

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of  
Application of Panasonic Avionics Corporation To Modify AMSS License To Permit Operation of Up to 2000 Technically Identical Aeronautical Mobile-Satellite Service (“AMSS”) Aircraft Earth Stations (“AESs”) in the 14.0-14.5 GHz and 10.7-12.75 GHz Frequency Bands )  
)  
) Call Sign E100089  
) File No.  
)  
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)

**APPLICATION FOR LICENSE MODIFICATION**

Mark DeFazio  
Manager, GCS Regulatory  
and Business Operations  
Panasonic Avionics Corporation  
26200 Enterprise Way  
Lake Forest, CA 92630

Carlos M. Nalda  
Squire Sanders  
1200 19<sup>th</sup> Street, NW  
Suite 300  
Washington, DC 20036  
(202) 626-6659

*Counsel for Panasonic Avionics Corporation*

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**APPLICATION FOR LICENSE MODIFICATION**

Panasonic Avionics Corporation (“Panasonic”) hereby submits this modification application to add a second aeronautical mobile-satellite service (“AMSS”) aircraft earth station (“AES”) terminal type to its Ku-band blanket license authorization.<sup>1</sup> The new AES terminal, the Panasonic Aura LE terminal, will operate in the United States and internationally in accordance with the terms of the *Panasonic AMSS Order*, prior Commission precedent governing U.S.-licensed AMSS systems and regulatory requirements designed to protect co-frequency services from harmful interference.

Panasonic seeks authority to operate up to 2000 technically identical Aura LE AESs in Ku-band frequencies (14.0-14.5 GHz uplink and 10.7-12.75 GHz downlink) to provide in-flight broadband connectivity onboard U.S. and foreign aircraft located in U.S. airspace. Panasonic also seeks to include additional satellite points of communication and make related changes to operate the Aura LE onboard U.S. aircraft traveling outside the United States.

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<sup>1</sup> Panasonic Avionics Corporation, Radio Station Authorization, Call Sign E100089, File No. SES-MOD-20111128-01386 and other associated file numbers (“*Panasonic AMSS License*”); *Panasonic Avionics Corporation Application for Authority to Operate Up to 50 Technically Identical Aeronautical Mobile-Satellite Service Aircraft Earth Stations in the 14.0-14.4 GHz and 11.7-12.2 GHz Frequency Bands*, Order and Authorization, 26 FCC Rcd 12557 (2011) (“*Panasonic AMSS Order*”).

To facilitate more efficient exchange of information and Commission consideration, Panasonic requests that this application proceeding be designated as permit-but-disclose for purposes of the *ex parte* rules.

## **I. INTRODUCTION**

Panasonic, the world leader in in-flight entertainment and communications (“IFEC”), seeks to add a new AES terminal to the previously licensed “eXConnect” Ku-Band AMSS system. The eXConnect System provides in-flight broadband connectivity to aircraft passengers and crew. The Aura LE is Panasonic’s next-generation AES antenna designed to supplement the previously licensed MELCO antenna.

In the *Panasonic AMSS Order*, the Commission evaluated the operational characteristics and network control capabilities of the eXConnect System and concluded that eXConnect AMSS operations comply with applicable FCC rules and policies. Panasonic hereby incorporates by reference the technical information associated with the Commission’s prior grant of AMSS operating authority, which fully details the operational characteristics of the eXConnect System.<sup>2</sup> This application focuses on the technical aspects of the Aura LE and related modifications to Panasonic’s AMSS license.

In addition to a number of foreign airline customers, Panasonic is pleased to inform the Commission that U.S. airlines, including a fleet-wide deployment for United Airlines, will utilize the eXConnect System and the Aura LE antenna. As a result, Panasonic will operate the Aura LE in international and foreign airspace onboard U.S.-registered aircraft, and must add a number of new satellite points of communication to provide connectivity on the international flight routes of its U.S. customers.

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<sup>2</sup> *See id.*

Grant of the requested license modification through an appropriately conditioned blanket radio station authorization will serve the public interest by enabling further implementation of the eXConnect system. This, in turn, will enable Panasonic to meet increasing consumer demand for in-flight broadband connectivity onboard U.S. and foreign aircraft.

## **II. THE EXCONNECT SYSTEM AND AURA LE OPERATIONS**

The eXConnect System consists of a U.S.-based network operations center (“NOC”), U.S. and foreign gateway earth station facilities, worldwide leased satellite capacity on various commercial Ku-band FSS satellites, high-capacity fiber links between terrestrial network elements and AESs authorized in the *Panasonic AMSS License*.

The Aura LE was previously examined by the Commission and authorized in experimental Call Signs WD9XQT and WF2XMD.<sup>3</sup> Consistent with Commission policy and precedent, interference will be avoided by controlling the off-axis EIRP spectral density emissions along the GSO arc to protect adjacent FSS satellites, and by coordination, frequency avoidance and/or exclusion zones with respect to other users of the Ku-band.

A detailed technical description of the Aura LE and an overview of eXConnect control functionality are set forth in the attached Technical Appendix.<sup>4</sup> The next-generation Aura LE terminal has superior performance relative to the currently authorized MELCO AES terminal.<sup>5</sup> Panasonic highlights certain operational characteristics of the Aura LE below.

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<sup>3</sup> See ELS File No. 0544-EX-ST-2008 (ground testing); ELS File No. 0281-EX-PL-2010 (in-flight operations).

