

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

In the Matter of	)	
	)	
Row 44, Inc.	)	File Nos. SES-LIC-20080508-00570
Application for Authority to Operate Up to	)	SES-AMD-20080619-00826
1,000 Technically Identical Aeronautical	)	SES-AMD-20080819-01074
Mobile Satellite Service Transmit/Receive	)	SES-AMD-20080829-01117
Earth Stations Aboard Commercial and	)	SES-AMD-20090115-00041
Private Aircraft	)	SES-AMD-20090416-00501
	)	
	)	Call Sign: E080100
	)	

**ORDER AND AUTHORIZATION**

**Adopted:** August 4, 2009

**Released:** August 5, 2009

By the Acting Chief, International Bureau and the Chief, Office of Engineering and Technology:

**I. INTRODUCTION**

1. With this Order, we grant blanket authority to Row 44, Inc. (Row 44) for domestic operation of up to 1,000 technically identical transmit/receive aircraft earth stations in the Aeronautical Mobile Satellite Service (AMSS). The aircraft earth stations will operate in the conventional Ku-band, transmitting in 14.05-14.47 GHz and receiving in 11.7-12.2 GHz. We also grant Row 44 a waiver of the U.S. Table of Frequency Allocations (Table of Allocations) to permit its operations in the 11.7-12.2 GHz band. These earth stations will be used to communicate via leased transponders on three geostationary satellites: Horizon 1 at 127° W.L., operated by Intelsat LLC; and AMC-2 at 101° W.L. and AMC-9 at 83° W.L., operated by SES Americom, Inc. Today's grant will allow Row 44 to provide two-way, in-flight broadband services to passengers and flight crews aboard commercial airliners and private aircraft. We believe that implementation of Row 44's AMSS system, pursuant to this authorization, will enhance competition in an important sector of the mobile telecommunications market in the United States.

**II. BACKGROUND**

**A. Ku-Band AMSS**

2. The 2003 World Radiocommunication Conference added a worldwide secondary Earth-to-space AMSS allocation in the 14.0-14.5 GHz band. At the same time, the International Telecommunication Union's Radiocommunication Sector adopted ITU-R M.1643, which sets forth detailed recommendations for operation of AMSS aircraft terminals in that band.<sup>1</sup> In November 2003, the Commission amended the Table of Allocations accordingly to add a secondary Earth-to-space AMSS

<sup>1</sup> Rec. ITU-R M.1643, Technical and Operational Requirements for Aircraft Earth Stations of Aeronautical Mobile-Satellite Service Including Those Using Fixed Satellite Service Network Transponders in the Band 14-14.5 GHz (Earth-to-space) (2003).

allocation in the 14.0-14.5 GHz band.<sup>2</sup> In a Notice of Proposed Rulemaking released in February 2005, the Commission proposed to amend the Table of Allocations to recognize AMSS operations in the 11.7-12.2 GHz band and to establish rules prescribing licensing procedures and operational requirements for Ku-Band AMSS.<sup>3</sup> This proceeding remains pending.

3. At present, there are no service-specific rules for licensing or operation of AMSS facilities in the 14.0-14.5 GHz band, and there is no domestic allocation for AMSS in the 11.7-12.2 GHz band. Nevertheless, the Commission has previously granted blanket authority for AMSS systems to operate in the conventional Ku-band on a secondary basis, for communication via leased transponders on Fixed Satellite Service (FSS)<sup>4</sup> space stations, subject to any rules that may be adopted in the Ku-Band AMSS proceeding.<sup>5</sup> Our action here is consistent with this precedent.

### **B. Row 44's License Application**

4. *System Description.*<sup>6</sup> The basic components of Row 44's proposed AMSS system include leased satellite transponders, aircraft earth stations (AESs) and a ground earth station (GES) linked with a network operating center (NOC). The GES that Row 44 will use is an existing facility in North Las Vegas, Nevada, licensed to Hughes Networks Systems, LLC. The NOC will be located in Westlake

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<sup>2</sup> *Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from the World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range, Report and Order*, ET Docket No. 02-305, 18 FCC Rcd 23426, 23454, ¶ 76 (2003). The amendment deleted a proviso that had limited the scope of the Mobile Satellite Services (MSS) allocation in the band by specifically excluding AMSS. Stations operating pursuant to a secondary allocation may not cause harmful interference to or claim protection from primary-service stations. See 47 C.F.R. §§ 2.104(d), 2.105(c). Non-conforming services may be provided only on a non-harmful-interference basis to any authorized conforming service and may not claim interference protection from those services.

<sup>3</sup> *Service Rules and Procedures to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service, Notice of Proposed Rulemaking*, IB Docket No. 05-20, 20 FCC Rcd 2906 (2005) (*Ku-Band AMSS NPRM*).

<sup>4</sup> See 47 C.F.R. § 25.201 (definition of Fixed Satellite Service).

<sup>5</sup> See *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, Order and Authorization*, 16 FCC Rcd 22645 (Int'l Bur. and OET, 2001); *ARINC Incorporated, Application for Blanket Authority for Operation of up to One Thousand Technically Identical Ku-Band Transmit/Receive Airborne Mobile Stations Aboard Aircraft Operating in the United States and Adjacent Waters, Order and Authorization*, 20 FCC Rcd 7553 (Int'l Bur. and OET, 2005) (*ARINC AMSS Order*); *ViaSat Inc., Application for Blanket Authority for Operation of Up to 1,000 Technically Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters, Order and Authorization*, 22 FCC Rcd 19964 (Int'l Bur. and OET, 2007) (*ViaSat AMSS Order*).

<sup>6</sup> The following description is excerpted from an attachment to Row 44's application captioned "Row 44 AMSS Network System Description and Technical Information."

Village, California. Authorized AESs are registered at the GES for operation on the network. The Row 44 system provides a link between multiple aircraft terminals and the Internet via multiple satellite gateways under the control of the NOC.

5. A Row 44 AES includes the following components: a linear polarized antenna array, the Satellite Antenna Assembly (SAA), installed on the top of an aircraft fuselage; an Antenna Control Unit (ACU); a Server Management Unit (SMU); a Modem Data Unit (MDU); and a High Power Transceiver (HPT). The antenna is mounted on a gimballed, motorized platform and can move at up to 15° per second, with acceleration of up to 15° per second-squared, in each of three axes. The ACU controls the antenna's azimuth, elevation and polarization orientation relative to the aircraft motion in order to point the antenna toward the target geostationary satellite. The ACU obtains information from the aircraft inertial navigation system, including aircraft latitude and longitude; inertial altitude; roll and pitch angles; true heading; roll, pitch, and yaw rates; and ground speed. The ACU uses this data, which is delivered every 20 milliseconds, to determine proper positioning of the SAA. The SMU serves as the system controller for the AES. The SMU supplies configuration information and a preferred list of satellites and their positions, which the ACU uses for controlling antenna pointing and satellite handoff. The MDU provides the modulation and demodulation of an analog carrier with the digital information that it receives from the SMU and HPT. The system uses time-division multiple access (TDMA) to accommodate multiple users in the same spectrum. The AESs also use a "slotted Aloha" protocol for the limited purpose of transmitting brief initial "handshake" signals to log on and request channel assignments.<sup>7</sup>

6. The Row 44 system has multiple modes for detecting and reacting to faulty operations. The ACU computes pointing error – that is, deviation of the antenna's main lobe from a sightline to the target satellite – from data delivered by the MDU. According to Row 44, the ACU is designed to limit pointing error to 0.2° during normal operation and will shut the AES transmitter down within 100 milliseconds if pointing error exceeds 0.5°. The pointing error is computed by the ACU from received dynamic Es/No values emanating from the MDU. The Es/No data is delivered at a rate of ten updates per second (*i.e.*, every 100 milliseconds). Row 44 asserts that the 0.2° error limit is maintained under various types of aircraft motion, including compliance in situations where the aircraft is not on the same longitude as the satellite it is transmitting to up to +/-25° skew angle. In summary, a combination of the aircraft position and movement information from the onboard aircraft computer, near-continuous signal strength data provided by the MDU as received/processed from the satellite, a closed loop, low latency and bias adjustment is utilized by the three axis gimballed control system to maintain accurate satellite tracking.

