

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

|   |   |                             |
|---|---|-----------------------------|
| In the Matter of                                | ) |                             |
|   | ) |                             |
| Amendment of Part 22 of the Commission's Rules  | ) | WT Docket No. <u>03-103</u> |
| 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              | ) | WT Docket No. 05-42         |
| Commission's Rules To Adopt Competitive         | ) |                             |
| Bidding Rules for Commercial and General        | ) |                             |
| Aviation Air-Ground Radiotelephone Service      | ) |                             |
|   | ) |                             |
| Application of Verizon Airfone Inc. for Renewal | ) | File No. 0001716212         |
| of 800 MHz Air-Ground Radiotelephone License,   | ) |                             |
| Call Sign KNKG804                               | ) |                             |

**REPORT AND ORDER  
AND  
NOTICE OF PROPOSED RULEMAKING**

**Adopted:** December 15, 2004

**Released:** February 22, 2005

By the Commission: Chairman Powell issuing a statement, Commissioners Copps and Adelstein approving in part, dissenting in part, and issuing separate statements.

**Comment Date: 20 days after publication in the Federal Register**  
**Reply Comment Date: 30 days after publication in the Federal Register**

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## I. INTRODUCTION

1. In this Report and Order,<sup>1</sup> we revise our rules governing the four megahertz of dedicated spectrum in the 800 MHz commercial Air-Ground Radiotelephone Service band.<sup>2</sup> In order to facilitate the provision of new, innovative wireless telecommunications services, including broadband services, to the public onboard aircraft, we adopt a flexible regulatory approach to determine the configuration of the band. Specifically, we adopt rules that enable interested parties to bid on spectrum licenses according to the band configuration that they believe will best meet their needs for the provision of air-ground services. Based on the band configurations proposed by the parties in this proceeding, the Commission will make available nationwide air-ground licenses in three configurations: (1) band plan 1, comprised of two overlapping, shared, cross-polarized 3 MHz licenses (licenses A and B, respectively),<sup>3</sup> (2) band plan 2, comprised of an exclusive 3 MHz license and an exclusive 1 MHz license (licenses C and D, respectively),<sup>4</sup> and (3) band plan 3, comprised of an exclusive 1 MHz license and an exclusive 3 MHz license (licenses E and F, respectively), with the blocks at opposite ends of the band from the second configuration.<sup>5</sup> Licenses will have a ten-year term. Licenses will be awarded to winning bidders for the

<sup>1</sup> Appendix A includes a list of commenting parties and short citations to such parties, which are used in this document.

<sup>2</sup> See 47 C.F.R. Pt. 22, Subpt. G; 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, *Notice of Proposed Rule Making*, 18 FCC Rcd 8380 (2003) (“*Notice*”). The spectrum currently consists of an uplink band at 849-851 MHz and a downlink band at 894-896 MHz. 47 C.F.R. § 22.857.

<sup>3</sup> Licenses A and B would authorize transmission of radio waves that are vertically and horizontally polarized, respectively, and would initially share 1.5 MHz at 849.000-850.500 MHz paired with 1.5 MHz at 894.000-895.500 MHz. Once Verizon Airfone's incumbent system ceases operations in the upper 0.5 MHz of each band, licensee B would shift its operations to 1.5 MHz at 849.500-851.000 MHz paired with 1.5 MHz at 894.500-896.000 MHz. If band plan 1 is implemented, the parties may agree to a different implementation scheme.

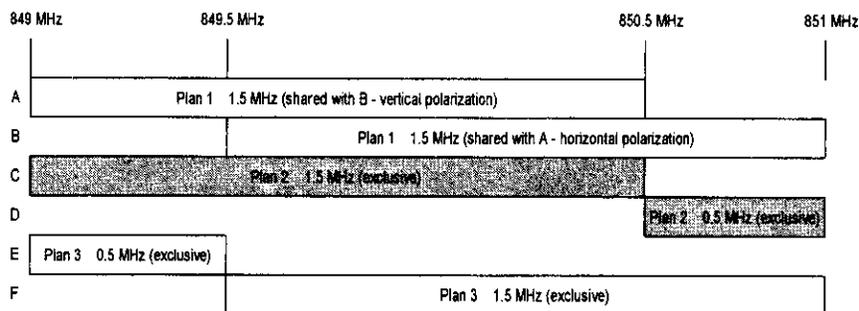
<sup>4</sup> License C would be located in the lower 1.5 MHz portion of each 2 MHz band (1.5 MHz at 849.000-850.500 MHz paired with 1.5 MHz at 894.000-895.500 MHz). License D would be located in the upper 0.5 MHz portion of each 2 MHz band (0.5 MHz at 850.500-851.000 MHz paired with 0.5 MHz at 895.500-896.000 MHz).

<sup>5</sup> License E would be located in the lower 0.5 MHz portion of each 2 MHz band (0.5 MHz at 849.000-849.500 MHz paired with 0.5 MHz at 894.000-894.500 MHz). License F would be located in the upper 1.5 MHz portion of each 2 MHz band (1.5 MHz at 849.500-851.000 MHz paired with 1.5 MHz at 894.500-896.000 MHz).

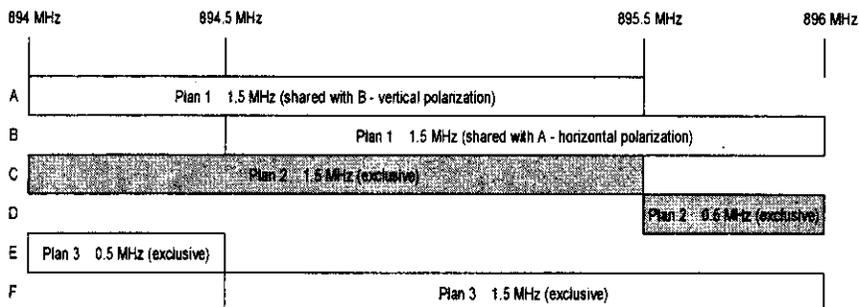
licenses comprising the configuration that receives the highest aggregate gross bid, subject to long-form license application review. In order to promote competition in the 800 MHz air-ground band, we will prohibit any party from obtaining a controlling interest, either at auction or by a post-auction transaction, in more than three megahertz of spectrum (either shared or exclusive) in the band. No single party, therefore, may hold more than one license in any of the available band configurations. In this item, we also contemporaneously issue a *Notice of Proposed Rulemaking (Notice)* in which we seek comment on competitive bidding rules to be used for the new spectrum licenses we make available today and on competitive bidding rules to resolve pending as well as future mutually exclusive applications for licenses in the 400 MHz general aviation Air-Ground Radiotelephone Service.<sup>6</sup>

## Air-Ground Band Plan Options

### Ground



### Airborne



2. *New 800 MHz Air-Ground Radiotelephone Service Band Plans.* We adopt a flexible regulatory framework that will enable licensees to provide air-ground communication services using any existing or future technology that can fit within their assigned spectrum block. Licenses A, B, C, and F could accommodate spectrally-efficient broadband technologies such as Code Division Multiple Access

<sup>6</sup> In addition to the 800 MHz commercial air-ground spectrum, there is spectrum in the 454/459 MHz band allocated for general aviation air-ground stations. 47 C.F.R. § 22.805.

(CDMA) 2000 1xEV-DO,<sup>7</sup> Fast Low-latency Access with Seamless Handoff Orthogonal Frequency Division Multiplexing (FLASH-OFDM),<sup>8</sup> and Global System for Mobile Communication Enhanced Data Rates for Global Evolution (GSM EDGE),<sup>9</sup> as well as Integrated Dispatch Enhanced Network (iDEN)<sup>10</sup> technology and other technologies. Licenses D and E also could accommodate iDEN and an array of narrowband technologies. The licensees will be required to provide service to airborne locations. Air-ground service may be any type (e.g., voice, data, broadband internet, etc.) and may be provided to any or all aviation markets (e.g., commercial, government, and general). New licensees also may reconfigure their licensed frequencies to accommodate multiple overlapping or exclusive air-ground systems through spectrum leasing, partitioning, disaggregation, or a combination of these mechanisms.

3. The new rules for the 800 MHz Air-Ground Radiotelephone Service that we adopt today will promote key spectrum policy objectives of the Commission, and will lead to greater technical, economic, and marketplace efficiency.<sup>11</sup> Our new framework for flexible spectrum access in this band will facilitate the provision of broadband services to consumers by eliminating unnecessary regulatory restrictions, and thereby provide greater flexibility in deploying the spectrum to respond to evolving market demands. We further our goal to “foster innovation and offer consumers meaningful choice in services”<sup>12</sup> by replacing the existing narrowband spectrum sharing approach—which limits services to voice and very slow speed data—with a highly flexible licensing approach. We also further our goal “to encourage the growth and rapid deployment of innovative and efficient communications technologies and services”<sup>13</sup> by providing flexibility to deploy current broadband technologies, which heretofore could not be used in the 800 MHz Air-Ground Radiotelephone Service band, as well as future technologies that can be deployed within the designated spectrum and consistent with technical regulations necessary to prevent harmful interference to adjacent frequency bands, especially those used for public safety communications. We also believe that providers of broadband air-ground service in this band will be well-positioned to compete against satellite-delivered broadband air-ground telecommunications services currently being offered or under development.

4. *Incumbent Transition.* Verizon Airfone is the sole incumbent currently operating in the

<sup>7</sup> CDMA2000 1xEV-DO (1x Evolution – Data Optimized) is an air interface standard for Wireless Internet officially known as IS-856. 1xEV-DO achieves a peak data rate of 2.45 Mbps on the forward link (from the Base Station, BTS, to the user). The technology is well-suited for high-speed mobile as well as fixed wireless Internet services. See also <http://www.wordiq.com/definition/CDMA2000>.

<sup>8</sup> OFDM is a modulation scheme that divides a single digital signal across multiple signal carriers simultaneously (FDM). The signals are spaced at precise frequencies, which prevents the demodulators from seeing frequencies other than their own (hence, orthogonal) so they do not interfere with each other. See also [http://www.flarion.com/products/flash\\_ofdm.asp](http://www.flarion.com/products/flash_ofdm.asp).

<sup>9</sup> EDGE is a faster version of GSM wireless service, which enables data to be delivered at rates up to 384 Kbps. The standard is based on the GSM standard and uses TDMA multiplexing technology. See also [http://www.wordiq.com/definition/Enhanced\\_Data\\_Rates\\_for\\_Global\\_Evolution](http://www.wordiq.com/definition/Enhanced_Data_Rates_for_Global_Evolution) (GSM EDGE definition); [http://www.ericsson.com/products/white\\_papers\\_pdf/edge\\_wp\\_technical.pdf](http://www.ericsson.com/products/white_papers_pdf/edge_wp_technical.pdf). (GSM EDGE White Paper).

<sup>10</sup> iDEN is a high-capacity digital trunked radio system providing integrated voice and data services to its users. The iDEN system uses M16-QAM digital modulation and VSELP (Vector Sum Excited Linear Predictor) speech coding techniques coupled with Time Division Multiple Access (TDMA) channel access methodology to enhance channel capacity and system services.

<sup>11</sup> See FCC Staff Report, *Spectrum Policy Task Force Report*, ET Dkt. No. 02-135 (rel. Nov. 2002). This document is available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-228542A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.doc).

<sup>12</sup> Federal Communications Commission, *Strategic Plan FY 2003-FY 2008* at 5 (2002).