<sup>4</sup> See Attachment 1 (Technical Appendix).

<sup>5</sup> See Attachment 2 (Antenna Specifications).

## A. Aura LE Performance and Operational Characteristics

The Aura LE was developed to optimize performance of the eXConnect System. It is a dual-panel, mechanically steered antenna designed for installation and operation onboard aircraft. The basic characteristics of the Aura LE antenna are summarized in Table 1. The Aura LE has been fully certified for aviation safety and currently is in operation onboard foreign airlines.

**Table 1. Aura LE Characteristics**

<b>Antenna Dimensions</b>	34.7 inches (0.88 m) 6.6 inches height (0.17 m)
<b>Type of Antenna</b>	Dual panel waveguide fed phased array
<b>SSPA Rated Output Power</b>	16 watts
<b>Bandwidth</b>	10.70 GHz to 12.75 GHz 14.0 GHz to 14.5 GHz
<b>Transmit Gain</b>	38 dBi
<b>EIRP</b>	48 dBW
<b>Transmit Polarization</b>	Horizontal or Vertical
<b>Receive G/T</b>	10 to 14 dB/K
<b>Transmit Azimuth Beamwidth</b>	1.5 degrees
<b>Transmit Elevation Beamwidth</b>	4 degrees

The Aura LE fully complies with the provisions governing Ku-band AMSS operations embodied in Recommendation ITU-R M.1643, as well as U.S. and international rules and policies governing such operations.

### 1. Antenna Pointing

Pointing for the Aura LE is accomplished via mechanical steering of the antenna and uses the aircraft attitude data (*i.e.*, yaw, roll, pitch and heading vector), together with location of the terminal (latitude, longitude, and altitude) to calculate the command vectors. This data, available from the ARINC 429 bus, is used in conjunction with the satellite coordinates to yield continuously updated steering commands for the antenna elevation, azimuth, and polarization. A local inertial sensor package placed on the antenna base plate itself provides high rate antenna

attitude sensing, which compensates for possible aircraft inertial navigation system (“INS”) errors caused by airframe deformation and data latency.

The pointing error of the Aura LE will be less than 0.2 degrees 1-sigma, which is consistent with interference-free operations.<sup>6</sup> Pointing error will be monitored and emissions will be inhibited within 100 milliseconds if the pointing error ever exceeds 0.35 degrees.

Panasonic has taken a conservative approach in setting the off-axis value for muting transmission and including Aura LE pointing offset and skew in setting maximum permissible transmit powers and skew angles such that even if mispointed 0.35 degrees (the point at which the antenna automatically mutes transmissions), the Aura LE will not exceed permissible off-axis EIRP spectral density levels.

## **2. Antenna Gain Patterns and Out-of-Band Emissions**

Antenna gain patterns for the Aura LE are included in the attached Technical Appendix. Azimuth patterns are plotted against the 25.209(a)(2) antenna pattern mask. Elevation patterns are plotted against the 25.209(a)(4) antenna pattern mask. Because the Aura LE is a dual-panel antenna with one panel behind the other, its antenna gain patterns change at lower elevation angles due to blockage from the front panel.

The Aura LE antenna complies with the out of band emissions limitations in 47 C.F.R. §25.202(f).

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<sup>6</sup> Operational and test flight data confirms these conclusions regarding pointing accuracy. Indeed, in a recent assessment, there were no instances above 10,000 feet where the measured error exceeded 0.2 degrees peak (excluding beam switches, of course, which involve antenna repointing to a new satellite while muted). Panasonic collected data every 5 milliseconds and analyzed over 1.5 million data points. Our analysis shows that the standard deviation (1-sigma) for pointing error is 0.02 degrees.

### **3. Antenna Control**

The attached Technical Appendix includes detailed information on other AES antenna control characteristics, including: (i) satellite access techniques; (ii) AES commissioning and log-in; (iii) automatic beam selection; (iv) return link power and frequency control; and (v) fault management. With respect to the last issue, the Aura LE ceases transmission in the event of the following conditions:

- loss of ARINC-429 data from the aircraft's inertial reference system ("IRS");
- invalid status message from the IRS;
- loss of the AES's 10 MHz reference signal;
- antenna pointing error exceeds 0.35 degrees, where the antenna ceases transmission within 100 ms and will not resume transmission until the pointing error is within 0.2 degrees; or
- any critical fault detected by the AES.

Furthermore, any event that results in the loss of modem lock to the AES downlink will cause the modem to cease all transmission.

### **4. Link Budgets**

Example edge of coverage link budgets for the Aura LE antenna forward and return links in the U.S. coverage area are shown in the attached Technical Appendix. Link performance is similar for other satellite points of communication. As shown by the link budgets, the Aura LE is able to close the links with positive margin.

#### **B. Protection of Co-Frequency Spectrum Users and Compliance with U.S. and International Regulatory Provisions**

The FCC has not yet established service rules applicable to Ku-band AMSS operations, but interference considerations are analogous to those that currently apply to ESVs set forth in 47 C.F.R. § 25.222 and VMES set forth in 47 C.F.R. § 25.226. In addition, international regulatory provisions, including Recommendation ITU-R M.1643, ECC DEC (05)11 and associated European technical standards provide important guidance on operations outside the United States.



