

BEFORE THE  
**Federal Communications Commission**

WASHINGTON, DC 20554

In re: Application of	)	
<b>Panasonic Avionics Corporation</b>	)	File Nos. SES-LIC-20100805-00992
	)	SES-AMD-20100914-01163
For Authority to Construct and Operate an	)	SES-AMD-20101115-01432
Aeronautical-Mobile Satellite Service Earth	)	
Station Network Operating in the Ku-Band	)	Call Sign E100089

To: Chief, International Bureau

**CONSOLIDATED REPLY OF ROW 44, INC. TO PANASONIC AVIONICS' RESPONSE  
AND PANASONIC AVIONICS' NOVEMBER 15 AMENDMENT**

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## **SUMMARY**

Panasonic Avionics' November 15<sup>th</sup> Response, as incorporated into its pending Application by its contemporaneously-filed Amendment, corrects some of the deficiencies in the initial Application. However, there remain significant questions regarding some aspects of the proposal.

It is a fundamental requirement for processing any Earth station application that the Applicant provide a complete record upon which the Bureau can determine whether grant of the application is consistent with the public interest, convenience and necessity. As amended, the Application fails to provide the threshold information required for the Bureau to make this determination. New applicants for AMSS authority can neither be held to a lesser standard than prior applicants for such authority, nor can they be excused from providing basic technical showings that other Ku-band AMSS providers have submitted, and which other MSS providers must file pursuant to the service rules applicable to Earth Stations on Vessels and Vehicle-Mounted Earth Stations.

First, the Applicant's effort to incorporate by reference the entirety of the 2003 Boeing modification application relating to the MELCO antenna is faulty in multiple respects. Panasonic Avionics fails to specify what specific elements of the Boeing application it is incorporating into its Application, leaving it for FCC staff to guess what portions may be relevant. Moreover, Panasonic Avionics fails to acknowledge the significant differences between its own proposal and the 2003 Boeing license with respect to modulation, multiple access scheme, transmitted signal bandwidths, frequency spreading factors, and skew angle range.

Second, Panasonic Avionics' showing with respect to off-axis EIRP spectral density along the geostationary arc also remains incomplete. In the September amendment, where skew

data was provided, the EIRP spectral density patterns submitted for skew angles greater than zero degrees are symmetrical and appear to be calculated rather than measured. Measured EIRP patterns are needed to confirm performance, particularly in view of the ITU requirement to consider the aging of antenna equipment in this connection. The information submitted by Panasonic Avionics also does not take into account the simultaneous effect of both misorientation and antenna mispointing. Absent this data, which has been submitted by prior AMSS applicants, it is not clear how the Applicant can substantiate its claim that it will reduce the EIRP spectral density in order to remain compliant with the FCC mask.

Third, Panasonic Avionics' has not provided antenna gain information relative to maximum geographic skew conditions. The MELCO antenna is a non-circular Cassegrain dish with an aspect ratio of approximately 3:1, such that the antenna pattern varies significantly with varying skew angle. In particular, the main beam and the first side lobes broaden significantly as the skew angle increases. Accordingly, Panasonic Avionics should be asked to provide complete antenna gain patterns for all skew angles up to the maximum 34 degree skew to demonstrate that there are no skew angles for which parasitic sidelobes occur.

Fourth, Panasonic Avionics' application contains insufficient information concerning the manner in which it maintains pointing accuracy to avoid interference to adjacent satellites. While it states that its pointing error exceeds  $0.25^\circ$  for only a small percentage of the time, this characterization is highly misleading. Assuming a normal distribution, a 1-sigma pointing error of 0.25 degrees means that the antenna will be accurately pointed within  $\pm 0.25$  degrees only 68% of the time. Because Panasonic therefore will not comply with the  $0.2^\circ$  antenna pointing limit, it must demonstrate that it will not exceed the off-axis EIRP limits when its antenna is maximally

mispointed, or that it otherwise will cease transmissions. The details of the mechanism for such compliance must be explained.

Fifth, it remains unclear precisely what the occupied transmit bandwidth will be for Panasonic Avionics' operating system. There remain inconsistencies between the service parameters specified in its Form 312 and those for which supporting documentation is provided in the associated exhibits, including the link budget.

Sixth, Panasonic Avionics continues to refuse to provide required information concerning geographic coverage of its service as required by the rules for both coordination of non-compliant Earth station antennas and for other MSS services operating in the Ku-band FSS. Panasonic Avionics must provide this information detailing the geographic scope of its service and it must be consistent with its link budget.

Row 44 continues to urge the International Bureau to withhold further action on the Application until the Applicant amends its proposal to come into compliance with the FCC's Rules and precedents concerning non-compliant Ku-band AMSS Earth station network applications. Absent the submission of another round of clarifying information as outlined in Section III of this Reply, the Application should be dismissed as defective.

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**CONSOLIDATED REPLY OF ROW 44, INC. TO PANASONIC AVIONICS' RESPONSE  
AND PANASONIC AVIONICS' NOVEMBER 15 AMENDMENT**

Row 44, Inc. ("Row 44"), by its attorneys and pursuant to Sections 25.154(e) and 1.45 of the Commission's Rules, hereby replies to two November 15, 2010 filings submitted by Panasonic Avionics Corporation ("Panasonic Avionics" or "Applicant"), a "Response to Petition of Row 44, Inc." ("PAC Response") and an Amendment to its pending application ("PAC Amendment"), which contained the same material as the PAC Response plus a revised FCC Form 312. The PAC Response, as incorporated into the Application by the PAC Amendment, corrects some of the deficiencies in Panasonic Avionics' original Application. However, there remain significant questions regarding some aspects of the proposal. Accordingly, Row 44 continues to urge the International Bureau (the "Bureau") to withhold further action on the Application until the Applicant amends its proposal to come into compliance with the FCC's Rules and precedents concerning non-compliant Ku-band aeronautical mobile-satellite service ("AMSS") Earth station network applications. As filed, and

as amended on September 14, 2010 and November 15, 2010, Panasonic Avionics' Application fails to provide all of the threshold information required for the Bureau to determine whether its AMSS Earth station network is compliant with the FCC Rules and policies and can operate without causing harmful interference to other Ku-band Fixed-Satellite Service ("FSS") users consistent with the public interest. Absent the submission of another round of clarifying information to provide the required showing, the Application should be dismissed as defective.

