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August 8, 2008

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Application of Row 44, Inc. for Special Temporary Authority
FCC File No. SES-STA-20080711-00928; Call Sign E080100

Dear Ms. Dortch

We are writing in response to the July 31, 2008 letter ("Row 44 Letter") of Row 44, Inc. ("Row 44") in support of its pending request for special temporary authority ("STA") to operate twelve aeronautical-mobile satellite service ("AMSS") earth stations mounted on commercial and private aircraft, for which an application for "full" authority is pending. *See* FCC File No. SES-LIC-20080508-00570 ("Row 44 AMSS Application"). In that letter, Row 44 asserts that under the terms of the STA it seeks, "[a]ntenna performance will be carefully monitored to ensure that the [aeronautical earth station] terminals are fully compliant with the FCC's rules[.]" Row 44 Letter at 2.

This claim is simply false – as is obvious from even a cursory review of the Row 44 AMSS Application. Notably, Row 44 itself admits that the proposed terminals would not comply with the power density limits specified in Section 25.134(g)(2) of the Commission's rules, or the antenna gain envelope in the elevation plane established by Section 25.209 of the Commission's rules. *See* Row 44 AMSS Application, Row 44 AMSS Network System Description and Technical Information, at 7-8.

A closer examination of the Row 44 AMSS Application provides additional cause for concern. As explained more fully in the Petition to Deny filed by ViaSat on June 27, 2008 (attached as Exhibit A) and the Reply filed by ViaSat on August 7, 2008 (attached as Exhibit B), the Row 44 AMSS Application is incomplete and incompatible with a two-degree operating environment. Specifically: (i) Row 44 has not provided representative two-way link budgets with respect to the proposed coverage area of all three of the satellites with which it plans to operate, (ii) Row 44 has not provided all of the antenna patterns required by Section 25.132 of the Commission's rules, (iii) Row 44 has not explained how its proposed antenna would take into account all of the flight dynamics of a moving aircraft, (iv) Row 44 has presented inconsistent information related to the technical parameters (including power density levels) of its proposed system, and (v) Row 44 has misstated the antenna gain of its terminals, artificially depressing

transmit antenna gain and suggesting that the proposed antenna would comply with the requirements of Section 25.209 of the Commission's rules in certain respects – when in fact it would not. The Commission has already acknowledged the incomplete nature of the Row 44 AMSS Application, and just yesterday asked Row 44 to provide additional information about its proposed network. *See* Letter from Scott A. Kotler, Chief, Systems Analysis Branch, Satellite Division, International Bureau to David S. Keir (Aug. 7, 2008).

Consistent with Commission precedent, ViaSat believes that the Row 44 AMSS Application should be dismissed as defective under Section 25.112 of the Commission's rules. Under these circumstances, grant of STA would be premature, at best.

Sincerely yours,

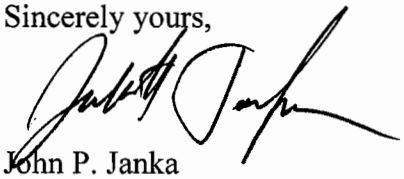

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EXHIBIT A

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FILED/ACCEPTED
JUN 27 2008
Federal Communications Commission
Office of the Secretary

In the Matter of	)	
	)	
Row 44, Inc.	)	
	)	
Application For Authority To Operate Up To 1,000 Technically-Identical Aeronautical-Mobile Satellite Service Transmit/Receive Earth Stations Aboard Commercial And Private Aircraft	)	FCC File No. SES-LIC-20080508-00570 Call Sign: E080100

PETITION TO DENY OF VIASAT, INC.

ViaSat, Inc. ("ViaSat"), pursuant to Section 309(d) of the Communications Act, as amended, and Section 25.154 of the Commission's rules,[1] petitions the Commission to deny the application of Row 44, Inc. ("Row 44") for authority to provide aeronautical-mobile satellite service ("AMSS") in the Ku-band ("Application"). Row 44 seeks to deploy this service through aeronautical earth stations ("AESs") located on commercial airplanes that would travel to, from and within the 48 contiguous states, Alaska, and Hawaii. ViaSat has substantial business interests in the operations of "traditional" VSAT networks, as well as the developing Ku-band AMSS industry. In fact, ViaSat itself holds a Commission license to provide AMSS services in the Ku-band.[2] As such, ViaSat has a distinct interest in ensuring that no authorized AMSS system poses an interference risk to existing Ku-band satellite operations.[3]

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1 47 U.S.C. § 309(d); 47 C.F.R. § 25.154.

2 *See ViaSat, Inc. Application for Blanket Authority for Operation of 1,000 Technically Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters*, 22 FCC Rcd 19964 (2007) ("*ViaSat AMSS Authorization Order*").

3 Accordingly, ViaSat has standing to file this Petition to Deny. *See FCC v. Sanders Brothers Radio Station*, 309 U.S. 470 (1940).

As explained below, Row 44's Application is materially incomplete. Moreover, Row 44 fails to demonstrate that its proposed AMSS system would be two-degree compatible. Accordingly, ViaSat respectfully requests that the Commission deny the Application.

I. INTRODUCTION AND BACKGROUND

In 2003, the Commission created a secondary allocation for mobile-satellite services, including AMSS, in the 14.0-14.5 GHz uplink band.[4] At present, there are no specific Commission service rules governing the licensing or operation of AMSS in the 14.0-14.5 GHz band, and there is no domestic allocation for AMSS in the 11.7-12.2 GHz downlink band. During the pendency of a rulemaking proceeding that seeks to address those issues, the Commission has applied its rules for very small aperture terminals ("VSATs") in the fixed-satellite service ("FSS") in evaluating applications for authority to provide AMSS, paying particular attention to the off-axis power density and antenna pointing concerns presented by the use of mobile AESs in the Ku-band.[5]

Row 44's Application seeks authority to provide AMSS in the Ku-band using the Horizons-1, AMC-2, and AMC-9 geostationary satellites. Included in the Application is a lengthy exhibit entitled "System Description and Technical Information" ("Row 44 System Description"). Significantly, that exhibit omits forward link budgets and elevation patterns for the proposed AES antenna.

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4 *Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range*, 18 FCC Rcd 23426, at ¶ 76 (2003).

5 *See, e.g., ViaSat AMSS Authorization Order* at ¶ 11 ("Although not directly applicable to AESs, the Commission's rules for Fixed-Satellite Service (FSS) earth stations provide guidance as to the technical criteria for evaluating AESs' off-axis e.i.r.p. density.").

II. THE APPLICATION IS INCOMPLETE AND SHOULD BE DISMISSED AS DEFECTIVE

As an initial matter, the Application is incomplete, and as such should be dismissed as defective. Among other things, Row 44 fails to provide representative link budgets for both segments of the proposed communications link, which are essential to permit the Commission and the public to assess whether the proposed system would comply with the Commission's rules and operate as described. Row 44 includes only two link budgets in its Application, both of which are return link budgets that assume a remote AES located over the vicinity of Fairbanks, Alaska using the Horizons-1 satellite. While Row 44 claims that these links budgets are "examples,"[6] it makes no attempt to show that these examples are *representative* of the operations of the proposed system. In fact, they are not.

First, Row 44 fails to include any forward link budgets (the communications link from the hub to the remote terminals on the airplanes). Second, Row 44 does not include any link budgets for communications over two of the proposed satellites – AMC-2 and AMC-9 – and does not claim that the operational parameters of these satellites are identical to those of Horizons-1. Third, Row 44 does not include link budgets that represent the differences in the coverage pattern of Horizons-1 over North America, even though, as explained in the attached Technical Annex, the operational parameters of the proposed system over Horizons-1 would change markedly across the proposed service area. Simply put, the link budgets included in the Application are insufficient to allow the Commission to conclude that the proposed system would be compatible with a two-degree spacing environment.

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[6] Row 44 System Description at 11.

In addition, Row 44 fails to supply any transmit elevation patterns, despite the requirement in Section 25.132(b) of the Commission's rules to submit such patterns.[7] Understanding the performance of the proposed antenna in the elevation plane is critical in the case of an AES because of the way that an airplane banks, turns, and otherwise changes direction during flight. While such an omission would give cause for concern under any circumstances, the omission of these transmit elevation patterns is particularly troubling here because Row 44, unlike other AMSS applicants, has not demonstrated that it has conducted extensive transmit/receive flight testing of its proposed antenna to establish that its AMSS system can operate on a moving platform with significant pitch, yaw, and roll without causing harmful interference into adjacent satellite operations.[8]

III. ROW 44 FAILS TO DEMONSTRATE THAT ITS PROPOSED AMSS SYSTEM WOULD BE TWO-DEGREE SPACING COMPATIBLE

Row 44 fails to demonstrate that its proposed AMSS system would be two-degree spacing compatible; in fact, the Application suggests the opposite. First, it appears that the proposed system would not comply with Section 25.134(g)(1) of the Commission's rules, which limits the maximum transmitter power density of routinely-processed VSATs.[9] Row 44 claims compliance, assuming a carrier bandwidth of 1600 kHz – including both the spectrum occupied by the signal (256 kHz or 512 kHz) and large guard bands that are approximately three to six

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7 *See* 47 C.F.R. § 25.132(b).