In accordance with U.S. and international provisions, and consistent with the *Panasonic AMSS Order*, the Aura LE employs a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals and is capable of inhibiting its own transmission in the event it detects unintended satellite tracking. It is also monitored and controlled by a ground-based NOC, which monitors operation of each AES to determine if it is malfunctioning. The Aura LE self-monitors and automatically ceases transmission on detecting an operational fault that could cause harmful interference to an FSS network. The Aura LE is also able to receive “enable transmission” and “disable transmission” commands from the NOC, and will cease transmission immediately after receiving a “parameter change” command from the NOC.<sup>7</sup>

Additionally, pursuant to paragraph 28(k) of the *Panasonic AMSS Order*, Panasonic logs records of aircraft and AES operating characteristics every 30 seconds to assist in addressing any potential interference event. This information is obtained from the ARINC 429 bus (aircraft data) and onboard modem (AES data). An example series of logs from and operating aircraft is set forth in Table 2.

**Table 2: Data Logging**

time	lat	long	alt	pitch	roll	heading	eirp	track erraz	track errel1	track errel2	sat long	txfreq	txbw	txdatarate	ant tx	mod tx
7/17/12 3:04:44	47.53	-118.88	39002	2.78	0.43	95.08	38.67	-0.065	0.004	-0.006	-91	14334.7	1666000	358743	1	1
7/17/12 3:05:13	47.53	-118.8	38994	2.92	0.16	95.55	38.58	-0.018	0.003	0.007	-91	14334.7	1666000	358743	1	1
7/17/12 3:05:42	47.53	-118.72	38998	3.01	0.05	95.88	38.64	-0.009	0.000	-0.001	-91	14334.7	1666000	358743	1	1
7/17/12 3:06:13	47.53	-118.63	39005	2.88	0.31	96.09	38.52	-0.009	0.008	-0.001	-91	14334.7	1666000	358743	1	1
7/17/12 3:06:44	47.53	-118.54	38997	2.98	0.77	95.83	38.58	0.018	0.006	-0.004	-91	14334.7	1666000	358743	1	1
7/17/12 3:07:12	47.53	-118.46	38997	3.08	0.75	95.83	38.77	-0.039	0.009	0.013	-91	14334.7	1666000	358743	1	1
7/17/12 3:07:43	47.52	-118.37	39002	3.02	0.46	96.12	-3	-0.026	-0.015	-0.010	-91	14334.7	1666000	358743	1	0
7/17/12 3:08:15	47.52	-118.28	38999	3.03	0.91	96.36	-3	0.030	0.003	-0.009	-91	14334.7	1666000	358743	1	0
7/17/12 3:08:43	47.52	-118.2	39008	2.74	0.53	96.67	-3	-0.008	-0.003	-0.016	-91	14334.7	1666000	358743	1	0

Panasonic would note the extremely small pointing offsets and two elevation offset entries, associated with the independently pointed front and rear panels of the Aura LE. The

<sup>7</sup> *Panasonic AMSS Order*, ¶26.

reported transmit frequency is the center frequency of the in-route (return link/AES-to-hub) group. Also note the cessation of transmission (EIRP and mod tx columns), which occurred in the context of AES repointing to another serving satellite.

The information will assist Panasonic in identifying and addressing any interference incidents that may occur. There have been no incidents of interference since the eXConnect System commenced operations. Other operational provisions necessary for protection of other co-frequency services are discussed below.

### **1. Protection of GSO FSS Systems**

Control of off-axis EIRP spectral density is essential to protect adjacent satellites operating in the Ku-band. The eXConnect System will control the off-axis EIRP spectral density generated by a single terminal so that it is no greater than is accepted for other Ku-band terminals operating with FSS satellites. This is consistent with FCC licensing conditions in the AMSS context, as well as the Commission's ESV and VMES rules and international regulations.

To the extent that any adjacent satellite operator experiences harmful interference from Aura LE terminal operations, Panasonic will cease terminal transmissions immediately. In addition, if another co-frequency, co-coverage GSO FSS satellite commences operation at a location within six degrees of one of Panasonic's serving satellites, Panasonic will cease operations absent a coordination agreement or demonstration that it will not cause harmful interference to the new satellite.

In the regions that have adopted two-degree satellite spacing, Panasonic will follow the Commission's off axis EIRP spectral density limits as defined by Section 25.218(f)(1).<sup>8</sup> Under this rule, the off-axis EIRP spectral density generated by a conforming terminal must be:

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<sup>8</sup> N = 1 for TDMA systems. Analogous provisions are included in ESV and VMES rules.

15–25log <sub>10</sub> (Θ + 0.2)	dBW/4 kHz	for	1.5° ≤ Θ ≤ 7°
–6	dBW/4 kHz	for	7° < Θ ≤ 9.2°
18–25log <sub>10</sub> (Θ + 0.2)	dBW/4 kHz	for	9.2° < Θ ≤ 48°
–24	dBW/4 kHz	for	48° < Θ ≤ 85°
–14	dBW/4 kHz	for	85° < Θ ≤ 180°

In other regions, particularly in Europe and Asia where larger orbital spacing is the norm, the routine power levels for Ku-band ESVs and VSATs are higher than the levels set forth in the Commission’s rules. For example, Resolution 902, which sets forth technical and operational requirements for Ku-band ESV operations, specifies the routine off-axis EIRP density levels for ESV transmissions in a three-degree spacing environment as the maximum levels to ensure compatibility with other FSS networks.<sup>9</sup> The Commission will grant authority to operate Ku-band ESVs at higher values on the condition that operators comply with the certification and cessation of emission requirements in Section 25.222 of the rules.<sup>10</sup> Panasonic intends to transmit at higher power in these areas, consistent with international practice and the terms of its satellite operator coordination agreements.