<sup>13</sup> *Id.*

800 MHz air-ground band. In April 2004, the company filed an application for renewal of its authorization to operate in the band, which is pending.<sup>14</sup> We are granting Verizon Airfone a non-renewable license for a five-year term on the effective date of this Report and Order. As explained below, the record reflects that unencumbered paired 1.5 MHz channels are necessary to deploy broadband technologies in the 800 MHz air-ground band. We seek to ensure that the air-ground spectrum can be used to provide broadband air-ground telecommunications services in the near future. If band plan 1 or 2 is the winning configuration at auction, Verizon Airfone's incumbent system must cease operations in the lower 1.5 MHz portion of each 2 MHz air-ground band within 24 months of the initial date of grant of a new license or licenses. Verizon Airfone may relocate its incumbent operations to the upper 0.5 MHz portion of each 2 MHz band (0.5 MHz at 850.500-851.000 MHz paired with 0.5 MHz at 895.500-896.000 MHz) and may continue to operate under the renewal authorization until the end of the five-year license term. If band plan 3 is the winning configuration at auction, Verizon Airfone's incumbent system must cease operations in the upper 1.5 MHz portion of each 2 MHz air-ground band within 24 months of the initial date of grant of license F; Verizon Airfone may relocate to the lower 0.5 MHz portion of each 2 MHz band (0.5 MHz at 849.000-849.500 MHz paired with 0.5 MHz at 894.000-894.500 MHz) and may continue to operate under the renewal authorization until the end of the five-year license term. We note that if Verizon Airfone acquires a new spectrum authorization as a result of competitive bidding, it could elect to continue its incumbent operations using such new authorization.

5. *Part 22 Biennial Review.* We also revise and eliminate, pursuant to our biennial review of regulations under Section 11 of the Communications Act of 1934<sup>15</sup> as well as a staff-initiated assessment of our Part 22 regulations, certain non-cellular Part 22 Public Mobile Services (PMS) rules that we find are no longer warranted as a result of technological change, increased competition in Commercial Mobile Radio Services (CMRS), supervening changes to related Commission rules, or a combination of these factors.<sup>16</sup> We implement certain staff recommendations<sup>17</sup> under Section 11 and our general regulatory authority for deleting or modifying various rules in Parts 1, 22, and 90.<sup>18</sup> Many of the

<sup>14</sup> See File No. 0001716212 (filed Apr. 28, 2004).

<sup>15</sup> 47 U.S.C. § 161. Section 11 requires us to review our regulations applicable to providers of telecommunications service and to "determine whether any such regulation is no longer necessary in the public interest as the result of meaningful economic competition between providers of such service," and to repeal or modify any regulation that we find no longer necessary in the public interest. 47 U.S.C. §§ 161(a)(2) & (b).

<sup>16</sup> 47 C.F.R. Pt. 22. Part 22 contains 10 subparts. The first three subparts—Subparts A (Scope and Authority), B (Licensing Requirements and Procedures) and C (Operational and Technical Requirements)—apply generally to all Part 22 licenses. The fourth subpart, Subpart D, contains rules for developmental authorizations. Each of the next five Subparts (E through I) contain rules applicable to one of the five Part 22 services: (1) Paging and Radiotelephone; (2) Cellular Radiotelephone; (3) Rural Radiotelephone; (4) Air-Ground Radiotelephone; and (5) Offshore Radiotelephone. Finally, Subpart J implements the Communications Assistance for Law Enforcement Act (CALEA) as it applies to Part 22 services. See Pub. L. No. 103-414, 108 Stat. 4279 (1994) (codified as amended in scattered sections of 18 U.S.C. and 47 U.S.C. §§ 229, 1001-1010, 1021).

<sup>17</sup> See Biennial Regulatory Review, CC Docket No. 00-175, *Report*, 16 FCC Rcd 1207 (2001) ("2000 Biennial Review Report"); Biennial Regulatory Review 2000 Updated Staff Report (rel. Jan. 17, 2001); 2002 Biennial Regulatory Review, *Report*, 18 FCC Rcd 4726 (2003); The Commission Seeks Public Comment in the 2002 Biennial Review of Telecommunications Regulations Within the Purview of the Wireless Telecommunications Bureau, *Public Notice*, 17 FCC Rcd 18933 (2002).

<sup>18</sup> In our *Cellular Year 2000 Biennial Report and Order*, we stated that "section 11 places the burden on the Commission to make the requisite determinations; no particular burden is placed on the opponents or proponents of a given rule." Year 2000 Biennial Regulatory Review—Amendment of Part 22 of the Commission's Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, *Report and Order*, 17 FCC Rcd 18401, 18404 ¶4 (2002) ("*Cellular Year 2000 Biennial Report and* (continued....)

rules that we revise or eliminate today reflect outdated policies and technical concerns or unnecessarily limit the flexibility of Part 22 licensees to respond to the marketplace and meet the needs of consumers. Our action today serves the public interest as it corrects these deficiencies and should facilitate technological innovation.

6. We also seek to harmonize our rules, where appropriate, across various wireless services. For example, we afford licensees of nationwide paging channels flexibility to provide other services and revise our rules that currently limit the provision of dispatch service by paging licensees. We also recodify certain Part 22 rules to Part 1 to provide uniform methods for the calculation of terrain elevation and distance for most wireless services. In addition to eliminating unnecessary regulatory hurdles, many of the rule changes that we adopt today will provide licensees with greater flexibility regarding the use of their spectrum and thereby enable them to better respond to market demands.

## II. REPORT AND ORDER

### A. 800 MHz Air-Ground Radiotelephone Service

7. We initiated this proceeding, inter alia, to reexamine our 800 MHz Air-Ground Radiotelephone Service band plan and service rules. Although the Commission initially licensed six 800 MHz air-ground nationwide licensees, only one licensee (Verizon Airfone) continues to provide service in the band, and our service rules allow it to provide only a limited range of narrowband voice and data services.<sup>19</sup> This circumstance led us to question in the *Notice* whether our existing rules were impeding the provision of telecommunications services desired by the public onboard aircraft.<sup>20</sup> Nearly all parties commenting on these issues agree that our existing band plan and rules have hindered the efficient, competitive provision of services desired by the public. Based on our review of the record in this proceeding, we conclude that the specified narrow bandwidth (6 kHz) of the existing 800 MHz Air-Ground Radiotelephone Service communications channels has constrained the ability of licensees to provide the type of broadband air-ground services desired by the traveling public. We find that the public interest will be served by adopting flexible rules that will enable interested parties to bid on licenses in three possible band configurations. The three band configurations are based on proposals submitted by parties in this proceeding and each includes at least one spectrum block that will permit the provision of high-speed telecommunications services to the public onboard aircraft.

8. In reexamining the current band plan and service rules, we must address both competitive

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*Order*”), citing *In the Matter of 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services, Report and Order*, 16 FCC Rcd 22628, 22679 ¶25 (2001); *see also* *Year 2000 Biennial Regulatory Review—Amendment of Part 22 of the Commission’s Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and other Commercial Mobile Radio Services, Second Report and Order*, 17 FCC Rcd 18485 (2002); *Erratum*, 17 FCC Rcd 22140 (2002).

<sup>19</sup> *See* Welcome to Airfone web site, [www22.verizon.com/airfone](http://www22.verizon.com/airfone) and [www.22.verizon.com/airfone/service/af\\_service.htm](http://www.22.verizon.com/airfone/service/af_service.htm). Another commercial air-ground licensee, AT&T Wireless, discontinued operations on September 1, 2002, and cancelled its license. *See* Claircom Licensee Corporation Application for Cancellation of License, Call Sign KNKG801, File No. 0001161399 (filed Jan. 16, 2003). Skyway Aircraft, Inc. has authority to operate in the commercial air-ground band under the current rules on a shared basis pursuant to a Special Temporary Authorization (STA). *See infra* para. 11.

<sup>20</sup> *Notice*, 18 FCC Rcd at 8389-8391 ¶¶17-21. The remaining five licenses have been unassigned for some time, and no one has formally requested that the Commission open another application filing window. Pursuant to Section 22.875 of our rules, applications for authorization in this service may only be filed during window filing periods announced by public notice. 47 C.F.R. § 22.875.

issues (*i.e.*, how many competitors can the spectrum and the market support) and technical considerations (*i.e.*, how much spectrum is necessary to efficiently and effectively support a range of air-ground service offerings, including voice and broadband applications, and the technical parameters to minimize the potential for air-ground systems to cause interference). We resolve these interrelated issues by adopting flexible rules to determine the best technological configuration of the band and the number of competitors for air-ground communications over multiple platforms (*i.e.*, terrestrial and satellite). We note that six companies—AirTV, ARINC, Boeing, Inmarsat, OnAir, and Row 44—are developing or have commenced offering broadband air-ground services using satellite-based systems.<sup>21</sup> We find that reconfiguration of the 800 MHz air-ground band will facilitate competition with these satellite-based offerings in the provision of high-speed air-ground services to commercial and other aircraft. We also note that other spectrum is available for the provision of air-ground communications services.<sup>22</sup> Based on our review of the record developed in this proceeding and for the reasons stated below, we conclude that a flexible licensing approach coupled with flexible technical and operational rules will promote the highest valued use of the 800 MHz air-ground spectrum for the provision of air-ground services that better meet the needs of the public.

## 1. Background

9. In 1990, the Commission allocated four megahertz of spectrum for commercial Air-Ground Radiotelephone Service, authorizing operation at 849-851 MHz (ground stations) and 894-896 MHz (airborne mobile stations).<sup>23</sup> Each band is divided into ten paired channel blocks,<sup>24</sup> which are allotted to specific geographic locations (essentially a national grid).<sup>25</sup> Each channel block contains 29 narrowband (6 kHz) communications channels and 6 very narrowband (3.2 kHz) control channels.<sup>26</sup> Under the current service rules, each licensee has an exclusive control channel, shares all the communication channels with the other licensees in the band,<sup>27</sup> and must provide nationwide service.<sup>28</sup> To promote interoperable communications and to manage interference, some of the ground station locations in North America and channel block assignments have been predetermined consistent with bilateral agreements with Mexico and with Canada.<sup>29</sup> The number of communications channels limits the

<sup>21</sup> See *infra* paras. 14-20.

<sup>22</sup> See *infra* para. 45.

<sup>23</sup> See Amendment of the Commission's Rules Relative to Allocation of the 849-851/894-896 MHz Bands, *Report and Order*, 5 FCC Rcd 3861 (1990), *recon. granted in part*, In the Matter of Amendment of the Commission's Rules Relative to Allocation of the 849-851/894-896 MHz Bands, *Memorandum Opinion and Order*, 6 FCC Rcd 4582 (1991).

<sup>24</sup> 47 C.F.R. § 22.857.

<sup>25</sup> 47 C.F.R. § 22.859.

<sup>26</sup> 47 C.F.R. § 22.857. The Wireless Telecommunications Bureau has granted a waiver allowing two of the control channels to be combined and used as a thirtieth communication channel while there are fewer than six licensees. See Claircom Licensee Corporation and GTE Airfone Incorporated Requests for Waivers of Air-ground Radiotelephone Service Rules, *Order*, 16 FCC Rcd 17959 (WTB, CWD 2001).

<sup>27</sup> 47 C.F.R. §§ 22.865, 22.869.

<sup>28</sup> 47 C.F.R. § 22.873(b).