8 Row 44 asserts that its user terminal would constantly monitor the "skew angle" between the terminal and the satellite to which it is transmitting, and cease transmissions if this angle exceeds +/- 25 degrees. Row 44 System Description at 9. However, it is unclear whether Row 44's calculation of this angle would be based on the aircraft's location alone, or whether it would account for pitch, yaw, and roll as a result of aircraft maneuvers. Notably, for commercial jets a bank angle in the range of 25 to 30 degrees is not uncommon.

9 47 C.F.R. § 25.134(g)(1).

times the size of the bandwidth of the specified signal.[10] This approach is simply incorrect and yields an artificially low power density. The Commission is clear that compliance (or non-compliance) with Section 25.134(g)(1) must be measured across the "bandwidth occupied by the symbol rate."[11] As explained in the attached Technical Annex, if compliance with Section 25.134(g)(1) is evaluated over the bandwidth of the signal, it is clear that Row 44's system would be more than 2.2 dB over that power density limit.

While this fact alone is cause for concern, there is reason to suspect that those user terminals would need to operate at higher power levels than those specified to achieve the throughput described in the Application, yielding even higher, non-compliant power densities. Row 44 proposes to use Time Division Multiple Access (TDMA) to permit multiple users to access the same spectrum.[12] In a TDMA system, each user is assigned only a portion of each time frame on the system, and consequently the effective data rate *per user* is only a portion of the data rate *for the system*. Thus, in order for the proposed system to achieve a throughput of 256 kbit/s – the minimum throughput that Row 44 suggests would support its service – the system would need to provide a much higher burst rate *per link*, which would require each user terminal to operate at power levels higher than those reflected in the link budgets included in the Application.[13]

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10 Row 44 System Description at 11. Row 44 provides no explanation as to why it has used a spacing factor of 6.25 to specify a carrier bandwidth of 1600 kHz.

11 *See Routine Licensing of Large Networks of Small Antenna Earth Stations Operating in the 12/14 GHz Frequency Bands*, Notice of Proposed Rulemaking, 5 FCC Rcd 2778, at ¶ 5 n.12 (1990) (noting that power density is calculated based on the "bandwidth occupied by the symbol rate[.]").

12 Row 44 System Description at 3.

13 Other portions of the Application suggest that the proposed system may not operate in accordance with the parameters specified therein. For example, the Application specifies antenna gains of 31.8 dBi in the 11.7 GHz receive band, but only 28.6 dBi in the 14.47

Nor does the proposed system comply with Section 25.222(a)(6) of the Commission's rules, which require VSATs to maintain a pointing error of less than 0.2 degrees.[14] Row 44 concedes that Section 25.222(a)(6) "may reasonably be extended to cover all Earth stations in motion operating on the Ku-band FSS frequencies" and claims that its proposed user terminals would meet this requirement.[15] Although the Commission's rules require Row 44 to demonstrate that its system would meet a tracking accuracy of 0.2 degrees *peak*,[16] Row 44 claims only that its system would meet a tracking accuracy of 0.2 degrees *root mean square* (RMS).[17] As the Technical Annex details, "peak" and "RMS" tracking accuracy are two very different standards, and Row 44's use of RMS would allow for some measure of significant mispointing in the direction of other geostationary spacecraft.

Although Row 44 claims that the proposed user terminals would cease transmissions within 100 milliseconds if the user terminal antenna were mispointed by more than 0.5 degrees,[18] it is unclear how Row 44 would achieve that level of performance when sampling would not occur quickly enough to facilitate that level of performance. Row 44 proposes to use closed loop

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GHz transmit band, which is highly unusual because antenna gain typically increases with frequency. If there is a valid technical explanation for why Row 44's antenna defies expectations in this respect, the Application does not provide it. If there are errors in how Row 44 calculated transmit antenna gain, that may affect whether the antenna pattern in fact complies with Section 25.209 of the Commission's rules. 47 C.F.R. § 25.209.

14 47 C.F.R. § 25.222(a)(6).

15 Row 44 System Description at 10-11 n.7.

16 In promulgating Section 25.222(a)(6), the Commission made clear its intent to make the rule "consistent with the technical parameters contained in Resolution 902," which requires a tracking accuracy within 0.2 degrees peak. *See Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/ 11.7-12.2 GHz Bands*, 20 FCC Rcd 674, at ¶ 104 n.271 (2005).

17 *Id.* at 10.

18 Row 44 System Description at 10.

tracking as a means to ensure that its user terminal antennas are properly pointed toward the target satellite.[19] As explained in the attached Technical Annex, an antenna utilizing closed loop tracking must acquire several samples around its offset tracking loop in order to determine its orientation, whether it is mispointed, and in what direction. Practically speaking, because of the minute changes in antenna gain that would occur as a result of 0.2° to 0.5° of angular mispointing, it would be extremely difficult – if not impossible – for the antenna to detect mispointing of such magnitude at all. At a minimum, however, effective tracking would require the antenna to collect many E_s/N_o samples. Row 44 has indicated that such samples would be output by the user terminal's modem every 100 milliseconds. Considering that the antenna would need to gather multiple samples before determining whether it is in fact mispointed, it would not be possible for the antenna to determine that it is mispointed, and then inhibit transmissions, within a single 100 millisecond period as claimed by Row 44.

* * * * *

As explained above, the Application is incomplete and fails to demonstrate that the proposed system is two-degree compatible. Accordingly, ViaSat respectfully requests that the Commission deny the Application.

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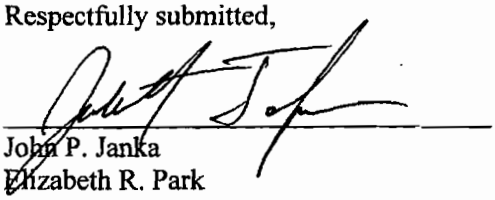
19 *Id.* at 9-10.

Respectfully submitted,



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June 27, 2008

TECHNICAL ANNEX

This Technical Annex provides technical support for arguments presented in the foregoing ViaSat Petition to Deny the Application of Row 44, Inc. ("Row 44") for authority to provide aeronautical-mobile satellite service ("AMSS") in the Ku-band. Specifically, this Annex details Row 44's failure to (i) supply representative link budgets reflecting the differences in coverage pattern of the Horizons-1 satellite across North America; (ii) supply transmit elevation patterns; (iii) provide a consistent and correct statement of its proposed carrier bandwidth; (iv) properly calculate EIRP spectral density; (v) properly account for the proposed use of TDMA architecture; (vi) demonstrate compliance with the Commission's antenna pointing accuracy requirements; (vii) demonstrate the ability to cease transmissions within 100 milliseconds of a mispointing event; and (viii) explain the facial inconsistency in Row 44's stated antenna gain performance.

1. ROW 44'S FAILURE TO SUPPLY REPRESENTATIVE LINK BUDGETS

Row 44 includes only two link budgets in its Application, both of which are return link budgets assuming a remote AES located at Fairbanks, Alaska and served by the Horizons-1 satellite. Among other things, these link budgets fail to reflect the diverse geographic locations from which Row 44 user terminals may operate. In particular, in at least a portion of the proposed service area, Row 44's AESs would need to operate at higher power in order to facilitate effective communications.

The Application specifies a remote G/T contour for the satellite of 2.9 dB/K for Fairbanks, Alaska. However, during the flight path from Fairbanks to CONUS, the spacecraft G/T would fall to below 2 dB/K and likely to 0 dB/K or less for some flight paths.

The Application specifies a clear sky RF head back off of 2.6 dB when operating at Fairbanks with a 512 kbit/s data rate. Using that additional available power to compensate for a lower spacecraft G/T, the Row 44 AES could support, at best, 512 kbit/s operations down to a 0.3 dB/K G/T contour. However, as discussed in Section 4 below, an AES operating from Fairbanks would already operate at an antenna input power density level approximately 2.2 dB above the Section 25.134 limit. Additional increases in power used to compensate for lower G/T would

exacerbate the degree to which the Row 44 system already fails to comply with Section 25.134(g)(1) of the Commission's rules.