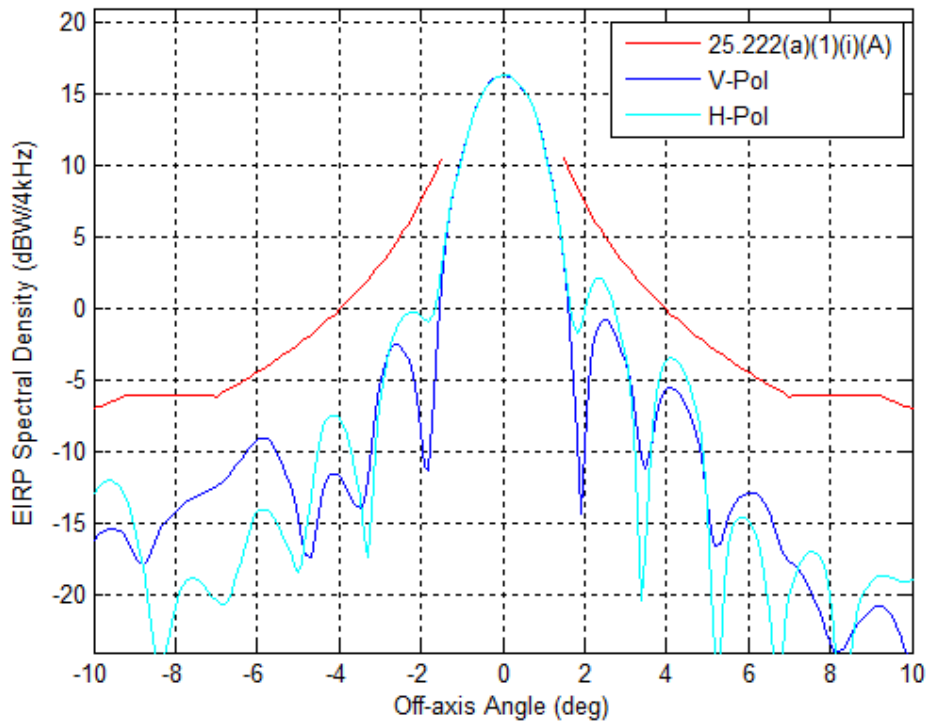
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<sup>9</sup> See Resolution 902, Provisions relating to earth stations located on board vessels which operate in fixed satellite service networks in the uplink bands 5925-6425 MHz and 14-14.5 GHz, WRC-03, (2003) at Annex 2. These values were developed for implementation globally for Ku-band satellites with 3-degree spacing, and are equivalent to the limits established by the ITU for the maximum permissible level of off-axis EIRP density from Ku-band VSATs. See Recommendation ITU-R S.728-1 at Recommends 1.

<sup>10</sup> Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, IB Docket No. 02-10, Order on Reconsideration, 24 FCC Rcd 10369, ¶ 10 (2009).

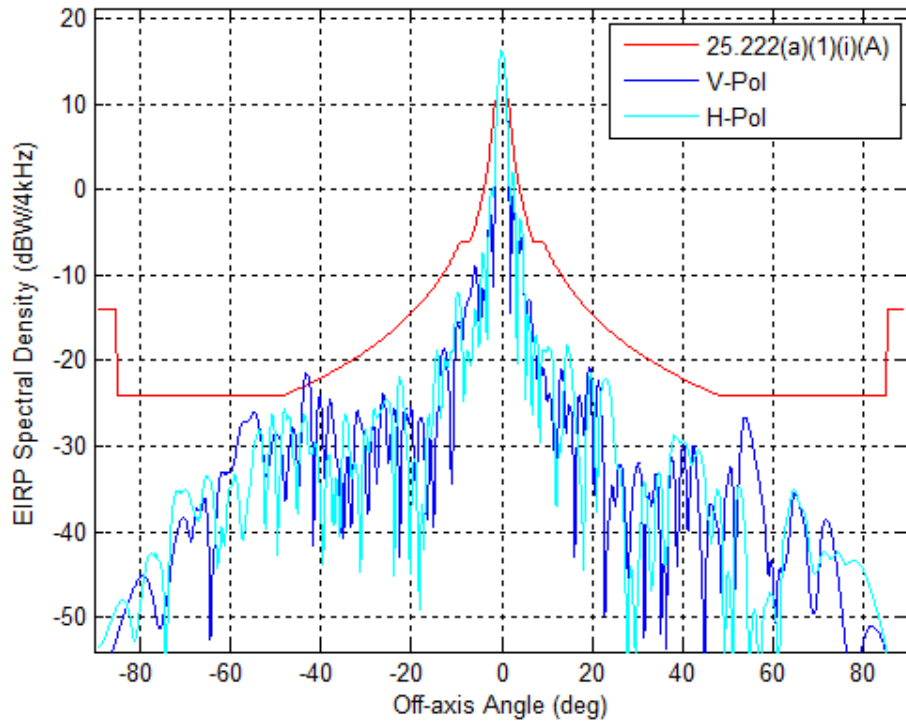
An example off-axis EIRP spectral density plot is shown in Figures 1 and 2, below.