7. The AES transmitter will also mute immediately if the ACU fails, loses communication with the aircraft inertial reference system, or loses communication with the SMU. Furthermore, Row 44 can shut down individual AES operation from the NOC if deemed appropriate due to reported interference. The GES will automatically cease transmission if it detects internal failures that can affect the characteristics of its own signals.

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<sup>7</sup> See Petition to Deny of ViaSat, Inc., filed June 27, 2008, at 5 (ViaSat Petition to Deny), Reply of ViaSat, Inc., filed Aug. 7, 2008, at 7 (ViaSat Reply). A slotted Aloha protocol assigns transmission time slots to remote terminals without precluding two or more terminals from transmitting simultaneously in the same frequencies. See 2000 Biennial Regulatory Review – Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage By, Satellite Network Earth Stations and Space Stations, Eighth Report and Order, IB Docket No. 00-248, 23 FCC Rcd 15099, 15126 ¶ 62 (2008) (*Part 25 Eighth Report and Order*).

8. *Procedural History.* Row 44's blanket license application was placed on public notice as accepted for filing on May 28, 2008.<sup>8</sup> On June 27, 2008, ViaSat, Inc. filed a petition to deny the application.<sup>9</sup> Row 44 filed an opposition to the petition to deny, and ViaSat filed a reply.<sup>10</sup> ViaSat also filed a supplement to the petition to deny, which Row 44 opposed, to which ViaSat filed a second reply.<sup>11</sup> In addition to these formal pleadings, ViaSat and Row 44 filed many written *ex parte* communications. Other interested parties also filed informal comments on the blanket application.<sup>12</sup>

9. Row 44 amended its application several times. In an amendment filed on June 19, 2008,<sup>13</sup> Row 44 submitted a copy of a coordination agreement between Row 44 and the National Aeronautics and Space Administration (NASA) pertaining to protection of the Space Research Service (SRS) in the 14.0-14.2 GHz band. With this amendment, Row 44 also submitted letters from SES Americom and Intelsat. In addition to operating Row 44's target satellites, SES Americom and Intelsat also operate a number of satellites within six degrees of those satellites.<sup>14</sup> These letters affirmed that the proposed operation of

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<sup>8</sup> Report No. SES-01036.

<sup>9</sup> ViaSat Petition to Deny.

<sup>10</sup> Row 44 Inc.'s Statement Pursuant to Section 25.154(e) of the Commission's Rules and Opposition to ViaSat Inc.'s Petition to Deny, filed July 23, 2008 (Row 44 Opposition to Petition to Deny); ViaSat Reply.

<sup>11</sup> Supplement to Petition to Deny of ViaSat, Inc. filed Oct. 10, 2008 (ViaSat Supplement to Petition to Deny); Opposition of Row 44, Inc. to Supplement to Petition to Deny of ViaSat, Inc., filed Oct. 23, 2008 (Row 44 Opposition to Supplement); Reply to Opposition to Supplement of ViaSat, Inc., filed Nov. 4, 2008 (ViaSat Reply to Opposition to Supplement).

<sup>12</sup> See Letter dated June 27, 2008 to Marlene H. Dortch, FCC Secretary, from Gregg Saretsky, Executive Vice President, Alaska Airlines; Letter dated June 27, 2008 to Marlene H. Dortch from Gary Kelly, Chairman of the Board, Southwest Airlines Co.; Letter dated Sept. 30, 2008 to Marlene H. Dortch from William Kolb, Director, ARINC; Letters dated Oct. 15 and 20, 2008 and Feb. 19, 2009 to Marlene H. Dortch from Bruce A. Olcott on behalf of The Boeing Company; Letter dated Dec. 12, 2008 to Marlene H. Dortch from Jeff Frisco, Chief Technology Officer, LiveTV; Letter dated Jan. 20, 2009 to Helen Domenici, Chief International Bureau, from Martin Kits van Heyningen, Chief Executive Officer, KVH Industries, Inc.; Letter dated Feb. 6, 2009 to Marlene H. Dortch from Michael Barrett, Chief Executive Officer, AeroSat Corp.; Letter dated Feb. 11 2009 to Marlene H. Dortch from Regina M. Keeney, on behalf of Southwest Airlines Co.; Letter dated Apr. 16 2009 to Marlene H. Dortch from Regina M. Keeney, on behalf of Alaska Airlines Inc.; Letter dated June 26, 2009 to Marlene H. Dortch from Joel M. Margolis, Senior Director, NeuStar Fiduciary Services; Letter dated July 1, 2009 to Marlene H. Dortch from Regina M. Keeney. The International Bureau referred the application to the Executive Branch law enforcement and homeland security agencies for coordination with respect to any national security, law enforcement or public safety concerns. On July 13, 2009, the Department of Justice indicated that those agencies would have no comment on Row 44's application.

<sup>13</sup> File No. SES-AMD-20080619-00826.

<sup>14</sup> Intelsat is the licensed operator of Galaxy 28, at 89° W.L., which is within six degrees of SES Americom's AMC-9 target satellite. Intelsat also operates Galaxy 3C at 95° W.L., Galaxy 19 at 97° W.L., and Galaxy 16 at 99° W.L., which are within six degrees of SES Americom's AMC-2 target satellite. SES Americom is the licensed operator of

Row 44's AESs would be consistent with the terms of Intelsat's and SES Americom's existing coordination agreements with adjacent satellite operators and that Row 44 had agreed to cease operation immediately upon notification from affected parties of unacceptable interference from operation of Row 44's AMSS system. The letter from Intelsat included an endorsement by Echostar Corporation, the licensed operator of another Ku-band satellite within six degrees of the Intelsat target satellite,<sup>15</sup> declaring that Echostar "agrees to operation ... with the technical parameters described herein."