**I. Introduction.**

It is a fundamental requirement for processing of any Earth station application that the Applicant provide a complete record upon which the Bureau can determine whether grant of the application is consistent with the public interest, convenience and necessity. *See* 47 U.S.C. § 309(d) & (e). This is true regardless of whether those satellite operators asked to give their assent through coordination have signed letters or affidavits with respect to the proposed operations. *See* 47 C.F.R. § 25.220(d). While successful coordination is a significant factor in support of an applicant's proposal, its completion does not excuse the applicant from meeting the threshold regulatory requirements that apply to it. New applicants for AMSS authority can neither be held to a lesser standard than prior applicants for such authority, as governed by FCC precedents, nor can they be excused from providing basic technical showings that other Ku-band MSS providers must submit under the service rules applicable to Earth Stations on Vessels

(“ESV”) and Vehicle-Mounted Earth Stations (“VMES”).<sup>1</sup> In this connection, the grant of prior authority to Boeing for the same antenna, but with different system characteristics, does not relieve Panasonic Avionics of the requirement to provide full details regarding its own system’s particular operation.

To date, Panasonic Avionics seems disinclined to provide these basic showings. Instead of correcting fully the deficiencies in its initial Application brought to the Bureau’s attention in Row 44’s Petition, Panasonic Avionics appears focused in its Response on further obscuring its proposed antenna’s actual performance, dodging the legitimate questions posed, and mischaracterizing elements of the Row 44 Petition in order to create straw men that it can more easily knock down.<sup>2</sup> The Bureau should discount these efforts and require Panasonic Avionics to meet the standards that apply to MSS applicants proposing operations in the Ku-band FSS spectrum.

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<sup>1</sup> In this regard, the Applicant oddly asserts that “Panasonic’s satellite operators have examined significantly greater technical information than required by this rule in the context of coordinating Panasonic’s AMSS operations,” but does not explain why at least the portion of this clearly relevant information that relates to the rules in question should be withheld from the FCC. PAC Response at 22. Panasonic Avionics notes that much of the material is “proprietary” (*id.*), but information reviewed by system operators in connection with prior AMSS coordinations has previously been filed with the FCC pursuant to appropriate requests for confidential treatment. *See, e.g., Row 44, Inc.*, 24 FCC Rcd 10223, 10228-29 (¶ 13) (IB/OET 2009).

<sup>2</sup> For example, Panasonic Avionics devotes an entire section of the PAC Response, covering a page and a half, to refuting a claim the Row 44 did not make – i.e., it argues that there is no requirement to “provide tracking and pointing performance flight test data.” PAC Response at 17-19. Row 44 made no such claim, but simply observed that the Applicant’s own emphasis on flight test data – i.e., that it confirmed that its system operated consistently “with domestic and international requirements governing Ku-band AMSS operations” through “interference-free flight test operations of the MELCO antenna over the past several months” – merited inclusion of available data from such testing because the Applicant sought to rely upon it. *See* Petition at 13; Application at 11. If Panasonic Avionics does not provide such data, it obviously cannot rely on this “testing” to support approval of its application.



## II. Panasonic Avionics Application Remains Incomplete in Several Key Respects.

### A. **Panasonic Avionics' Effort to Incorporate by Reference the Prior Boeing Application for the MELCO Antenna is Faulty.**

In its Application, and repeatedly in the PAC Response, Panasonic Avionics maintains that it is incorporating by reference the whole of the prior Boeing application for use of the MELCO antenna. *See* Application at 7; PAC Response at i, 2-3, 5, 8, 18 and 23. As Row 44 noted in its Petition, there are multiple problems with this approach. *See* Petition at 12-13.

#### 1. **Panasonic Avionics' Application Fails to Comply With FCC Requirements.**

First, Panasonic does not comply with the FCC's explicit requirements for incorporation by reference, set forth in the instructions to Form 312. There, the FCC makes plain that applicants seeking to rely on previously submitted materials must identify the relevant information not only by file number and call sign, but also with respect to the particular exhibits and specific page numbers of the prior application that contain relevant data. *See* FCC Form 312, "Instructions for Completion of FCC Form 312 Application for Satellite Space and Earth Station Authorizations" at 2 (Incorporation by Reference).<sup>3</sup> This degree of detail is nowhere provided in Panasonic Avionics' many references to the Boeing application, even though such detail is especially necessary in this instance, where the prior filing was submitted by a different company, and more than seven years has passed since the original submission. Instead, Panasonic Avionics simply refers generally to the almost 75-page Boeing modification

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<sup>3</sup> The pertinent instruction states: "Reference documents, exhibits, or other lengthy showings already on file with the FCC may be referred to in the application without further submission only if: (a) the information is ***current and accurate in all significant respects*** and (b) the reference ***states specifically where the previously filed information can be found*** (*i.e.*, station call sign and application file number, title of proceeding, docket number or legal citations), ***including exhibit and page references***. If either of these criterion is not met, the reference documents must accompany the application" (***bold/italicized*** emphasis added; underlined emphasis in original).

application as if the entirety of that filing was germane to its own proposal. *See* Application at 7; PAC Response at i, 2-3, 5, 8, 18 and 23.