Panasonic has taken the conservative approach of including the Aura LE's maximum pointing offset and skew angles in setting maximum transmit power levels. Thus, the terminal's off-axis EIRP spectral density remains well below the U.S. off-axis EIRP spectral density limit for the main lobe, shown in the solid red line (using the analogous limits in Section 25.222), even at maximum pointing offset.<sup>11</sup>



**Figure 1. Maximum Off-axis EIRP Spectral Density of the Aura LE Antenna (0°-10° Off-Axis)**

<sup>11</sup> The minor excursion at more than 40° off-axis in Figure 2 is consistent with the Commission's rules. *See, e.g.*, 47 C.F.R. § 25.222(a)(1)(i)(A). Maximum international off-axis EIRP spectral density levels are up to 8 dB higher than the U.S. limits. Data in FCC Form 312 specify the maximum Aura LE transmit EIRP and EIRP spectral density associated with all potential satellite points of communication.



**Figure 2. Maximum Off-axis EIRP Spectral Density of the Aura LE Antenna (0°-90° Off-Axis)**

It should be emphasized that the example in Figures 1 and 2 is an extreme case: worst-case power, edge of coverage, worst-case skew, etc. (14.25 GHz, 35° skew angle, 45° elevation angle in San Diego, CA), and reaching the limits in this way will only occur very rarely and briefly if at all.

Finally, Panasonic’s satellite operator has coordinated the operation of the Aura LE antenna in the United States and potentially affected operators within +/- 6 degrees of the Galaxy 17 satellite have accepted the operation of the Aura LE terminal.<sup>12</sup> The status of coordination efforts for other satellites is addressed in Section III, *infra*.

<sup>12</sup> See Attachment 3 (Coordination Information).

## 2. Protection of Future NGSO FSS Systems

The Aura LE exceeds the off-axis EIRP spectral density values set forth in the Commission's rules in directions away from the geostationary arc. This separate off-axis EIRP spectral density mask was intended to protect Ku-band NGSO FSS systems. However, no systems of this type are presently planned or are operating. Panasonic will enter into coordination arrangements with any future Ku-band NGSO FSS system to protect such systems from interference from Aura LE transmissions.

## 3. Protection of Terrestrial Fixed Services

Panasonic has examined current spectrum use in the 14.0-14.5 GHz band and has determined that there are no active FCC-licensed terrestrial services with which its proposed operations could conflict. In areas outside the United States, Panasonic will follow ITU and other international requirements to protect FS operations. Specifically, Panasonic will limit power flux density ("PFD") to the levels stated in Recommendation ITU-R M.1643 Part B in areas where protection is required.

## 4. Protection of Radio Astronomy Services

For purposes of protecting radio astronomy services ("RAS") sites, consistent with Recommendation ITU-R M.1643-Part C, Panasonic will limit aggregate PFD in the 14.47-14.5 GHz band within line-of-sight of radio astronomy stations operating within the band.

$$\begin{array}{lll} 190 + 0.5 \cdot \theta & \text{dB(W/(m}^2 \cdot 150 \text{ kHz))} & \text{for } \theta \leq 10^\circ \\ -185 & \text{dB(W/(m}^2 \cdot 150 \text{ kHz))} & \text{for } 10^\circ < \theta \leq 90^\circ \end{array}$$

Within the United States, Panasonic will limit aggregate PFD in the 14.47-14.5 GHz band when in the vicinity of U.S. RAS sites.<sup>13</sup> Panasonic has also entered into a coordination agreement with the National Science Foundation obligating Panasonic to limit aggregate PFD to the specified levels.<sup>14</sup>

## **5. Protection of Space Research Services**

Panasonic recognizes the utilization of the frequency band from 14.0-14.05 GHz (and the possible use of the band from 14.05-14.2 GHz) allocated to the Space Research Service (SRS), including the National Aeronautics and Space Administration (“NASA”) Tracking and Data Relay Satellite System (“TDRSS”) for space research operation. Panasonic has entered into a coordination agreement with NASA regarding the protection of current and future TDRSS sites.<sup>15</sup>

### **C. Downlink Transmissions in the 10.7-12.75 GHz band**

As discussed in Section IV, below, Panasonic seeks a waiver of the allocation table to permit the Aura LE to receive FSS space-to-Earth transmissions in the 10.7-12.75 GHz band. All downlink transmissions to Panasonic’s AES terminals will operate within the space station authorizations and coordinated limits for downlink EIRP spectral density of the proposed satellites, as agreed by the operators of adjacent satellites within +/- 6 degrees.

Panasonic will accept interference from lawful operation of any station in the 10.7-12.75 GHz band in accordance with the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106.

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<sup>13</sup> -221 dBW/m<sup>2</sup>/Hz (for protection of Green Bank, Arecibo and Socorro); -189 dBW/m<sup>2</sup>/Hz (for protection of all other RAS sites).

<sup>14</sup> Panasonic will similarly protect RAS sites located outside the United States by coordinating and/or avoiding transmissions during radio astronomy observations.

<sup>15</sup> Outside the United States, where necessary, Panasonic will avoid or cease AES emissions on frequencies used by the SRS systems when operating in the vicinity of SRS sites.

### **III. AUTHORITY FOR AMSS OPERATIONS OUTSIDE THE UNITED STATES**

Panasonic hereby requests authority for Aura LE operations on U.S.-registered aircraft located outside U.S. territory. The Commission has appropriately found that Panasonic's AMSS operations are consistent with the public interest,<sup>16</sup> and the eXConnect System will provide even greater benefits when extended to the passengers and crew of U.S.-registered aircraft operating internationally. Further implementation of the eXConnect System will also help maintain U.S. leadership in advanced satellite telecommunications systems and broadband services. Finally, the conditions set forth in the *Panasonic AMSS Order*, international regulations and other appropriate licensing conditions will adequately protect other services located outside the United States.

