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October 2, 2008

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

Re: Call Sign E080100: Applications of Row 44, Inc. 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 Nos. SES-LIC-20080508-00570; SES-AMD-20080619-00826; SES-AMD-20080819-01074; SES-AMD-20080829-01117;

Special Temporary Authority, FCC File No. SES-STA-20080711-00928; and

Special Temporary Authority, FCC File No. SES-STA-20080811-01049.

Notice of Ex Parte Presentation

Dear Ms. Dortch:

On October 1, 2008, representatives of ViaSat, Inc. ("ViaSat") met with Commission staff regarding the above-captioned applications of Row 44, Inc. ("Row 44"). Specifically, Daryl T. Hunter, ViaSat's Director of Regulatory Affairs, and John P. Janka and Jarrett S. Taubman of Latham & Watkins LLP, counsel to ViaSat, met with members of the International Bureau listed below. The presentation attached hereto, the video demonstration contained on the enclosed CD-ROM (which was embedded in the presentation), and ViaSat's positions of record all formed the basis for the discussions.

Please contact the undersigned should you have any questions.

LATHAM&WATKINS LLP

Sincerely yours,

John P. Janka
Jarrett S. Taubman

Counsel for ViaSat, Inc.

cc: Karl Kensinger
Scott Kotler
Steve Duall
Frank Peace
David Keir, Counsel for Row 44, Inc.

Key Technical Issues With Row 44 Application

Development of AMSS Industry

- The FCC, the ITU and other regulatory agencies, with industry participation, have developed a mature and proven framework that protects FSS satellites from interference
- Much of the innovation and investment in the VSAT industry over the last 20 years has been directed at building systems that create value while not causing interference
- When Boeing, ARINC and ViaSat proposed and introduced their AMSS systems for FSS satellites, great care was taken to assure with high certainty that these networks would not cause interference
- Most of the innovation (centering largely around spread spectrum) and investment in these new AMSS systems has been directed at ensuring non-interference

ViaSat

ViaSat's Interest in Row 44 Application

- While a number of technical approaches have proven sufficient to avoid harmful interference into adjacent operations, Row 44's approach does not fully account for all of the relevant interference dynamics
- ViaSat has a substantial stake in the traditional VSAT and ESV sectors, as well as the emerging Ku-band AMSS and VMES sectors, and could be harmed by deployment of an AMSS system if it were to cause interference
- As such, ViaSat is taking a very close look at all license applications in this space, especially those that propose the use of standard or minimally spread TDMA

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Key Technical Issues

- **Pointing error is greater than Row 44's claimed 0.2° peak value**
  - **Was initially reported by Row 44 as 0.2° RMS but later changed to 0.2° peak without explanation in August 19, 2008 amendment**
- **Aircraft banking maneuvers will add to geographic skew**
  - **Resulting in greater anticipated elevation antenna pattern interference into the GSO plane than reported by Row 44**
- **Return Link Budget issues**
  - **Several changes were made to link parameters such as spreading, modulated bandwidth, and power reduction, but no new link budgets have been supplied**
  - **Link budgets are critical to understanding if the system can actually perform at the stated power levels throughout the intended service area**

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Antenna Pointing Error

- **Row 44 uses aircraft Inertial Reference Unit (IRU) data from ARINC 429 or 664 bus to drive pointing solution of antenna control unit (ACU)**
  - Row 44 Technical Description also claims to use E_S/N_O based closed loop pointing using E_S/N_O samples received every 100 ms
  - In its opposition, Row 44 deemphasized its reliance on Es/No based close loop tracking and relied solely on open loop pointing based on IRU data
- **Typical stated accuracy 2σ (95.4%) of IRU used in commercial airliners is 0.4° in heading axis, and 0.1° each in the pitch and roll axis**
- **3σ (99.7%) will be assumed as a reasonable value for peak. The peak (3σ) accuracy of the IRU is then 0.6° in heading and 0.15° each in pitch and roll**

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Antenna Pointing Error (cont)

- **Reported IRU heading and attitude information is further degraded by installation offset errors, i.e., unit not perfectly aligned in airframe.**
  - Installation alignment errors "good enough" for aircraft navigation (i.e. can fly fine with 0.2° alignment error) are not appropriate for antenna pointing needed to manage interference
- **Antenna installation alignment error in airframe adds to inherent IRU offset errors**
- **Deflection (bending and torsional) of airframe due to static and dynamic loads adds additional error**
- **ViaSat estimates the static (0.073°) and dynamic (0.168°) errors of the AeroSat antenna to total 0.241° peak. These errors are exclusive of the other errors identified above and the effect of all of these errors is additive**
- **Total of all pointing errors - IRU, IRU and antenna offsets, airframe deflection, and antenna static and dynamic - are obviously significantly greater than claimed 0.2° peak pointing error**

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Antenna Pointing Error (cont)

- Connexion by Boeing used a high performance reflector antenna with local rate gyros to enhance dynamic pointing performance.
- Even using this high performance antenna, Boeing still estimated its 1σ (68.3%) pointing error to be 0.25° in azimuth and 0.6° in elevation
- The equivalent peak (3σ (99.7%)) pointing error for Boeing is then 0.75° in azimuth and 1.8° in elevation
- Row 44 should be required to submit a detailed engineering analysis, signed by a registered professional engineer, detailing how Row 44 would achieve the claimed 0.2° pointing error

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Aircraft Banking and Skew Angle

- **Row 44 proposes to inhibit transmit if "Skew Angle" exceeds ±25°**
  - This ±25° limit is apparently intended to ensure that the elevation pattern (which does not comply with Section 25.209) comes no closer than 65° to the GSO plane
- **Transmissions would be inhibited at angles greater than ±25° to prevent higher than allowed off-axis EIRP density signals in the direction of adjacent satellites due to the wide elevation pattern impinging on the GSO plane**
- **The choice of a ±25° limit by Row 44 assumes that the rest of their system meets FCC requirements**
- **Pointing error and uplink power control error would impact off-axis EIRP density, necessitating a reduced value for "Skew Angle"**

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Row 44 Azimuth Antenna Pattern

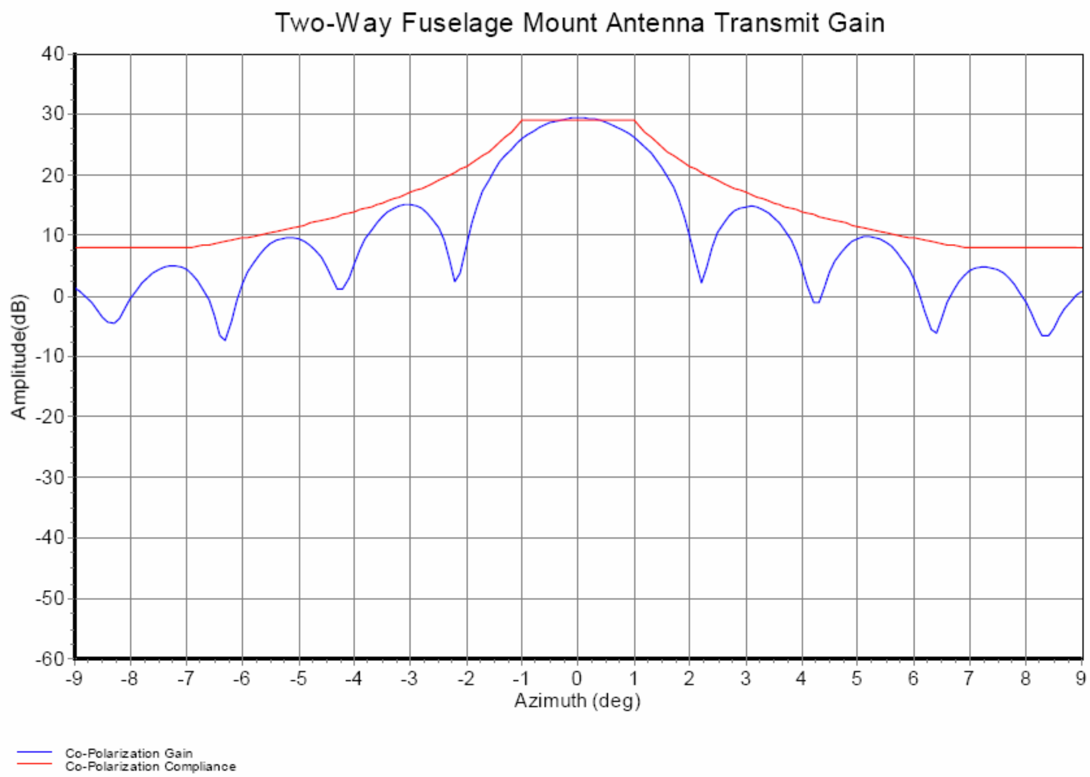

FIGURE 4.1.2-4 Antenna Gain in dBi for 14.05 GHz (Horizontal Polarization) (25.209 Expanded Azimuth)