10. In response to an inquiry letter from International Bureau (Bureau) staff,<sup>16</sup> Row 44 filed a second amendment<sup>17</sup> on August 19, 2008. In this amendment, Row 44 reduced the peak total equivalent isotropically radiated power (EIRP) specification for an AES from 40.6 dBW to 38.6 dBW, clarified the mispointing specification and submitted graphs depicting calculated off-axis EIRP density with zero mispointing and with mispointing at the specified worst-case level of 0.2 degrees. Row 44 filed a third amendment<sup>18</sup> on August 29, 2008 in response to another letter of inquiry from Bureau staff,<sup>19</sup> submitting further off-axis EIRP density data, outroute link budgets, antenna patterns taken at frequencies at the edges of the proposed AES transmit band and other technical information. In a fourth amendment<sup>20</sup> filed on January 15, 2009, Row 44 submitted letters from SES Americom, Intelsat and Echostar expressing support for a request by Row 44 for temporary authority for in-flight test operation. Row 44 filed a fifth amendment<sup>21</sup> on April 16, 2009 to correct its radiation-hazard analysis to reflect the previous reduction of the maximum EIRP specification.

### C. Testing of Row 44 Facilities

11. On May 9, 2008, the Bureau granted a request by Row 44 for Special Temporary Authority (STA) for ground-based testing of a single fixed earth station with the same technical specifications as the proposed AESs.<sup>22</sup> Similarly, on July 11, 2008, Row 44 filed a request<sup>23</sup> for an STA for operation of

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AMC-21 at 125° W.L., which is within six degrees of Intelsat's Horizon 1 target satellite.

<sup>15</sup> Echostar is the licensed operator of Echostar 9 at 121° W.L., which is within six degrees of the Horizon 1 target satellite.

<sup>16</sup> Letter dated August 7, 2008 to David S. Keir, Counsel to Row 44, from Scott A. Kotler, Chief, Systems Analysis Branch, Satellite Division, International Bureau (requesting information on input power, worst-case pointing error, antenna control, error detection, and off-axis equivalent isotropically radiated power (EIRP) density in the geostationary orbit plane).

<sup>17</sup> File No. SES-AMD-20080819-01074.

<sup>18</sup> File No. SES-AMD-20080829-01117.

<sup>19</sup> Letter dated Aug. 25, 2008 to David S. Keir, Counsel to Row 44, from Scott A. Kotler, Chief, Systems Analysis Branch, Satellite Division, International Bureau.

<sup>20</sup> File No. SES-STA-20090115-00041.

<sup>21</sup> File No. SES-STA-20090416-00501.

<sup>22</sup> File No. SES-STA-20080508-00571. The STA for ground testing, initially granted for a period of sixty days, was

twelve AESs for in-flight testing for a period of sixty days, with the same operating parameters and target satellites specified in the underlying blanket license application.<sup>24</sup> Row 44 proposed to install the test stations on commercial aircraft operated by Alaska Airlines and Southwest Airlines and on a private airplane operated by Row 44. In support of the in-flight STA request, Row 44 filed a copy of an agreement with the licensed operators of Ku-band satellites within six degrees of Row 44's target satellites – namely, Intelsat, SES Americom and Echostar.<sup>25</sup> Under the terms of the agreement, Row 44 promised to share test data with the other signatories and inform them of test procedures and schedules. Row 44 also agreed to cooperate with the other signatories to measure any adjacent satellite interference from test operation, both under normal flight conditions and when test-bed aircraft were put through maneuvers intended to cause antenna misorientation.

12. Because the operators of the satellites that would be primarily affected by interference from Row 44's operations had consented to the in-flight STA request and participated in formulation of the test plan, the Bureau's Satellite Division concluded that granting the request would facilitate resolution of concerns regarding interference that might result from full-scale operation.<sup>26</sup> The Bureau granted the in-flight STA, subject to several conditions, including requirements that Row 44 fulfill its obligations under the letter agreement with adjacent satellite operators and submit detailed reports on the results of ground-based and in-flight testing to those operators and to the Commission.<sup>27</sup> The Bureau later granted requests for follow-on STAs allowing in-flight testing to continue for additional sixty-day periods, beginning on May 15 and July 14, 2009.<sup>28</sup>

13. Row 44 filed a report on ground-based testing on April 13, 2009, and filed a report on the results of in-flight testing on May 11, 2009, certifying that copies of each had been given to SES

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successively extended at Row 44's request. *See* File Nos. SES-STA-20080702-00877, SES-STA-20080903-01141, SES-STA-20081110-01465, and SES-STA-20090106-00004.

<sup>23</sup> File No. SES-STA-20080711-00928.

<sup>24</sup> *See* Letter dated Sept. 11, 2008 from David S. Keir, Counsel to Row 44, Inc., to Helen Domenici, Chief, International Bureau, referencing File Nos. SES-AMD-20080819-01074, SES-AMD-20080829-01117, and SES-AMD-20080619-00826.

<sup>25</sup> Letter dated Feb. 6, 2009, from David S. Keir, Counsel to Row 44, Inc., to Marlene H. Dortch, Secretary, FCC, at Attachment A. As noted above, Intelsat is the licensed operator of Galaxy 28, at 89° W.L., which is within six degrees of SES Americom's AMC-9. Intelsat also operates Galaxy 3C at 95° W.L., Galaxy 19 at 97° W.L., and Galaxy 16 at 99° W.L., which are within six degrees of SES Americom's AMC-2 satellite. SES Americom is the licensed operator of AMC-21 at 125° W.L., which is within six degrees of Intelsat's Horizon 1 satellite. Echostar is the licensed operator of Echostar 9 at 121° W.L., which is also within six degrees of Horizon 1.

<sup>26</sup> *Row 44, Inc., Application for Special Temporary Authority for Mobility Testing of Aircraft Earth Stations, Order and Authorization*, 24 FCC Rcd 3042 (Int'l Bur. 2009) (*Row 44 March 13 STA Order*).

<sup>27</sup> *Row 44 March 13 STA Order*, 24 FCC Rcd at 3045 ¶ 7.

<sup>28</sup> *Row 44, Inc., Application for Special Temporary Authority for Operation of Aircraft Earth Stations, Order and Authorization*, 24 FCC Rcd 5662 (Int'l Bur., Sat. Div., 2009); File No. SES-STA-20090709-00854 (granted July 14, 2009).

Americom, Intelsat and Echostar.<sup>29</sup> Although Row 44 requested that the reports be withheld from public inspection, copies were also provided to ViaSat under the terms of a protective order.<sup>30</sup>

14. On June 19, 2009, Row 44 filed a document captioned "Statement of Satellite Operators," signed by representatives of Intelsat, SES Americom and Echostar.<sup>31</sup> In this document, the satellite operators declared that they had all received copies of Row 44's in-flight test report and had no objection to grant of Row 44's pending blanket license application.

15. On June 23, 2009, ViaSat publicly filed a redacted critique of Row 44's test reports and separately submitted an unredacted version under seal, pursuant to the protective order.<sup>32</sup> Row 44 provided copies of the full, unredacted critique to representatives of Intelsat, SES Americom and Echostar on June 26.<sup>33</sup> Row 44 responded to ViaSat's critique on July 10, 2009, and ViaSat replied on July 17, 2009.<sup>34</sup>

### III. DISCUSSION

#### A. Adjacent Satellite Interference

16. Row 44 maintains that its AMSS system will not cause harmful interference to adjacent satellite operators.<sup>35</sup> Specifically, Row 44 contends that its proposed AMSS operation is consistent with

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<sup>29</sup> See Letters dated Apr. 13 and May 11, 2009 to Robert G. Nelson, Chief, Satellite Division, from David S. Keir, filed in SES-LIC-20080508-00570 and SES-STA-20080711-00928. The test report, "Satellite Interference Test Plan and Report: Row 44 Satellite Broadband System," is dated May 6, 2009.