#### **A. eXConnect Operations Outside the United States**

Except with respect to authority to transmit at higher power operations pursuant to satellite coordination agreements as requested herein, Panasonic recognizes and accepts that the operational conditions set forth in the *Panasonic AMSS Order* will apply to its aircraft earth station operations outside the United States. These conditions already ensure that Panasonic's AMSS operations will not cause harmful interference to any other users of the Ku-band.<sup>17</sup>

eXConnect operations are fully consistent with the coordination agreements of Panasonic's space segment providers. Therefore, eXConnect AESs may transmit within agreed parameters and up to coordinated power levels. In those areas where greater than two-degree spacing is the norm, Panasonic will operate at higher power levels consistent with larger orbital

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<sup>16</sup> *Panasonic AMSS Order*, ¶ 25.

<sup>17</sup> *See id.*, ¶ 19.



spacing and applicable coordination agreements. Indeed, the Aura LE, as well as the MELCO terminal, are already operating at such higher powers onboard foreign-registered aircraft.

**B. Additional Satellites Points of Communication**

Panasonic seeks to include a number of additional satellite points of communication for international operations to provide global service to eXConnect-equipped aircraft of U.S. customer airlines. Because these satellites will be used to provide eXConnect services that have previously been authorized by the Commission in the United States, authorizing the Aura LE to communicate with additional satellites would serve the public interest.

**1. Satellites for Non-U.S. Operations**

Specifically, Panasonic requests authority to operate the Aura LE terminal with the additional satellite points of communications identified in Table 3, below, for service outside the United States. These satellites are currently being used to support eXConnect AES operations onboard foreign-registered aircraft and they are integral elements of the eXConnect System. The public interest would be strongly served by allowing U.S. aircraft to access these satellites on the same basis as their foreign counterparts.

**Table 3: Satellite Points of Communication<sup>18</sup>**

Satellite	Gateway Earth Station	
	City, Country	Operator
GE 23 (NP/NP, NP/SWP)	Brewster, USA	USEI
GE 23 (SP/SP)	Adelaide, Australia	ASCS
Superbird C2	Hong Kong, China	PCCW
Asiasat 5	Dubai (Sharjah)	Etisalat
Yamal 201	Moscow, Russia	Rusat
W2A (Eutelsat 10A)	Santander, Spain	MTN/Eriza
Anik F1R	Mt. Jackson, Virginia, USA	Telesat
Estrela do Sul 2 (T-14R)	Mt. Jackson, Virginia, USA	Telesat
Intelsat 14 (IS-14)	Cologne, Germany	Stellar
Apstar 6	Beijing, China	China Satcom
Apstar 7	Djibouti, Africa	Bringcom
Galaxy 17	Atlanta (Ellenwood), Georgia, USA	Intelsat
T-11N (Telstar 11R)	Mt. Jackson, Virginia, USA	Telesat

The coverage beams for each of these satellites are shown and associated hub earth stations are identified in the attached Technical Appendix. Including these satellites as authorized points of communication would serve the public interest by enabling Panasonic to serve U.S. airlines on virtually all international routes, thereby allowing U.S. airlines to enjoy the full benefits of the eXConnect System’s global coverage.

In addition to the coordination affidavit for Galaxy 17, Panasonic is submitting an affidavit from Telesat regarding the coordination status eXConnect operations on the T-14 satellite.<sup>19</sup> Panasonic is in the process of obtaining similar coordination affidavits from its other satellite operators and respectfully request authority to update the record of this proceeding once that

<sup>18</sup> Although Galaxy 17 is not an additional satellite point of communication, it is included in Table 3 to reflect a change of the associated gateway.

<sup>19</sup> See Attachment 3 (Coordination Information).

information is obtained. Importantly, the pendency of coordination affidavits need not delay public notice of this modification application because the operational and technical parameters described herein are independent of the supporting coordination information. Thus, interested parties can comment meaningfully on the modification application regardless of whether additional coordination information is submitted before or after the application is placed on public notice.

## **2. Additional Considerations**

In authorizing U.S. earth station licensees to access foreign-licensed satellites, the Commission may consider other factors including competition concerns (i.e., *DISCO II* considerations<sup>20</sup>) and satellite end-of-life disposal policies. Panasonic respectfully suggests that it is not clear that these considerations must or should be strictly applied in the unique context of international AMSS operations, particularly for access to foreign satellites with no U.S. coverage and where no reasonable alternatives are available.

Assuming the Commission's *DISCO II* policies are applicable, Panasonic notes that all foreign satellites that it seeks to add as authorized points of communication are licensed by WTO members countries (Canada, France, China and Russia). As a result, there is a presumption in favor of access to these satellites under *DISCO II*.

With respect to satellite end-of-life disposal information requirements, the Commission's policies apply to space station licensees in the context of accessing the U.S. market. This would not appear to include AMSS blanket license applicants seeking to access foreign satellites serving regions outside the United States. Furthermore, when it adopted its orbital debris

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<sup>20</sup> See *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, Report & Order, 12 FCC Rcd 24094 (1997) ("*DISCO II*").

mitigation policies, the Commission disclaimed any intent to engage in a “‘unilateral’ or ‘extraterritorial’ imposition of Commission rules” on non-U.S.-licensed spacecraft.<sup>21</sup>

Accordingly, Panasonic has not obtained comprehensive end-of-life information on all of the subject foreign-licensed satellites.