<sup>29</sup> See "Arrangement Between the Department of Communications of Canada and the Federal Communications Commission of the United States of America Concerning the Use of the Bands 849-851 and 894-896 MHz," signed August 18, 1992 (U.S.A.) and August 28, 1992 (Canada), Section 4. See also "Protocol Concerning the Use of the 849-851 and 894-896 MHz Bands for Public Air-To-Ground Radio Service," signed June 16, 1994 by the Government of the United States and the Government of Mexico, Article IV.

number of voice calls that can be simultaneously handled in a particular area, and the narrow bandwidth of these channels limits a service provider to voice and low-speed data services.<sup>30</sup>

10. The current 800 MHz Air-Ground Radiotelephone Service rules contemplate six competing licensees providing voice and low-speed data services. Six entities were originally licensed under these rules, which required all systems to conform to detailed technical specifications to enable shared use of the air-ground channels. Only three of the six licensees built systems and provided service, and two of those failed for business reasons. Only Verizon Airfone remains as an incumbent in the band.<sup>31</sup> The prescriptive command-and-control nature of the current air-ground service rules, the regulatory requirement to share only four megahertz of spectrum among up to six licensees, and the limited data capacity of the narrow bandwidth (6 kHz) communications (slow dial-up modem speed) preclude the provision of broadband services to the public.

11. We note that Skyway Aircraft, Inc. acquired the former "ClairCom" air-ground system and has authority to operate in the 800 MHz air-ground band under the current rules on a shared basis pursuant to a Special Temporary Authorization (STA).<sup>32</sup> In this proceeding, SkyWay has argued that it has an expectancy to use the air-ground spectrum,<sup>33</sup> and supported retention of the existing 800 MHz Air-Ground Radiotelephone Service rules.<sup>34</sup>

## 2. Market for Air-Ground Wireless Communications Services

12. There is substantial and rapidly growing consumer, airline, and service provider interest in access to high-speed Internet and other wireless services onboard aircraft.<sup>35</sup> Market research suggests that 38 percent of frequent flyers are willing to pay for high-speed access to the Internet and their

<sup>30</sup> When the Commission adopted the rules for this service, it implemented policies and technical constraints consistent with the experimental air-ground system licensed to Airfone, Inc. (now Verizon Airfone) six years prior to the order establishing the service in Part 22. See Amendment of the Commission's Rules Relative to Allocation of the 849-851/894-896 MHz Bands, *Report and Order*, 5 FCC Rcd 3861 (1990). The Commission sought to promote open entry, which required that the licensees be technically compatible and coordinate with one another.

<sup>31</sup> As noted above, Verizon's license expired in July 2004, and its renewal application currently is pending. See File No. 0001716212 (filed Apr. 28, 2004).

<sup>32</sup> SkyWay's STA (call sign WPYZ281) expired November 30, 2004, and the company has filed a request to extend the STA, which is pending. See File No. 00019331747 (filed Nov 11, 2004). The STA provides that "SkyWay has no future entitlement to hold an authorization to provide air-ground telecommunications services as currently authorized by this STA," and requires SkyWay to advise any customers of the potentially temporary nature of its operating authority.

<sup>33</sup> Skyway Comments at 5 (filed Apr. 1, 2004). We note that the STA is explicitly conditioned on the outcome of this proceeding.

<sup>34</sup> Skyway Comments at 5 (filed Nov. 26, 2003).

<sup>35</sup> See, e.g., White Paper, *Satellite Competition to Terrestrial Air-to-Ground Service*, transmitted by Letter from Donald C. Brittingham, Director-Wireless/Spectrum Policy, Verizon, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 7, 2004; Letter from Rich Farr, Senior Manager, Radio Communications, American Airlines, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Aug. 30, 2004, clarified by Letter from Rich Farr, Senior Manager, Radio Communications, American Airlines, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 28, 2004 (collectively, "American Airlines Letters"); AirCell *Ex parte* Presentation, *Business Structure & Market Outlook for Inflight Communications Services at 12-31* (July 26, 2004); In Search of an In-Air Connection, *Readers are Willing to Pay Airlines for a Good Web Connection in the Sky*, Wall St. Journal, Apr. 6, 2004, available at <http://webreprints.djreprints.com/974390656496.html>.

corporate network.<sup>36</sup> A September 2003 market study, moreover, indicates that 43 percent of adults who travel by commercial aircraft are interested in using their own wireless phones, and 34 percent would like to connect to the Internet with a laptop while onboard an aircraft.<sup>37</sup> American Airlines and Continental Airlines both state that passenger demand for in-flight connectivity for Internet access, email, and text messaging is increasing, and that passengers expect high-speed data rates.<sup>38</sup>

13. We see great potential for air-ground wireless services for commercial, government, and general aviation. These user markets can be served by satellite systems, systems using the spectrum subject to this rulemaking, by AirCell (and potentially others) using the cellular or other CMRS bands,<sup>39</sup> and by Air-Ground Radiotelephone Automated Service (AGRAS) stations in the 454/459 MHz bands serving general aviation. We also consider, in a separate *Notice of Proposed Rulemaking*, the possibility of modifying Section 22.925 of our rules,<sup>40</sup> which prohibits the use of cellular phones onboard airborne aircraft.<sup>41</sup> We intend in that companion proceeding to examine, inter alia, the possible use of onboard pico cells to control cellular handsets on airborne aircraft. We note, however, that as the expert agency responsible for air traffic safety, the Federal Aviation Administration (FAA) also regulates the use of cellular phones and other personal electronic devices on aircraft because of the potential for interference to aircraft communications and navigation systems.<sup>42</sup> Thus, the scope of use of cellular phones onboard airborne aircraft remains subject to FAA regulations, regardless of the action we may take in the companion proceeding.

14. Boeing has been authorized by the Commission to deploy up to 800 transmit and receive earth stations on aircraft in the 14 GHz uplink and the 12 GHz downlink bands.<sup>43</sup> By the terms of the

<sup>36</sup> The study was conducted by Forrester Research. See Boeing Press Release, "Infonet and Connexion by Boeing Announce Plans to Deliver 'Wi-Fi in the Sky' Capabilities to MobileXpress™ Customers," available at [http://www.boeing.com/news/releases/2004/q2/nr\\_040510j.html](http://www.boeing.com/news/releases/2004/q2/nr_040510j.html).

<sup>37</sup> The study, conducted by telephone, included a random sample of 1,009 U.S. adults, and is available at [http://www.ce.org/events/event\\_info/downloads/Presentation\\_Bates\\_Wireless\\_Devices\\_on\\_Planes.ppt](http://www.ce.org/events/event_info/downloads/Presentation_Bates_Wireless_Devices_on_Planes.ppt).

<sup>38</sup> Comments of Continental Airlines (filed Sept. 29, 2004); American Airlines Letters, *supra* note 35.

<sup>39</sup> AirCell operates in the cellular band under a Commission-granted waiver of Section 22.925, 47 C.F.R. § 22.925, which prohibits use of cellular telephones in airborne aircraft. AirCell received the waiver based on its use of technology specifically designed to avoid interference to ground-based cellular systems. See *infra* note 89.

<sup>40</sup> 47 C.F.R. § 22.925. In the *Notice*, we asked whether we should repeal or modify Section 22.925. See *Notice*, 18 FCC Rcd at 8390-8391 ¶22. This prohibition was initially adopted to prevent harmful interference to terrestrial cellular systems. See Amendment of Sections of Part 22 of the Commission's Rules in the Matter of Airborne Use of Cellular Telephones and the Use of Cell Enhancers in the Domestic Public Cellular Radio Service, *Report and Order*, 7 FCC Rcd 23 (1991).

<sup>41</sup> See Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and other Wireless Devices Aboard Airborne Aircraft, WT Dkt No. 04-435, *Notice of Proposed Rulemaking*, FCC 04-288 (rel. Feb. 15, 2005).

<sup>42</sup> See 14 C.F.R. § 91.21; Federal Aviation Administration Advisory Circular No. 91.21-1A, "Use of Portable Electronic Devices aboard Aircraft" (Oct. 2, 2000).

<sup>43</sup> See In the Matter of The Boeing Company, Application for Blanket Authority To Operate up to Eight Hundred Technically Identical Transmit and Receive Mobile Earth Stations Aboard Aircraft in the 14.0-14.5 GHz and 11.7-12.2 GHz Frequency Bands, File No. SES-LIC-20001204-02300, Call Sign: E000723, *Order and Authorization*, 16 FCC Rcd 22645 (IB 2001) ("*Boeing Transmit-Receive Order*"). A waiver of Section 2.106 of the Commission's rules was necessary because at that time the U.S. Table of Frequency Allocations did not include allocations for Aeronautical Mobile Satellite Service (AMSS) downlinks in the 12 GHz band and AMSS uplinks in the 14 GHz band. However, the Commission has since added a secondary allocation in the 14-14.5 GHz band for AMSS, (continued....)

grant, Boeing's authority to communicate with these satellites is limited geographically to the airspace above the United States and its territorial waters.<sup>44</sup> Boeing currently has pending before the Commission an application to expand its authority by seeking to communicate with several foreign satellites from aircraft flying over the high seas (*i.e.*, over international waters).<sup>45</sup> Boeing has also filed a petition for rulemaking, which is pending before us, seeking establishment of licensing and service rules for the Aeronautical Mobile Satellite Service (AMSS).<sup>46</sup>

15. In 2004, Connexion by Boeing launched a broadband in-flight Internet, data, and entertainment service on commercial flights operated by non-U.S. airlines,<sup>47</sup> using a Ku-band satellite system. Boeing states that it can provide a forward link data rate of up to 5 megabits, and a reverse link of 512 kbps.<sup>48</sup> Each plane equipped with the Connexion service offers either an Ethernet Local Area Network (LAN) connection or a wireless 802.11b network connection, or both.<sup>49</sup> The company has entered into agreements with numerous carriers,<sup>50</sup> and reportedly expects to generate service revenues of \$500,000 per airplane per year and annual revenues of \$2 billion.<sup>51</sup> Boeing projects that by 2010, the market for passenger Internet service will mature, and the company's market share will range from 4,500 to 5,000 of the 14,000 aircraft that will be flying at that time.<sup>52</sup> Boeing's Connexion service is currently available only on foreign airlines such as Lufthansa; however, some routes of these foreign carriers cover

(Continued from previous page)

following the addition of an international AMSS allocation in that band at the 2003 World Radiocommunication Conference. *See* Amendment of the Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radio Communications Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, *Report and Order*, 18 FCC Rcd 23426 (2003). Under its current authorization, Boeing is not permitted to cause harmful interference to other allocated services in the 11.7-12.2 GHz and 14-14.5 GHz frequency bands, and must accept all interference from authorized users of these bands. *Boeing Transmit-Receive Order*, 16 FCC Rcd at 22653-54 ¶19.

<sup>44</sup> *Boeing Transmit-Receive Order*, 16 FCC Rcd at 22653-54 ¶19.

<sup>45</sup> *See* The Boeing Company, Application to Modify Blanket AMSS Earth Station Authorization Call Sign E000723; File No. SES-MOD-20040301-00304, filed Mar. 1, 2004 ("*Boeing AMSS Modification Application*").

<sup>46</sup> Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum in the 14-14.5 GHz Band to the Aeronautical Mobile-Satellite Service ("AMSS") and To Adopt Licensing and Service Rules for AMSS Operations in the Ku-Band, The Boeing Company, Petition for Rulemaking, filed July 21, 2003.

<sup>47</sup> *See* <http://www.connexionbyboeing.com>.

<sup>48</sup> *See* Satcom Shakeout, *Business & Commercial Aviation*, Fred George, at 89 (Sept. 2004).