<sup>30</sup> See *Row 44, Inc., Application for Authority to Operate up to 1,000 Technically-Identical Aeronautical-Mobile Satellite Service Earth Stations in the 14.05-14.47 GHz (Transmit) and 11.7-12.2 (Receive) Frequency Bands, Application for Special Temporary Authority for Mobility Testing of Aircraft Earth Stations, Order to Disclose Pursuant to Protective Order*, 24 FCC Rcd 5536 (Int'l Bur., 2009). Row 44 sent copies of both reports to ViaSat counsel on May 14, 2009. Letter dated May 14, 2009 to Jarrett Taubman from David S. Keir, Counsel to Row 44, Inc., filed in SES-STA-20090417-00507 and SES-STA-20080711-00928.

<sup>31</sup> Letter dated June 19, 2009 to Marlene H. Dortch, Secretary, FCC, from David S. Keir, at Attachment (Statements signed by Jose Albuquerque, Intelsat Senior Director for Spectrum Engineering, Krish Jonnalagadda, Spectrum Development Manager for SES Americom, and David Blair, Senior Vice President for Space Programs & Operation, Echostar).

<sup>32</sup> Letter dated June 23, 2009 to Marlene H. Dortch, Secretary, FCC, from John P. Janka and Jarrett S. Taubman, Counsel for ViaSat, Inc.

<sup>33</sup> Letter dated June 30, 2009 to Marlene H. Dortch, Secretary, FCC, from David S. Keir, Counsel to Row 44.

<sup>34</sup> Letter dated July 10, 2009 to Marlene H. Dortch, Secretary, FCC, from David S. Keir, Counsel to Row 44; Letter dated July 17, 2009 to John Giusti, Acting Chief, International Bureau, from John P. Janka and Jarrett S. Taubman, Counsel for ViaSat, Inc.

<sup>35</sup> Off-axis radiation is radiation generated in directions other than the direction of the transmitting antenna's main

the technical requirements in Section 25.222 for operation of earth stations on vessels (ESVs) in the Ku-band.<sup>36</sup> Hence, Row 44 maintains that its application meets ITU-R M.1643's essential recommendation that off-axis EIRP density not exceed "the levels that have been published and coordinated" for FSS networks.<sup>37</sup> Row 44 also argues that its system has been coordinated with all potentially affected satellite operators, consistent with Section 25.220.<sup>38</sup> We provide background for both of Row 44's arguments below.

17. *Background.* Row 44 observes that, in the *Ku-Band AMSS NPRM*, the Commission proposed rules that would provide for routine licensing of Ku-band AESs meeting certain off-axis EIRP density limits.<sup>39</sup> The Commission also proposed to limit permissible Ku-band AES pointing error to 0.2 degrees, and to require that operators monitor and mute transmission upon detecting fault conditions that could result in harmful interference.<sup>40</sup> Those proposed limits for routinely licensed Ku-band AESs were very similar to the limits on pointing error and off-axis EIRP density that the Commission had previously adopted for Ku-band ESVs, which are set forth in Section 25.222. Thus, the Ku-band ESV off-axis EIRP

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lobe. Off-axis radiation from an earth station transmitting to a geostationary satellite can cause harmful interference to other geostationary satellites in the vicinity of the earth station's target satellite operating in the same frequency bands.

<sup>36</sup> Row 44 License Application, Technical Exhibit at 6.1.1.1.

<sup>37</sup> Row 44 License Application, Technical Exhibit at 6.1.1.1., *citing* ITU-R Rec. 1643, Annex 1, Part A. *See also* "Supplemental Information" filed June 19, 2008 in File Nos. SES-LIC-20080508-00570 and SES-AMD-20080619-00826.

<sup>38</sup> Row 44 Opposition to Petition to Deny at 2.

<sup>39</sup> Row 44 License Application, Technical Exhibit at 6.1.1.1., *citing Ku-Band AMSS NPRM*, 20 FCC Rcd at 2926-27, ¶36. The proposed limits for routinely licensed Ku-band AESs using an access protocol (such as TDMA) that precludes simultaneous operation of multiple terminals on the same carrier frequencies were largely identical to the in-plane off-axis EIRP density limits now specified in Section 25.218 for routinely processed digital FSS earth stations that transmit in the 14.0-14.5 GHz band with a TDMA or FDMA access protocol. *See Ku-Band AMSS NPRM*, 20 FCC Rcd at 2926-27, ¶36, and 47 C.F.R. § 25.218(f)(1). For systems that allow simultaneous operation of two or more AESs in a common frequency band, the Commission invited comment on two possible methods of regulating *aggregate* off-axis radiation: i) prescribe the same off-axis EIRP-density limits proposed as a routine processing standard for single-carrier-per-frequency-channel systems as limits on aggregate off-axis EIRP density for routine licensing of systems allowing simultaneous co-frequency AES transmissions or ii) adopt a routine licensing standard for systems of the latter type that prescribes single-terminal off-axis radiation limits for AESs transmitting simultaneously in a common frequency channel by reducing the permissible off-axis EIRP density by a factor of  $10 \cdot \log(N)$  dB, N being the number of simultaneously-transmitting co-frequency AESs. *Ku-Band AMSS NPRM*, 20 FCC Rcd at 2926-27, ¶¶ 36-37. These proposals are largely irrelevant here, as Row 44's system operates in TDMA mode except when its AESs transmit initial log-in signals of a few milliseconds in duration using a contention access protocol. Moreover, the Commission concluded recently that use of contention protocols is generally non-problematic. *Part 25 Eighth Report and Order*, 23 FCC Rcd at 15132-35, ¶¶ 77-82.

<sup>40</sup> *Ku-Band AMSS NPRM*, 20 FCC Rcd at 2929, ¶41. The *Ku-Band AMSS NPRM* also asked whether Ku-band AMSS systems not meeting prescribed off-axis EIRP density limits should be licensed based on a coordination showing of the kind prescribed in Section 25.220. *Ku-Band AMSS NPRM*, 20 FCC Rcd at 2928-29, ¶40.



density limits may provide guidance as to reasonable off-axis criteria for Ku-band AESs. Section 25.222 also prescribes that Ku-band ESVs must cease transmitting within 100 milliseconds when pointing error exceeds 0.5 degrees and may not resume transmitting until the error is reduced to less than 0.2 degrees.<sup>41</sup> Furthermore, Recommendation ITU-R M.1643 states that, in the interest of minimizing adjacent satellite interference, an AMSS system that uses the 14.0-14.5 GHz band for AES transmission should be operated in such a manner that the off-axis EIRP density produced by AES terminals in the network does not exceed "the levels that have been published and coordinated for the specific and/or typical earth station(s) pertaining to FSS networks ...."<sup>42</sup> Accordingly, Row 44 maintains that, by demonstrating compliance with the pointing error and off-axis EIRP density limits for ESVs in Section 25.222, it has also demonstrated compliance with the requirements for AESs in Recommendation ITU-R M.1643.<sup>43</sup>