At the 256 kbit/s data rate, Row 44 indicates that the clear sky RF head back off is 5.6 dB for the Fairbanks, AK location. Increasing power further to support operation in areas where the satellite G/T falls below the given 2.9 dB/K value would again only increase the amount by which Row 44 is non compliant with Section 25.134. For example, if the G/T were to fall to -2.7 dB/K, the user terminal would need to operate at maximum power to close the link, resulting in an antenna input power density of 7.8 dB above the Section 25.134 limit (2.2 dB + 5.6 dB).

2. ROW 44'S FAILURE TO SUPPLY TRANSMIT ELEVATION PATTERNS

Row 44 fails to include any transmit elevation patterns in the Application. Section 25.132(b) of the Commission's rules requires earth station applicants to submit co-polarized patterns for each of the two orthogonal senses of polarization from 0 to 45 degrees in elevation. While Row 44's failure to comply with the rule this would give cause for concern under any circumstances, the omission of these patterns is particularly troubling because there is no indication that Row 44 has conducted extensive testing of its proposed antenna under an experimental license like other AMSS applicants (including ViaSat). Such testing is critical to demonstrate the actual performance of the antenna in a dynamic environment. Row 44's aeronautical system, which does not conform to the U.S. Table of Frequency Allocations, when operating on a moving platform with significant pitch, yaw, and roll, has the potential to direct radiation intended for the elevation plane instead into the direction of adjacent spacecraft in the geostationary orbital arc. Thus, an understanding on Row 44's transmit parameters in the elevation plane, as well as the real-world performance of its antenna technology, is essential to assessing the potential for harmful interference into adjacent satellite operations.

3. ROW 44'S ARTIFICIAL INFLATION OF STATED CARRIER BANDWIDTH

The Application claims a carrier bandwidth of 1600 kHz, even though the link budgets included in the Application report noise bandwidths of 256 kHz and 512 kHz, respectively. It therefore appears that Row 44's claimed carrier bandwidth is not accurate.

The Application lists emission designator 1M60G7D. Emission designators are intended to designate the *necessary* or *occupied* bandwidth of an emission, as opposed the bandwidth *assigned* or *allocated* by the system. Thus, Row 44's choice of emission designator implies that the system would actually use 1600 kHz of bandwidth when transmitting from its user terminals.

Notably, the Application specifies the user terminal modulation type as offset-QPSK, with a transmitted signaling rate of either 256 or 512 kbit/s, and a forward error correction of rate 1/2, 2/3, or 4/5 turbo code. With respect to the 256 kbit/s case, the necessary and occupied bandwidth for such a transmission can be calculated by: (i) multiplying the user data rate of 256 kbit/s by 2, because the Rate 1/2 FEC encoder outputs two encoded bits per inputted user data bit; and (ii) multiplying this result by 1/2, because QPSK modulation transmits two bits per symbol. The result, 256 kHz, is usually considered *necessary* bandwidth, or noise bandwidth, of the signal.

To determine *occupied* bandwidth, necessary bandwidth is normally multiplied by a bandwidth expansion factor of approximately 1.2 to 1.4 in order to account for the square root raised cosine (SRRC) filtering typically applied to modem PSK modulators. These calculations would result in an occupied bandwidth of between 307.2 kHz and 358.4 kHz.

The link budgets included in the Application specify a noise bandwidth of 256 kHz for the 256 kbit/s case, which is consistent with the calculation above. However, Row 44 proceeds to multiply the signal by a carrier spacing factor of 6.25 to specify a final carrier spacing value of 1600 kHz. No explanation is given for the carrier spacing factor, or why a signal with at most 358.4 kHz of occupied bandwidth would need 1600 kHz of satellite bandwidth allocated to it.

4. ROW 44'S INCORRECT CALCULATION OF EIRP SPECTRAL DENSITY

The Application incorrectly calculates EIRP spectral density for purposes of assessing compliance with Section 25.134(g)(1), which provides that applications to provide VSAT service in the Ku-band will be routinely processed only if "[t]he maximum transmitter power spectral density of a digital modulated carrier into any GSO FSS earth station antenna shall not exceed -14.0 - 10log(N) dB(W/4 kHz)," where N=1 for TDMA systems. Row 44 claims compliance with Section 25.134(g)(1) based on use of 1600 kHz of bandwidth. However, the link budgets prepared by Row 44 are based on noise bandwidths of 256 kHz and 512 kHz, respectively. In other words,

Row 44 only plans to use, at most, 512 kHz of spectrum per carrier. Pursuant to Commission precedent, compliance with Section 25.134(g)(1) must be measured across this used spectrum; Row 44 cannot artificially deflate its power spectral density by including guard band spectrum in its calculations.

When these carrier widths of 256 kHz and 512 kHz are considered, it is clear that Row 44's system would not comply with Section 25.134(g)(l). With respect to the 256 kbit/s case, the Application specifies an uplink EIRP of 34.9 dBW, with a transmit antenna gain of 28.6 dBi. Therefore, the input power density into the antenna would be 6.3 dBW/256 kHz, or -11.76 dBW/4 kHz. This value is 2.238 dB above the FCC 25.134 limit of -14 dBW/4 kHz. Similar calculations show the same 2.2 dB exceedance in the 512 kbit/s case.

5. ROW 44'S FAILURE TO ACCOUNT FOR ITS USE OF TDMA ARCHITECTURE

The link budgets included in the Application fail to account for the TDMA architecture of the proposed system. Row 44 proposes to use the Hughes HX system, which employs Time Division Multiple Access (TDMA) to permit multiple users to access the same spectrum. In the Hughes HX TDMA system, a 45 millisecond (ms) frame length is defined, with individual users assigned to some number of time slots of each frame in which they may transmit. The greater the number of users assigned to share a particular inbound frequency channel, the less time per frame each user is granted access the channel. For example, assuming that a frame is to be shared equally by 4 users, each user may then transmit for 1/4th of the frame, or 11.25 ms.

Because each user transmits only for a portion of the frame, the effective data rate *per user* is only a portion of the data rate *for the system.* For example, if each user is transmitting at 256 kbit/s, but for only 11.25 ms per frame, the effective data rate at which each user transmits is 64 kbit/s (256 kbit/s x 11.25 ms/frame x 22.222 frame/s). If a user desires to transmit more data per second (i.e., per each frame), that user must either use a greater portion of the frame or transmit at a higher signaling rate during the allocation portion.

In practice, the actual data rate would be somewhat lower because a portion of the 45 ms frame is set aside for slotted Aloha contention access. These slots are used by terminals in the Hughes HX system to request bandwidth from the system.

Row 44's link budgets suggest that user terminals would operate with a throughput of 256 kbit/s or 512 kbit/s, making the effective throughput for each user of Row 44's TDMA system substantially lower. However, a lower throughput is unlikely to support the proposed AMSS operations. Accordingly, each AES would need to either transmit for a longer portion of the frame, or at a higher signaling rate. Since Row 44 proposes to operate on a TDMA basis, it is simply not feasible for each AES to use a larger portion of the frame. Therefore, transmissions at a higher data rate seem to be the most plausible option. This is consistent with the choice of emission designator.

As noted above, Row 44 has specified an emission designator of 1M60G7D, or a 1600 kHz wide carrier. Based on Row 44's proposed use of OQPSK modulation, and rate 1/2 FEC, this bandwidth could support a throughput of 1600 kbit/s, which would in turn support an effective throughput per user of at least 256 kbit/s (assuming each user transmitted for at least 7.2 ms per 45 ms frame). This would allow Row 44 to actually operate the system with aircraft transmitting at 1600 kbit/s, as opposed to 256 kbit/s or 512 kbit/s as stated in Row 44's link budgets. However, in order for the desired E_b/N_o or C/N to remain constant as the data rate increases, the transmitted power must increase by the same ratio. For the 256 kbit/s case where the burst data rate increases to 1600 kbit/s, the transmit power must increase by a ratio of 6.25:1 or 7.96 dB. This higher transmit power is not reflected in the Application, and could significantly increase the risk of harmful interference into adjacent satellite operations.

Finally, in addition to the power increases above, Row 44 makes no mention of the increased power density due to collisions in the slotted Aloha contention access time slots when multiple aircraft request bandwidth from the system at the same time. In conventional VSAT systems with compliant antennas, the momentary off-axis power increase due to collisions in contention access channels is of some concern, but in a mobile network with non-compliant antennas operating at higher than allowable input power densities, the increased off-axis power density due to contention access is particularly troublesome.

6. ROW 44'S FAILURE TO DEMONSTRATE COMPLIANCE WITH POINTING ACCURACY REQUIREMENTS

The Application fails to demonstrate that the proposed system would comply with Section 25.222(a)(6) of the Commission's rules, which has been applied to require blanket licensed AESs to maintain a pointing error of less than 0.2 degrees between the orbital location of the target satellite and the axis of the main lobe of the earth station antenna. Row 44 claims to meet this requirement. More specifically, though, Row 44 claims to meet a tracking accuracy of 0.2 degrees root mean square, and the ability to cease transmissions within 100 ms if the antenna is mispointed beyond 0.5 degrees.