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Row 44 Elevation Antenna Pattern

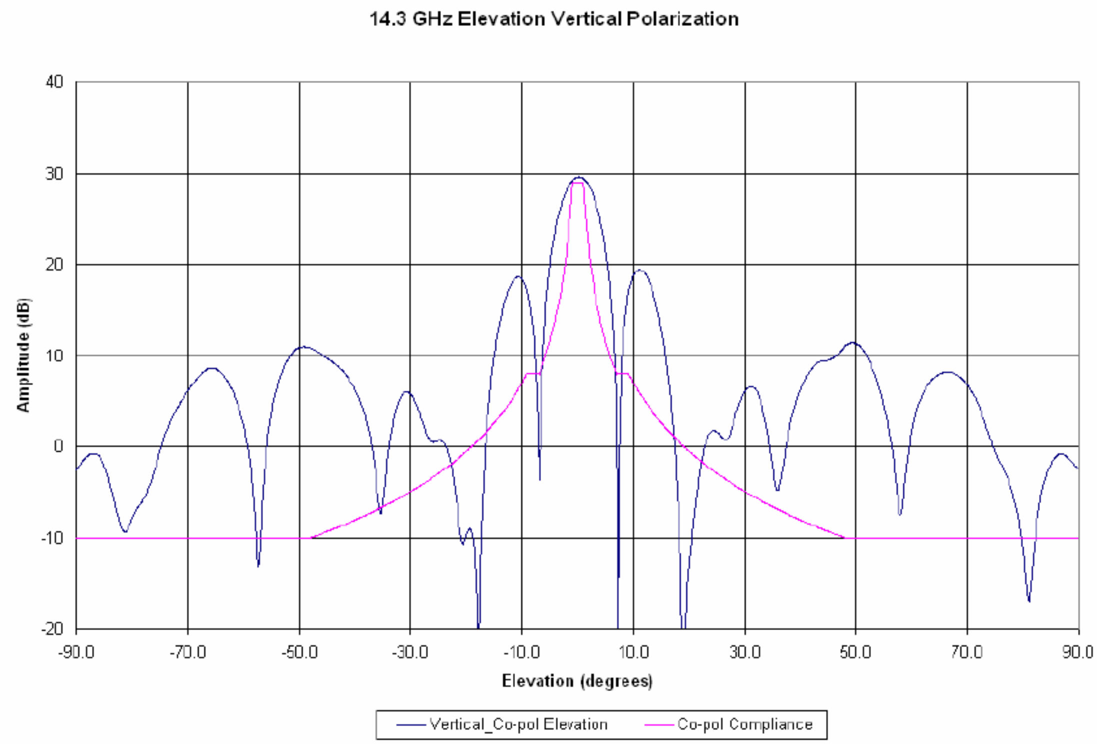
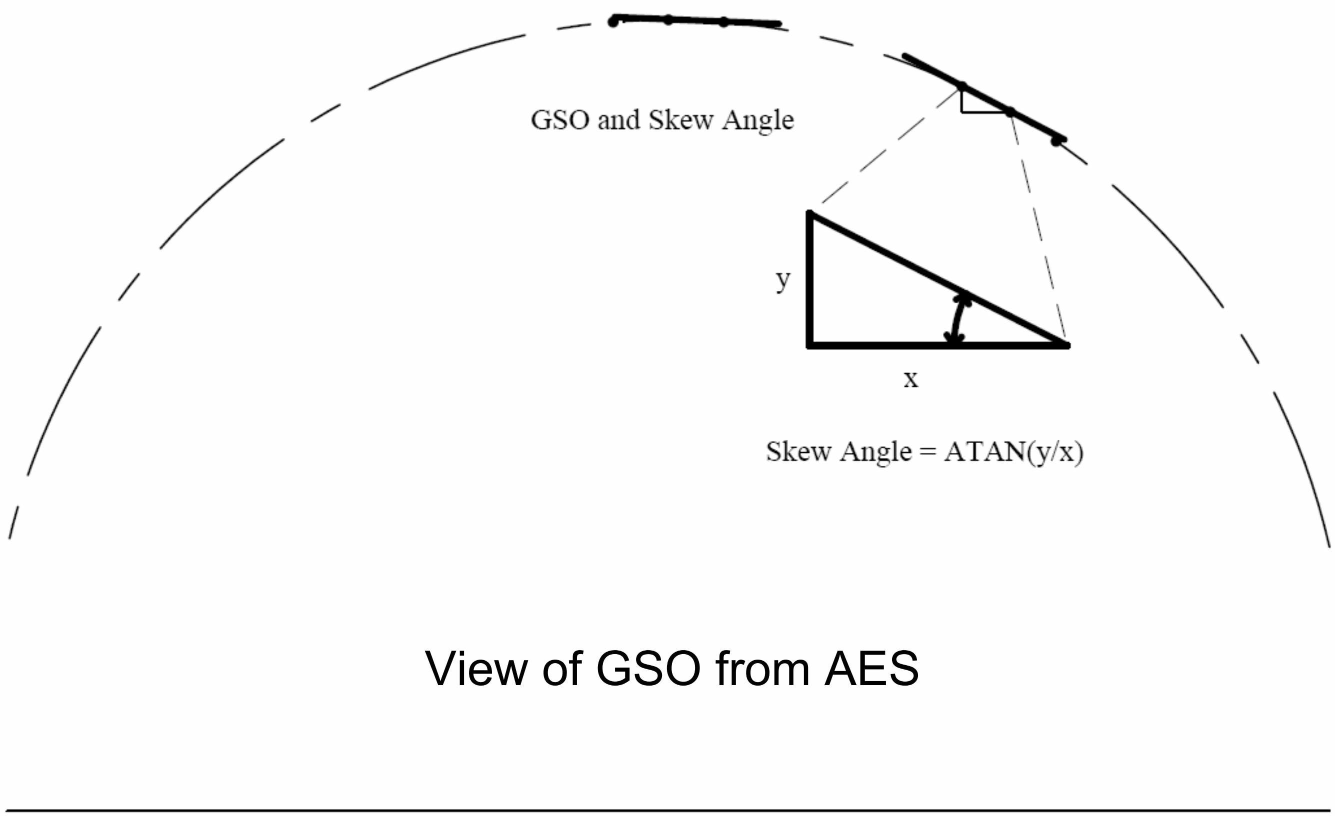
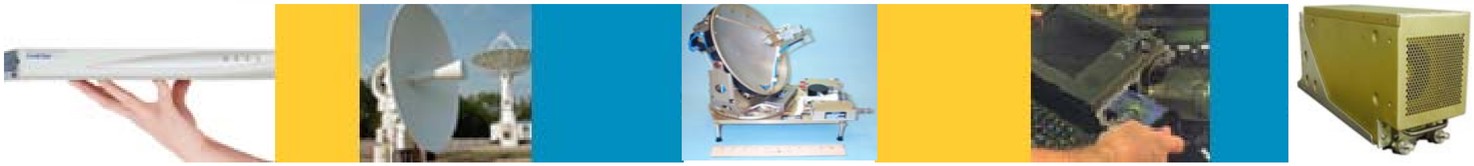


FIGURE 4.1.2-109 Antenna Transmit Elevation Gain in dB for 14.3 GHz (Vertical Polarization)
(25.209 Sidelobe Compliance)

Aircraft Banking and Skew (cont)



View of GSO from AES



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Aircraft Banking and Skew (cont)

- Row 44 does not discuss the effect of aircraft banking on the alignment of antenna azimuth and elevation axis
- In level flight, the elevation axis of the antenna is vertical and perpendicular to the GSO plane when the aircraft is due North of the operating satellite
- When the aircraft banks, the elevation antenna pattern will be tilted with respect to the GSO plane depending upon the direction of the turn because the AeroSat antenna does not have a mechanism to adjust for this tilt
- Depending on the direction of the bank, the tilt will either add or subtract to the geographic skew
- Bank angles of up to 30° are common on commercial airliners
- In the following discussion, the bank angle will be assumed to be toward the victim satellite and additive to geographic skew