<sup>49</sup> *See* <http://www.connexionbyboeing.com/index.cfm?p=cbb.aboutservice&l=en.US&ec>. Rates for unlimited internet access through the Connexion service are based on the flight duration: \$14.95 for short-haul flights less than three hours, \$19.95 for medium-haul flights between three to six hours, and \$29.95 for long-haul flights over six hours. *See* <http://www.connexionbyboeing.com/index.cfm?p=cbb.pricing&l=en.US&ec>. Alternatively, users can purchase 30 minutes of Internet access for an initial fee of \$7.95 on flights under three hours and \$9.95 for flights over three hours, and \$0.25 per minute thereafter. *Id.*

<sup>50</sup> Connexion has definitive service agreements with Lufthansa, Scandinavian Airlines System (SAS), and Japan Airlines to equip their long-haul fleets with the Connexion service. In addition, British Airways has completed a successful service demonstration, and both All-Nippon Airways and Singapore Airlines have announced their intent to install the Connexion service on their long-range aircraft. *See* <http://www.connexionbyboeing.com>.

<sup>51</sup> *See* Coffee, Tea or Broadband, Quentin Hardy, *Forbes* (June 17, 2004), available at [http://www.forbes.com/technology/networks/2004/06/17/cz\\_gh\\_0617wifi.html](http://www.forbes.com/technology/networks/2004/06/17/cz_gh_0617wifi.html).

<sup>52</sup> *See* Stuck in the Air? Surf the Web, Boeing's Internet service lands first airline contract, Kelly Quigley, *Crain's Chicago Business* (Mar. 25, 2004).

U.S. territory.<sup>53</sup> Boeing also has approached a number of U.S. airlines regarding installation of the Connexion service on their U.S.-registered aircraft.<sup>54</sup> Connexion Service currently is available in the United States on executive jet platforms the size of a Boeing 737 and larger, including Airbus aircraft.<sup>55</sup> Boeing has also announced that, in cooperation with Rockwell Collins eXchange service, service will be available in early 2005 on a majority of the global routes flown by business jet operators, including the entire Bombardier Global family of aircraft.<sup>56</sup>

16. Aeronautical Radio Inc. (ARINC) is currently pursuing several efforts in order to bring broadband service to both business and commercial aircraft. The company has filed an application with the Commission seeking authority to offer, on a non-interference basis, a service similar to Boeing's Connexion.<sup>57</sup> While this application remains pending before the Commission, ARINC has begun testing a Ku-band satellite system pursuant to a grant of experimental authority.<sup>58</sup> ARINC claims that its proposed SKYLink service can offer aircraft passengers uplink speeds between 512 kbps and 3 Mbps and downlink speeds up to 128 kbps.<sup>59</sup> The company recently announced that it is conducting talks with three domestic airlines interested in the service.<sup>60</sup> The company claims that "SKYLink is the only broadband Internet solution suited to 95 percent of the world's passenger aircraft."<sup>61</sup> The commercial SKYLink hardware package, which weighs 150 pounds (including its low-profile antenna), reflects advances in technology that enable deployment of increasingly lighter weight satellite-based air-ground systems.<sup>62</sup>

17. SITA INC, Airbus and Tenzing recently formed OnAir, a company that intends to offer a

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<sup>53</sup> See *id.* at 2; Boeing AMSS Modification Application, Public Interest Statement at 5.

<sup>54</sup> See "Battle of the Bands," *Flight International* (Sept. 22, 2004).

<sup>55</sup> See <http://www.connexionbyboeing.com/index.cfm?p=cbb.executivejet&l=en.US&ec>.

<sup>56</sup> See *id.*

<sup>57</sup> Aeronautical Radio Inc., Application for Blanket Authority to Operate Aboard Aircraft up to 1000 Technically-Identical Transmit and Receive Mobile Earth Stations in the 11.7-12.2 and 14.0-14.5 GHz Frequency Bands, File No. SES-LIC-20030910-01261, filed Sept. 10, 2003, and Amendment, File No. SES-AMD-20031223-01860, filed Dec. 23, 2003.

<sup>58</sup> The Commission recently renewed ARINC's experimental authority to conduct a limited market study of its SKYLink service on 15 aircraft until May 1, 2006. See File No. 0130-EX-RR-2004 (Call Sign WC2XPE). A previous grant had modified ARINC's experimental authority to conduct a limited market study on up to 120 aircraft (originally authority was granted for only 15 aircraft). See File No. 0054-EX-PL-2001, modified by File No. 0029-EX-ML-2003 and File No. 0029-EX-ML-2004. Informal objections challenging the increase in the number of aircraft requested for the limited market study were filed by Boeing and Rockwell Collins Corporation. See *In the Matter of Aeronautical Radio Inc., Experimental License Modification to Expand Limited Market Study, Informal Objections of The Boeing Company and Rockwell Collins Corporation*, filed Sept. 13, 2004. Upon consideration of these objections, the Commission again modified ARINC's experimental authority to allow only 15 aircraft in its limited market study.

<sup>59</sup> ARINC Comments at 1-2.

<sup>60</sup> See Press Release, "ARINC Will Show New Broadband Internet Solution for Commercial Aircraft at WAEA" (Aug. 24, 2004), available at <http://www.arinc.com/news/2004/08-24-04.html>.

<sup>61</sup> See Press Release, "ARINC SKYLink<sup>SM</sup> Offers Internet for Airline Passengers on the Compact PEA Entertainment Unit" (Sept. 21, 2004) (statement by Robert Thompson, Senior Director of ARINC Satellite Services), available at <http://www.arinc.com/news/2004/09-21-04.html>.

<sup>62</sup> See Press Release, "SKYLink<sup>SM</sup> Satellite Broadband Demo Shows Airlines How to Achieve 'Total Aircraft Communications'" (Sept. 21, 2004), available at <http://www.arinc.com/news/2004/09-21b-04.html>.

range of voice and data broadband services to both long- and short-haul fleets across the world.<sup>63</sup> The company anticipates that SITA's existing cabin connectivity customers and Tenzing's existing customers will form the OnAir customer base.<sup>64</sup> OnAir expects to introduce access to corporate Virtual Private Networks and Internet browsing capabilities in 2005.<sup>65</sup>

18. Inmarsat also provides onboard wireless services to airlines,<sup>66</sup> corporate and private users,<sup>67</sup> and governmental entities.<sup>68</sup> The company uses a constellation of geostationary satellites to provide service to approximately 5,000 aircraft fitted with Inmarsat aeronautical communications systems, including more than 2,000 aircraft operated by major air carriers, including Air France, Continental, Delta, Qantas, United, US Airways, and Virgin Atlantic.<sup>69</sup> The remaining aircraft are operated by businesses and private individuals, and by a variety of government agencies, including the military.<sup>70</sup> Inmarsat delivers services to aircraft using seven different systems.<sup>71</sup> Swift64 is Inmarsat's latest service offering and provides enough data bandwidth for applications such as high-quality voice, email, Internet and intranet access, and videoconferencing.<sup>72</sup> Inmarsat states that Swift64 terminals now offer up to four 64 kbit/s channels that can be bonded to produce a 256 kbit/s data rate.<sup>73</sup> It also claims that application of compression and acceleration techniques can boost the effective rate to beyond half a megabit per second.<sup>74</sup>

19. On September 22, 2004, Row 44, LLC,<sup>75</sup> a provider of data communication services and equipment to the aviation industry, announced an agreement with Hughes Network Systems (HNS)<sup>76</sup> to bring broadband connectivity to North American commercial and business aircraft.<sup>77</sup> The company

<sup>63</sup> See [http://www.sita.com/index.asp?activeDir=/home/News\\_Centre/Press\\_releases/Press\\_releases\\_-2004/&activeFile=Going\\_On\\_Air.html](http://www.sita.com/index.asp?activeDir=/home/News_Centre/Press_releases/Press_releases_-2004/&activeFile=Going_On_Air.html).

<sup>64</sup> Over 60 airlines use SITA's current cabin connectivity services on 1,100 aircraft, including American Airlines, Air France, Asiana Airlines, KLM, Delta Airlines, Emirates, Singapore Airlines, Qantas, Saudi Arabian Airlines, Alitalia and Malaysia Airlines. Tenzing's cabin connectivity services are currently available on airlines including Cathay Pacific Airways, Continental Airlines, Emirates, Northwest Airlines, United Airlines, US Airways and Virgin Atlantic Airways. Tenzing has developed a system using software and existing onboard communications equipment to deliver text and data to and from aircraft. See <http://www.tenzing.com/about/>. Tenzing email and text-messaging systems are on more than 800 commercial aircraft flown by Cathay Pacific Airways, Continental Airlines, Iberia, Northwest Airlines, United Airlines and Virgin Atlantic. *Id.*

<sup>65</sup> See [http://www.onair.aero/en/vision/vision\\_strategy\\_en.pdf](http://www.onair.aero/en/vision/vision_strategy_en.pdf).

<sup>66</sup> See [http://aero.inmarsat.com/markets/air\\_transport.aspx?top\\_level\\_id=5&sub\\_level\\_id=1](http://aero.inmarsat.com/markets/air_transport.aspx?top_level_id=5&sub_level_id=1).

<sup>67</sup> See [http://aero.inmarsat.com/markets/business\\_aviation.aspx?top\\_level\\_id=5&sub\\_level\\_id=2](http://aero.inmarsat.com/markets/business_aviation.aspx?top_level_id=5&sub_level_id=2).

<sup>68</sup> See [http://aero.inmarsat.com/markets/government.aspx?top\\_level\\_id=5&sub\\_level\\_id=3](http://aero.inmarsat.com/markets/government.aspx?top_level_id=5&sub_level_id=3).

<sup>69</sup> See [http://aero.inmarsat.com/markets/default.aspx?top\\_level\\_id=5](http://aero.inmarsat.com/markets/default.aspx?top_level_id=5).

<sup>70</sup> *Id.*

<sup>71</sup> See [http://aero.inmarsat.com/services/default.aspx?top\\_level\\_id=3](http://aero.inmarsat.com/services/default.aspx?top_level_id=3).

<sup>72</sup> See [http://aero.inmarsat.com/services/swift\\_64.aspx?top\\_level\\_id=3&sub\\_level\\_id=1](http://aero.inmarsat.com/services/swift_64.aspx?top_level_id=3&sub_level_id=1).

<sup>73</sup> See [http://aero.inmarsat.com/technology/enabling\\_technologies.aspx?top\\_level\\_id=6&sub\\_level\\_id=4](http://aero.inmarsat.com/technology/enabling_technologies.aspx?top_level_id=6&sub_level_id=4).

<sup>74</sup> See *id.*

<sup>75</sup> See <http://www.row44.com/>.

<sup>76</sup> See *id.*

<sup>77</sup> See Press Release, "Row 44 Announces Strategic Relationship with Hughes Network Systems" (Sept. 21, 2004), available at [http://www.row44.com/press/2004\\_09\\_21.htm](http://www.row44.com/press/2004_09_21.htm).

intends to leverage the existing HNS DIRECWAY® satellite platform, which it claims is capable of high-speed connectivity of up to 30 Mbps to aircraft, to provide in-flight entertainment, consumer services, security, flight deck data, cabin crew operations, operational services, and emergency medical support.<sup>78</sup> The system supports both wired and wireless WiFi (802.11) installations and uses a lightweight low-profile radome (*i.e.*, a dome-shaped antenna enclosure) and steerable antenna (only three inches thick) that can simultaneously provide DBS television and two-way Internet traffic.<sup>79</sup> Row 44 is in discussions with a number of major airlines and owners of business jet fleets, and system testing is targeted to begin in early 2005.<sup>80</sup>

20. On September 23, 2004, AirTV announced that it has signed a launch services agreement with Arianespace<sup>81</sup> to deliver in-flight entertainment and connectivity for airlines worldwide.<sup>82</sup> AirTV states that its system will provide more than 60 channels of live television (in multiple languages) and 40 Mbps of Internet, e-mail, and data services to aircraft.<sup>83</sup> AirTV has adopted an incremental approach for rollout of its system. AirTV plans to launch its initial satellite in 2007 over the North Atlantic Ocean. This satellite will cover airline routes from Europe and the Middle East to North America (roughly one-third of all airline traffic).<sup>84</sup> AirTV's subsequent three satellites will be launched soon after, providing coverage for aircraft flying over nearly all of the commercial airline routes around the globe.<sup>85</sup>

21. Although they do not currently provide the types of passenger-based phone and internet access services that the Aeronautical Mobile Satellite Service is capable of providing, the two operating Big LEO (Low Earth Orbit) systems, Iridium Satellite LLC (Iridium) and Globalstar USA (Globalstar), serve the aviation market for their private communication needs.<sup>86</sup> Aviation users can access the Iridium network to send and receive voice, messaging, and data regardless of their positions on or above the earth.<sup>87</sup> Globalstar provides specially designed communication solutions for in-flight voice and data services aboard both helicopters and fixed-wing aircraft.<sup>88</sup> Globalstar also provides internet connectivity

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<sup>78</sup> *Id.*

<sup>79</sup> *Id.*

<sup>80</sup> *Id.*

<sup>81</sup> See [http://www.arianespace.com/site/about/about\\_index.html](http://www.arianespace.com/site/about/about_index.html).