Even assuming that the user terminal antenna would be capable of providing tracking accuracy within 0.2 degrees root mean square, though, Row 44 makes no claim that it is able to provide a tracking accuracy of within 0.2 deg peak, in a manner consistent with Annex 2 to ITU RES 902-4. In promulgating Section 25.222(a)(6), the Commission made clear its intent to make that rule " consistent w ith the technical parameters contained in Resolution 902." Thus, the Application does not demonstrate Row 44's compliance with Section 25.222(a)(6).

Row 44's calculations, which utilize a root mean square approach, provide insight only into the "average"[1] value of the signal under the peak. As such, a signal with a huge momentary excursion from the base to peak could have the same root mean square value as a signal with a smaller excursion from the base with a longer duration. Thus, the root mean square value would not indicate the degree by which the antenna is truly mispointed at any given time, and thus would not adequately protect adjacent satellite operations from harmful interference during a large excursion.

7. ROW 44'S FAILURE TO DEMONSTRATE THE ABILITY TO CEASE TRANSMISSIONS WITHIN 100 MS OF MISPOINTING EVENT

The Application fails to demonstrate that the AES antenna would cease transmissions within 100 milliseconds of a mispointing event. Row 44 proposes to use closed loop tracking to

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[1] The average and root mean square values of a signal differ slightly, and average as used in this context is intended to be a descriptive approximation.

ensure that its user terminal antennas are properly pointed at the target satellite. Row 44 also claims that "[a]ll emissions shall automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the antenna exceeds 0.5°." Closed loop tracking typically requires some form of offset scanning, where the antenna is pointed away from boresight to develop an error signal upon which to track. An antenna utilizing closed loop tracking must acquire several samples around its offset tracking loop in order to determine its orientation, how far mispointed it is, and in what direction.

Row 44 has indicated that E_s/N_o information would be output by the user terminal's modem every 100 milliseconds. A number of these E_s/N_o data points would be required for each offset scanning cycle, and a number of scanning cycles would be required before the tracking loop could converge. Further, multiple E_s/N_o samples indicating a departure from the current average value would be required for the antenna control unit to determine that pointing accuracy is outside the allowed 0.5 degree limit. Thus, it is simply not possible for the antenna to determine through a single 100 millisecond sample that it is mispointed by more than 0.5 degrees, and then inhibit transmissions, all within the same 100 millisecond period.

Row 44 also fails to distinguish between pointing accuracy in the azimuth and elevation planes. While Row 44 has not furnished elevation antenna patterns, it has specified the height and width of the AES antenna aperture. The beamwidth of the antenna in the elevation and azimuth planes may be inferred from this information using established antenna theory formulas. Based on this beamwidth, it is possible to determine that a 0.2 deg offset in elevation pointing would yield a change in gain of roughly 0.01 dB, while a 0.5 deg offset in elevation pointing would yield a change in gain of roughly 0.06 dB. In the azimuth plane, a 0.2 degree offset from boresight would yield a change in gain of roughly 0.15 dB, whereas a 0.5 degree offset from boresight would yield a change in gain of roughly 0.9 dB.

The "N_o" component of the "E_s/N_o" signal, which provides the information sampled by the antenna for tracking purposes, is composed of thermal noise, adjacent satellite downlink interference, cross-polarization interference, and other factors. These components are not static and vary considerably from instant to instant, often with swings of more than 0.5 dB. As such, in the elevation plane it would be difficult to distinguish a mispointing event from normal fluctuation

of the signal. A large number of 100 ms E_s/N_o samples would be required for the ACU to establish a meaningful value for E_s/N_o and resolve signals in the 0.06 dB range.

Realistically, effective tracking likely would require at least a 0.5 dB of E_s/N_o change, which would correspond to roughly 1.5 degrees of elevation offset and roughly a 0.4 degree of offset from antenna boresight in the azimuth plane.

Row 44 does not discuss how its E_s/N_o based closed loop tracking system would avoid mispointing due to the presence of adjacent satellites. The tracking system has no way of distinguishing between thermal noise and other noise sources, and a tracking system which is reliant on N_o as a component of its closed loop tracking would attempt to point the antenna to the best E_s/N_o. A higher power density satellite operating to the East side the target satellite would result in a higher N_o component from the East due to the greater downlink interference on that side.

The tracking system would be biased towards the Western satellite because while the E_s component would be reduced somewhat when the antenna is pointed to the West, the N_o component would fall off faster, and the resultant E_s/N_o would be higher, even though the antenna would be mispointed to the West.

8. ROW 44'S FAILURE TO EXPLAIN INCONSISTENT ANTENNA GAIN PERFORMANCE

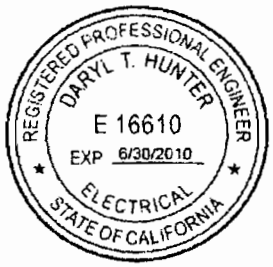
The Application specifies antenna gains of 28.6 dBi at 14.47 GHz and 31.8 dBi at 11.7 GHz. This is highly unusual, since antenna gain typically increases with frequency, as opposed to decreasing with frequency, as Row 44 suggests would be the case with respect to its antenna. Using an efficiency value of 65%, which is typical, and calculating backwards from the receive antenna gain of 31.8 dBi yields an antenna area of 0.122 m^2. Inputting this area back into the gain formula using the transmit frequency yields a gain of 33.64 dBi – or 5.05 dB over Row 44's claimed gain of 28.6 dBi.

It should be noted that Aerosat, the manufacturer of the antenna that Row 44 proposes to employ, has published antenna brochures specifying the transmit gain of its antenna as 33.3 dBi, which is within 0.34 dB of the 33.64 dBi calculated above.

If there is a valid technical explanation for why Row 44 is stating the transmit antenna gain as only 28.6 dBi, the Application includes no such explanation.

ENGINEERING INFORMATION CERTIFICATION

I hereby certify that I am the technically qualified person responsible for reviewing the engineering information contained in the foregoing submission, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this pleading, and that it is complete and accurate to the best of my knowledge and belief.



Daryl T. Hunter, P.E.
ViaSat, Inc.
6155 El Camino Real
Carlsbad, CA 92009-1699

Dated: June 27, 2008

DECLARATION

I, Daryl T. Hunter, hereby make the following declarations under penalty of perjury. I understand that this Declaration will be submitted to the Federal Communications Commission.

1. I am Director, Regulatory Affairs of ViaSat, Inc.

2. I have reviewed the foregoing Petition to Deny of ViaSat, Inc.

3. I certify that the facts set forth in the foregoing Petition to Deny of ViaSat, Inc. are true and correct to the best of my knowledge.

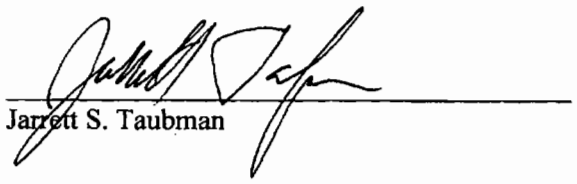
Daryl T. Hunter

Executed June 27, 2008

CERTIFICATE OF SERVICE

I, Jarrett S. Taubman, hereby certify that on this 27th day of June, 2008, I served a true copy of the foregoing Petition to Deny of ViaSat, Inc. by first class mail, postage pre-paid upon the following:

David S. Keir
Leventhal Senter & Lerman PLLC
2000 K Street, NW
Suite 600
Washington, DC 20006



Jarrett S. Taubman

EXHIBIT B

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Row 44, Inc.	)	
	)	
Application For Authority To Operate Up To 1,000 Technically-Identical Aeronautical-Mobile Satellite Service Transmit/Receive Earth Stations Aboard Commercial And Private Aircraft	)	FCC File No. SES-LIC-20080508-00570
	)	Call Sign: E080100

REPLY OF VIASAT, INC.

FILED/ACCEPTED
AUG - 7 2008
Federal Communications Commission
Office of the Secretary

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Counsel for ViaSat, Inc.

August 7, 2008

Summary

ViaSat's Petition to Deny demonstrates that Row 44's application for authority to provide aeronautical-mobile satellite service ("AMSS") in the Ku-band is materially incomplete and incompatible with a two-degree spacing environment. Specifically, ViaSat's Petition explains that Row 44 has not adequately demonstrated how its secondary and non-conforming AMSS system would protect the Fixed Satellite Service (FSS) systems for which the Ku-band is allocated on a primary basis. Row 44's Opposition fails to address these issues.