18. As an alternative argument, Row 44 recommends granting its application on the basis of coordination with the potentially affected adjacent satellite operators.<sup>44</sup> The coordination policy on which Row 44 relies is embodied in Section 25.220 of the Commission's rules.<sup>45</sup> Specifically, the Commission's rules distinguish between "routine" and "non-routine" geostationary FSS earth station applications. Part 25 sets forth technical standards for routine processing of FSS earth station applications.<sup>46</sup> Applications for conventional Ku-band geostationary FSS earth stations that do not qualify for routine processing based on those technical standards can be granted on the basis of coordination with potentially affected satellite operators. In order to qualify for licensing under Section 25.220, an applicant must submit a certification from the operator of each target satellite that it has coordinated operation of the proposed non-conforming earth stations with the operators of all geostationary satellites within six degrees of orbital separation from the target satellite. Further, each target satellite operator must certify that the proposed non-conforming earth station operation is consistent with all existing coordination agreements with other satellite operators and that such operation will be addressed in future coordinations. The earth station applicant must certify that it will operate in compliance with all such coordination agreements.<sup>47</sup>

19. *Pleadings.* In its petition to deny Row 44's application, ViaSat contends that Row 44 failed to demonstrate that its proposed AMSS system can operate without causing adjacent satellite interference. Specifically, ViaSat argues that Row 44 had failed to provide essential technical information, and that the power density and antenna mispointing of Row 44 AESs would exceed limits in Commission rules pertaining to Ku-band VSAT stations and ESVs. In particular, ViaSat claims that Row 44 has not shown that its AESs can limit pointing angle error to 0.2 degrees, or that they can mute

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<sup>41</sup> 47 C.F.R. § 25.222(a)(7).

<sup>42</sup> Row 44 License Application, Technical Exhibit at 6.1.1.1. *See also* Rec. ITU-R M.1643, Annex 1, Part A, ¶1.

<sup>43</sup> Row 44 License Application, Technical Exhibit at 6.1.1.1.

<sup>44</sup> Row 44 Opposition to Petition to Deny at 3.

<sup>45</sup> 47 C.F.R. § 25.220.

<sup>46</sup> *See* 47 C.F.R. §§ 25.134, 25.212, 25.218.

<sup>47</sup> 47 C.F.R. § 25.220(d)(1).

transmission within 100 milliseconds when pointing angle error exceeds 0.5 degrees, as specified in Row 44's application.<sup>48</sup> ViaSat also contends that Row 44 did not properly account for the effect of aircraft banking on antenna misorientation.<sup>49</sup> Furthermore, ViaSat argues that Row 44 AESs will have to operate with higher than specified amplifier output power in order to maintain an adequate signal/noise margin, and will consequently generate off-axis EIRP density in excess of the pertinent envelope specified in Sections 25.218 and 25.222 even if pointing error is kept within 0.2 degrees.<sup>50</sup>

20. As noted above, Row 44 tested its proposed AMSS system to determine whether or to what extent its system would cause harmful interference to adjacent satellite operators under normal flight conditions. Row 44 filed reports of its test results pursuant to requests for confidentiality on April 13 and May 11, 2009. Those test results were also provided to ViaSat pursuant to a confidentiality agreement.<sup>51</sup> In an *ex parte* statement filed on June 23, 2009, ViaSat argues that the deficiencies in Row 44's technical showing are not cured by the Row 44's April 13 and May 11, 2009 test reports. ViaSat maintains that the test reports are inconclusive because they do not adequately describe the test procedures and do not include data on key variables. ViaSat also contends that the test procedures are defective in a number of respects.<sup>52</sup>

21. In an *ex parte* statement dated June 18, 2009, Row 44 submitted statements from adjacent satellite operators declaring that they had reviewed Row 44's test data and that they had no objections to Row 44's proposed operations.<sup>53</sup> On July 17, 2009, ViaSat filed an *ex parte* statement maintaining, in part, that the adjacent satellite operators may not have any particular expertise needed to evaluate the

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<sup>48</sup> ViaSat Petition to Deny at 6-7 and Technical Annex at 5-8. *See also* ViaSat Reply at 10-12; ViaSat Supplement to Petition to Deny at 5-8 and Exhibit A at 1-3; ViaSat Reply to Opposition to Supplement, Exhibit A at 6-21; Letter dated July 29, 2009, to Marlene H. Dortch, Secretary, FCC, from John P. Janka, Counsel for ViaSat, at 2 (*ViaSat July 29 Letter*) (recommending requiring Row 44 to limit pointing error to 0.2° as a condition of any license granted to Row 44).

<sup>49</sup> ViaSat Supplement to Petition to Deny at 8-11 and Exhibit A at 4-17; Reply to Opposition of Supplement at 14-17 and Exhibit A at 21.

<sup>50</sup> *See* ViaSat Reply to Opposition to Supplement, Exhibit A at 1-5. *See also* *ViaSat July 29 Letter* at 4-5 (recommending requiring Row 44 to limit off-axis EIRP to 3 dB below the limit placed on ESV operators, as a condition of any license granted to Row 44).

<sup>51</sup> *See* Letters dated Apr. 13 and May 11, 2009 to Robert G. Nelson, Chief, Satellite Division, from David S. Keir, filed in SES-LIC-20080508-00570 and SES-STA-20080711-00928. The test report, "Satellite Interference Test Plan and Report: Row 44 Satellite Broadband System," is dated May 6, 2009.

<sup>52</sup> Letter dated June 23, 2009 to Marlene H. Dortch, FCC Secretary, from John P. Janka and Jarrett S. Taubman, Counsel for ViaSat, Inc.; *ViaSat July 29 Letter* at 5-6. Row 44 filed a detailed rebuttal of ViaSat's technical arguments on July 10, 2009. Letter dated July 10, 2009 to Marlene H. Dortch, FCC Secretary, from David S. Keir, Counsel to Row 44, Inc.

<sup>53</sup> Letter to Marlene H. Dortch, FCC Secretary, from David S. Keir with attachment dated June 18, 2009 signed by Jose Albuquerque, Intelsat Senior Director for Spectrum Engineering, Krish Jonnalagadda, Spectrum Development Manager for SES Americom, and David Blair, Senior Vice President for Space Programs & Operation, Echostar.

potential for interference from a novel AMSS system.<sup>54</sup> In another *ex parte* communication filed on July 29, 2009, ViaSat urged the Bureau, in the event it decides to grant operating authority for Row 44's proposed system, to impose conditions pertaining to pointing error, data logging, reporting, off-axis EIRP, and the rate of data transmission.<sup>55</sup>

22. *Discussion.* We decline to address ViaSat's arguments concerning adjacent satellite interference, because Row 44 has resolved these interference issues through coordination with all potentially affected satellite operators. ViaSat contends, for several reasons, that Row 44's application cannot be granted on the basis of coordination without addressing its concerns regarding interference.<sup>56</sup> We summarize ViaSat's grounds for this contention and respond to them in turn.