<sup>82</sup> See Press Release, "AirTV Signs With Arianespace to Launch its First Broadband In-Flight Entertainment/Communications Satellite in 2007" (Sept. 23, 2004), available at [http://www.airtv.net/press\\_release\\_092304.html](http://www.airtv.net/press_release_092304.html).

<sup>83</sup> *Id.*

<sup>84</sup> See <http://www.airtv.net/overview.html>.

<sup>85</sup> *Id.*

<sup>86</sup> "Big LEO" refers to low Earth orbit mobile-satellite services above 1 GHz. Big LEO systems are subject to 47 C.F.R. § 25.136(a) ("User transceiver units associated with the 1.6/2.4 GHz Mobile-Satellite Service . . . may not be operated on civil aircraft unless the earth station has a direct physical connection to the aircraft cabin or cockpit communication system."). For more detail regarding the Big LEO licensees, see generally Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, Report and Order, Fourth Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 13356 (2004).

<sup>87</sup> See [http://www.iridium.com/market/iri\\_market-detail.asp?solutionid=22](http://www.iridium.com/market/iri_market-detail.asp?solutionid=22).

<sup>88</sup> See <http://www.globalstarusa.com/en/products/aviation.php>.

for aircraft through two airborne satellite telephone systems.<sup>89</sup>

22. AirCell also is interested in providing service to commercial airline passengers. In conjunction with its cellular licensee partners, AirCell currently provides, pursuant to waiver, air-ground services to more than 1,400 general aviation aircraft using traditional cellular networks and frequencies.<sup>90</sup> The AirCell operations employ existing ground-based cellular networks pursuant to agreements with 23 cellular providers.<sup>91</sup> While, to date, AirCell has provided air-ground service only to general aviation aircraft over its network, it has announced plans to begin testing the service in commercial aircraft.<sup>92</sup> AirCell has participated extensively in this proceeding and stated an interest in providing services in the 800 MHz air-ground spectrum.

23. Verizon Airfone is the sole incumbent operating in the 800 MHz air-ground spectrum. The company's service is available on approximately 4,500 aircraft (including 1,500 commercial aircraft).<sup>93</sup> Verizon Airfone generally charges a connection fee of \$3.99 for each voice call, plus \$3.99 per minute of air time.<sup>94</sup> Verizon Airfone has taken several steps to enhance its services in recent years. The company launched an in-flight data service called JetConnect(SM) in September 2002 on some commercial U.S. flights, including planes operated by Continental Airlines, Inc.<sup>95</sup> JetConnect service includes instant messaging, online games, and current news, priced at \$5.99 for an entire flight.<sup>96</sup> In 2004, the company introduced two new pricing plans for Verizon Airfone voice calls made by Verizon Wireless subscribers—\$10.00 per month and \$0.10 per minute, or \$0.69 per minute with no monthly fee.<sup>97</sup> Despite these efforts, demand for Verizon Airfone Service has waned in recent years. American Airlines, for example, has suspended Verizon Airfone service due to a sharp decline in passenger

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<sup>89</sup> *Id.*

<sup>90</sup> AirCell and its partners have been granted waivers of the Commission's rule, 47 C.F.R. § 22.925, prohibiting the use of cellular phones on planes in order to implement an air-ground service. AirCell's system uses specially designed mobile units and ground equipment to allow users to access the existing networks of AirCell's cellular licensee partners without causing the harmful interference against which Section 22.925 was designed to protect. See *In the Matter of AirCell, Inc., Petition, Pursuant to Section 7 of the Act, For a Waiver of the Airborne Cellular Rule, Or, in the Alternative, for a Declaratory Ruling, Order*, 14 FCC Rcd 806 (WTB 1998), recon. granted in part, denied in part, *Order on Reconsideration*, 14 FCC Rcd 18430 (WTB 1999), app. for rev. denied, *Memorandum Opinion and Order*, 15 FCC Rcd 9622 (2000), affirmed in part and remanded in part sub nom., *AT&T Wireless Services, Inc., et al., v. FCC*, 270 F.3d 959, 968 (D.C. Cir. 2001), pet. for reh'g denied Jan. 29, 2002, *Order on Remand*, 18 FCC Rcd (2003), pet. for rev. denied sub nom., *AT&T Wireless Services, Inc. v. FCC*, 365 F.3d 1095 (D.C. Cir. 2004).

<sup>91</sup> See [www.Aircell.com/about](http://www.Aircell.com/about).

<sup>92</sup> See *id.* AirCell has indicated that, to the extent any additional or modified waiver authority or experimental license is required in order to conduct the desired tests on commercial aircraft, it will obtain such necessary authorization. See *In the Matter of AirCell, Inc., Petition, Pursuant to Section 7 of the Act, for a Waiver of the Airborne Cellular Rule, or, in the Alternative, for a Declaratory Ruling, Order*, 17 FCC Rcd 19586, 19586-87 ¶2 (WTB, CWD 2002). Nothing in AirCell's current waiver prohibits operation on commercial, as opposed to general aviation, aircraft.

<sup>93</sup> Verizon Airfone Comments at 12.

<sup>94</sup> See [http://www22.verizon.com/airfone/service/af\\_service\\_genrates.html](http://www22.verizon.com/airfone/service/af_service_genrates.html).

<sup>95</sup> See [http://www22.verizon.com/airfone/service/af\\_service\\_genrates.html#JetConnect](http://www22.verizon.com/airfone/service/af_service_genrates.html#JetConnect).

<sup>96</sup> *Id.*

<sup>97</sup> See [http://www22.verizon.com/airfone/vzw/vzw\\_airfone\\_service.html](http://www22.verizon.com/airfone/vzw/vzw_airfone_service.html).

demand.<sup>98</sup> The service has declined from up to 15 users per flight, at prices comparable to today's rates, to two or three users per flight today.<sup>99</sup>

### 3. Reconfiguration of the 800 MHz Air-Ground Radiotelephone Service Band

24. In the *Notice*, we asked parties to assess our current rules and policies affecting the 800 MHz Air-Ground Radiotelephone Service and identify restrictions or policies that impede the competitive provision of services designed to meet consumers' needs.<sup>100</sup> We asked whether any changes to our rules could provide greater opportunities for the competitive provision of air-ground services, leading to lower prices to consumers and increased choices in wireless services and enhancements while traveling by plane.<sup>101</sup> We specifically asked parties to make suggestions for rules and policies that would achieve more effective consumer choice,<sup>102</sup> and whether this spectrum should be limited to air-ground use, or whether we should allow for more flexible use.<sup>103</sup> We sought comment on increasing the operational flexibility afforded to air-ground licensees and whether such flexibility would raise any co-channel, adjacent channel, or other interference issues, *e.g.*, with respect to existing or future services in the 800 MHz band.<sup>104</sup> We also sought comment regarding whether the 800 MHz air-ground spectrum is being efficiently used and possible changes to our rules that would encourage the use of more innovative, spectrum-efficient technologies that could be utilized in this spectrum and how best to promote deployment of such technology.<sup>105</sup>

#### a. Spectrum Reconfiguration Proposals

25. In response to the *Notice*, four parties—AirCell,<sup>106</sup> Boeing,<sup>107</sup> Space Data,<sup>108</sup> and Verizon

<sup>98</sup> See American Airlines Letters, *supra* note 35.

<sup>99</sup> See Joe Sharkey, "Almost here: Cell phones at 37,000 feet," N.Y. Times, Oct. 10, 2004, at C6 (statement of William E. Pallone, President, Verizon Airfone).

<sup>100</sup> *Notice*, 18 FCC Rcd at 8389-8390 ¶¶17-21.

<sup>101</sup> *Id.* at 8389 ¶17.

<sup>102</sup> *Id.*

<sup>103</sup> *Id.* at 8390 ¶21.

<sup>104</sup> *Notice*, 18 FCC Rcd at 8390 ¶20. The 849-851 MHz air-ground band is immediately adjacent to 800 MHz General Category land mobile channels at 851-854.75 MHz that are used by both public safety and commercial SMR systems and that are discussed in our pending proceeding on 800 MHz public safety interference issues. See *Improving Public Safety Communications in the 800 MHz Band; Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels, Notice of Proposed Rule Making*, 17 FCC Rcd 4873 (2002), *Erratum*, 17 FCC Rcd 7169 (2002). The Commission recently issued an Order in that proceeding, which provides, *inter alia*, that the NPSPAC public safety channels will be moved to spectrum just above 851 MHz. See *Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order*, 19 FCC Rcd 14969, 15050 at ¶151 (2004), as amended by *Erratum*, 19 FCC Rcd 19651 (2004), and *Erratum*, 19 FCC Rcd 21818 (2004) ("*800 MHz Order*"), order clarified by *Supplemental Order and Order on Reconsideration*, FCC 04-294, 2004 WL 2973805 (F.C.C.) (rel. Dec. 22, 2004). Below, we adopt a rule that subjects ground stations that operate in the 849-851 MHz air-ground band to the cellular interference rule adopted in the *800 MHz Order*. See *infra* para. 67.

<sup>105</sup> *Notice*, 18 FCC Rcd at 8390 ¶19.

<sup>106</sup> See AirCell Comments; AirCell Reply Comments; Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated July 27, 2004, transmitting "Business Structure & Market Outlook for Inflight Communications Services"; Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 9, 2004, transmitting "AirCell Response to FCC Questions" at 3-7 ("AirCell September 9 Response to FCC"); Letter from Michele C. (continued....)

Airfone<sup>109</sup>—submitted detailed proposals regarding revision of the 800 MHz Air-Ground Radiotelephone Service band plan and rules. These parties uniformly agree that the 800 MHz air-ground band should be reconfigured, and urge us to adopt a band plan and rules that would enable a licensee to deploy spectrally-efficient broadband technologies, including CDMA2000 1xEV-DO and FLASH-OFDM. The parties, however, offer different proposals for reconfiguration of the band.