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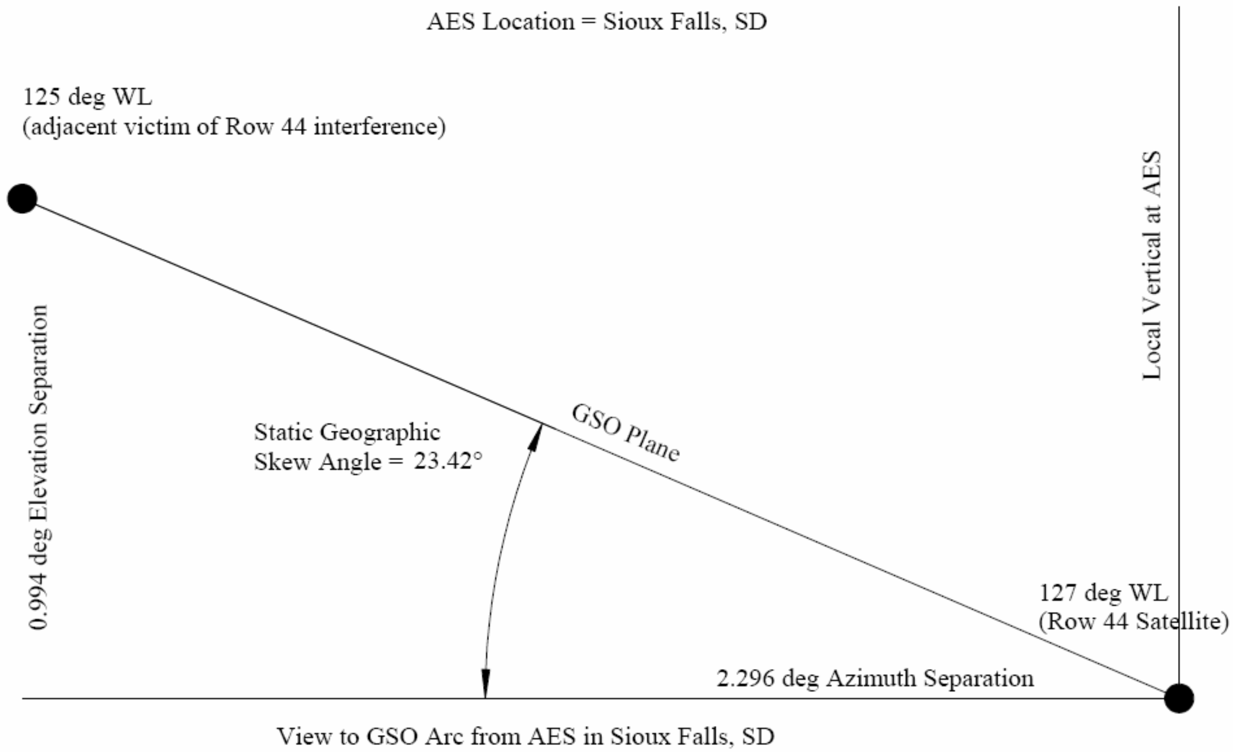
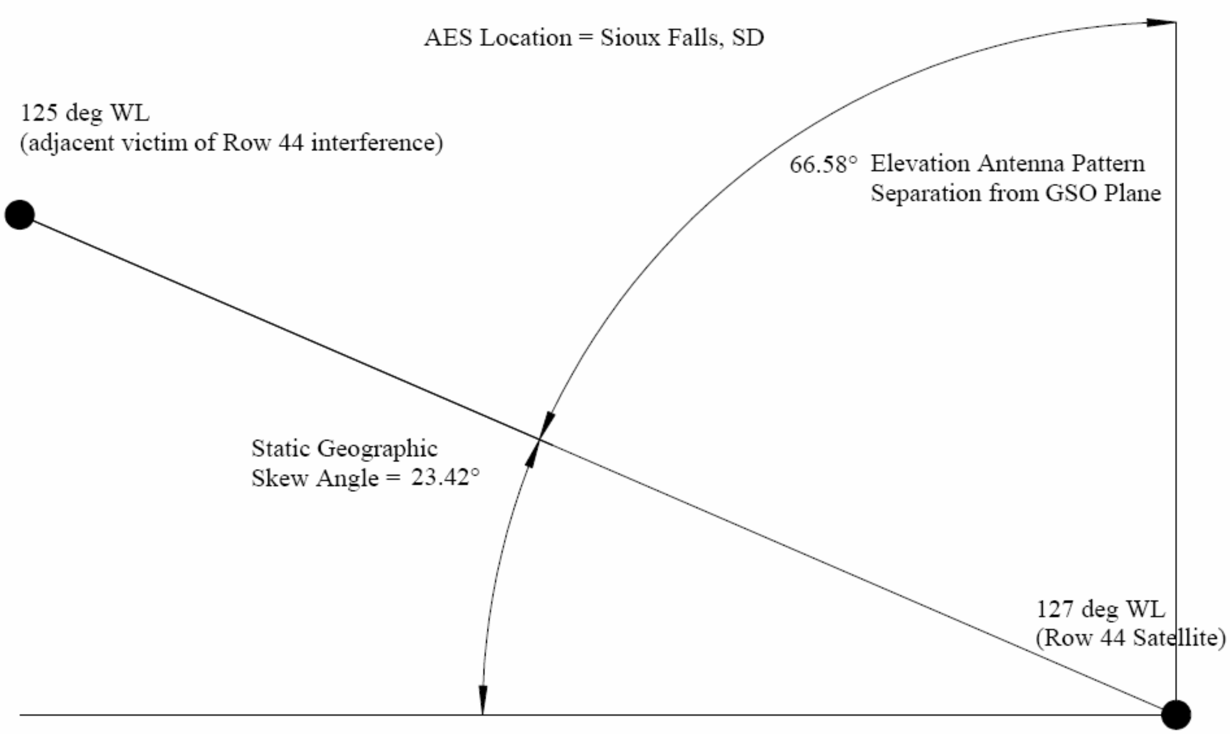
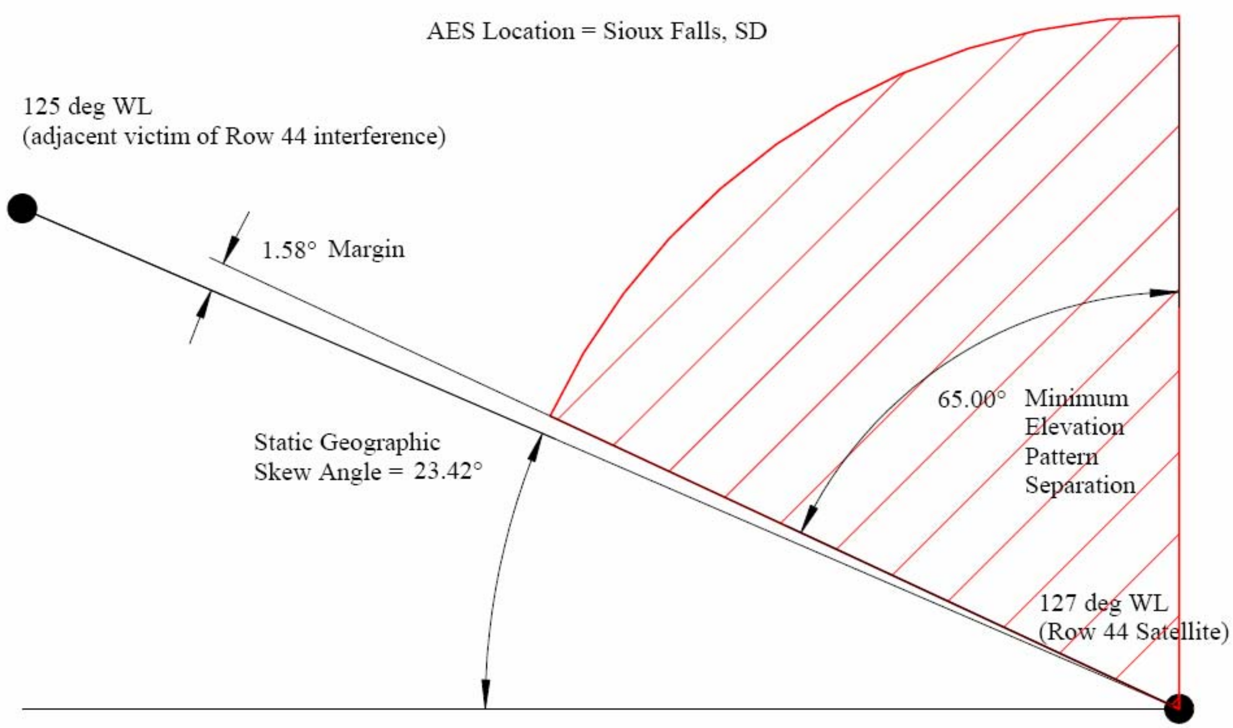
Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)