23. First, ViaSat maintains that the coordination procedure in Section 25.220 is inapplicable here because it pertains only to licensing of FSS earth stations, whereas Row 44 is requesting a blanket license for AES operation, which is a type of Mobile Satellite Service (MSS). Even if, as ViaSat contends, the coordination procedure in Section 25.220 does not apply to Row 44's application, we consider it appropriate, as a matter of policy, to use an approach analogous to the one in Section 25.220 in this case, where the operators of all Ku-band satellites within six degrees of the designated target satellite(s) have formally consented to grant of the application. Moreover, the potentially affected satellite operators had an opportunity to review the test reports and arguments concerning potential uplink interference raised by third parties, as well as the technical specifications in Row 44's application. In light of these circumstances, we find that grant of Row 44's application is appropriate. This result is consistent with the policy embodied in Section 25.220 and with the Commission's general preference for licensing procedures that do not unreasonably interfere with business negotiations and market mechanisms.<sup>57</sup>

24. Second, ViaSat argues against granting blanket authority for Ku-band AES operation based solely on coordination with adjacent satellite operators, because Ku-band AMSS is a nascent service that may rely upon unproven technology. Further, ViaSat asserts that there is little reason to assume that adjacent satellite operators have sufficient knowledge and expertise to assess the technical issues presented by license applications for such operation. We are not convinced by ViaSat's arguments that we should place less weight on coordination when considering applications for Ku-band AMSS earth stations than when considering applications for Ku-band FSS earth stations. While it may be true that the technology of Ku-band AMSS is emerging, we believe that potentially affected satellite operators are nonetheless capable of assessing the potential interference impact of proposed Ku-band AES operation. ViaSat's assertion that adjacent satellite operators cannot assess the risk of potential interference to their

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<sup>54</sup> Letter dated July 17, 2009, to Marlene H. Dortch, Secretary, FCC, from John P. Janka, Counsel for ViaSat, at 10.

<sup>55</sup> *ViaSat July 29 Letter* at 2.

<sup>56</sup> See Letter dated June 30, 2009 to Marlene H. Dortch from John P. Janka and Jarrett S. Taubman (*ViaSat June 30 Letter*), Letter dated July 17, 2009 to John Giusti, Acting Chief, International Bureau, from John P. Janka and Jarrett S. Taubman, at 2.

<sup>57</sup> See, e.g., *Amendment of the Commission's Space Station Licensing Rules and Policies, First Report and Order and Further Notice of Proposed Rulemaking*, IB Docket No. 02-34, 18 FCC Rcd 10760, 10766-67 ¶7 (2003).

own systems from such proposed operation is at odds with the reasoning underlying the Commission's adoption of the coordination-based licensing rule in Section 25.220.<sup>58</sup> In view of their monitoring of Row 44's test operation and their actual notice of ViaSat's technical critique, it is reasonable to assume that Intelsat, SES Americom and Echostar were aware of the potential for interference from Row 44's proposed operations and took that into account in the coordination process. In short, there is no reason to assume that their consent is uninformed.

25. Third, ViaSat contends that, even assuming the coordination procedure in Section 25.220 is available in this case, that would not obviate evaluation of technical arguments pertaining to potential uplink interference. According to ViaSat, the coordination procedure in Section 25.220 permits the Commission to presume that proposed earth stations will not cause harmful interference, but asserts that this is a rebuttable presumption.<sup>59</sup> ViaSat maintains that the Commission has an obligation to evaluate the potential for harmful interference from Row 44's proposed operation in light of ViaSat's technical arguments. ViaSat notes that Section 309(a) of the Communications Act requires the Commission to determine, based on examination of the application "and upon consideration of such other matters as the Commission may officially notice," whether granting the application would serve the public interest. Nothing in Section 25.220, ViaSat asserts, absolves the Commission from that obligation. We disagree with ViaSat's contention that Section 309 of the Communications Act<sup>60</sup> bars the Commission from granting Row 44's application without ruling on the merits of all of ViaSat's arguments concerning interference with adjacent satellite operation. This is especially the case where all of the operators of those potentially affected adjacent satellites have consented to Row 44's operations. This resolves concerns regarding interference to existing satellite operators. With regard to future satellite operators, we will include a condition in Row 44's authorization that requires it to coordinate with operators of new Ku-band satellites within six degrees of its target satellites. Absent a coordination agreement, Row 44

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<sup>58</sup> See 2000 Biennial Review – Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum by, Satellite Network Earth Stations and Space Stations, Fifth Report and Order, IB Docket No. 00-248, 20 FCC Rcd 5666, 5688 ¶51 (2005) ("Satellite operators are aware of the link budgets and other operating parameters of their satellite systems and are capable of determining whether a given non-routine earth station operating at a given power level can be accommodated within those link budgets, transponder plans, or business plans. In the coordination process, satellite operators use refined analysis to determine whether earth station operations can be accommodated .... Satellite operators do not need the Commission to adopt standards for non-routine earth station operations to make that determination.")

<sup>59</sup> ViaSat June 30 Letter at 5.

<sup>60</sup> Section 309(d)(2) of the Act states that, in a case where a petition to deny has been filed against a pending license application,

[i]f the Commission finds on the basis of the application, the pleadings filed, or any other matters which it may officially notice that there are no *substantial and material* questions of fact and that a grant of the application would be consistent with subsection (a) [i.e., that granting the application will serve "the public interest, convenience, and necessity"] ... it shall make the grant, deny the petition, and issue a concise statement of the reasons for denying the petition, which statement shall dispose of all *substantial* issues raised by the petition.

(Emphasis added.)

will have to cease operation when the GSO FSS system commences operation, unless Row 44 demonstrates that it will not cause interference to the new GSO FSS system.

26. Finally, we note that ViaSat recommends imposing data-logging requirements on Row 44, because Row 44's AESs will be operated in a transient and intermittent fashion, and therefore it could be more difficult to determine whether those AESs are the source of harmful interference.<sup>61</sup> We agree with ViaSat on this issue. Accordingly, the authorization granted herein is also subject to a condition imposing data-logging requirements comparable to the logging requirements for ESV operators.<sup>62</sup> This will facilitate identification of Row 44's system as the source in the event that harmful interference results from its operations.

### **B. Other Issues in the 14.05-14.47 Uplink Band**

27. The 14.0-14.5 GHz band is allocated on a primary basis for non-governmental FSS Earth-to-space transmission and on a secondary basis for non-governmental MSS Earth-to-space transmission.<sup>63</sup> Row 44's request for authority for AES operation on a secondary basis in the 14.05-14.47 GHz band is therefore consistent with the Table of Allocations. Operators of radio stations licensed on a secondary basis must protect or coordinate with systems licensed on a primary basis and previously-authorized systems licensed on a secondary basis.<sup>64</sup> Other services in the band include (1) FSS networks operating on a primary basis in the 14.0-14.5 GHz uplink band, (2) space research stations operating in the 14.0-14.2 GHz band on a secondary basis, (3) government-operated terrestrial fixed and mobile stations operating on a secondary basis in the 14.4-14.5 GHz segment and (4) grandfathered non-governmental land mobile stations licensed on a secondary basis in the 14.2-14.4 GHz segment. We discuss each of these services below.