26. AirCell and Boeing jointly propose that we reconfigure the four megahertz of spectrum in the band into two co-primary, overlapping 3.0 MHz licenses.<sup>110</sup> The parties propose that each licensee would initially share three megahertz of spectrum in the band (1.5 MHz at 849.000-850.500 MHz paired with 1.5 MHz at 894.000-895.500 MHz).<sup>111</sup> They propose that one licensee use vertical radio wave polarization and the other use horizontal radio wave polarization in order to mitigate potential inter-system interference.<sup>112</sup> This approach would provide one megahertz of spectrum (the upper 0.5 MHz of

(Continued from previous page)

Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 30, 2004, transmitting "Passenger Benefits from Competition in Broadband Airline Communications" and "Providing Deck-to Deck Coverage;" Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Oct. 4, 2004, transmitting "AirCell October 1 Presentation to FCC;" Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 6, 2004, transmitting "Air-to-Ground Myths & Realities" at 4 ("AirCell Air-to-Ground Myths & Realities"); Declaration of Paul A. London on behalf of AirCell, dated Dec. 7, 2004 ("AirCell London Declaration").

<sup>107</sup> See Connexion by Boeing Proposed Rules Governing Operation of Multiple 800 MHz Air to Ground Systems (Sept 10, 2004); Letter from Howard J. Symons, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 8, 2004 ("Boeing December 8 *Ex parte*").

<sup>108</sup> See Space Data Reply Comments; Space Data's Proposed ATG Rules (June 10, 2004); Letter from Cheryl A. Tritt, Morrison & Foerster LLP, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 9, 2004, transmitting "Space Data Corporation: Air-to-Ground Analysis" ("Space Data September 9 Analysis"); Letter from Cheryl A. Tritt, Morrison & Foerster LLP, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 17, 2004, transmitting "Space Data November 16, 2004 Presentation;" Letter from Cheryl A. Tritt, Morrison & Foerster LLP, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 29, 2004, transmitting "AirCell's Criticisms of Space Data's ATG Proposals are Inaccurate and Completely Unsubstantiated" ("Space Data November 29 Analysis"); *Ex parte* Presentation of Gerald Knobloch, CEO, Space Data dated Dec. 8, 2004 ("Space Data December 8 *Ex parte*").

<sup>109</sup> See Verizon Airfone Comments; Verizon Airfone Reply Comments; Verizon Airfone has Legal and Equitable Rights as the Only Qualified Licensee Providing In-Flight Services to the Public at 5-6 (Sept. 9, 2004) ("Verizon Airfone September 9 Statement"); Verizon Airfone Response to Air-to-Ground Licensing Scenario Under Consideration by the FCC at 5 (Sept. 10, 2004) ("Verizon Airfone September 10 Response to FCC").

<sup>110</sup> See AirCell Further Notes on the Deployment of Two Cross-Polarized Systems in the ATG Band and Response to Verizon Airfone/Telcordia at 3 (Nov. 23, 2004) ("AirCell Further Notes on the Deployment of Two Cross-Polarized Systems"); Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 12, 2004, transmitting "AirCell Two Cross-Polarized Systems in the ATG Band;" Letter from Michele C. Farquhar, Hogan & Hartson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Oct. 21, 2004, transmitting "Deployment of two Cross-Polarized Systems in the ATG Band" ("AirCell/Boeing Joint Proposal"). See Letter from Howard J. Symons, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Oct. 21, 2004 (confirming Boeing's concurrence in joint proposal with AirCell). AirCell and Boeing each filed several separate proposals to reconfigure the air-ground spectrum during the course of this proceeding before submitting the AirCell/Boeing Joint Proposal.

<sup>111</sup> See AirCell/Boeing Joint Proposal at 4.

<sup>112</sup> See *id.* at 3-4.

each 2 MHz band) to accommodate Verizon Airfone's incumbent system for a limited transition period.<sup>113</sup> Following the transition period, the licensee using horizontal radio wave polarization would shift its operations to 1.5 MHz at 849.500-851.000 MHz paired with 1.5 MHz at 894.500-896.000 MHz, and each licensee's spectrum would overlap the other's spectrum by 60 percent. The parties suggest that the Commission specify ground station spacing based on the existing site list for the air-ground service.<sup>114</sup> The parties propose that sites serving the same airspace be located within two miles of each other and that the licensees coordinate the location of new sites.<sup>115</sup>

27. Verizon Airfone, the sole incumbent in the 800 MHz air-ground band, initially proposed that the four megahertz of spectrum in the band be licensed to one exclusive licensee, and contended that it should receive the license without an auction based on its incumbent status.<sup>116</sup> More recently, Verizon Airfone supports reconfiguring the band into an exclusive 3 MHz license and an exclusive 1 MHz license.<sup>117</sup>

28. Space Data proposes the use of combinatorial bidding to determine configuration of the 800 MHz air-ground band.<sup>118</sup> Based on the outcome of an auction, Space Data's proposal would accommodate one of three band configurations—(1) a shared licensing approach with overlapping 2.75 MHz and 3 MHz licenses, (2) exclusive 3MHz and 1 MHz licenses, or (3) exclusive 2.75 MHz and 1.25 MHz licenses.<sup>119</sup> Space Data also has proposed the use of combinatorial bidding procedures to auction three exclusive 1.33 MHz spectrum blocks or two exclusive 1.5 MHz blocks and two shared 1.0 MHz blocks.<sup>120</sup> The latter approach would permit either exclusive or shared licensing of the band.<sup>121</sup>

#### b. Available Air-Ground Band Plans

29. We have reviewed the extensive record in this proceeding and carefully weighed the parties' competing proposals to reconfigure the 800 MHz air-ground spectrum band. We conclude that the public interest will be served by adopting a flexible framework that will enable interested parties to bid on spectrum licenses according to the band configuration that they believe will best meet their needs for the provision of air-ground services. Interested parties may bid on spectrum licenses in any of the following three band plans,<sup>122</sup> including two overlapping, shared, cross-polarized spectrum licenses (band plan 1) as advocated by AirCell and Boeing and exclusive spectrum licenses (band plans 2 and 3) as proposed by Space Data and Verizon Airfone. Licenses will have a ten-year term.

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<sup>113</sup> See *id.* at 4.

<sup>114</sup> See *id.* at 8. See 47 C.F.R. § 22.859.

<sup>115</sup> See AirCell/Boeing Joint Proposal at 8.

<sup>116</sup> Verizon Airfone Comments at 8-12.

<sup>117</sup> See, e.g., Verizon Airfone September 10 Response to FCC.

<sup>118</sup> See Space Data November 16, 2004 Presentation at 7-9.

<sup>119</sup> See *id.* at 8.

<sup>120</sup> See Space Data October 13 Presentation at 3-6.

<sup>121</sup> Space Data also has proposed two exclusive 1.6 MHz licenses for GSM, and a single 0.8 MHz license to accommodate the incumbent system. See Space Data November 16, 2004 Presentation. Alternatively, the company suggested that an additional 100 kilohertz of spectrum be allocated to accommodate 2.5 MHz and 1.6 MHz spectrum blocks for CDMA and GSM, respectively. *Id.*

<sup>122</sup> The band configurations are illustrated above at paragraph 1.

Band plan 1—two overlapping, shared, cross-polarized 3 MHz licenses (licenses A and B, respectively).<sup>123</sup>

Band plan 2—an exclusive 3 MHz license and an exclusive 1 MHz license (licenses C and D, respectively).<sup>124</sup>

Band plan 3—an exclusive 1 MHz license and an exclusive 3 MHz license (licenses E and F, respectively), with the blocks at opposite ends of the band from the third configuration.<sup>125</sup>

The Commission will award licenses to winning bidders for the licenses comprising the band plan that receives the highest aggregate gross bid, subject to long-form license application review. In order to further competition and ensure maximum use of this frequency band for air-ground services, no party will be eligible to hold more than one of the spectrum licenses being made available.<sup>126</sup>

30. We believe this flexible approach to configuration of the band will promote our goal in this proceeding of facilitating the highest valued use of this scarce spectrum resource, resulting in the provision of wireless communications services that better meet the needs of the traveling public onboard aircraft.<sup>127</sup> We also further our strategic objective “to encourage the growth and rapid deployment of innovative and efficient communications technologies and services”<sup>128</sup> by adopting rules that will permit licensees to deploy any current or future technology with an occupied bandwidth that fits within its assigned spectrum and to provide any kind of air-ground service to any type of aircraft. As explained below, we also provide a transition period for the incumbent system currently operated by Verizon Airfone.<sup>129</sup>

31. The parties urge us to reconfigure the air-ground band to enable the deployment of CDMA2000 1xEV-DO and/or FLASH-OFDM technologies in the air-ground band in order to deliver high-speed communications services to consumers onboard aircraft.<sup>130</sup> We conclude that a 3 MHz spectrum block (comprised of 1.5 MHz paired channels) will provide sufficient spectrum to deploy these technologies in the air-ground band. The originators of these technologies, QUALCOMM Incorporated

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<sup>123</sup> Licenses A and B would be vertically and horizontally polarized, respectively, and would initially share 1.5 MHz at 849.000-850.500 MHz paired with 1.5 MHz at 894.000-895.500 MHz. If band plan 1 is implemented, the parties may agree to a different implementation scheme. Once Verizon Airfone’s incumbent system ceases operations in the upper 0.5 MHz of each band, licensee B would shift its operations to 1.5 MHz at 849.500-851.000 MHz paired with 1.5 MHz at 894.500-896.000 MHz.

<sup>124</sup> License C would be located in the lower 1.5 MHz portion of each 2 MHz band (1.5 MHz at 849.000-850.500 MHz paired with 1.5 MHz at 894.000-895.500 MHz). License D would be located in the upper 0.5 MHz portion of each 2 MHz band (0.5 MHz at 850.500-851.000 MHz paired with 0.5 MHz at 895.500-896.000 MHz).

<sup>125</sup> License E would be located in the lower 0.5 MHz portion of each 2 MHz band (0.5 MHz at 849.000-849.500 MHz paired with 0.5 MHz at 894.000-894.500 MHz). License F would be located in the upper 1.5 MHz portion of each 2 MHz band (1.5 MHz at 849.500-851.000 MHz paired with 1.5 MHz at 894.500-896.000 MHz).

<sup>126</sup> See *infra* paras. 39-44.

<sup>127</sup> See *Notice*, 18 FCC Rcd at 8389 ¶17.

<sup>128</sup> Federal Communications Commission, Strategic Plan FY 2003-FY 2008 at 5 (2002).

<sup>129</sup> See *infra* paras. 75-76.

<sup>130</sup> AirCell, Boeing, Space Data, and Verizon Airfone each urge us to enable the deployment of CDMA. See, e.g., AirCell October 13 Presentation at 5; Boeing Proposed Rules at n.2. Verizon Airfone also urges us to enable the deployment of FLASH-OFDM. See Verizon Airfone Response to FCC at 5.

(CDMA) and Flarion Technologies Inc. (OFDM), both state that 125 kHz guard bands are required on each side of a 1.25 MHz wide carrier to deploy their respective technologies,<sup>131</sup> and that a 3 MHz spectrum block (comprised of 1.5 MHz paired channels) would provide sufficient spectrum to deploy these technologies in the band. AirCell, Boeing, and Verizon Airfone concur that guard bands are necessary.<sup>132</sup> Accordingly, in view of the foregoing and our goal to encourage the deployment of spectrally efficient technologies in the air-ground band, each of the three band plans includes at least one spectrum license of 3 MHz.

32. In addition, future licensees in the 800 MHz air-ground band, as well as other interested parties, will have the opportunity to engage in spectrum leasing under our rules.<sup>133</sup> Future licensees will also be permitted to engage in partitioning and/or disaggregation of their licenses.<sup>134</sup> These regulatory opportunities are intended to provide the air-ground marketplace greater flexibility to respond to consumer demand.

33. Below, we address the location of ground stations, the provision of deck-to-deck service (*i.e.*, service from takeoff to landing), competitive considerations, and the provision of services in the air-ground band.