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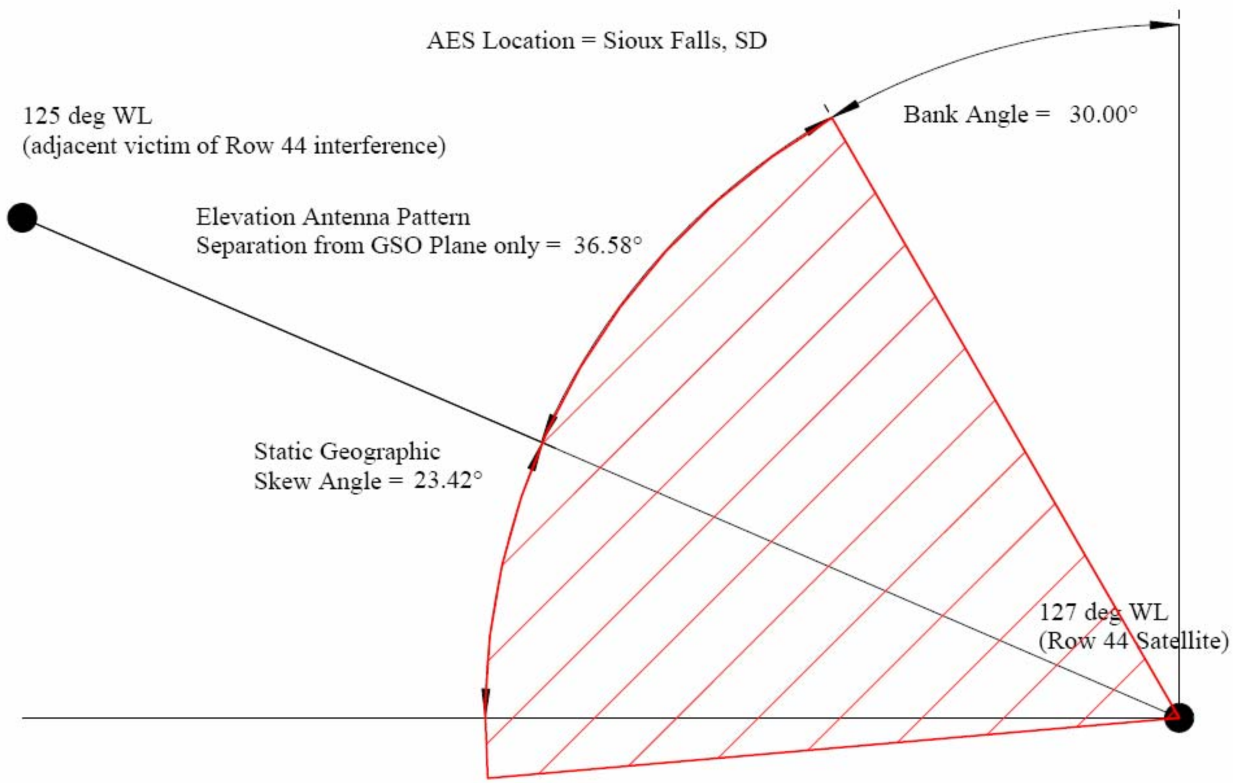
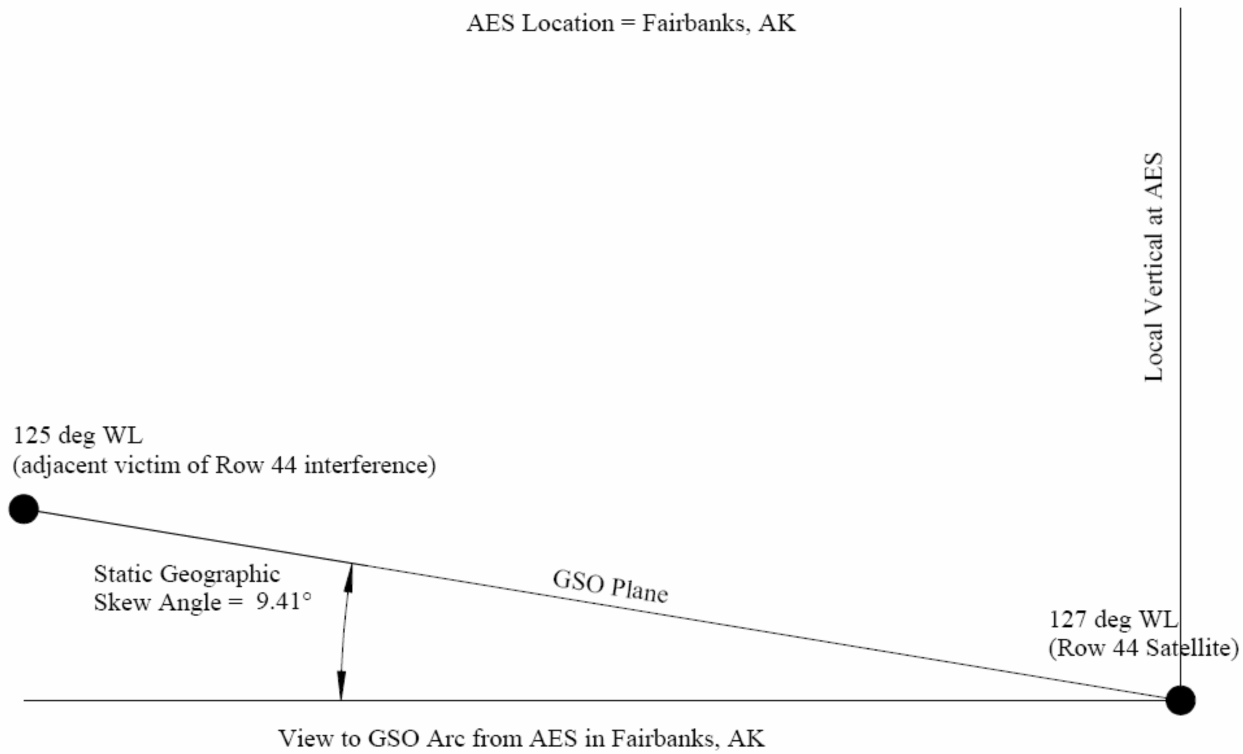
Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)



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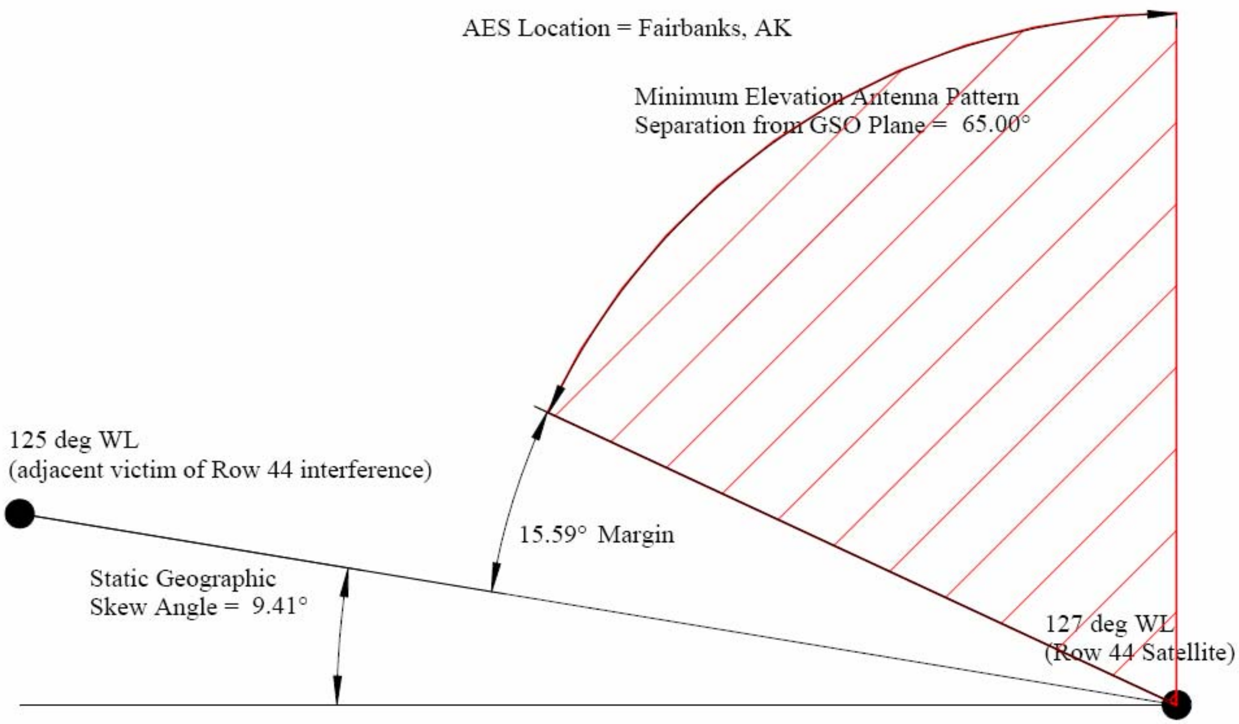
Aircraft Banking and Skew (cont)