Second, the instructions also require that any cross-referenced information must be “current and accurate in all significant respects” (*id.*, *see* note 1), a standard which it is far from clear the Applicant could meet given the multiple differences in the two proposals. In general, Panasonic Avionics simply fails to acknowledge the importance of the fact that there are critical differences between its own proposal and the facilities covered by the 2003 Boeing license. By not identifying specifically the relevant portions of the earlier application, Panasonic Avionics is, in effect, seeking to impose a significant burden on FCC staff to sift through the 2003 material and identify the portions that are actually important to consider in the pending proceeding, or simply to garner acceptance of the false premise that the pending proposal varies little from Boeing’s.

2. Panasonic Avionics Ignores the Considerable Differences Between Boeing’s Licensed System and Its Own Proposal.

There are indisputably considerable differences between how Panasonic Avionics proposes to operate its Earth station network and how Boeing previously operated using a system incorporating the MELCO antenna. In particular, the current application includes different technical parameters with respect to Modulation (BPSK and QPSK instead of OQPSK); multi-user access scheme (TDMA v. CDMA); signal transmission bandwidth (160 kHz, 2.56 MHz & 9 MHZ instead of 24.3 MHz and 32.4 MHz); frequency spreading factors; and skew angle.

Also of critical significance is the fact that the Panasonic Avionics system will substitute a different modem – the iDirect modem – for the type used previously by Boeing. This change may have a substantial impact on the manner in which the system handles pointing accuracy, but any explanation of this effect is entirely absent from Panasonic Avionics’ operating description.

In particular, Boeing's 2003 modification application provided an explicit explanation of how its system's pointing accuracy would be achieved through use of received-signal strength indicator ("RSSI") modem data, as augmented by additional accuracy improving methods.<sup>4</sup> Because Panasonic Avionics is using a different modem in its configuration, a complete explanation, and perhaps field testing and data submission, is required to demonstrate that the new modem maintains pointing error to at least the same limits as the Boeing system. As Boeing explained in its application, the modem has a key function for proper pointing of the antenna and for assuring compliance with the rules. Given the complexity of the Boeing antenna pointing technique (*i.e.*, sequential lobing), Panasonic Avionics' statement that antenna pointing control and tracking performance has not been evaluated during its experimental test flights is cause for concern. See PAC Response at 18. Without careful examination, it cannot be concluded that the non-harmful-interference performance of the OQPSK modulated signal in Boeing's CDMA scheme will be repeated in the case of a BPSK or QPSK signal in a D-TDMA scheme.

Moreover, Boeing's Connexion service operated the MELCO antenna within a skew angle range substantially narrower than the range over which Panasonic proposes to operate. With AMC 4 at 101° W.L. and Telstar 6 at 93° W.L. as its sole points of communication, the maximum skew angle for the Boeing service to cover the continental United States was approximately  $\pm 25$  degrees. In contrast, the only points of communication for the proposed Panasonic Avionics service are Galaxy 12 at 91° W.L. and Estrela Do Sul at 63° W.L., requiring a maximum skew angle of at least 34 degrees to cover those portions of the United States that

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<sup>4</sup> See FCC File No. SES-LIC-20001204-02300, Technical Annex at 24.

Panasonic Avionics' system would actually be able to serve.<sup>5</sup> *See also* Section II.F., below.

Given the large difference in the skew angle range between the two systems, the past success of Boeing's operations in avoiding reported harmful interference to other Ku-band FSS users is not probative of whether Panasonic Avionics can achieve similar results, particularly when the related issues of maximum EIRP spectral density compliance and pointing accuracy are also taken into consideration, as they must be.

**B. Panasonic Avionics' Showing with Respect to Off-Axis EIRP Spectral Density along the GSO Arc is Incomplete.**

As a general rule, Panasonic Avionics seems fundamentally disinclined to provide a complete picture of its operations, relying instead on shortcuts premised not only on the alleged similarity of its proposal to Boeing's, as discussed in the foregoing section, but also on assertions that the antenna "has essentially equivalent performance" in both polarizations and across frequency bands. *See* PAC Response at 13-17. The Applicant, however, neither explains what it means by "essentially equivalent," nor why it would be unduly burdensome to produce, as previous AMSS applicants have, the full quantity of off-axis EIRP spectral density graphs that the existing Ku-band MSS rules for ESVs and VMESs require. *See* 47 C.F.R. §§ 25.222(a)(1) and 25.226(a)(1). In addition, if Panasonic Avionics does not have such data to provide to the FCC, then it seems dubious that it could confidently make the claim that its system has "essentially equivalent performance" across frequencies and polarizations.