### (i) Location of Ground Stations

34. Band plans 2 and 3 provide for exclusive spectrum licensing and will afford new licensees significant flexibility to configure and modify their systems to address current and future market conditions. For example, licensees will be able to initially configure their systems to best meet the needs of their customers, and may flexibly reconfigure or add ground stations to respond to future demand for air-ground services.<sup>135</sup> An exclusive licensee also could deploy new technologies in response to changing market conditions—without having to coordinate its choice of technology with another licensee in the band.<sup>136</sup> If the band is comprised of two overlapping 3 MHz licenses (band plan 1), the new licensees will be required to jointly file a spectrum sharing and site selection plan with the Wireless Telecommunications Bureau within six months of the initial grant of their spectrum licenses,<sup>137</sup> and will be required to notify the Bureau of any changes to the plan. The Wireless Telecommunications Bureau will issue a public notice prior to the Commission's auction of new 800 MHz air-ground spectrum

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<sup>131</sup> See Letter from Dean R. Brenner, Senior Director, Government Affairs, QUALCOMM Incorporated, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 3, 2004, at 2; Letter from Michael J. Thornton, Flarion Technologies Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Sept. 2, 2004, at 1.

<sup>132</sup> See AirCell October 13 Presentation at 5; Boeing Proposed Rules at n.2; Verizon Airfone Response to FCC at 5. Space Data, however, suggests that CDMA could be deployed in 2.5 MHz. See Space Data December 8 *Ex parte*.

<sup>133</sup> See 47 C.F.R. § 1.9005.

<sup>134</sup> See 47 C.F.R. §§ 1.948(e) & (f).

<sup>135</sup> The FAA forecasts that, over the ten-year period from 2005 through 2015, aviation passenger traffic is expected to increase by 45 percent, to over one billion passengers. See Views and Estimates of the Committee on Transportation and Infrastructure for FY 2005, located at <http://www.house.gov/transportation/views2005.html>.

<sup>136</sup> Certain spacing requirements are necessary in border areas.

<sup>137</sup> In the event that the parties determine that more than six months is required to prepare and file the plan, they may request an extension of the six-month period.

licenses in which it will specify the filing requirements for the plan.<sup>138</sup> This approach would provide parties with overlapping spectrum licenses flexibility to configure their systems without having to adhere to minimum spacing requirements or site locations dictated by the Commission. AirCell, which supports spectrum sharing in the band, observes that parties with overlapping licenses would act with “enlightened self-interest” and cooperate in the site selection process.<sup>139</sup>

## (ii) Provision of Deck-to-Deck Service

35. The record reflects that parties desire deck-to-deck service (*i.e.*, service from terminal to terminal). The Federal Air Marshal (FAM) Service, for example, urges us to ensure that communications capabilities in the air-ground band are fully operational during all phases of a commercial flight.<sup>140</sup> We note that air-ground communications services are currently provided to Federal, State, and local agencies, including the FBI, the U.S. Department of Energy, and the U.S. Customs Service,<sup>141</sup> and that the air-ground spectrum can be used to support aircraft management, other public safety services, and homeland security communications. In view of the foregoing and in light of our statutory mandate to promote the safety of life and property,<sup>142</sup> we have selected three band plans that would enable licensees to provide deck-to-deck service.

36. An exclusive licensing approach (band plans 2 and 3) would facilitate the provision of service continuously because ground stations can be located without inter-system coordination and would not have to be limited in power or sector orientation by the presence of an overlapping licensee. If a spectrum sharing approach (band plan 1) is selected by the auction winners, the record indicates that the parties will have to agree on power limits and sharing rules to facilitate the full provision of deck-to-deck service. AirCell suggests that a licensee could deploy a hybrid system that uses terrestrial spectrum (such as cellular or PCS spectrum) to provide service at low altitudes in the vicinity of airports.<sup>143</sup> As noted above, in the event that applicants seeking band plan 1 win at auction, the new licensees will have to jointly file a spectrum sharing plan with the Wireless Telecommunications Bureau, which may include terms to facilitate the provision of deck-to-deck service.

## (iii) Competitive Considerations

37. AirCell and Boeing urge us to configure the 800 MHz air-ground band into two overlapping 3.0 MHz licenses, claiming that because shared use is possible under rules that they propose, consumers would benefit from having two providers in the band each with access to three megahertz of spectrum.<sup>144</sup> As noted above, however, such a spectrum sharing regime would require the Commission to

<sup>138</sup> We note that the parties may seek confidential treatment of the plan in accordance with the Commission’s rules and policies. *See, e.g.*, 47 C.F.R. § 0.459.

<sup>139</sup> *See* AirCell Further Notes on the Deployment of Two Cross-Polarized Systems at 3.

<sup>140</sup> *See* Letter from Robert S. Bray, Deputy Assistant Director, Federal Air Marshal Service, U.S. Immigration and Customs Enforcement, U.S. Department of Homeland Security, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 2, 2004.

<sup>141</sup> *See, e.g.*, AirCell October 1 Presentation to FCC at 3.

<sup>142</sup> 47 U.S.C. § 151.

<sup>143</sup> AirCell states that a handoff of traffic between an air-ground system and a terrestrial system at 500 feet would facilitate the provision of deck-to-deck service. *See* AirCell Two Cross-Polarized Systems in the ATG Band at 3-5. *See also* AirCell Further Notes on the Deployment of Two Cross-Polarized Systems at 4-7.

<sup>144</sup> *See* AirCell September 9 Response to FCC at 1-2; Boeing Response to Verizon Airfone’s *Ex parte* Presentation of September 3 and 10, 2004 at 4-5.

dictate rules such as requiring that the parties coordinate ground station locations or adhere to spacing criteria. AirCell, moreover, notes that if licensees that share spectrum wish to deploy incompatible technologies, one of the licensees may have to acquire spectrum in another band suitable for air-ground service.<sup>145</sup> We conclude that adopting only the spectrum sharing proposal of AirCell and Boeing and incorporating it into our rules may unnecessarily limit a licensee's ability to respond to changing market conditions and provide optimal air-ground broadband services to the public. We therefore make available a sharing plan that would permit the licensees, rather than the Commission, to determine appropriate and necessary sharing rules. In order to provide potential licensees requiring additional flexibility with the ability to operate without sharing requirements, we also make available exclusive licensing plans as well. The holder of an exclusive spectrum block could, for example, flexibly site its ground stations and select any technology without having to coordinate with another operator in the band. Accordingly, we provide for both shared and exclusive licensing options.

38. The flexible band configuration approach that we adopt today will enable interested parties to bid on overlapping spectrum licenses (band plan 1) as proposed by AirCell and Boeing in the event that they believe spectrum sharing will best meet their needs for the provision of air-ground services. Under this approach, the individual licensees—rather than the Commission, as suggested by AirCell and Boeing—would determine the criteria for ground station locations and other technical requirements necessary to facilitate the provision of broadband services on an overlapped basis. Moreover, in lieu of codifying their sharing plan into the Commission's rules, any sharing plan that the winning bidders develop between themselves can be modified at any time without their having to seek a change in the rules. If band plan 1 is implemented, we expect the parties to engage in good faith negotiations in developing and implementing their spectrum sharing plan. If the two licensees cannot agree on a spectrum sharing plan or if a dispute arises under their initial or amended agreement, we would encourage them to use binding arbitration or other alternative dispute resolution procedures. Alternatively, either party may request that the Commission resolve major disputes by filing, for example, a petition for declaratory ruling; the Commission would endeavor to resolve such matters expeditiously.

39. *Eligibility Restriction.* A number of commenting parties urge us to promote competition in the 800 MHz air-ground band.<sup>146</sup> T-Mobile USA, for example, supports licensing multiple providers in the band if it is technically feasible.<sup>147</sup> AirCell, Boeing, and Space Data state that we should limit eligibility to prevent a single entity from obtaining all four megahertz of spectrum in the band.<sup>148</sup> Verizon

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<sup>145</sup> See AirCell Air-to-Ground Myths & Realities at 4.

<sup>146</sup> See, e.g., Letter from the Honorable Fred Upton, Chairman, House Energy and Commerce Subcommittee on Telecommunications and the Internet, to Michael Powell, Chairman, Federal Communications Commission, dated Dec. 10, 2004 (the Commission should "enable competition in the air-to-ground marketplace"); Letter from the Honorable Conrad Burns, Deputy Whip, United States Senate, to Michael Powell, Chairman, Federal Communications Commission, dated Dec. 1, 2004 (the Commission should "formulate a policy that promotes competition in air-ground services"); Letter from Robert C. Land, Vice President of Government Affairs and Associate General Counsel, JetBlue Airways, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 6, 2004; Letter from Luisa L. Lancetti, Vice President, Wireless Regulatory Affairs, Sprint, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 3, 2004; Letter from Edward P. Faberman, Executive Director, Air Carrier Association of America, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Oct. 4, 2004.

<sup>147</sup> See Letter from Thomas J. Sugrue, Vice President, Government Affairs, T-Mobile USA, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 15, 2004.

<sup>148</sup> See AirCell Air-to-Ground Myths & Realities at 4; Letter from Howard J. Symons, Mintz Levin Cohn Ferris Glovsky and Popeo, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Nov. 16, 2004, (continued....)

Airfone, however, contends that we should make available all four megahertz of spectrum in the band to a single party on an exclusive basis.<sup>149</sup>

40. In developing the available band plan options, we have considered the potential harms and benefits that may accrue from the possibility of a single provider in this band versus opportunities for multiple service providers. We have also weighed the possible harms and benefits in the context of our goal in this proceeding of facilitating the highest valued use of this spectrum, resulting in the provision of wireless telecommunications services onboard aircraft that better meet the needs of the traveling public.<sup>150</sup> Included in this balancing, we have considered not only the existence of emerging satellite-based competition<sup>151</sup> but also the availability of other spectrum for the provision of air-ground service.<sup>152</sup> In addition, we have taken into account the fact that our new air-ground band plan and rules will provide an adequate amount of spectrum for the provision of new high-speed wireless services using the 800 MHz air-ground spectrum that cannot be provided under our current rules, and we anticipate that any future provider will take advantage of the new rules to provide services that will compete more directly with broadband air-ground providers operating from different platforms. Therefore, we find that the air-ground band plan and the flexible service rules that we adopt today are likely to enhance intermodal air-ground competition even if ultimately only one entity operates in the 800 MHz air-ground band.

41. Nevertheless, in light of the very limited amount of spectrum (four megahertz) available in the 800 MHz air-ground band, we conclude that the public interest would be served by ensuring access to this spectrum by more than one entrant by prohibiting any single party from controlling more than three megahertz of spectrum in the band. Although other spectrum and platforms will be available for the provision of domestic air-ground service, the 800 MHz air-ground band constitutes the only four megahertz of spectrum dedicated specifically to the commercial air-ground service in the United States. Thus, there is currently no guarantee that any spectrum other than the 800 MHz air-ground band and the spectrum used by satellite services will in fact be used for commercial air-ground service. We accordingly conclude that it is in the public interest to promote competition by ensuring that at least two parties will have an opportunity to provide service in the 800 MHz air-ground band. Other providers will be able to access the spectrum through secondary markets, resale or similar means.<sup>153</sup> In addition, the record demonstrates that no more than three megahertz of spectrum is required to deliver high-speed air-ground services using today's broadband technologies.<sup>154</sup> Permitting one party to control the entire four megahertz of spectrum comprising the band therefore could result in one megahertz of spectrum (25 percent of the band) lying fallow, which would undermine our goal of promoting the highest valued use of this spectrum. As discussed below, we find that the holder of a 1 MHz spectrum block could provide a meaningful competitive alternative to air-ground services currently offered by Globalstar and Iridium, could offer more robust applications than currently provided by AirCell and Verizon Airfone once the latter discontinues its narrowband operations in the 1 MHz spectrum block, and could offer services superior to Air-Ground Radiotelephone Automated Service (AGRAS) stations in the 454/459 MHz band.