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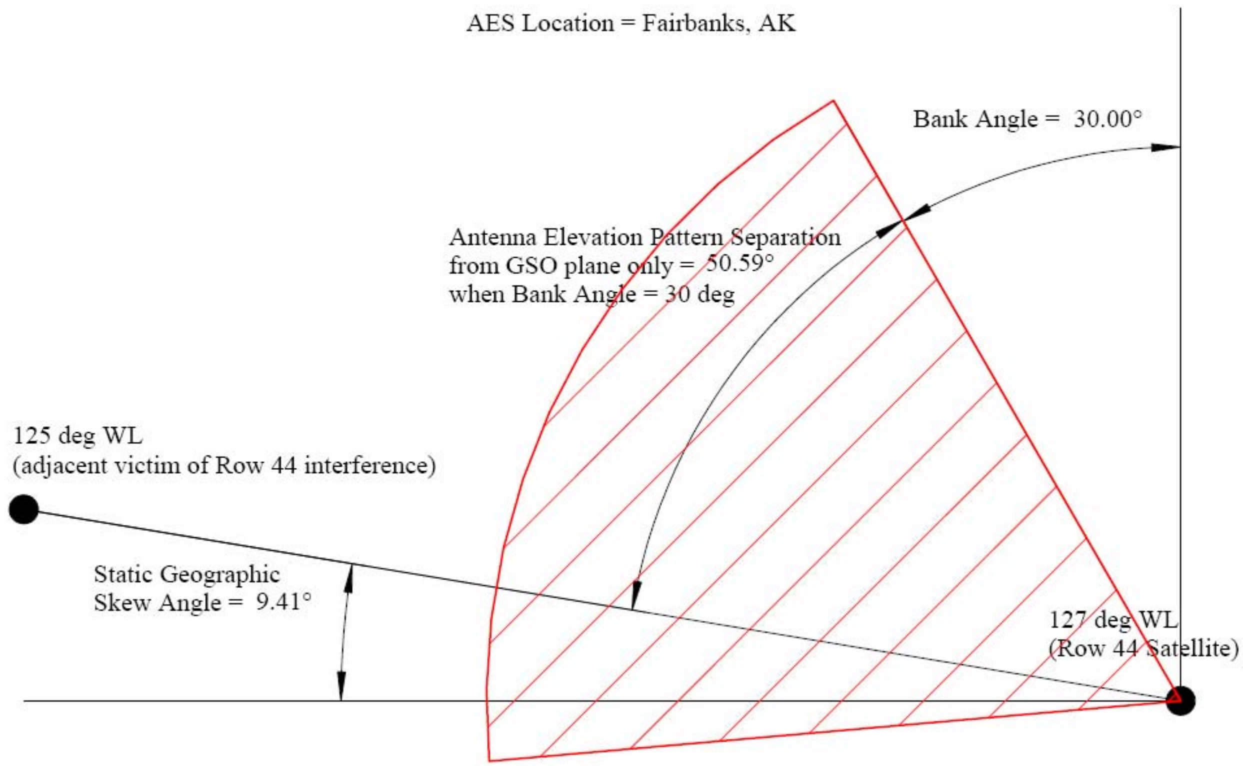
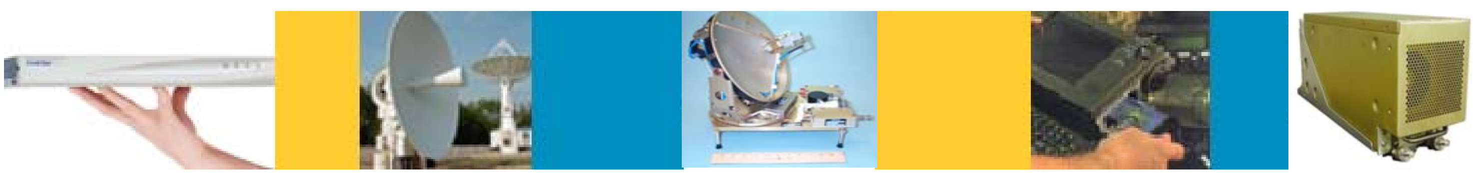
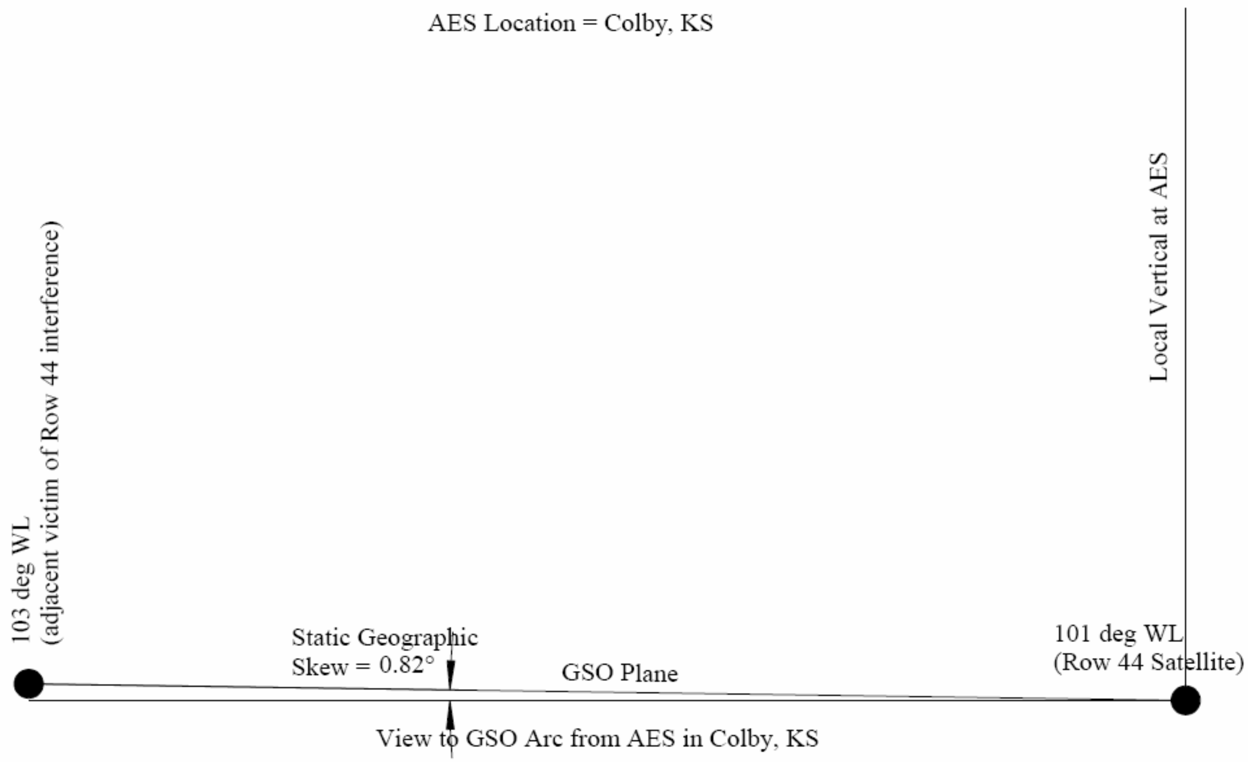
Aircraft Banking and Skew (cont)