1. A Complete Set of Measured EIRP Spectral Density Patterns Is Required.

The Applicant's assertion that "the interference characteristics of the Panasonic eXConnect system will be equal to or better than the previously authorized Connexion by Boeing

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<sup>5</sup> Due to the additive effect of aircraft banking, among other factors involving flight dynamics, it appears that Panasonic Avionics operation with a 34 degree maximum skew may not provide enough margin to provide service to significant parts of the West Coast of the United States.

system" (PAC Response at 9) is not supported by the EIRP pattern exhibits unless the EIRP spectral density skew patterns provided are based on actual measured data.<sup>6</sup> In the September amendment, where skew data was provided, the EIRP spectral density patterns submitted for skew angles greater than zero degrees are symmetrical and appear to be calculated rather than measured, while the zero degree skew angle plots do show typical asymmetries and significant differences between vertical and horizontal polarizations. *Compare* September 14<sup>th</sup> Amendment, FCC File No. SES-AMD-20100914-01163, Appendix C at Figs. 1 & 2 and PAC Response at 15-16, Figs. 1 & 2.<sup>7</sup> It seems evident from the antenna gain patterns attached to the PAC Amendment (and to the PAC Response) that the EIRP spectral density patterns should also differ significantly between horizontal and vertical polarization. If this indicates, as it would appear, that the EIRP patterns do not represent actual measured patterns, then the data provided thus far to demonstrate compliance with the FCC's EIRP spectral density mask is of little relevance to consideration of the Application. Because the MELCO antenna is a Cassegrain reflector, with an aspect ratio of approximately 3:1, the antenna patterns for a defined skew value cannot simply be interpolated from the zero degree skew patterns provided. The Applicant needs to provide the real world data representing actual antenna performance. This measured data must necessarily be obtainable given Panasonic Avionics' experimental operations.

The ultimate question, of course, is whether the MELCO antenna can maintain acceptable EIRP performance at critical angles of less than seven degrees for both polarization senses,

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<sup>6</sup> From an interference standpoint, the entire power density pattern must be considered, not just the maximum input power density from the modem into the antenna. For this reason, Panasonic Avionics' statement focused solely on maximum input power density is misleading. *See* PAC Response at 9 n.23.

<sup>7</sup> There are no EIRP spectral density patterns for skew angles greater than zero degrees in the November 15<sup>th</sup> PAC Amendment or PAC Response.

consistent with the relevant FCC Ku-band masks, not only when the antenna is perfectly aligned but when maximum antenna pointing error is taken into account.<sup>8</sup> The information submitted by the Applicant, however, does not take into account the effect of both misorientation (skew) and mispointing error, and therefore fails to answer the question whether the mask is exceeded for any skew angle at any frequency within the allocated frequency band when the maximum pointing error is properly considered. The omission of this required data is inconsistent with both the ESV and VMES rules and with the information required from previous AMSS applicants in connection with their applications. *See* 47 C.F.R. § 25.222(a)(1) and § 25.226(a)(1). In particular, Panasonic should be required to provide measured EIRP spectral density patterns for both orthogonal senses of polarization and all skew angles in the angular range -34 degrees to +34 degrees along the tangent to the orbital arc at the position of the target satellite for an angular range along the orbit and at the bottom, middle and top of each allocated frequency band plotted against the FCC mask. In the absence of a full complement of data, it is not clear how Panasonic Avionics can substantiate its claim that it will adjust its EIRP spectral density in order to remain in compliance with the FCC EIRP spectral density mask. *See also* Section II.D.

2. Measured EIRP Spectral Density Patterns Will Properly Take Into Account the Aging of the Antenna Equipment.

International Telecommunication Union (“ITU”) requirements mandate that the aging of antenna equipment be taken into consideration. *See* ITU-R M.1643, Part A, ¶ 2.2. The MELCO

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<sup>8</sup> Panasonic Avionics also attempts to discount any impact from off-axis transmissions between 90 and 180 degrees, in the direction of the aircraft fuselage. *See* PAC Response at 13 n.32. However, if an AMSS antenna transmits significant power in this angular range, the power would be reflected by the metallic surface of the aircraft, and could potentially be emitted in undesired directions within -90 to 90 degree angular range, causing greater potential for interference.

antennas originally mounted on Lufthansa aircraft have been non-operational since the termination of Boeing's Connexion service four years ago, at the end of 2006. It appears that only a small number of these antennas have been reactivated by Panasonic Avionics under its experimental license. Given the passage of time, absent field testing and measurement, it cannot be certain that any of these antennas, and specifically all those being reactivated for use, are still able to operate within their original specifications. Aging and/or corrosion of bearings, gears, aperture, and/or hollow conductors is very likely to occur during a time period of four years for an operating aircraft. If any of these antenna components has changed its properties there is a potential that key characteristics of the antenna systems are affected. Accordingly, even more so than in the case of newly-installed equipment, the current application requires the submission of antenna patterns that demonstrate actual antenna performance.

**C. Panasonic Avionics' Has Not Provided Antenna Gain Information Relative to Maximum Geographic Skew Conditions.**

In response to Row 44's Petition, Panasonic Avionics has submitted additional antenna gain patterns pursuant to Section 25.220(b) of the FCC's Rules. *See* 47 C.F.R. § 25.220(b); PAC Response/PAC Amendment at Attachment A. While these patterns provide additional important data, the PAC Amendment is still not complete.

As noted above, the MELCO antenna is a non-circular Cassegrain dish with an aspect ratio of approximately 3:1, such that the antenna pattern varies significantly with the skew angle of the antenna. In particular, the main beam and the first side lobes broaden significantly as the skew angle increases. For finite skew angles, such equipment configurations pose a special problem in that the secondary Cassegrain reflector has its own mechanical holders. There are certain skew angles at which portions of the transmitted signal are reflected by these holders, in turn affecting the overall antenna pattern.