As an initial matter, (i) ViaSat is a "party of interest" entitled to participate in this proceeding, (ii) the Application is not entitled to streamlined processing under Section 25.220 of the Commission's rules, which is inapplicable to AMSS license applications, and (iii) the Commission's acceptance of the Application for filing does not signify that it is "substantially complete" – as the Commission's request for additional information from Row 44, released earlier today, vividly illustrates. The Commission is obligated to carefully review Row 44's Application to ensure that grant of the required waivers would not undermine the rules with which Row 44 would not comply.

More fundamentally, Row 44's Application remains defective, as Row 44 (i) has failed to include representative link budgets for both the transmit and receive functions of its AMSS terminals, over the expected service area of the three different spacecraft that Row 44 proposes to use, (ii) has failed to provide all of the transmit elevation patterns required by Section 25.132(b) of the Commission's rules, and (iii) has failed to explain how its untested antenna would adequately account for all of the dynamics of a moving aircraft. Neither the Commission nor the public can fully evaluate the Application in the absence of this information.

Moreover, Row 44 again fails to demonstrate that its proposed operations would be compatible with a two-degree operating environment. Specifically: (i) while Row 44 now claims for the first time that its proposed system would use spread spectrum modulation, the parameters specified in the Application are inconsistent with the use of such modulation, (ii) Row 44 fails to demonstrate that its proposed system would meet the tracking accuracy specified in Section 25.222 of the Commission's rules, and (iii) Row 44 has misstated the antenna gain of its terminals, artificially depressing transmit antenna gain and suggesting that the proposed antenna would comply with the requirements of Section 25.209 of the Commission's rules – when in fact it would not.

For these reasons, among others, ViaSat respectfully requests that the Commission dismiss or deny the Application. If the Commission does grant the Application, the Commission should, consistent with previous grants of AMSS license applications, (i) require Row 44 to track its terminal locations to facilitate the enforcement of the requirement that Row 44 operate on a secondary, non-interference basis, and (ii) require Row 44 to file a report with the Bureau one year after commencing commercial operations addressing installed equipment configurations, EIRP compliance, and compliance with assigned bandwidth/emission designators, and including a table of reported interference events.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Row 44, Inc.	)	
	)	
Application For Authority To Operate Up To 1,000 Technically-Identical Aeronautical-Mobile Satellite Service Transmit/Receive Earth Stations Aboard Commercial And Private Aircraft	)	FCC File No. SES-LIC-20080508-00570 Call Sign: E080100

REPLY OF VIASAT, INC.

ViaSat, Inc. ("ViaSat") replies to the Opposition filed by Row 44, Inc. ("Row 44") on July 23, 2008 in this proceeding. Row 44 filed its Opposition in response to ViaSat's Petition to Deny ("Petition") Row 44's application for authority to provide aeronautical-mobile satellite service ("AMSS") in the Ku-band ("Application").[1] Row 44's Application is a "non-routine" application that relies on waivers of the Commission's rules. As detailed in ViaSat's Petition, Row 44's Application is materially incomplete and does not demonstrate that its proposed operations are compatible with a two-degree spacing environment. Further, Row 44's Opposition fails to address the issues that ViaSat has raised. Accordingly, the Commission should dismiss or deny the Application.

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[1] ViaSat filed its Petition on June 27, 2008. Accordingly, Row 44 should have filed its Opposition no later than July 10, 2008. *See* 47 C.F.R. §§ 25.154(c). Instead, on that date Row 44 filed a letter claiming that its Opposition was in fact due July 28, 2008. *See* Letter from David S. Keir to Marlene H. Dortch, Secretary, Federal Communications Commission (Jul. 10, 2008). Since replies are due within five business days "after the time for filing oppositions has expired," exclusive of the three additional business days applicable where (as here) an opposition is served by mail, this Reply is timely. *See* 47 C.F.R. §§ 25.154(d) and 1.4(h).

I. ROW 44'S PROCEDURAL CLAIMS ARE MERITLESS

Row 44's Opposition contains a number of baseless procedural claims. First, Row 44 claims that ViaSat has no basis to participate in this proceeding because ViaSat has not shown that it would suffer interference from Row 44's non-compliant network.[2] However, Section 25.154(a)(4) of the Commission's rules plainly provides that ViaSat need only present facts sufficient to establish that it is a "party of interest."[3] As explained in the Petition, ViaSat has substantial business interests in the operations of "traditional" Ku-band VSAT networks, as well as the developing Ku-band AMSS industry, and also holds a Commission license to provide AMSS services in the Ku-band.[4] Moreover, ViaSat currently uses capacity on the Horizons-1 satellite for its managed broadband service, and plans to use capacity on the AMC-21 satellite, located two degrees from Row 44's proposed operations. As such, ViaSat has a distinct interest in ensuring that no authorized AMSS system poses an interference risk to existing Ku-band satellite operations, and ViaSat is a party of interest to this proceeding.[5]

Second, Row 44 incorrectly asserts, without foundation, that its Application is subject to processing pursuant to Section 25.220 of the Commission's rules.[6] Contrary to Row 44's assertion, the Commission has repeatedly noted that FSS service rules such as Section

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2 Opposition at 2 ("Contrary to the requirements of Section 25.154(a)(4) . . . ViaSat nowhere provides any specific basis for its objections in terms of potential claimed interference to those cited operations.").

3 *See* 47 C.F.R. § 25.154(a)(4).

4 *See ViaSat, Inc. Application for Blanket Authority for Operation of 1,000 Technically Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters*, 22 FCC Rcd 19964 (2007) ("*ViaSat AMSS Order*").

5 Accordingly, and as ViaSat notes in its Petition, ViaSat has standing. *See FCC v. Sanders Brothers Radio Station*, 309 U.S. 470 (1940).

6 *See, e.g.*, Opposition at 1 n.1.

25.220 are not directly applicable to AMSS license applications, such as Row 44's Application.[7] Further, Section 25.220 expressly does not apply in the analogous case of an ESV applicant that proposes to operate in an FSS band.[8]

The Commission has an obligation to carefully review the Application to ensure that Row 44's proposed operations do not cause harmful interference into any other Commission licensee, particularly given (i) Row 44's request for a waiver of Section 2.106 of the Commission's rules to permit it to provide AMSS on a non-harmful interference basis, (ii) the absence of *any* AMSS service rules, (iii) the nascent nature of AMSS, and (iv) the still-developing nature of AMSS technologies. The Commission may not, as Row 44, suggests, simply rely on the certifications of two satellite operators.[9] Rather, the Commission *must* closely review the Application based on the information in the record, including the inconsistencies and deficiencies that ViaSat has identified. Any expedited review that may be appropriate in a "Section 25.220" case[10] is simply inapplicable where an applicant seeks waivers to operate a new class of service.

Third, Row 44 asserts that "the fact that the FCC has accepted the Application for filing as substantially complete" demonstrates that the Application is not defective.[11] That statement is not only factually inaccurate, but also is flatly inconsistent with Section 25.150 of

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7 *See ViaSat AMSS Order* at ¶ 11 (noting that "the Commission's rules for Fixed-Satellite Service (FSS) earth stations" are "not directly applicable to AESs . . . ."). As ViaSat has noted, the Commission does look to its FSS earth station rules for guidance in ensuring that AMSS operations do not pose an interference threat.

8 47 C.F.R. § 25.220(a)(1) ("This section applies to earth station applications other than ESV and 17/24 GHz BSS feeder link applications . . . .").

9 *See* Opposition at 1-2.

10 *See id.* at 2 n.5.

11 *Id.* at 3-4.

the Commission's rules, and with a series of Commission decisions that have dismissed defective applications after they have appeared on public notice.[12]

II. THE APPLICATION IS DEFECTIVE

ViaSat's Petition establishes that Row 44's Application is incomplete, and as such should be dismissed by the Commission.[13] Row 44 still has not provided all of the information that would be needed before the Commission could grant the waivers that Row 44 requires due to the non-compliant nature of its service and equipment.

A. Row 44's Failure to Include Representative Link Budgets

ViaSat's Petition demonstrates that Row 44's Application fails to provide representative link budgets for both segments of the proposed communications link.[14] In response, Row 44 admits that it has not provided a link budget for the satellite-to-airplane portion of the proposed service, and then asserts that it is under no obligation to submit *any* link budgets.[15] Particularly in the case where an applicant seeks a waiver of the Commission's rules, that applicant is obligated to provide sufficient data to facilitate meaningful review of its Application by the Commission and the public, and to allow the Commission to ensure that grant of the requested waiver would not undermine Commission policy. It is incumbent on Row 44 to

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12 *See* 47 C.F.R. § 25.150 ("Neither the assignment of a file number and/or other identifier nor the listing of the application on public notice as received for filing indicates that the application has been found acceptable for filing or precludes the subsequent return or dismissal of the application if it is found to be defective or not in accordance with the Commission's rules."). *See also, e.g., WTL Communications, Inc.*, 23 FCC Rcd 2475 at ¶ 7 (2008) ("Thus, we find that the RVCR application must be dismissed as having been inadvertently accepted for filing."); *Telenor Satellite, Inc.*, DA 07-1360 (Mar. 20, 2007) (dismissing earth station application previously accepted for filing by public notice).