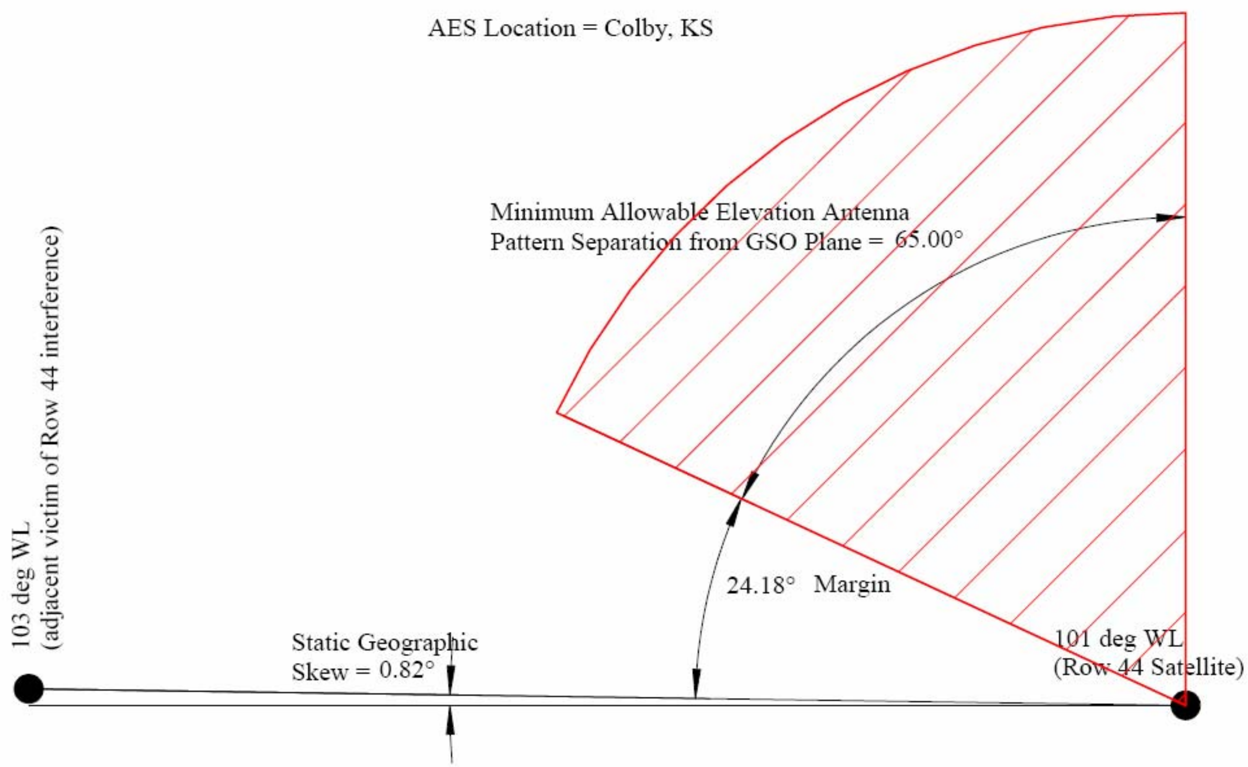




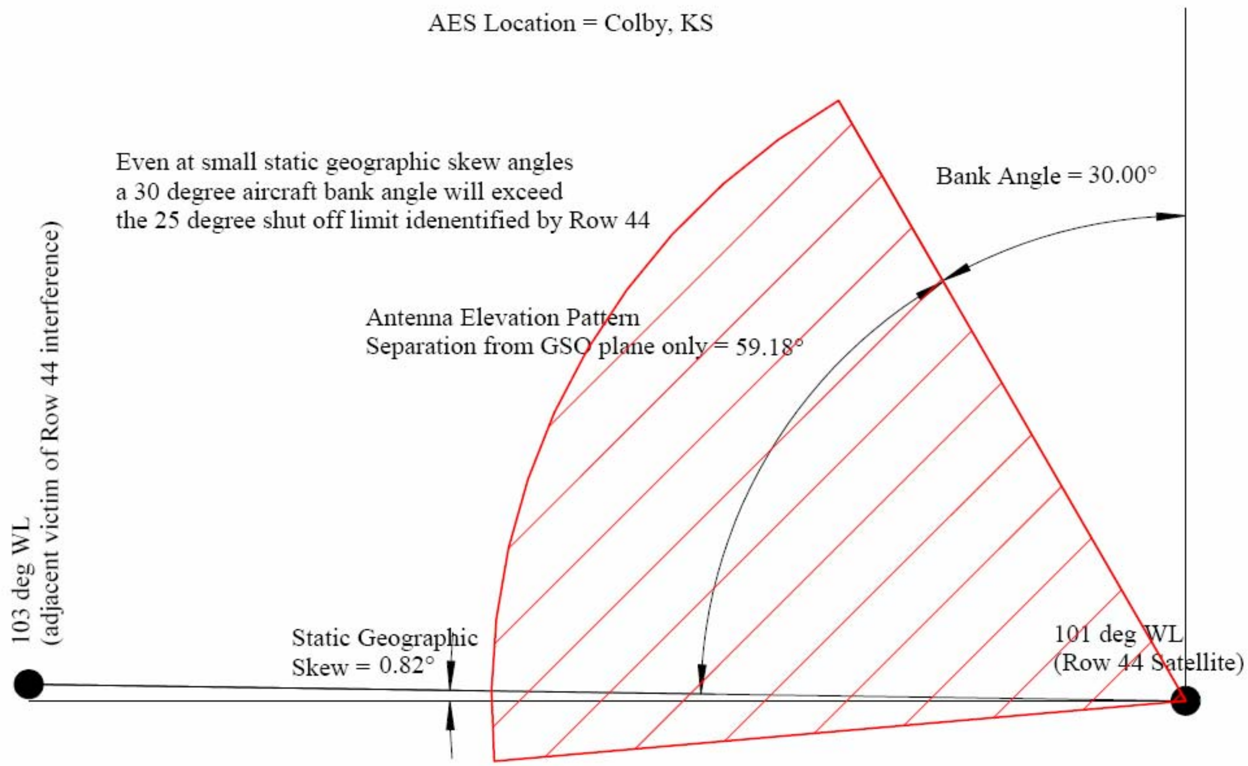
Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)

Aircraft Banking and Skew (cont)

- **Commercial aircraft follow Instrument Flight Rules (IFR)**
- **A keystone of IFR flight is the standard rate turn**
  - Turn rate is 360° per 2 minutes (3° per second) below 250 knots commonly, and half that (1.5° per second) at higher speeds
- **Aircraft follow Air Traffic Control (ATC) flight corridors which are designed with specific turn radius and true airspeed (TAS) in mind**
- **Bank angle for a level coordinated turn is a physical function of rate of turn, velocity, and gravity**

$$Bank\_Angle = \tan^{-1}\left(\frac{True\_Airspeed \times Rate\_of\_Turn}{g}\right)$$

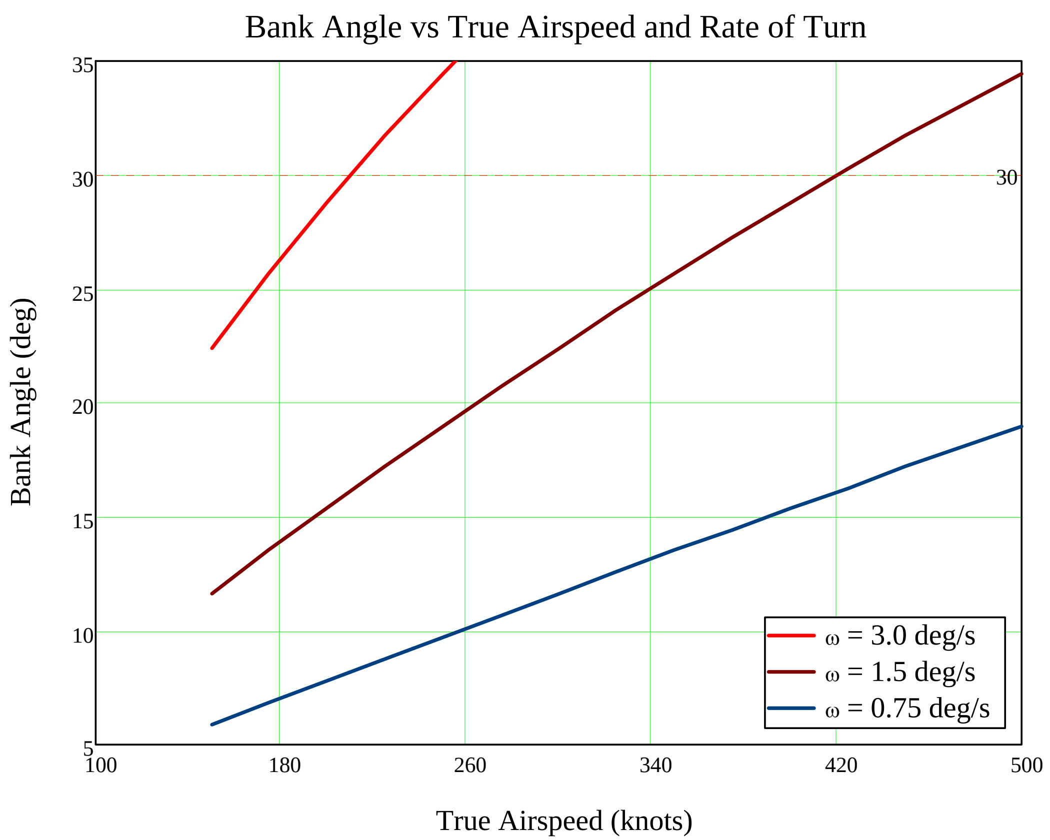
- **Turn radius is a function of velocity and bank angle:**