Because the patterns for horizontal and vertical polarization for zero degrees skew differ significantly, as shown in Attachment A to the PAC Response, there is a potential for parasitic sidelobes to occur, especially considering the different antenna gains of the two polarizations. Further, because the antenna is non-circular, the two dimensional antenna pattern does also not possess a rotational symmetry. Therefore the antenna pattern for a defined skew angle along the tangent to the orbital arc at the position of the target satellite might look very different from the patterns for zero degree skew. Accordingly, Panasonic Avionics should be asked to provide complete antenna gain patterns for all skew angles up to the maximum 34 degree skew in order to demonstrate that there are no skew angles for which parasitic sidelobes occur in the angular range of approximately seven degrees to 85 degrees azimuth.<sup>9</sup>

**D. Panasonic Avionics' Application Contains Insufficient Information Concerning the Manner in Which It Maintains Pointing Accuracy to Avoid Interference to Adjacent Satellites.**

1. Because Panasonic Avionics States That It Will Not Comply with the 0.2° Antenna Pointing Accuracy Requirement, It Must Demonstrate That It Will Not Exceed the Applicable Off-Axis EIRP Limits.

As noted above, although there are no rules specifically applicable to AMSS applicants, prior blanket license applicants have been required to provide the information and certifications that are equivalent to those provided by previous applicants for MMSS (ESV) and LMSS (VMES) Earth station networks. Panasonic Avionics itself has at least provided lip service to meeting these requirements in its initial Application and in the PAC Response. *See* Application

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<sup>9</sup> Because parasitic sidelobes can have significant power, Panasonic Avionics may need to consider the potential impact of such potentially interfering patterns on adjacent satellite operators outside the  $\pm 6^\circ$  coordination zone specified under § 25.220.



at Regulatory Compliance Index and p. 14.<sup>10</sup> Nonetheless, the proffered showings fall well short of satisfying the requirements.

Sections 25.222 and 25.226 both include a requirement that applicants, in addition to providing the EIRP spectral density compliance showing discussed under Section II.B., above, shall identify the “maximum antenna pointing error” for the subject antenna and “demonstrate that the maximum antenna pointing error can be achieved without exceeding the off-axis EIRP spectral-density limits” when the applicant is unable to maintain pointing accuracy to within 0.2°. 47 C.F.R. §§ 25.222(b)(1)(iv)(A) and 25.226(b)(1)(iv)(A). With respect to this requirement, Panasonic Avionics asserts that it “identifies the pointing accuracy of the MELCO antenna as 0.25° 1-sigma.” PAC Response at 19. But as the Applicant’s subsequent explanation implies, albeit in less than accurate fashion, 0.25° 1-sigma does not identify a maximum antenna pointing error, but is instead a statistical measure of confidence that the actual value will not deviate from the mean by more than the stated value (i.e., one standard deviation from the

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<sup>10</sup> Although the Applicant cited both Sections 25.222 and 25.226, which govern ESV and VMES applicants, it principally referred to essentially the same EIRP spectral density provisions that appear in 25.218 of the FCC’s Rules. *See* Application at 15-16. Nonetheless, in its October 18, 2010 Letter, the Applicant disclaimed reliance on any of these rules, but asserted that it cited these regulations “in the context of providing additional technical information not required by Section 25.220 to further demonstrate that Panasonic’s proposed AMSS operations are compliant with the Commission’s two-degree spacing policies and will not cause harmful interference ...” *See* Letter from Carlos M. Nalda and Joshua T. Guyan, Counsel to Panasonic Avionics, to Marlene H. Dortch, Secretary, FCC, at 2 (dated October 18, 2010). It would appear that the Applicant is under the mistaken impression that it can cite to these provisions if they are believed to be somehow helpful to its cause, but otherwise to ignore them as irrelevant. Because it would make no sense as a matter of both policy and procedure to hold AMSS applicants to a lesser standard than ESV and VMES applicants, which have almost identical rules, these regulations must be considered relevant to Panasonic Avionics’ Application.

mean).<sup>11</sup> Specifically, Panasonic Avionics states that “pointing error exceeds 0.25° for a small percentage of the time based on statistical characterization of the error.” PAC Response at 19. This characterization that pointing error will only exceed 0.25° “a small percentage of the time” is highly misleading.

Assuming a normal distribution, a 1-sigma pointing error of 0.25 degrees is a statement that the antenna will be accurately pointed within  $\pm 0.25$  degrees approximately 68% of the time.<sup>12</sup> This indicates that almost one-third of the time, the pointing error will be greater than 0.25 degrees. This is not a “small percentage of the time” by any reasonable definition of that term. Moreover, one can predict based on the information the Applicant provides that approximately five percent of the time (1 in 20 pointing actions), the pointing error will be greater than 0.5 degrees, the point at which automatic shutdown would be required under one provision of the ESV/VMES Rules. Based on standard statistical distributions, a 1-sigma error of 0.25 degrees indicates that the actual maximum antenna pointing error would be

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<sup>11</sup> At any rate, since the stated mispoint of 0.25° exceeds the 0.2° pointing accuracy standard, Panasonic makes plain that it cannot satisfy the standards of Sections 25.222(a)(1)(ii)(A) or 25.226(a)(1)(ii)(A) of the Commission’s Rules. *See* 47 C.F.R. §§ 25.222(a)(1)(ii)(A) and 25.226(a)(1)(ii)(A). Thus, Panasonic is required to identify its maximum antenna pointing error and demonstrate how it will maintain EIRP spectral density within the stated limits when this maximum pointing error occurs. *See* 47 C.F.R. §§ 25.222(a)(1)(ii)(B) and 25.226(a)(1)(ii)(B).

<sup>12</sup> In order to have a 99.7% confidence level of events being within the stated value, the value must be 3-sigma.

approximately 0.75 degrees. Panasonic Avionics has not provided data regarding off-axis EIRP levels with this maximal degree of mispoint, as is required.<sup>13</sup>

2. The Applicant Must Describe How It Will Control Off-Axis EIRP To Prevent Harmful Interference When Antenna Mispoint Exceeds 0.2° Or When Harmful Interference Would Otherwise Be Caused.