#### **1. Protection of NGSO FSS Systems in the 14.0-14.5 GHz Band**

28. In 2001, the Commission adopted rules to permit nongeostationary orbit (NGSO) FSS systems to operate in the 14.0-14.5 GHz uplink band as a primary service.<sup>65</sup> Thus, Row 44 – as the operator of a secondary service in that band – has an obligation to protect any authorized Ku-band NGSO FSS operations from interference. At present, there are no authorized Ku-band NGSO FSS systems and no applications are pending for such systems. However, if the Commission authorizes a Ku-band NGSO FSS system in the future, Row 44 will have to cease operation when the NGSO FSS system commences operation, unless Row 44 demonstrates that it will not cause interference to the new NGSO FSS system or reaches a coordination agreement with the system's licensed operator.

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<sup>61</sup> *ViaSat July 29 Letter* at 3.

<sup>62</sup> *See* 47 C.F.R. §§ 25.221(c)(1) and 25.222(c)(1).

<sup>63</sup> *See* 47 C.F.R. § 2.106.

<sup>64</sup> *See* 47 C.F.R. § 2.105(b)(2).

<sup>65</sup> *See 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, First Report and Order and Further Notice of Proposed Rule Making*, ET Docket No. 98-206, 16 FCC Rcd 4096 (2000).

## 2. Protection of Space Research Operation in the 14.0-14.2 GHz Band

29. The 14.0-14.2 GHz portion of the Ku-Band is domestically allocated for secondary-status Federal-government operation in the SRS.<sup>66</sup> NASA currently operates SRS Tracking and Data Relay Satellite System (TDRSS) stations in the 14.0-14.05 GHz segment of the SRS band. Row 44 has signed a coordination agreement with NASA pertaining to protection of current and future TDRSS sites.<sup>67</sup> Under the terms of the agreement, Row 44 must specify a central point of 24/7 contact for interference resolution and must terminate transmissions from any AES that would exceed defined interference thresholds when the AES is within line of sight of a TDRSS earth station. We condition the authority granted in this Order upon Row 44's adherence to the terms of this coordination agreement.

## 3. Protection of Non-Federal Land Mobile Stations in the 14.2-14.4 GHz Band

30. Prior to March 2, 2005, the Table of Allocations included an allocation for non-government terrestrial mobile radio services in the 14.2- 14.4 GHz band. Footnote NG184 to the Table of Allocations provides that land mobile stations authorized for operation in that band prior to March 1, 2005 may continue operating on a secondary basis until their licenses expire. Our records indicate that there are approximately twenty-five grandfathered stations, although the records do not indicate whether the stations are actually operating in the 14.2-14.4 GHz band. ITU-R M.1643 recommends adoption of certain power flux density (PFD) limits on emissions from aircraft earth stations in the 14.0-14.5 GHz band when they are within line of sight of any territory where fixed terrestrial networks are in operation. Row 44 states in its application that it will ensure that PFD from its AMSS operation will not exceed the recommended limits at any locations where protection is needed.<sup>68</sup> Given the small number of grandfathered stations and the likelihood that aircraft earth stations transmitting to geostationary target satellites will interfere with operation of ground-based radio receivers in the United States, we believe that Row 44's operation is unlikely to cause actual interference to these receivers. Moreover, we note that Row 44's license is required to maintain a 24-hour point of contact as a condition on its license. This point of contact will be able to stop Row 44's transmissions quickly in the unlikely event that its AESs cause any interference to these ground-based radio receivers.

## 4. Protection of U.S. Government Fixed and Mobile Stations in the 14.4-14.5 GHz Band

31. The 14.4-14.5 GHz segment of the Ku-Band is domestically allocated on a secondary basis for Federal-government fixed and mobile radio services.<sup>69</sup> Because the 14.4-14.5 GHz band is shared with the U.S. government, we have coordinated Row 44's application with the National

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<sup>66</sup> 47 C.F.R. § 2.106.

<sup>67</sup> Row 44 submitted a copy of the agreement with NASA as an attachment to an application amendment it filed on June 19, 2008. IBFS File No. SES-AMD-20080619-00826.

<sup>68</sup> Row 44 AMSS Application, System Description and Technical Information at 6.1.2.

<sup>69</sup> See 47 C.F.R. § 2.106.

Telecommunications and Information Administration (NTIA), which administers authorizations for federal radio stations. NTIA has informed the Commission that it has no objection to Row 44's proposed AMSS operation.

### C. Protection of Radio Astronomy in the 14.47-14.5 GHz Band

32. The National Science Foundation (NSF), an independent Federal agency, supports radio-astronomy observation in the 14.47-14.5 GHz band at National Radio Astronomy Observatories in New Mexico and West Virginia, and the use of the band for radio-astronomy observation at those sites is recognized in Footnote US203 to the U.S. Table of Allocations.<sup>70</sup> The NSF also supports radio-astronomy observation in the 14.47-14.5 GHz band at various other sites in the continental United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands.<sup>71</sup> ITU-R M.1643 recommends that aircraft earth stations cease transmission in the 14.47-14.5 GHz band and meet PFD limits in the 14.0-14.47 GHz band when within line of sight of radio astronomy stations observing in the 14.47-14.5 GHz band.<sup>72</sup> Although Row 44 is not proposing to operate in the 14.47-14.5 GHz band, it has signed a coordination agreement with NSF that requires Row 44 to limit aggregate PFD in that band to within specified levels.<sup>73</sup> Row 44 states in its blanket application that it will operate in compliance with those coordinated limits.<sup>74</sup> We condition its authorization accordingly.

### D. Operations in the 11.7-12.2 GHz Downlink Band

33. The 11.7-12.2 GHz band is domestically allocated on a primary basis for FSS downlink transmission, including downlink transmission to earth stations on vessels,<sup>75</sup> and is allocated on a secondary basis for operation of grandfathered terrestrial radio stations.<sup>76</sup> The Commission has proposed to add an allocation for AMSS downlinks in the 11.7-12.2 GHz band,<sup>77</sup> but there is no such allocation at the present time. Hence, Row 44 requests a waiver to permit operations in the 11.7-12.2 GHz band on a

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<sup>70</sup> 47 C.F.R. § 2.106, Footnote US203.

<sup>71</sup> See, e.g., Row 44 Application, attachment entitled "A Coordination Agreement Between the National Science Foundation ("NSF") and Row 44, Inc. ("Row 44") for Operation of the Row 44 AMSS and Radio Astronomy Sites Jointly Sharing the 14.0-14.5 GHz Band," at Table 2.1.

<sup>72</sup> Rec. ITU-R M.1643, Annex 1, Part B.

<sup>73</sup> Row 44 AMSS Application, Appendix 1.

<sup>74</sup> *Id.*, System Description and Technical Information at 6.1.3.

<sup>75</sup> 47 C.F.R. § 2.106, Footnotes NG145 and NG183; *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, Report and Order*, IB Docket No. 02-10, 20 FCC Rcd 674, 706-07 ¶79 (2005).

<sup>76</sup> 47 C.F.R. § 2.106, Footnote NG184.