Panasonic would note, however, that most of the satellite models and satellite operator end-of-life procedures have been reviewed and approved by the Commission, and all of these in-orbit satellites are licensed by WTO members and long-time spacefaring nations, strongly suggesting that these foreign licensing jurisdictions will exercise “direct and effective regulatory oversight” of the operator’s debris mitigation measures.<sup>22</sup> Thus, Panasonic’s proposed access to the additional foreign-licensed satellite points of communication would be consistent with the Commission’s satellite end-of-life disposal policies even if they were applicable.<sup>23</sup>

Importantly, Panasonic has found a scarcity of available Ku-band capacity for its global network and that each of these satellites was carefully selected to provide optimum coverage and performance of the eXConnect system. Thus, there are no real viable alternatives to these satellites. Furthermore, an alternative conclusion regarding access to any of the subject satellites would place U.S. airlines at a severe disadvantage vis-a-vis their foreign counterparts.<sup>24</sup>

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<sup>21</sup> *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, ¶ 96 (2004).

<sup>22</sup> *See id.* at ¶95.

<sup>23</sup> Panasonic respectfully requests permission to supplement the record with respect to this issue if deemed necessary or appropriate by the Commission.

<sup>24</sup> Access to these satellites is only relevant for U.S.-registered aircraft because the Commission does not have jurisdiction to license foreign aircraft radio operations outside the United States. Thus, foreign airlines will have full access to all eXConnect satellites regardless of the Commission’s determination in this proceeding.

Given these factors, including the presumption in favor of entry for satellites licensed by WTO members and the lack of available alternatives with equivalent coverage, the Commission should permit U.S.-registered aircraft equipped with the Aura LE to communicate with all of the requested satellites. A contrary conclusion would deprive U.S. airlines and their passengers of access to eXConnect service in large geographic regions, potentially including major flight routes in Asia, Europe and the Middle East. At the same time, foreign airlines competitors would maintain unfettered access to eXConnect service in these critical areas. Thus, it is plainly in the public interest to add these satellites to the Panasonic AMSS license as authorized points of communication.

### **C. Additional Emissions Designators**

Panasonic may use fractional transponder leases to obtain Ku-band FSS satellite capacity. Accordingly, Panasonic seeks to add a limited number of emission designators with various bandwidths for use with all authorized satellite points of communication. Panasonic hereby requests authority to add emission designators 500KG7D and 9M00G7D for the return link (AES transmit) and 1M20G7D, 36M0G7D and 72M0G7D for the forward link (AES receive). For each of these emission designators, Panasonic will continue to manage its aggregate transmit off-axis EIRP spectral density so that it remains within the levels accepted by adjacent satellite operators. As previously indicated, Panasonic will also limit the downlink power spectral density for each satellite within the accepted limits for all emissions.

## **IV. WAIVER REQUESTS**

The Commission's Rules may be waived "for good cause shown."<sup>25</sup> In particular, a waiver of the U.S. Table of Allocations to permit non-conforming spectrum uses can be granted

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<sup>25</sup> 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

“when there is little potential interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services.”<sup>26</sup> A waiver is also appropriate where a grant “would not undermine the underlying policy objectives of the rule in question” and would be in the public interest.<sup>27</sup>

**A. Section 2.106 Waiver**

Panasonic respectfully requests a waiver of Section 2.106 of the Commission’s Rules, 47 C.F.R. § 2.106, the U.S. Table of Frequency Allocations, to permit its AMSS operations in the 10.7-12.75 GHz band on a non-interference, non-protected basis. In this case, there is good cause for the requested waiver.

The Commission has already granted Panasonic a waiver for non-conforming use of the 11.7-12.2 GHz band in the context of its existing AMSS license because there is no real potential for interference from use of this FSS downlink (receive) spectrum. Panasonic’s use is consistent with satellite operator coordination agreements established technical limitations and spectrum allocations used by its FSS space segment providers, and Panasonic will not claim protection from other conforming users of the band. For the same reasons, Panasonic should be permitted to access the 11.7-12.2 GHz band outside the United States for Aura LE receive operations.

Similarly, Panasonic should be permitted to access other portions of the 10.7-12.75 GHz band used by its FSS space segment providers for Aura LE receive operations onboard U.S.-registered aircraft. Panasonic’s use of “extended” Ku-band spectrum will be limited to regions

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<sup>26</sup> See *The Boeing Company*, Order and Authorization, 16 FCC Rcd. 22645, 22651 ¶ 12 (Int’l Bur. 2001); *Fugro-Chance, Inc.*, Order and Authorization, 10 FCC Rcd. 2860, 2860 ¶ 2 (Int’l Bur. 1995) (authorizing non-conforming MSS in the C-band); see also *Motorola Satellite Communications, Inc.*, Order and Authorization 11 FCC Rcd. 13952, 13956 ¶ 11 (Int’l Bur. 1996) (authorizing service to fixed terminals in bands allocated to the mobile-satellite service).

<sup>27</sup> See *GE American Communications, Inc.*, Order and Authorization, 15 FCC Rcd. 3385, 3391 ¶ 14 (Int’l Bur. 1999).

of the world where the spectrum is allocated for satellite downlinks, so the effect on co-frequency operations will be *de minimis*. Panasonic also will not claim protection from conforming uses of the spectrum and will cease operations upon notification that its receive operations are causing interference to any conforming use of the band.