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transmitting "Bidders in an ATG Auction Should Be Limited To Acquiring a Single License" ("Boeing November 16 *Ex parte*"); Space Data November 16, 2004 Presentation at 7-9.

<sup>149</sup> See Letter from Donald C. Brittingham, Director-Wireless/Spectrum Policy, Verizon, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 8, 2004.

<sup>150</sup> See Notice, 18 FCC Rcd at 8389 ¶17.

<sup>151</sup> See *supra* paras. 14-20.

<sup>152</sup> See *infra* para. 45.

<sup>153</sup> See *supra* para. 32.

<sup>154</sup> See *supra* para. 31.

A 1 MHz spectrum block could support such applications as email service, Internet access, messaging services, avionic support, and homeland security services.<sup>155</sup> Given the many potential uses of a 1 MHz spectrum block, restricting the access of any single party to three megahertz of the spectrum not only will increase the air-ground service choices available to consumers, but also will ensure the efficient use of this spectrum. We also believe that promoting competition in the band and with satellite-based service providers will serve the public interest by spurring technological innovation.<sup>156</sup> In light of these findings, we conclude that it is in the public interest to have two licensees in this band.

42. The Commission has previously determined that an eligibility restriction may be imposed when open eligibility poses a significant likelihood of substantial harm to competition in specific markets and when a restriction will be effective in eliminating that harm.<sup>157</sup> AirCell, Boeing, and Space Data argue that we should prevent a single entity from obtaining all four megahertz of spectrum in the 800 MHz air-ground band,<sup>158</sup> but they do not specifically address whether open eligibility in the band would result in a significant likelihood of substantial competitive harm in the air-ground market. In light of our findings above that three megahertz is an adequate amount of spectrum to provide new services and that an eligibility restriction is in the public interest, we conclude that it is unnecessary at this time for us to determine whether there would be “a significant likelihood of substantial harm to competition” if we imposed no eligibility restrictions in this band. Although we do not apply the “competitive harm” standard in this proceeding, as this market develops we will, as in other contexts, consider a waiver of the eligibility rule based on a showing that market conditions and other factors would favor common control of more than three megahertz without resulting in a significant likelihood of substantial competitive harm.<sup>159</sup>

43. In view of the foregoing, we will prohibit any party from obtaining a controlling interest, either at auction or by a post-auction transaction, in more than three megahertz of spectrum (either shared or exclusive) in the 800 MHz air-ground band. Each of the three band configurations contains two licenses and each includes at least one 3 MHz license. Accordingly, no party may have a controlling

<sup>155</sup> See *infra* para. 49.

<sup>156</sup> See AirCell London Declaration at 9 ¶16 (noting that “[c]ompetition between providers would encourage innovation and deployment of new technologies”).

<sup>157</sup> See, e.g., Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands, *Report and Order*, 18 FCC Rcd 23318, 23346-47 ¶¶69-70 (2003); 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, Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates, and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band, *Memorandum Opinion and Order and Second Report and Order*, 17 FCC Rcd 9614, 9677-82 ¶¶159-70 (2002); Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, Implementation of Section 309(j) of the Communications Act - Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz, *Report and Order and Second Notice of Proposed Rule Making*, 12 FCC Rcd 18600, 18619-20 ¶¶32-35 (1997).

<sup>158</sup> See, e.g., AirCell London Declaration at 16 ¶30 (“the FCC should not risk auctioning a single ATG license”); Boeing November 16 *Ex parte* at 1 (noting that the benefits of competition will be negated if a single entity is permitted to occupy the entire air-ground band); Space Data November 16, 2004 Presentation at 4 (noting that a holder of an exclusive 4 MHz license would have no incentive to provide a competitor with access to the air-ground market).

<sup>159</sup> See 2000 Biennial Regulatory Review, Spectrum Aggregation Limits for Commercial Mobile Radio Services, *Report and Order*, 16 FCC Rcd 22668, 22669, 22671, 22704-705, 22708-709 ¶¶2, 7, 78, 88-89 (2001); 1998 Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256 ¶82 (1999).

interest in more than one license in the band plan implemented as a result of the Commission's auction of new air-ground licenses. For purposes of this eligibility restriction, individuals and entities with either de jure or de facto control of a licensee in the band will be considered to have a controlling interest in the licensee.<sup>160</sup>

44. We also will apply the definitions of "controlling interests" and "affiliate" currently set forth in Sections 1.2110(c)(2) and 1.2110(c)(5) of the Commission's rules.<sup>161</sup> These provisions have worked well to identify individuals and entities that have the ability to control applicants for Commission licenses and therefore are well-suited to our goal here of ensuring that no party will hold a controlling interest in more than three megahertz of spectrum (shared or exclusive) in the 800 MHz air-ground band. We note that Section 1.2110(c)(2) includes the requirement that ownership interests generally be calculated on a fully diluted basis,<sup>162</sup> and also provides that any person who manages the operations of an applicant pursuant to a management agreement, or enters into a joint marketing agreement with an applicant, shall be considered to have a controlling interest in the applicant if such person, or its affiliate, has authority to make decisions or otherwise engage in practices or activities that determine, or significantly influence, the types of services offered, or the terms or prices of such services.<sup>163</sup> We find that, together with the other provisions of Sections 1.2110(c)(2) and 1.2110(c)(5), these provisions will ensure that no entity will hold a controlling interest in more than three megahertz of spectrum (shared or exclusive) in the 800 MHz air-ground band.

45. *Additional Spectrum.* We note that in addition to the 800 MHz air-ground band, other mobile allocation spectrum is available for the provision of air-ground communications services, including several commercial mobile radio service bands. The allocations for the frequency blocks 698-792 MHz, 1710-1755 MHz, 1850-2000 MHz, and 2110-2175 MHz, for example, do not restrict aeronautical communications and could be used to provide air-ground communications services. We are committed to fostering flexible regulatory schemes to facilitate competitive entry in the provision of air-ground communications. In the *Advanced Wireless Services Notice*, for example, we have sought comment on whether two nationwide 10 MHz licenses (1915-1920 MHz/1995-2000 MHz, and 2020-2025 MHz/2175-2180 MHz) should be issued for services such as air-ground.<sup>164</sup> Sprint Corporation and Verizon Wireless have filed comments in that proceeding noting that this spectrum would be particularly well-suited for the provision of air-ground service, which would be consistent with the band's existing service allocations.<sup>165</sup> T-Mobile USA also notes that this spectrum could be used to provide air-ground

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<sup>160</sup> *De jure* control is evidenced by holdings of greater than 50 percent of the voting stock of a corporation, or in the case of a partnership, general partnership interests. *De facto* control is determined on a case-by-case basis.

<sup>161</sup> 47 C.F.R. §§ 1.2110(c)(2) & (5). These provisions define controlling interests and affiliates for the purpose of determining auction applicants' eligibility for small business provisions.

<sup>162</sup> 47 C.F.R. § 1.2110(c)(2)(ii)(A)(1).

<sup>163</sup> 47 C.F.R. §§ 1.2105(c)(2)(ii)(H) & (I).

<sup>164</sup> See *In the Matter of Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, Notice of Proposed Rulemaking*, 19 FCC Rcd 19263, 19272 ¶22 (2004) ("*Advanced Wireless Services Notice*"). Sprint suggests that the Commission specifically designate spectrum in these bands for air-ground service. See Letter from Luisa L. Lancetti, Vice President, Wireless Regulatory Affairs, Sprint, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 3, 2004.

<sup>165</sup> See *Joints Comments of Sprint Corporation and Verizon Wireless*, WT Dkt No. 04-356, at 5 (filed Dec. 8, 2004).

service.<sup>166</sup>

46. *Intermodal Competition.* We conclude that satellite-based systems and terrestrial air-ground systems have the potential to compete with one another.<sup>167</sup> Satellite-based companies currently are developing or already providing high-speed Internet access to passengers onboard aircraft,<sup>168</sup> and intend to provide in-flight entertainment, consumer services, security, flight deck data, cabin crew operations, operational services, and emergency medical support.<sup>169</sup> Boeing notes that aeronautical mobile satellite spectrum is an “appropriate vehicle” for the provision of domestic air-ground communications services, but that it is not “fully substitutable” for terrestrial air-ground service.<sup>170</sup> In its reply comments, however, Boeing suggests that “aeronautical communication services are composed of a broader class of services than ATG operations in the 800 MHz or terrestrial cellular bands” and includes both traditional voice and limited data service (currently offered in the 800 MHz and cellular bands) and advanced broadband communications applications, such as those provided by Connexion by Boeing.<sup>171</sup> It states that “aeronautical communication services can be provided using various types of technologies and system architectures, including terrestrial and satellite-based systems.”<sup>172</sup> We agree.

47. Although terrestrial and satellite platforms are not perfect competitive substitutes from which to provide air-ground services, either platform can be used to deliver high-speed broadband connectivity to aircraft. Satellite platforms offer an efficient means to deliver point-to-multipoint services such as multi-channel video services to aircraft. Depending on the system configuration, higher data rates to aircraft can be achieved via satellite.<sup>173</sup> Boeing states that, at some level of domestic traffic, an air-ground system or a hybrid air-ground/satellite system would be more cost-effective than a satellite-based system.<sup>174</sup> On the other hand, terrestrial systems may be better suited for voice over Internet Protocol (VoIP) services because of lower latency.<sup>175</sup>

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<sup>166</sup> See Comments of T-Mobile USA, Inc., WT Dkt No. 04-356, at 8 n.17 (filed Dec. 8, 2004). *But cf.* Comments of Nextel Communications, WT Dkt No. 04-356, at 6 (filed Dec. 8, 2004) (asserting that use of this spectrum for air-ground service has the potential to cause interference to services in adjacent spectrum bands).

<sup>167</sup> American Airlines urges us to view the market for the competitive provision of air-ground services as including services in the 800 MHz air-ground band and satellite-based services. See American Airlines Letters, *supra* note 34.

<sup>168</sup> See *supra* paras. 14-20.

<sup>169</sup> See *id.*

<sup>170</sup> See Boeing Response to Verizon Airfone’s *Ex parte* Presentations of September 3 and 10, 2004 at 3.

<sup>171</sup> Boeing Reply Comments at 7.

<sup>172</sup> See *id.*

<sup>173</sup> See Satcom Shakeout, Business & Commercial Aviation, Fred George, at 89 (Sept. 2004) (noting that Ku-band satellite communications systems have the potential to provide 10 Mbps satellite-to-aircraft download speeds).

<sup>174</sup> See Letter from Carlos M. Nalda, Steptoe and Johnson, to Marlene H. Dortch, Secretary, Federal Communications Commission, dated Dec. 11, 2003, transmitting “Connexion by Boeing Aeronautical Broadband” at Slide 9. See also Broad Verizon, Shepard’s Inflight, Vol. 10, No. 3 at 11 (Autumn 2004) (noting that, according to Verizon Airfone, terrestrial infrastructure may be more economical than satellite infrastructure to serve domestic markets). See also Amendment of the Commission’s Rules Relative to Allocation of the 849-851/894-896 MHz Bands, Report and Order, 5 FCC Rcd 3861, 3863 ¶19 (1990) (noting that the cost of providing air-ground services “via satellite is likely to be greater, at least initially, than the cost of such service over terrestrial-based facilities”).

<sup>175</sup> Latency refers to the delay between when a TCP/IP packet is transmitted through the system and when it is received.