13 The Commission has already acknowledged the incomplete nature of the Application. *See* Letter from Scott A. Kotler, Chief, Systems Analysis Branch, Satellite Division, International Bureau to David S. Keir (Aug. 7, 2008).

14 Petition at 3.

15 Opposition at 4.

provide that information here, as (i) Row 44's antennas would require a waiver of the Commission's Section 25.209 antenna mask, (ii) Row 44's service would be provided on a secondary, non-interfering basis pursuant to a waiver of the Table of Frequency Allocations, and (iii) the parameters included in link budgets must be evaluated in considering whether such waivers are justified. Such a showing would be consistent with the type of data the Commission required to be submitted in non-complaint FSS VSAT applications for over 15 years, before the Commission and industry developed experience with the interference potential of non-compliant FSS VSAT antennas.[16]

Row 44 admits that link budgets are normally submitted "as a good faith demonstration that the power assumptions underlying the application are correct and that operation is feasible."[17] It is therefore inconceivable why Row 44 will not make such a "good faith demonstration," which is central to the proper evaluation of the Application. In particular, the missing forward link budgets are critical because the Application seeks more than "transmitting authority," despite Row 44's contrary claim.[18] The Application clearly anticipates operations in the "receive" portion of the Ku-band, and Row 44 admits when seeking a waiver that the downlink signal to the airplane would exceed the EIRP spectral density limits specified in Section 25.134(g)(2) of the Commission's rules.[19] Yet, Row 44 provides almost no other

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16 Notably, the Commission's original rules for non-compliant VSATs explicitly required earth station applicants to submit link budgets, demonstrating that the Commission expects to review such information in considering non-routine earth station applications. *See Routine Licensing of Large Networks of Small Antenna Earth Stations Operating in the 12/14 GHz Frequency Bands*, 6 FCC Rcd 7372, at ¶ 13 (1991) ("We will also require that link budget analyses be included in each Category 2 application . . . .").

17 Opposition at 4.

18 *See id.* at 5.

19 *See* Application, Row 44 AMSS Network System Description and Technical Information, at 7-8. *See also* 47 C.F.R. § 25.134(g)(2).

meaningful information with respect to the forward link of its proposed AMSS system from the satellite to the airplane, or whether that link would sustain a viable service on a secondary, non-interference basis.[20] While Row 44 claims that "providing information concerning this link would be superfluous" because the hub station that Row 44 proposes to use is already licensed,[21] the terms of that license would address, at most, only the parameters of the link between the hub station and the satellite, as opposed to the portion of the link between the satellite and Row 44's proposed user terminals on airplanes.

Further, Row 44 does not deny that (i) Row 44 has failed to provide link budgets for two of the three points of communication proposed in the Application (AMC-2 and AMC-9), or that (ii) due to the unique characteristics of AMC-2 and AMC-9, the partial Horizons-1 link budgets may not be representative of links with AMC-2 or AMC-9. Similarly, Row 44 does not deny that it has not provided link budgets reflecting differences in the coverage pattern of Horizons-1 (or AMC-2 or AMC-9) over North America. While Row 44 concedes that the link characteristics of Horizons-1 would vary over the proposed coverage area, and that "there are some potential flight paths where G/T would be too low to close the inroute link,"[22] Row 44 fails to describe what these flight paths would be, or to describe in any form those areas in which Row 44 actually would be able to provide service in a manner consistent with its link budgets.[23]

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20 Exhibit C of the System Description and Technical Information included in the Application contains link budgets only for the return, or "inroute" link from the airplane to the hub. *Cf.* Opposition at 5 (claiming that the Application includes both "inroute" and "outroute" link budgets).

21 *Id.*

22 *Id.* at 7 n.11.

23 Given this failure, it is far from "pure conjecture" to suggest that power increases above what is stated in the Application may be necessary to sustain a viable service. *See id.*

In desperation, perhaps, Row 44 mistakenly claims that ViaSat's AMSS license application "included the same quantum of link budget information as Row 44's application."[24] Unlike Row 44, ViaSat's application included both forward and return link budgets, and satellite contours for the expected service area over CONUS.[25] Row 44 should not be held to a lesser standard. ViaSat therefore urges the Commission to require Row 44 to provide similar information.

B. Row 44's Failure to Provide All Required Transmit Elevation Patterns

ViaSat's Petition demonstrates that Row 44's Application fails to provide the transmit elevation patterns required by Section 25.132(b) of the Commission's rules.[26] In response, Row 44 claims that the Application includes the required transmit elevation patterns for *14.3 GHz*.[27] However, Section 25.132(b) clearly provides that measures "shall be made at the bottom, middle and top of each allocated frequency band and submitted to the Commission[.]"[28] Row 44 seeks authority to operate in the 14.05 GHz – 14.47 GHz band, and therefore is obligated also to submit transmit elevation patterns for the bottom and top of this band (a requirement that Row 44 has satisfied with respect to its transmit azimuth patterns).

Row 44's continued failure to provide a full set of transmit elevation patterns is conspicuous and troubling. Row 44 admits that its antenna does not comply with Section 25.209 in the elevation plane, but neither the Commission nor ViaSat knows the full extent of Row 44's

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24 *Id.* at 5 n.7.

25 ViaSat, Inc., Application for Blanket Authority for Operation of 1,000 Technically Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters, File No. SES-LIC-20051028-01494, at Exhibit B ("ViaSat AMSS License Application").

26 Petition at 4.

27 Opposition at 3.

28 47 C.F.R. § 25.132(b).

non-compliance, particularly at the band edges where antennas often vary most significantly from the Section 25.209 mask. Here, understanding performance in the elevation plane is essential to ascertaining the potential for interference from the proposed system into two-degree-spaced adjacent spacecraft. The reason is simple – if an airplane were, for example, to bank to make a turn, the elevation plane of the Row 44 antenna would be "tilted" towards adjacent spacecraft in the geostationary arc. Without the missing elevation data, it therefore is impossible to assess whether the proposed antenna would be capable of operating on a moving platform with significant pitch, yaw, and roll without causing harmful interference into adjacent satellite operations.

Even after Row 44 provides that data, it would be incumbent on Row 44 to explain how its antenna – which has not been extensively tested – would actually account for all of the relevant flight dynamics of an airplane. While Row 44 claims that its user terminal would constantly monitor the "skew angle" between the terminal and the satellite to which it is transmitting, and would cease transmissions if this angle exceeds +/- 25 degrees, Row 44 has not addressed whether its calculation of this angle would be based simply on the aircraft's lontitude and latitude, or whether, as it should, Row 44 also would account for pitch, yaw, and roll as a result of aircraft maneuvers. Because the elevation plane of the Row 44 antenna would be "tilted" towards adjacent spacecraft in the geostationary arc when an airplane is making certain maneuvers, any failure to adequately account for pitch, yaw and roll could result in interference into adjacent spacecraft due to the non-compliance of Row 44's antenna in the elevation plane.[29]

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[29] Petition at 4 n.8.

III. THE APPLICATION DOES NOT DEMONSTRATE COMPATIBLITY WITH A TWO-DEGREE SPACING ENVIRONMENT

ViaSat's Petition demonstrates that Row 44's Application is incompatible with a two-degree spacing environment. Row 44 responds by providing new information that is inconsistent with other aspects of its pending application, and fails to explain how it will comply with Commission rules.

A. Row 44's Incompatibility with Applicable Power Density Limits

ViaSat's Petition establishes that the parameters specified in Row 44's Application do not comply with Section 25.134(g)(1) of the Commission's rules, which limits the maximum transmitter power density of routinely-processed VSATs.[30] In response, Row 44 (i) asserts that ViaSat's critique "fails to take into account the appropriate spectral spreading factor,"[31] and (ii) provides new information about Row 44's system design that is not contained in the Application itself. While Row 44 is free to modify its system design to incorporate spectral spreading, its Application contains information that is not consistent with the use of spread spectrum modulation. Notably, Row 44's link budgets specify carrier noise bandwidths of 256 kHz and 512 kHz, without qualification or suggestion of spreading, as opposed to the more than 1 MHz of bandwidth that would be occupied by a spread signal. Moreover, these link budgets specify a carrier spacing factor of 6.25 – a number which bears no relationship to the spreading factors of 2 and 4 that Row 44 provides for the first time in its Opposition.[32]

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30 *Id.* at 4-5. *See also* 47 C.F.R. § 25.134(g)(1).