The applicable rules also require that the Applicant demonstrate that the transmitter “can detect if the transmitter exceeds the declared maximum antenna pointing error and can cease transmission within 100 milliseconds” if the maximum error at which the system can maintain compliance is exceeded, and further demonstrate that transmissions will remain inhibited until the mispointing condition is rectified and pointing accuracy is restored to a value “less than or equal to the declared maximum antenna pointing error.” 47 C.F.R. §§ 25.222(b)(1)(iv)(B) and 25.226(b)(1)(iv)(B). Panasonic Avionics does not even acknowledge this requirement, let alone provide an explanation of how it can be met.

Indeed, the Applicant is not entirely consistent in identifying which compliance approach its system will employ, stating in its initial application that “[p]ointing error will be monitored and emissions will be inhibited if the pointing error ever exceeds 0.5 deg” (Application at 4), but stating in the PAC Response that “[w]hen operating in horizontal polarization,” it would “reduce its maximum EIRP spectral density when necessary to remain compliant with the mask.” PAC Response at 14. If Panasonic claims that it will be able to reduce its maximum EIRP spectral density when necessary to remain compliant with the mask, instead of simply ceasing

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<sup>13</sup> See, e.g., Letter from Scott A. Kotler, Chief, Systems Analysis Branch, FCC, to David S. Keir, Counsel to Row 44, Inc., FCC File No. SES-LIC-20080508-00570, at 2 (dated August 7, 2008)(requiring submission of EIRP spectral density graphs depicting “when the antenna is maximally misoriented in azimuth, elevation, and polarization ... under two potential situations (1) the antenna has zero mispointing with the target satellite and (2) the antenna is maximally mispointed from the target satellite before the antenna receives a cessation of emission command”).

transmission, then it must demonstrate definitively how it will determine when the mask is exceeded, and how it will ensure that the EIRP spectral density is reduced in these instances. Alternatively, it must show that it can cease transmission within 100 milliseconds, as required when the EIRP spectral density limits would be exceeded due to mispointing.<sup>14</sup> Given the significant role of the Boeing modem in achieving compliance with these requirements<sup>15</sup>, Panasonic Avionics should explain whether and how its iDirect modem is used to achieve compliance and whether its performance in this regard differs from the modem used by Boeing.

**E. It Remains Unclear Precisely What the Occupied Transmit Bandwidth Will Be for Panasonic Avionics' Operating System.**

Despite Panasonic Avionics' submission of a corrected link budget, there remain inconsistencies between the service parameters specified in its Form 312 and those for which supporting documentation is provided in the associated exhibits, including the link budget. For example, the revised link budget continues to specify a "Noise bandwidth" of 1.67 MHz for the return link. *See* PAC Response at Attachment C. However, the Form 312 does not include an emission designator for this bandwidth, instead specifying 160 kHz, 2.56 MHz and 9 MHz. *See* Application, Form 312, Schedule B at Line E47. The Application does not even include the transmit emission designator 1M67G7D, which would appear to be the value equivalent to the bandwidth specified in both the original and the revised link budgets. Accordingly, it is not clear whether the "Noise bandwidth" set forth in the link budget is the occupied bandwidth, the

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<sup>14</sup> From the receive patterns Panasonic Avionics has now submitted, it can be inferred that a pointing error of 0.5 degrees would reduce the received signal strength by a very small amount of about 0.1 dB. Taking into account the typical signal fluctuation from the satellite, the atmosphere, and aircraft vibrations of about 0.5 dB, a reduction in the received signal strength of this magnitude attributable to mispointing would not be significant enough to permit detection of the level of mispointing that would ordinarily require cessation of emissions.

<sup>15</sup> *See* page 6 & footnote 4, above.

necessary bandwidth, or the effective signal bandwidth. Based on the link budget calculation, however, it appears to state the necessary bandwidth. *See also* Application, Technical Appendix at 11 (“... the terminal is operating with a 1.66 MHz carrier bandwidth”).<sup>16</sup>

The Commission’s Rules provide that the emission designator defines the "necessary bandwidth" for the identified transmission. *See* 47 C.F.R. 2.201(a). Using the bandwidth value and the maximum EIRP spectral density from the necessary bandwidth, the maximum total EIRP per carrier can be calculated. If the maximum EIRP per carrier is reduced, as Panasonic Avionics has done in its Amendment, and the emission designator remains the same, the EIRP spectral density is reduced by the same amount that the total EIRP is reduced. Thus the 8.6 dBW/4kHz, the 41.3 dBW EIRP, and the 9 MHz emission designator provided in Form 312 are inconsistent both with each other and with the parameters in the link budget. In particular, the 0.8 dB reduction in EIRP from 42.1dB to 41.3 dB that is shown in Form 312, Schedule B is not reflected in the link budget and would actually reduce the 8.6 dBW/4kHz EIRP spectral density originally implied, and still specified in Form, 312.<sup>17</sup>

If the emission designator cannot be calculated according to Sections 2.202(c)(1), (2), or (3), then § 2.202(c)(4) applies. *See* 47 C.F.R. 2.202(c). That is, if "the transmit power is not uniform across the emission designator bandwidth, but rolls off at the edges of the bandwidth" (see PAC Response at 10), Panasonic must then provide actual measurements to verify the transmit signal bandwidth. *See* 47 C.F.R. § 2.202(c)(4). From these measurements the effective signal bandwidth can be determined by taking into account the provisions of Section 25.202(f)(1)

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<sup>16</sup> The PAC Response indicates that the effective signal bandwidth is 0.8 dB smaller than the necessary bandwidth, which would appear to reduce its link margin from 1 dB to 0.2 dB.