Use of other portions of the 10.7-12.75 GHz bands is also consistent with the Commission's 2004 Report and Order permitting downlink (receive) operations in the extended Ku-band by ESV systems because of the negligible risk of interference with existing operations,<sup>28</sup> and the Commission has previously permitted AMSS and ESV operations in spectrum outside the 11.7-12.2 GHz band.<sup>29</sup> Indeed, Panasonic is already using these bands for Aura LE downlink operations of foreign-registered aircraft outside the United States without interference incident, and use by AESs on U.S.-registered aircraft would be similarly free from interference and can be permitted accordingly.

#### **B. Off-Axis EIRP Spectral Density for Regions Outside the GSO Arc**

As a result of its compact configuration, the Aura LE exceeds off-axis EIRP spectral density values for regions beyond +/- 3° from the GSO arc. These limits are principally designed to facilitate potential NGSO use of the Ku-band.

No NGSO systems have yet been constructed or are even under serious consideration. If and when such a system is licensed by the Commission, Panasonic will take all necessary steps

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<sup>28</sup> *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, 20 FCC Rcd 674 (2005).

<sup>29</sup> *See, e.g.,* The Boeing Company, Experimental Special Temporary Authorization Radio License and Experimental Radio Station Construction Permit and License, Call Sign WC2XVE (various file numbers) (Ku-band AMSS authority) and KVH Industries, Inc., Radio Station Authorization, Call Sign E090001 (various file numbers) (Ku-band ESV authority).

prior to the launch of any new NGSO system to ensure that the Panasonic system does not cause harmful interference to the new system, including entering into a coordination agreement with any future such systems. Panasonic acknowledges that the Commission may condition the grant of this license application upon a requirement that Panasonic take such necessary coordination measures.

### **C. Other Waivers**

Panasonic has examined analogous mobile VSAT rules, other rules provisions and AMSS licensing orders adopted by the Commission during the past decade, and has included a full legal and technical demonstration establishing that its proposed AMSS operations are consistent with Commission rules and policies. However, to the extent the Commission concludes that any potentially applicable rule or policy may not be fully satisfied, Panasonic respectfully requests a waiver of any Commission rule or policy that may be necessary to facilitate full implementation of the eXConnect system with the Aura LE.

## **V. OTHER ISSUES**

### **A. Compliance with future AMSS Service Rules**

Panasonic acknowledges and accepts that any authorization granted by the Commission will be conditioned upon compliance with any additional conditions or requirements concerning operation of its AMSS system adopted in the Commission's pending Ku-band AMSS rulemaking proceeding.<sup>30</sup>

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<sup>30</sup> *Service Procedures and Rules to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service*, IB Docket No. 05-20, Notice of Proposed Rulemaking, FCC 05-14 (2005).



## **B. Ground Operations and RF Safety**

Panasonic seeks to operate the Aura LE intermittently while on the ground for maintenance, commissioning and other purposes. This AES and other AES terminals have been previously authorized for ground operations. Panasonic will not operate the AES while aircraft are on the ground unless appropriate safety protocols are in place to ensure that persons having access to areas within 22.0 meters of the AES are not exposed to RF energy in excess of the maximum permissible limits specified in 47 C.F.R. § 1.1310.

Panasonic will take all reasonable and customary measures to prevent human exposure to harmful non-ionizing radiation exceeding the maximum permissible exposure limits, including prominently marking the exterior surface of the AES with a warning of the potential for exposure to high levels of radiofrequency energy. A radiation hazard analysis of the Aura LE antenna is provided as Exhibit E to the Technical Appendix.

## **C. Permit-But-Disclose Status**

Panasonic requests the Commission to designate this modification application proceeding as permit-but-disclose for purposes of the *ex parte* rules. Section 1.1200(a) of the Commission's rules, 47 C.F.R. § 1.1200(a), allows the Commission to modify the *ex parte* status of a proceeding if such modification is in the public interest. Although the issues raised in the Aura LE application are straightforward, grant of permit but-disclose status for the application proceeding will facilitate communication between the Commission, Panasonic and any interested parties. This, in turn, will allow the Commission to develop a full and complete record, and process the application as efficiently and expeditiously as possible. Accordingly, permit-but-disclose status will serve the public interest.

## **VI. CONCLUSION**

Grant of this modification application will serve the public interest by allowing Panasonic to extend the benefits of the eXConnect System to foreign airlines utilizing the Aura LE terminal in the United States, and to U.S. airlines operating worldwide. Adding new satellite points of communication as requested herein will also ensure that U.S. airlines operating internationally will have full access to the global eXConnect System. This, in turn, will facilitate the provision of in-flight broadband services to passengers and crews aboard U.S. and foreign aircraft around the world.

**Technical Certificate**

I, Paul Sarraffe, hereby certify that I am the technically qualified person responsible for the preparation of the technical discussion contained in this Modification Application and associated Technical Appendix, that I am familiar with Part 25 of the Commission's Rules (47 C.F.R. Part 25), and that I have either prepared or reviewed the technical information submitted in this application and found it to be complete and accurate to the best of my knowledge and belief.

By: Paul R. Sarraffe

Paul Sarraffe  
Panasonic Avionics Corporation  
eXConnect Systems Engineering

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