31 Opposition at 6.

32 *See* Opposition Technical Annex at 1-2. Row 44 fails to explain how it has selected these spreading factors, or why its unspread 256 kbps and 512 kbps signals would occupy 400 kHz and 800 kHz, respectively. As ViaSat demonstrated in its Petition, the actual occupied bandwidths of the unspread carriers would be significantly lower. *See* Petition Technical Annex at 3.

These deficiencies and inconsistencies, among others, suggest that Row 44's Application, as originally filed, either (i) did not anticipate the use of spread spectrum modulation or (ii) is now incomplete and underspecified. In either case, the Commission must evaluate the Application on the basis of the information contained therein, and necessarily conclude that the operations proposed in the Application would not comply with Section 25.134(g)(1) of the Commission's rules, for these reasons and those specified in ViaSat's Petition. As the Commission has noted repeatedly, Section 25.112 of the Commission's rules "requires the Commission to return, as unacceptable for filing, any earth station application that . . . contains internal inconsistencies . . . ."[33] Therefore, the Commission should dismiss the Application; neither the Commission nor the public should be forced to speculate in order to cure Row 44's ambiguities or reconcile Row 44's inconsistencies.

B. Row 44's Noncompliance with Applicable Antenna Pointing Requirements

ViaSat's Petition establishes that Row 44's proposed system would not comply with Section 25.222(a)(6) of the Commission's rules, which requires a pointing error of less than 0.2 degrees.[34] Specifically, although the Commission's rules require Row 44 to demonstrate that its system would meet a tracking accuracy of 0.2 degrees *peak,* Row 44 claims only that its system would meet a tracking accuracy of 0.2 degrees *root mean square* (RMS). Row 44 does not respond to this criticism – and indeed, cannot. Instead, Row 44 merely asserts that "[t]his performance is equivalent to that reported by ViaSat in its own AMSS license application."[35]

As an initial matter, the substance of ViaSat's AMSS license application is irrelevant to an evaluation of Row 44's Application and whether Row 44's proposed system

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33 *Telenor Satellite, Inc.*, DA 07-1360, at 1 (Mar. 20, 2007). *See also* 47 C.F.R. § 25.112.

34 47 C.F.R. § 25.222(a)(6).

35 Opposition at 8.

would meet a tracking accuracy of 0.2 degrees peak – a requirement that Row 44 does not challenge. The Commission should view Row 44's non-response for what it is: an attempt to distract from the fundamental and inescapable fact that Row 44's Application does not comply with the Commission's rules.

Further, ViaSat's application was filed in 2005 and premised on ITU-R M.1643, which does not specify an explicit pointing accuracy requirement. In contrast, Row 44's Application was filed in 2008, and explicitly (but wrongly) claims compliance with Section 25.222 of the Commission's rules, which incorporates the technical parameters established in ITU Resolution 902.[36] In short, Row 44's Application is subject to different requirements than ViaSat's, fails to meet those requirements, and fails to seek any waiver of those requirements. In any event, though, the low power density of ViaSat's signal would allow ViaSat's antennas to be mispointed by 2 degrees (or more) without exceeding the OAED mask, and without adversely affecting adjacent networks.[37] As discussed below, that is not the case with the higher-powered Row 44 system.

In evaluating the performance of Row 44's proposed antenna, the Commission should recognize that pointing accuracy limits are intended to protect adjacent users by ensuring that individual antennas operate at power density levels that do not exceed the applicable OAED mask in the direction of the adjacent satellite, even when mispointed. For the reasons noted above, Row 44's system likely would need to increase input power in portions of the aircraft's

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36 The Commission has made clear its intent to make Section 25.222(a)(6) "consistent with the technical parameters contained in Resolution 902," which requires a tracking accuracy within 0.2 degrees peak. *See Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/ 11.7-12.2 GHz Bands*, 20 FCC Rcd 674, at ¶ 104 and n.271 (2005).

37 *See* Reply Comments of ViaSat, Inc., Exhibit A at 6-12, IB Docket No. 05-20 (Aug. 3, 2005).

flight path (at least up to the Section 25.134(g)(1) limit) in order to ensure continuous service during a significant number of flights.[38] During such periods, any mispointing would exacerbate the potential for harmful interference into adjacent operations. Since Row 44 has not provided complete link budgets or antenna patterns, however, neither the Commission nor the public can properly evaluate just how serious the impact of such mispointing would be. As such, it is critical that Row 44's system meet a tracking accuracy of 0.2 degrees peak – as opposed to 0.2 degrees RMS, which is significantly less restrictive.

C. Row 44's Improper Antenna Gain Calculation

ViaSat's Petition notes that the antenna gain Row 44 specifies in the 14 GHz transmit band does not correspond, as a matter of physics, with the antenna gain Row 44 specifies in the 11 GHz receive band. ViaSat's Petition proceeds to question whether Row 44's Application incorrectly calculates transmit gain, and thus the compliance of its antenna with the requirements of Section 25.209.[39] Row 44 addresses this discrepancy by explaining that it has not measured gain from the input of the antenna, but rather has taken the unorthodox approach of "backing out" of a true antenna gain calculation certain expected losses between the power amplifier inside the plane and the antenna on top of the fuselage.[40]

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38 Incredibly, Row 44 suggests that the way to ensure continuous service where G/T is too low to close the link "is to avoid the affected flight paths, not to increase power." Opposition at 7 n.11. Based on ViaSat's extensive experience with manufacturing and implementing in-flight communications systems (e.g., Connexion by Boeing), it is highly unlikely that any operator would alter an aircraft's flight path in order to maintain a communications link; given the high cost of fuel and the need for regulatory clearances, such an alteration would be a clear case of the tail wagging the dog.

39 Petition at 5 n.13. The Application specifies antenna gains of 31.8 dBi in the 11.7 GHz receive band, but only 28.6 dBi in the 14.47 GHz transmit band, which is inconsistent with the typical increase in antenna gain with an increase in the frequency range.

40 Opposition Technical Annex at 3.

Row 44's approach has the effect of artificially depressing the antenna gain reported in the Application. As shown in Exhibit 1, when calculated using the standard methodology based on specifications published by the manufacturer of the proposed antenna (Aerosat), Row 44's transmit antenna gain is not compliant with the Section 25.209 antenna mask.[41] Notably, Row 44 seeks no waiver of Section 25.209. Further, to the extent that Row 44 seeks to rely on this "line loss" to reduce the expected power level that would be input to the antenna, Row 44 fails to explain whether this line loss is representative of each application of its technology, or whether the length of the "transmit flexible-waveguide structure" that produces this loss would vary among the different aircraft types that may utilize the Row 44 system.

* * * * *

As explained above and in ViaSat's Petition, Row 44's Application is incomplete and fails to demonstrate that the proposed system would be two-degree compatible. Accordingly, ViaSat respectfully requests that the Commission dismiss or deny the Application. If the Commission does grant the Application, the Commission should, consistent with previous grants of AMSS license applications, (i) require Row 44 to track its terminal locations to facilitate the enforcement of the requirement that Row 44 operate on a secondary, non-interference basis, and (ii) require Row 44 to file a report with the Bureau one year after commencing commercial operations addressing installed equipment configurations, EIRP compliance, and compliance with assigned bandwidth/emission designators, and including a table of reported interference events.[42]

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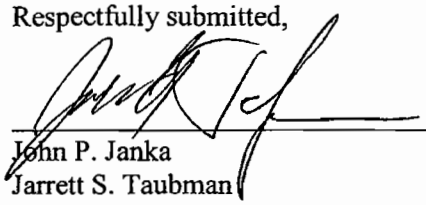
41 The 4.7 dB adjustment value in Exhibit 1 is the difference between the 33.3 dBi gain specified in Aerosat marketing materials and the 28.6 dBi gain provided by Row 44 in the Application.

42 *See, e.g., The Boeing Company*, 6 FCC Rcd 22645, at ¶ 19 (2001); *ARINC Incorporated*, 20 FCC Rcd 7553, at ¶ 56 (2005); *ViaSat AMSS Order* at ¶ 28.