<sup>17</sup> In addition, the 0.8 dB reduction in EIRP should change the value for Maximum EIRP density toward the horizon reflected at Line E60 of Form 312, Schedule B.

of the Rules. *See* 47 C.F.R. 2.202(f)(1). Together with the maximum EIRP spectral density, the maximum EIRP per carrier can then be calculated. This is the type of information that the Commission has previously requested from applicants in order to clarify the nature of proposed operations.<sup>18</sup>

**F. Panasonic Avionics Continues to Refuse to Provide Required Information Concerning Geographic Coverage of its Service.**

In its Petition, Row 44 noted that Panasonic Avionics had failed to provide a complete description of its geographic coverage area (*e.g.*, a service area coverage map) illustrating the expected extent of its network's coverage capability. *See* Petition at 11. In response, Panasonic Avionics simply asserted that Row 44's observation was "erroneous" and "without foundation." PAC Response at 11. This response, however, ignores two separate sections of the FCC's Rules that squarely contradict this contention. Generally, Section 25.220 of the Commission's Rules, upon which Panasonic Avionics explicitly relies, provides that all Earth station applicants must include a "[d]etailed description of the service to be provided." 47 C.F.R. § 25.220(g)(1). More specifically, both the ESV and VMES rules require Ku-band MSS applicants to include a specific exhibit "describing the geographic area(s) in which the [service] will operate." 47 C.F.R. § 25.222(b)(3) and 47 C.F.R. § 25.226(b)(4). Panasonic Avionics must provide this information detailing the geographic scope of its service.

**III. In Light of the Omissions Outlined Above, The Commission Should Request Additional Information from Panasonic Avionics.**

To summarize the more detailed points made in the foregoing section, Row 44 provides a list below of the discrete questions that remain unanswered in or key items of information that

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<sup>18</sup> *See, e.g.*, Letter from Scott A. Kotler, Chief, Systems Analysis Branch, FCC, to David S. Keir, Counsel to Row 44, Inc., FCC File No. SES-LIC-20080508-00570, at 3 (dated August 25, 2008) (requesting a spectrum analyzer plot of a typical transmitted signal).

remain missing from Panasonic Avionics' amended Application, and which should be answered or provided, as applicable, prior to further processing of the Application.

- A. Cross-References to Boeing Application
  - 1. What specific elements of the 2003 Boeing application does PA seek to incorporate by reference, cited by Exhibit and/or page number, as applicable, as required by FCC Rules?
- B. Off-Axis EIRP Spectral Density
  - 1. Do the Off-Axis EIRP Spectral Density Patterns reflect actual measured values?
  - 2. What impact does inclusion of misorientation and mispointing data have on compliance with the FCC EIRP spectral density mask?
  - 3. What are the measured EIRP spectral density patterns for both vertical and horizontal polarization and for all skew angles from minimum to maximum along the orbital arc at the bottom, middle and top of the transmit frequency band as compared to the EIRP spectral density mask?
  - 4. How will PA know when it must reduce EIRP spectral density in order to remain in compliance with the FCC mask?
  - 5. Alternatively, what means will the Applicant employ to ensure that transmissions are ceased in the event that the EIRP spectral density mask would be exceeded?
- C. Skew Angle
  - 1. Provide antenna gain patterns showing the degree to which 25.209 mask is exceeded at the maximum skew angle.
  - 2. Are there skew angles for which parasitic sidelobes occur and exceed the FCC mask in the angular range of approximately  $7^{\circ}$  to  $85^{\circ}$  azimuth?
- D. Pointing Accuracy
  - 1. What is the maximum antenna pointing error for the MELCO antenna, as employed in Panasonic Avionics' proposed operating system?
  - 2. How does the iDirect modem help maintain pointing accuracy and/or monitor EIRP spectral density compliance?
  - 3. Does the pointing accuracy performance of the iDirect modem differ from the performance of the Boeing modem?
- E. Occupied Transmit Bandwidth
  - 1. What portion of the bandwidth is actually occupied by the system transmit signal?
  - 2. What are the spectral characteristics of the Applicant's transmitted waveform?

F. Geographic Coverage

1. Provide an exhibit describing the geographic areas in which the service will operate.
2. Provide a correct link budget that matches the corrected data in Form 312, Schedule B.

**IV. Panasonic Avionics Procedural Arguments Are Misplaced and Fundamentally Inaccurate.**

Following the filing of the PAC Response and the PAC Amendment on November 15, 2010, Row 44 filed a letter noting the different reply/comment deadlines applicable to these filings under the FCC's Rules, and stating that it planned to file a consolidated reply today, December 1, 2010, which it calculated as the later of the two applicable deadlines.<sup>19</sup> In response to the November 19<sup>th</sup> Letter, Panasonic Avionics filed responsive correspondence arguing, (1) that it was questionable whether Row 44 had a right to respond to either filing, and (2) that if such rights applied in the case of both the PAC Response and the PAC Amendment, the response deadline would be the same in each case – November 26, 2010, the day after Thanksgiving.<sup>20</sup> The first contention is frivolous, and the second is inaccurate.

Panasonic cannot legitimately contend that Row 44 is not a party to this application proceeding. Row 44 established such status on October 15, 2010, when it filed its Petition. *See* 47 C.F.R. §1.1202(d)(1). Under separate provisions of the FCC's Rules, Row 44 has a right to respond when Panasonic Avionics initiates a filing with the Commission, or a right of reply when Panasonic Avionics files any opposition or response to a Row 44 filing. *See* 47 C.F.R. §

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<sup>19</sup> *See* Letter from David S. Keir, Counsel to Row 44, to Marlene H. Dortch, Secretary, FCC, (dated November 19, 2010) (“November 19<sup>th</sup> Letter”).