$$Radius = \left(\frac{True\_Airspeed^{2}}{g \times \tan(Bank\_Angle)}\right)$$

- **30° bank is only 1.15 G – not objectionable to passengers**
- **G-force is a function solely of bank angle:**

$$G\_Force = \left(\frac{1}{\cos(Bank\_Angle)}\right)$$

Aircraft Banking and Skew (cont)



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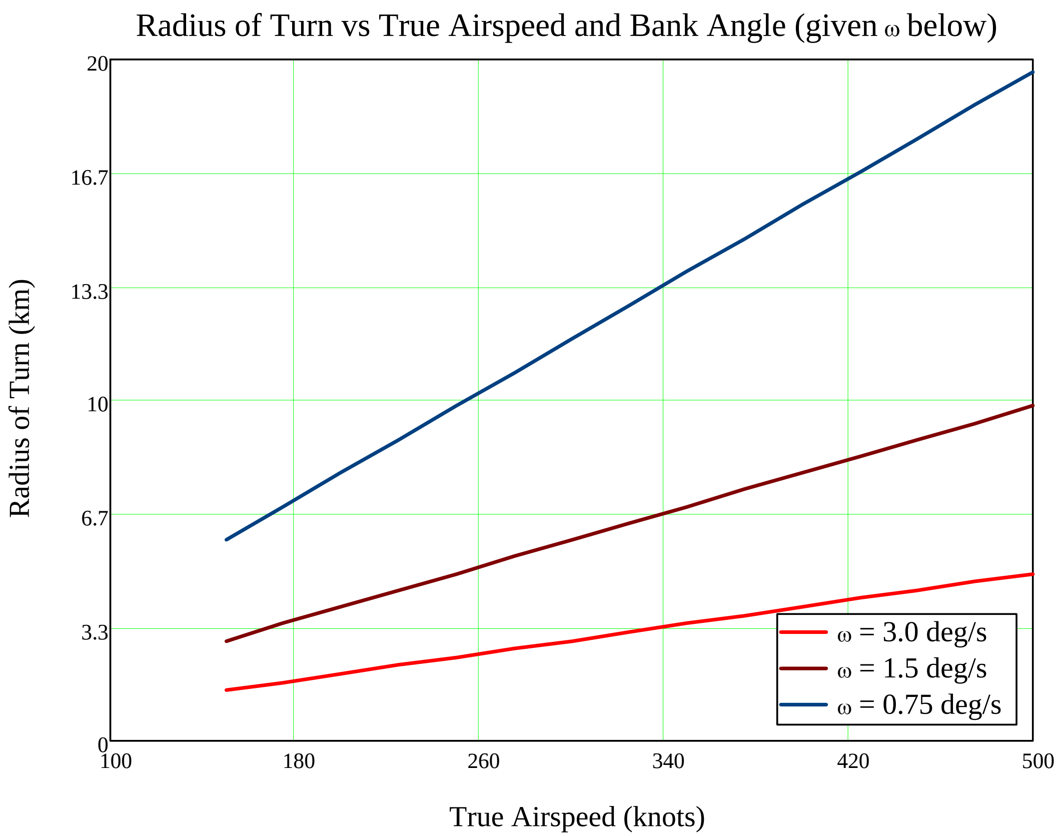
Aircraft Banking and Skew (cont)



Aircraft Banking and Skew (cont)

- **Row 44 has not responded to issues ViaSat has raised with respect to the issue of bank related antenna alignment on skew**
- **Even if Row 44 does commit to inhibit transmissions when bank and geographic skew combine to equal 25° or more, there are still two serious service issues**
- **(1) How does Row 44 accomplish this?**
  - **Row 44 must detail how it will determine the degree to which banking maneuvers add to geographic skew in flight and how it will implement the TX inhibit function**
  - **Row 44 must include bank angle, heading, geographic skew angle, and transmitter state, in data logging records in addition to other standard AMSS data logging parameters**
  - **Annual report must include a demonstration that transmissions complied with the requirement to inhibit transmissions when bank and skew exceeded limit**
- **(2) Is service viable given requirement to inhibit transmissions during some banking maneuvers?**
  - **Southwest Airlines has a fleet of 535 aircraft. Approximately 75% of the aircraft are flown each day, with each aircraft turned around an average of 7 times per day, 365 days per year for a total of approximately 1.06 million flights per year**
  - **Assuming each aircraft has only 2-3 banks per flight where bank angle and geographic skew combine to 25° or more, there would be:**

2-3 million TX inhibit episodes per year for Southwest alone

Row 44 Proposed Western Coverage Zone

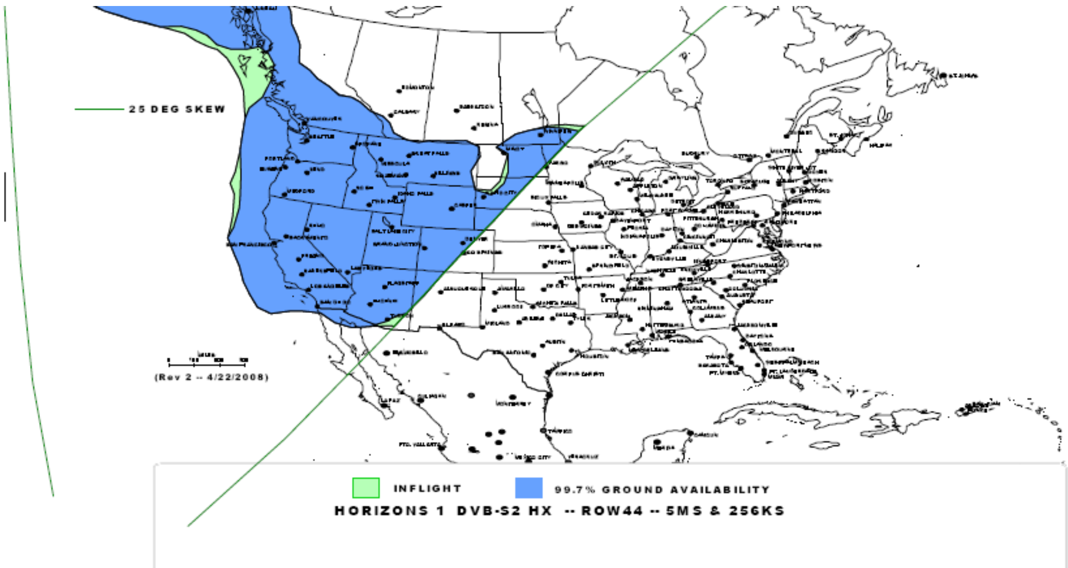


FIGURE 5-5 North American Coverage Using Horizons 1 Satellite

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Row 44 Proposed Central Coverage Zone