Respectfully submitted,



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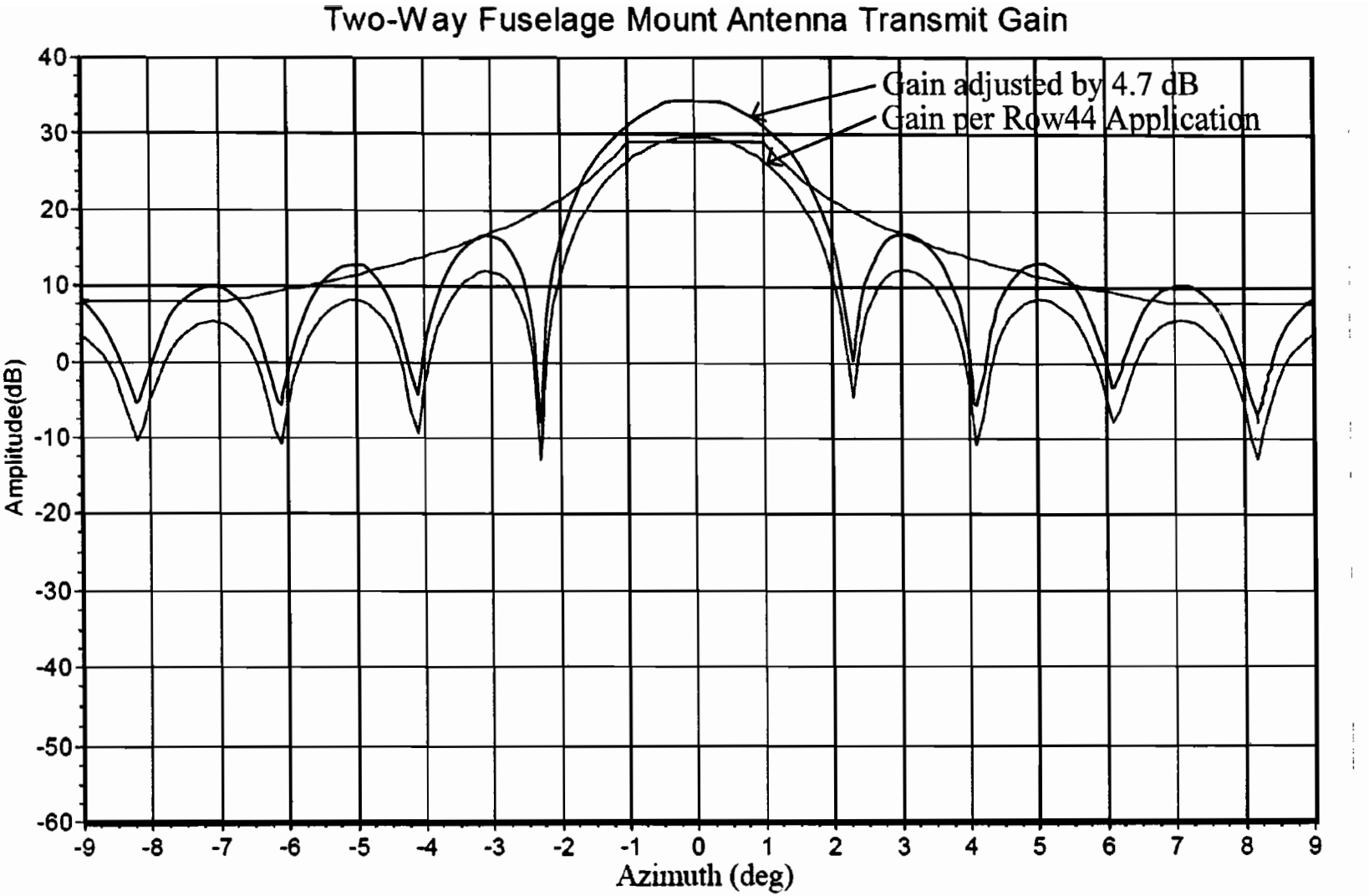
Counsel for ViaSat, Inc.

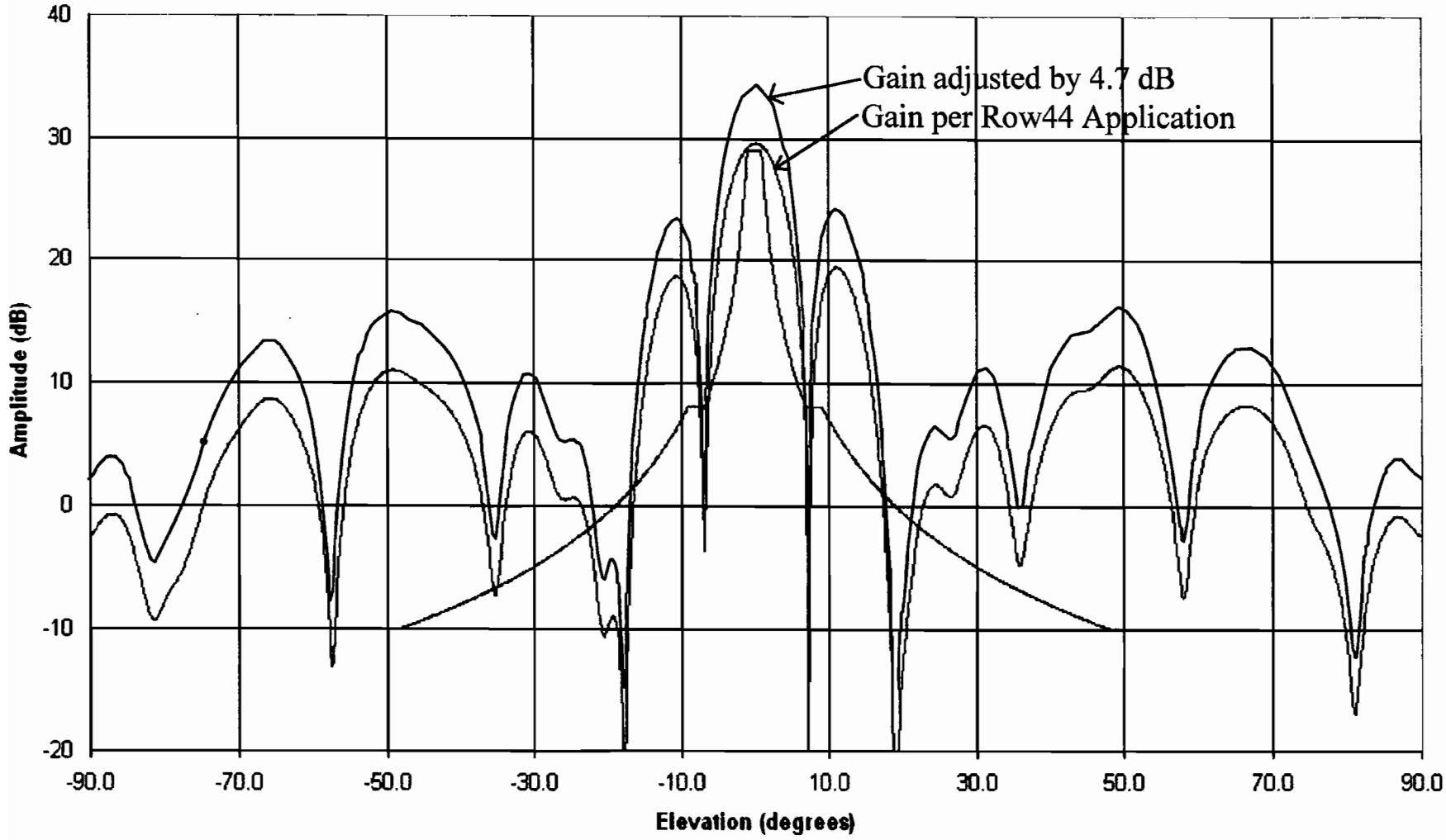
August 7, 2008

EXHIBIT 1



The 4.7 dB adjustment value is the difference between the 33.3 dBi gain specified in marketing materials released by the manufacturer (Aerosat) and the 28.6 dBi gain provided by Row 44 in the Application.

14.3 GHz Elevation Vertical Polarization



The 4.7 dB adjustment value is the difference between the 33.3 dBi gain specified in marketing materials released by the manufacturer (Aerosat) and the 28.6 dBi gain provided by Row 44 in the Application.

ENGINEERING INFORMATION CERTIFICATION

I hereby certify that I am the technically qualified person responsible for reviewing the engineering information contained in the foregoing submission, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this pleading, and that it is complete and accurate to the best of my knowledge and belief.

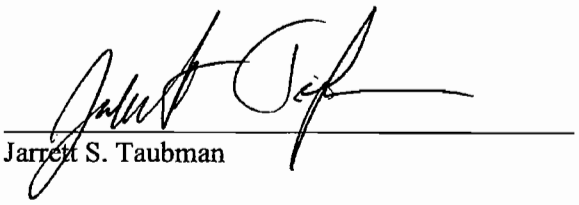
Daryl T. Hunter, P.E.
ViaSat, Inc.
6155 El Camino Real
Carlsbad, CA 92009-1699

Dated: August 7, 2008

CERTIFICATE OF SERVICE

I, Jarrett S. Taubman, hereby certify that on this 7th day of August, 2008, I served a true copy of the foregoing Reply of ViaSat, Inc. by first class mail, postage pre-paid upon the following:

David S. Keir
Leventhal Senter & Lerman PLLC
2000 K Street, NW
Suite 600
Washington, DC 20006



Jarrett S. Taubman