<sup>20</sup> *See* Letter from Carlos M. Nalda, Counsel to Panasonic Avionics, to Marlene H. Dortch, Secretary, FCC (dated November 22, 2010) (“November 22<sup>nd</sup> Letter”).



1.45(b) & (c).<sup>21</sup> The issue addressed in Row 44's November 19<sup>th</sup> Letter was that because Panasonic Avionics filed both a response to Row 44's Petition and submitted a new amendment to the original application, there were different deadlines applicable to two almost identical filings.

While Row 44 and Panasonic Avionic agree on the reply deadline with respect to the PAC Response (November 26, 2010), notwithstanding the dispute over whether such filing is permitted, they disagree on the deadline for responding to the PAC Amendment.<sup>22</sup> Panasonic Avionics erroneously maintains that it was not required to serve this filing on Row 44, and that therefore, the filing deadline would have been ten days from the November 15<sup>th</sup> filing date – defaulting to November 26<sup>th</sup> due to the Thanksgiving holiday. *See* November 22<sup>nd</sup> Letter at 2. This is not correct. As outlined above, Row 44 is a party to the Application, and therefore any communication regarding the application, which necessarily includes an amendment, should have been served on Row 44 under the Commission's Rules. *See* 47 C.F.R. § 1.1202(b)(1) and 1.1208.<sup>23</sup> The Applicant states quite plainly in its November 22<sup>nd</sup> Letter that it failed to comply

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<sup>21</sup> *See also* 47 C.F.R. § 1.115(a)(4) (“Applications for earth station authorizations must be filed in accordance with the pleading limitations, periods and other applicable provisions of §§1.41 through 1.52 of this chapter”).

<sup>22</sup> While Panasonic Avionics asserts that Row 44 offered no “rationale or any public interest basis whatsoever” for its alternative request for a brief extension of time, if required, it goes without saying that a filing due on the day after Thanksgiving would impose on the filer a hardship unmatched by virtually any other date. Filings of a technical nature involving complex Earth station networks require coordination with multiple parties, including counsel, engineering and business personnel, consultants and others. To require such coordination among all these individuals in the midst of the busiest travel day of the year (Wed.), a secular day of family gathering celebrated by all Americans regardless of faith (Thurs.), and the ensuing holiday weekend would be too much even for the most churlish misanthrope to ask.

<sup>23</sup> The application is a restricted proceeding to which Row 44 has become a party. Any communication from the applicant to the FCC that is not served upon Row 44 is therefore a prohibited *ex parte* presentation under Section 1.1202(b)(1). Accordingly, service is required to avoid violation of the FCC's Rules.

with this requirement. *See* November 22<sup>nd</sup> Letter at 2 (“Panasonic did not serve the application upon Row 44 or any other party”). Technically, service upon Row still has not been properly effected, and thus this response is not yet due, even today.<sup>24</sup> Nonetheless, Row 44 was aware of the PAC Amendment at the time it filed its November 19<sup>th</sup> Letter, and it committed therein to filing its consolidated response today, December 1<sup>st</sup>.

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<sup>24</sup> Row 44’s counsel received a copy of the PAC Amendment by email on November 17, 2010. However, the FCC’s Rules provide that “Documents that are required to be served must be served in paper form, even if documents are filed in electronic form with the Commission...” 47 C.F.R. § 1.47(d). Even if email delivery constituted proper service, the application of the ten-day response period plus the three-day addition for mail service would yield a filing deadline of today, December 1, 2010. *See* 47 C.F.R. § 1.45(b) and 1.4(h).

**V. Conclusion.**

For all of the foregoing reasons, Row 44 continues to urge the Commission to require that Panasonic Avionics provide the remaining data, as identified herein, that is needed to complete the showing that is required of a Ku-band AMSS applicant. Action on the Application should continue to be deferred until this additional information is provided. In the event that the Applicant does not timely submit the additional information necessary to complete its required showing of compliance with the FCC's Rules, the Application would be subject to dismissal without prejudice.

Respectfully submitted,

**ROW 44, INC.**

By: \_\_\_\_\_

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December 1, 2010

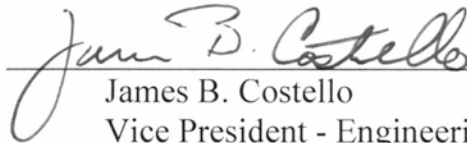
*Its Attorney*

## TECHNICAL CERTIFICATE

I, James B. Costello, hereby certify that I am the technically qualified person responsible for the preparation of the technical discussion contained in the foregoing "Consolidated Reply of Row 44, Inc. to Panasonic Avionics' Response and Panasonic Avionics' November 15 Amendment," 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 and supporting facts contained herein and found them to be complete and accurate to the best of my knowledge and belief.

December 1, 2010

By:

A handwritten signature in cursive script that reads "James B. Costello". The signature is written in black ink and is positioned above a horizontal line.

James B. Costello  
Vice President - Engineering  
Row 44, Inc.

**CERTIFICATE OF SERVICE**

I, David S. Keir, hereby certify that a true and correct copy of Row's 44, Inc.'s foregoing "Consolidated Reply of Row 44, Inc. to Panasonic Avionics' Response and Panasonic Avionics' November 15 Amendment" was sent by first-class, postage prepaid mail this 1<sup>st</sup> day of December, 2010, to the following:

Carlos M. Nalda, Esquire  
Joshua T. Guyan, Esquire  
Squire Sanders & Dempsey  
1201 Pennsylvania Avenue, NW  
Washington, DC 20044

  
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David S. Keir