of spectrum, the transmitted power spectral density from a single base station beam into the GSO arc must not exceed -74.5 dBW/Hz. If the number of base station beams is increased beyond 600, then the total transmitted power toward the GSO arc must be adjusted accordingly, such that the total transmitted power toward the GSO arc from all beams is not greater than -46.7 dBW/Hz. If the number of air-ground mobile broadband base stations increases from 150 to 250, the single beam EIRP density must be less than the value

$$- 74.5 - 10 \text{Log}\left(\frac{n}{150}\right) \text{ dBW / Hz} \quad \text{for } 150 \leq n \leq 250$$

(1)

and the aggregate EIRP density from all beams must be less than

$$- 46.7 - 10 \text{Log}\left(\frac{n}{150}\right) \text{ dBW / HZ} \quad \text{for } 150 \leq n \leq 250 \quad (2)$$

where n is the number of base stations.

- b) Transmissions from an air-ground mobile broadband aircraft stations must not exceed an EIRP density of 3 dBW/2 megahertz. Furthermore, the aggregate EIRP from all air-ground mobile broadband aircraft stations toward the GSO arc must not exceed -47 dBW/Hz. When deriving the aggregate EIRP density toward the GSO arc, the aircraft cruise level roll angle of $\pm 5^\circ$ in elevation must be taken into account.
- c) Every air-ground mobile broadband base station may increase its transmit power by up to 6 dB to compensate for rain fade. In compensation for the increase in power, the air-ground mobile broadband base station must reduce the number of beams it transmits to maintain the same maximum transmitted power.

§ 22.1122 Out of Band Emissions (OOBE) Requirement for Two Separate Air-Ground Mobile Broadband Systems.

If two separate licensees deploy air-ground mobile broadband systems within distinct portions of the 14.0 to 14.5 GHz band, the power level of any emission outside a air-ground mobile broadband licensee's frequency band of operation shall be attenuated below the transmitter power of P watts (with averaging performed only during periods of transmission) within the licensee's band of operation by at least $43 + 10 \log(P)$ dB. Compliance with this rule shall be measured via use of instrumentation employing a resolution bandwidth of 1 megahertz or greater, except that in the 1 megahertz bands immediately adjacent to the licensee's frequency band of operation, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (that is, 1 megahertz or 1 percent of the emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least 26 dB below the transmit power level.

**STATEMENT OF
CHAIRMAN JULIUS GENACHOWSKI**

Re: Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0-14.5 GHz Band, GN Docket No. 13-114, RM-11640.

One of my favorite comedians, Louis C.K. has a terrific bit where he jokes about sitting next to somebody on a plane who complains about the quality of the in-flight Wi-Fi.

The punch line was that it's ridiculous for someone to be complaining about technology when he is "sitting in a chair in the sky connecting to the Internet!"

While we like to think of ourselves as Louis C.K. in this anecdote – the person with some perspective and modest expectations – the reality is that we expect and often need to be able to get online 24/7, at home, in an office or on a plane. And four years after Louis C.K. first told that joke, those aren't unrealistic expectations.

With today's item, we take an important step to improve in-flight broadband service.

A little background.

There are two types of current in-flight broadband service: satellite-based and air-to-ground. Both are licensed by the FCC.

The satellite systems, known as Earth Stations Aboard Aircraft, use satellite antennas installed on the top of planes to communicate with satellite space stations.

This service, operated by multiple licensees, shares 1 GHz of spectrum among the licensees and with many other Fixed-Satellite Service operators.

Air-to-ground systems deliver in-flight broadband through a ground-based network that communicates with an antenna on the bottom of a plane, which connects to an onboard Wi-Fi system providing service throughout the cabin.

The current air-ground licensee operates with just 4 MHz in the 800 MHz band.

This item is focused on meeting the growing demand for in-flight broadband by freeing up spectrum for use for air-to-ground services.

Of course, identifying new spectrum for new uses has been an FCC priority for the past several years.

We've worked to free up spectrum for use with traditional auctions. We've worked to reallocate spectrum for mobile broadband from both commercial and government bands, and we've worked to share spectrum where reallocation isn't possible. We've removed regulatory barriers to terrestrial and other flexible spectrum use. We've cleared new bands for mobile broadband. And we've freed up unlicensed spectrum for dynamic use.