<sup>77</sup> *Ku-Band AMSS NPRM*, 20 FCC Rcd at 2915-16, ¶15

non-interference, non-protected basis.<sup>78</sup> Row 44 indicates in its blanket application that the EIRP density of downlink signals from the target satellites to its AESs will not exceed 13 dBW/4 kHz.<sup>79</sup> Row 44 has filed copies of letters from the licensed operators of its target satellites certifying that this proposed downlink operation is consistent with coordination agreements with adjacent satellite operators.<sup>80</sup> The Commission has previously granted authority to Boeing, ARINC and ViaSat for use of the 11.7-12.2 GHz band for AMSS downlink transmission from existing FSS satellites, based upon either a showing that the 10 dBW/4kHz routine-processing limit in Section 25.134(g)(2) would not be exceeded or proof of consent by adjacent satellite operators.<sup>81</sup> Consistent with these precedents, we conclude that a waiver is warranted to allow Row 44 to use the 11.7-12.2 GHz band for AMSS downlinks on a non-interference, non-protected basis.

#### IV. CONCLUSION

34. We find, pursuant to Section 309 of the Communications Act, 47 U.S.C. § 309, that grant of Row 44's blanket license application for AMSS operation, as conditioned herein, will serve the public interest, convenience, and necessity. Row 44's authorization is conditioned upon compliance with any additional conditions or requirements concerning operation of its AMSS system adopted in the pending Ku-band AMSS rulemaking proceeding.

#### V. ORDERING CLAUSES

35. Accordingly, IT IS ORDERED that File No. SES-LIC-20080508-00570, as amended by SES-AMD-20080619-00826, SES-AMD-20080819-01074, SES-AMD-20080829-01117, SES-AMD-20090115-00041, SES-AMD-20090416-00501 IS GRANTED to the extent indicated herein, and Row 44, Inc. IS AUTHORIZED to operate up to 1,000 technically identical transmit/receive mobile earth stations aboard aircraft in the continental United States and over its territorial waters, linking with the Horizon 1 satellite at 127° West Longitude, AMC-2 at 101° W.L., and AMC-9 at 83° W.L., in the 11.7-12.2 GHz and 14.05-14.47 GHz frequency bands, consistent with the specifications in the application and in compliance with the Commission's rules, except insofar as waived herein, and subject to the following conditions:

- a) The stations authorized herein must operate in compliance with any rule requirements

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<sup>78</sup> Row 44 AMSS Application, System Description and Technical Information at 3.0.

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

<sup>80</sup> See Letter agreements filed with amendment SES-AMD-20080619-00826.

<sup>81</sup> *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, Order and Authorization*, 16 FCC Rcd 5864, 5867 ¶10 (Int'l Bur. and OET 2001) (granting blanket license conditioned on submission of proof that operators of adjacent satellites had no objection to proposed operation with peak downlink EIRP density in excess of the 10 dBW/4KHz routine licensing limit); *ARINC AMSS Order*, 20 FCC Rcd at 7571 ¶54; *ViaSat AMSS Order*, 22 FCC Rcd at 19972 ¶26.



- subsequently adopted by the Commission.
- b) The licensee must accept interference from lawful operation of any station in the 11.7-12.2 GHz band in accordance with the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106, and shall immediately terminate operation upon notification that such operation is causing harmful interference, not permitted under the terms of a coordination agreement, with lawful operation of any radio system in the 11.7-12.2 GHz band in conformance with the U.S. Table of Frequency Allocations.
  - c) In the event that another co-frequency GSO FSS satellite commences operation at a location within six degrees of one of the Row 44 target satellites identified in this Order, the target satellite operator must coordinate with the operator of that satellite. Absent a coordination agreement, Row 44 must cease operation of its AMSS system unless it can show that it will not cause harmful interference to that co-frequency FSS satellite.
  - d) In the event that a co-frequency NGSO satellite system commences operation, the operators of the Row 44 target satellites identified in this Order must coordinate with the operator of that satellite system. Absent such coordination agreements, Row 44 must cease operation of its AMSS system unless it can show that it will not cause harmful interference to that co-frequency NGSO satellite system.
  - e) Operation of a station authorized herein shall immediately terminate upon notification that such operation is causing harmful interference, not permitted under the terms of coordination agreements, with (1) lawful operation of any radio system in the 14.0-14.5 GHz band authorized on a primary basis in conformance with the U.S. Table of Frequency Allocations or authorized on a secondary basis prior to the effective date of this order, or (2) operation of any TDRSS earth station in the band 14-14.2 GHz, or (3) radio astronomy observations in the 14.47-14.5 GHz band.
  - f) The licensee shall maintain a point of contact available 24 hours per day, seven days per week, with the authority and ability to cease transmissions, for discussing interference concerns with other licensees and U.S. Government agencies, and shall submit a letter to be included in its license file with the name and telephone number of the point of contact prior to commencing operation.
  - g) Aircraft earth stations authorized herein must employ a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals, and each station must be capable of inhibiting its own transmission in the event it detects unintended satellite tracking.
  - h) Aircraft earth stations authorized herein must be monitored and controlled by a ground-based network control and monitoring center. Such stations must be able to receive "enable transmission" and "disable transmission" commands from the network control center and must cease transmission immediately after receiving any "parameter change" command until receiving an "enable transmission" command from the network control center. The network control center will monitor operation of each aircraft earth station to determine if it is malfunctioning, and each aircraft earth station will self-monitor and automatically cease transmission on detecting an operational fault that could cause harmful interference to a fixed satellite service network.
  - i) Operation in the 11.7-12.2 GHz band shall be in accordance with the space station authorization for the target satellites.
  - j) Stations authorized herein shall not be used to provide air traffic control communications.
  - k) Licensee's AMSS system shall operate in compliance with any limits established by the International Telecommunication Union (ITU) to protect other services allocated internationally.
  - l) Operation pursuant to this authorization shall conform to the requirements of Row 44's

coordination agreements with NASA, NSF, and operators of Ku-band geostationary satellites within six angular degrees of the designated target satellites.

- m) For a period of one year from the release of this order, the licensee shall maintain records of the following data for each operating AES: location (latitude, longitude, altitude); aircraft attitude (pitch, yaw, roll); transmit frequency and occupied bandwidth; data rate; EIRP; and target satellite. This data shall be recorded at intervals of no more than two minutes while an AES is transmitting and every 30 seconds when aircraft roll angle is greater than 10 degrees. The licensee shall also record instances when AES pointing error exceeds 0.2 degrees. The licensee shall make this data available upon request to an FSS system operator or the Commission within 24 hours after receiving the request.
- n) Row 44 shall take all reasonable and customary measures to prevent human exposure to harmful non-ionizing radiation exceeding the maximum permissible exposure limits in Section 1.1310 of the Commission's rules, 47 C.F.R. § 1.1310. The exterior surface of the antenna shall be prominently marked with a warning of the potential for exposure to high levels of radiofrequency energy.

36. IT IS FURTHER ORDERED that Section 2.106 of the Commission's rules IS WAIVED with respect to operation of the Row 44 AMSS network in the 11.7-12.2 GHz downlink band, consistent with the terms of this authorization.

37. This *Order and Authorization* is issued on delegated authority pursuant to Sections 0.241 and 0.261 of the Commission's rules, 47 C.F.R. §§ 0.241 and 0.261, and is effective upon release.

FEDERAL COMMUNICATIONS COMMISSION

John V. Giusti  
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Julius P. Knapp  
Chief,  
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