By freeing up 30 MHz in the WCS band and 40 MHz in the AWS-4 band, in addition to 10 MHz we'll auction in the H-Block and spectrum that will be freed up by innovative new policies like incentive

auctions and spectrum sharing in the 3.5 GHz band, the Commission is on track to exceed its goal of unleashing 300 MHz for broadband by 2015.

Increasing the availability of spectrum – and hitting the long-term goal of 500 MHz by 2020 will require a great deal of ongoing work.

The game is certainly worth the candle because a robust mobile ecosystem will drive economic growth, job creation, and our country's global competitiveness.

Today's Notice of Proposed Rulemaking would free up, for secondary use, 500 megahertz of spectrum, for a new Air-Ground Mobile Broadband service.

So we would be going for 4 megahertz of spectrum for air-to-ground to 504 megahertz.

This service would help meet consumer demand by offering airline passengers access to better in-flight broadband and will increase competitive pressure on current systems to improve the quality of their in-flight services.

Specifically, the proposal could provide broadband capacity of up to 300 gigabits per second on a combined basis. This will enable business and leisure travelers aboard aircraft in the United States to be more productive and have more choices in entertainment, communications, and social media, and it could lower prices.

Today's proposal is also designed to ensure protection for existing commercial and federal users in this band.

Namely, Fixed-Satellite Service (FSS) licensees in the 14.0-14.5 GHz band provide critical operations for the U.S. media, banking, retail, and transportation sectors and have a long and effective history of spectrum sharing and coordination.

These licensees will continue to have primary rights and protection from interference from this secondary service.

The record to date suggests that spatial diversity will allow coexistence, and that this would be a strongly beneficial and efficient use of spectrum.

Of course, the Commission will expect engagement from all stakeholders to help identify appropriate safeguards to protect current and future FSS operations, as well as federal users in the band.

And we need to continue to facilitate forward-thinking proposals like this one that help move us toward more efficient and productive use of our limited spectrum resources.

Today's Notice demonstrates how technology and innovation are enabling new solutions to meet spectrum demand, while protecting incumbent users.

I thank Kate Dumouchel, Renee Gregory, Michael Steffen, and the terrific teams in IB, WTB, and OET for their work on this item.

**STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN**

Re: Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0-14.5 GHz Band, GN Docket No. 13-114, RM-11640.

For about a decade, the Commission has seen a steady increase in interest for high-speed Internet, on airplanes, and we have taken a number of actions to address this trend. In 2005, the FCC reconfigured the 800 megahertz band, to provide four megahertz of spectrum for broadband service to airline consumers. Last year, the Commission adopted rules to further enable fixed satellite service, or FSS, licensees, to provide broadband service on aircraft.

But the record before the agency demonstrates a need to do more in order to satisfy consumer demand for quality inflight broadband service. A recent study predicts that the number of aircrafts offering broadband service will continue to rise from about 3,000 in 2012, to 15,000 by 2021. Today's airline passengers expect the same level of broadband service that is available on the ground. It appears, however, that current inflight options carry higher prices but offer much lower speeds, than terrestrial broadband.

Fortunately, the record before the agency also suggests that there could be at least one viable option to meet the demand for improved inflight service. The NPRM states that a terrestrial-based Air-to-Ground Mobile broadband service using 150 to 250 base stations in the 14 GHz band could provide 300 Gigabits per second to passengers on aircrafts. This broadband service would receive secondary status and there would be technical rules to protect primary licensees, such as Fixed Satellite Services in the K-U Band, and co-secondary Federal agencies. The key to this type of band sharing is spatial diversity. FSS earth station antennas would point to the south and above the horizon; while Air-to-Ground service base stations would point to the north.

To be sure, many of the rules proposed in this NPRM were initiated by a 2011 petition that Qualcomm filed. The International Bureau, however, put this petition out for public comment. This process allowed for the development of a substantial engineering analysis of the potential technical issues that could arise if this service is permitted in the 14 GHz band. Today, we seek comment on initial proposals to address those issues. And, as is the normal course at the Commission, we will keep an open mind until the record is closed. We are proposing a number of rules that could lead to other entities offering this service. For example, consistent with Section 309(j) of the Communications Act, we propose to use competitive bidding when mutually exclusive applications are accepted for filing.

In addition, this item seeks comment on the proper geographic licensing schemes, secondary market proposals, and bidding credits for small businesses that could be applied to this service. These policies promote the Commission's traditional interests in competition, innovation, and investment. Therefore, I am pleased to support the adoption of this NPRM, which is the result of an interoffice effort that included several members of the International Bureau, the Office of Engineering and Technology, and the Wireless Bureau. I wish to thank them all, for their contributions, to this item.

**STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL**

Re: Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0-14.5 GHz Band, GN Docket No. 13-114, RM-11640.

Count me as someone who will acknowledge that being disconnected on a flight has benefits—like quiet time to read, uninterrupted by the dogged buzz of a smartphone. When I board an airplane, I still bring piles of paper to comb through and review. While my staff would never admit it, I am pretty sure they relish the time when I am up in the air and they can get work done without the usual blitz of e-mails from me.

But despite the benefits for my staff, in our hyperconnected age, we need and expect access to connectivity and content anytime and anywhere. The world simply does not wait for us to get off the plane. We expect information at our fingertips at all times. We expect to stay in touch with our loved ones, our jobs, and our communities wherever we go.

Air travel stands out as one of the few places where we can't always rely on a connection. Being cut off can mean we miss an important e-mail, critical news from home, or the chance to share a time-sensitive document. Although new broadband services are now on some aircraft, they are not ubiquitous. For frequent travelers, the routine of shutting off the wireless connections on our smartphones, tablets, and laptops when we board is all too familiar.

So I support today's rulemaking, which proposes to establish a new, terrestrial-based air-ground mobile broadband service in the 14.0-14.5 GHz band for passengers aboard aircraft. This system would use time-division duplex communications to provide a link between base stations and aircraft. Yet within each aircraft communications between passenger devices would be carried by short-range links like Wi-Fi. According to some, using 500 megahertz of spectrum in this band could sustain data rates to aircraft of up to 300 gigabits per second. Impressive. Although we can trust, we should also verify. So in the months ahead, as we gather a record in response to this proposal, I want to better understand these claims. In addition, I want to ensure that the proposed new service, which would be secondary to existing services in the band, will not cause harmful interference. We also must ensure that as we move forward we take steps to create a robust environment for competition in the provision of broadband services to passengers aboard aircraft. And if we are successful, my staff will get to hear from me more often.

Thank you to the International Bureau, the Wireless Telecommunications Bureau, and the Office of Engineering and Technology for your work on this issue.

**STATEMENT OF
COMMISSIONER AJIT PAI**

Re: Expanding Access to Broadband and Encouraging Innovation through Establishment of an Air-Ground Mobile Broadband Secondary Service for Passengers Aboard Aircraft in the 14.0–14.5 GHz Band, GN Docket No. 13-114, RM-11640.

It's happened to almost every sports fan. You're flying during the NFL playoffs or March Madness, you boot up your laptop (eager to see how the Kansas City Chiefs or University of Kansas Jayhawks are doing), and lo and behold—there's no Wi-Fi. Or worse, you get a connection, but the broadband is so slow and pricey that you wish you hadn't.

Like many Americans, I have been frustrated by the lack of high-speed broadband service when I fly. Some flights don't offer any broadband service at all. Others do, but speeds are usually much slower than what we enjoy on the ground, and it's expensive. So what does this mean? Lower productivity for business travelers and less enjoyable flights for vacationers.

That's why I was pleased to learn about Qualcomm's proposed air-ground mobile broadband system. Last October, I had the opportunity to see firsthand some of the equipment being developed by Qualcomm in San Diego. This system has the potential to deliver a much better broadband experience for members of the flying public. Because it would use a wide swath of spectrum, the system's data throughput would be much greater than current onboard options. For passengers, that should mean higher speeds and the ability to access a wider range of applications, like video. Moreover, injecting additional competition into the air-ground broadband market should lead current service providers to lower prices and to improve their quality of service.

These prospects are exciting, but we also have to be careful not to get ahead of ourselves. Today, we are simply taking the step of seeking comment on establishing a new air-ground mobile broadband service in the 14.0–14.5 GHz band. Because this new service would have secondary status, we will have to ensure that it would not interfere with the band's incumbent users. I hope that in time, the record in this proceeding will include detailed engineering studies that will help us assess whether our proposal today would preserve the ability of current Fixed-Satellite Service (FSS) providers to conduct their operations and to innovate in the 14.0–14.5 GHz band.

Finally, I would like to thank the staff of the International Bureau, Wireless Telecommunications Bureau, and Office of Engineering and Technology for all of their hard work on this NPRM. Like so many Commission items, today's NPRM resulted from collaboration among multiple Bureaus and Offices, and our work product is strengthened substantially by such a team effort.