C-6

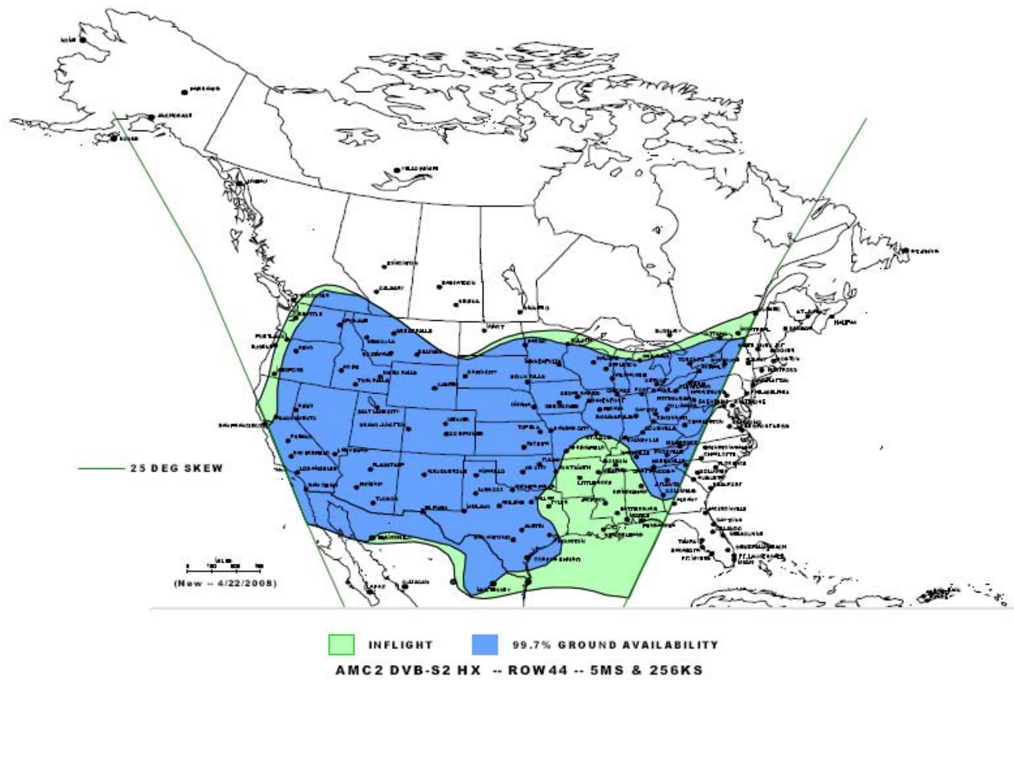

FIGURE 5-3 North American Coverage Using AMC-2 Satellite

Row 44 Proposed Eastern Coverage Zone

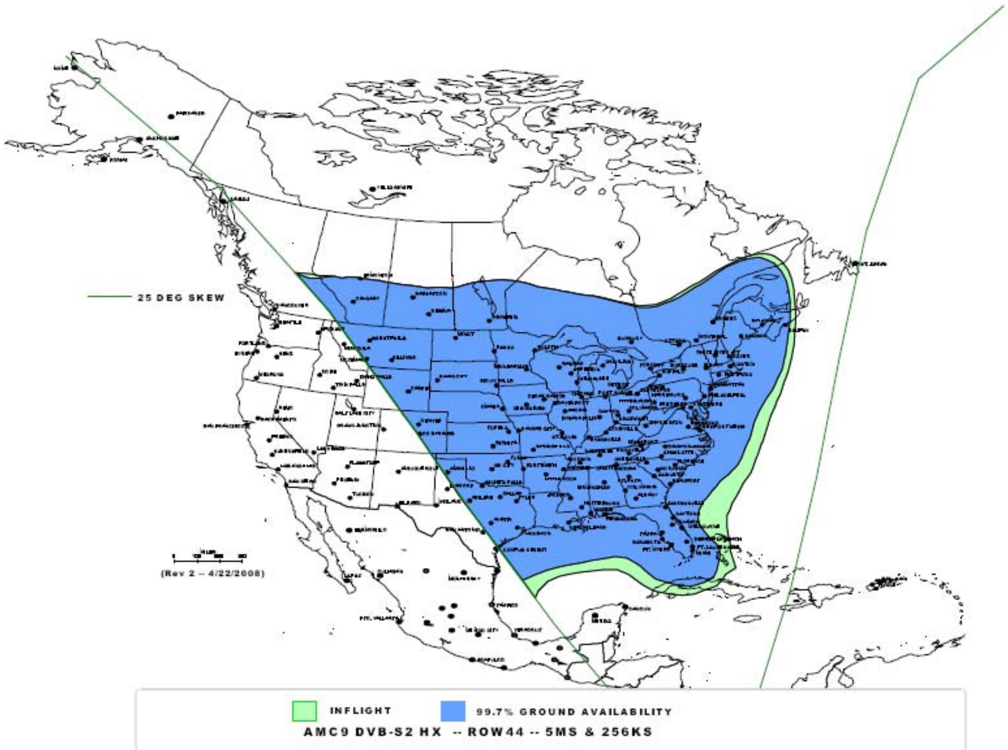

FIGURE 5-4 CONTINENTAL US COVERAGE USING AMC-9 SATELLITE

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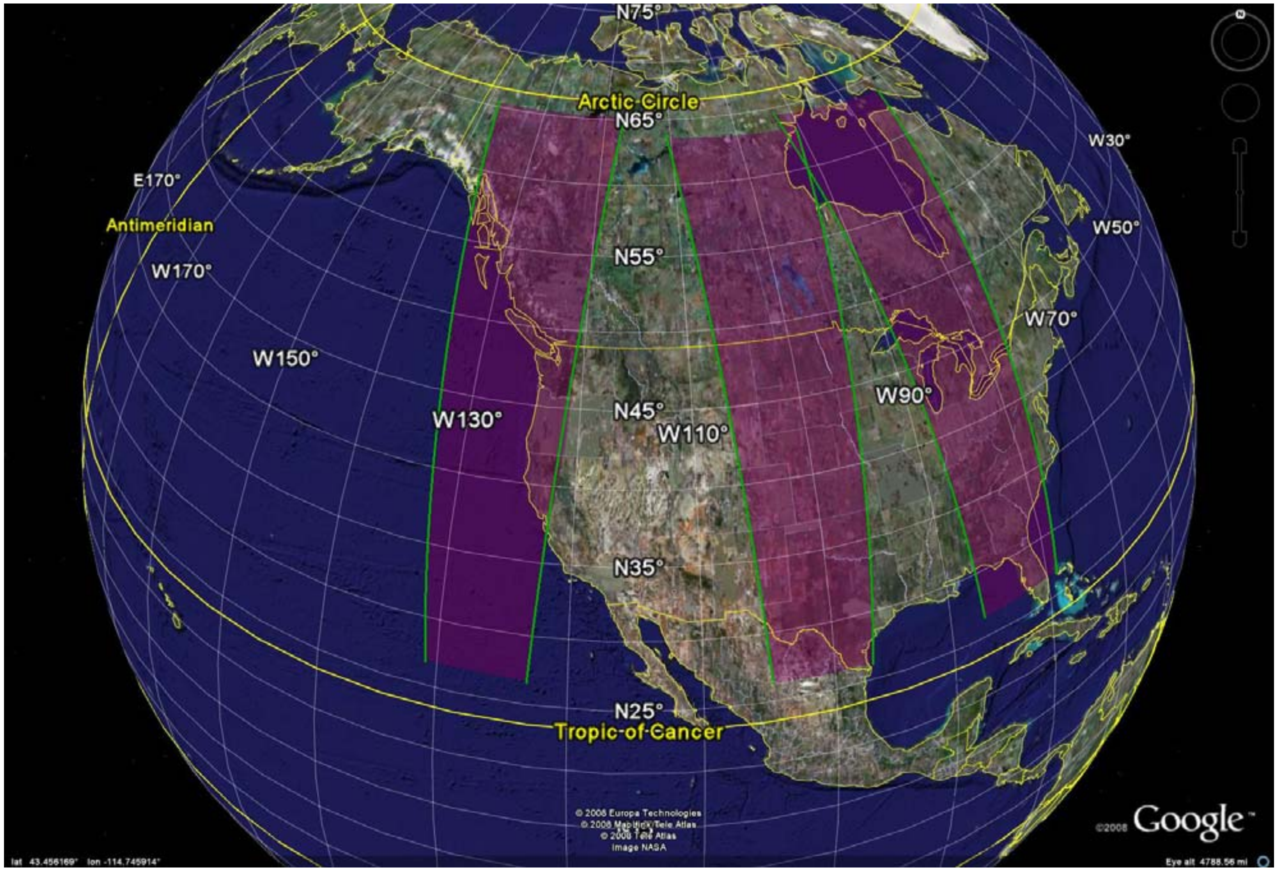
Aircraft Banking and Skew (cont)



Representative ±5° deg skew angle zones for each of the Row 44 Satellites

Aircraft Banking and Skew (cont)

- In the Google Earth picture, zones depicting the ±5° skew limits are shown for each satellite
- Within the zones, banks of up to 25° could occur at 0° skew and only 20° at the edge of the zones
- Outside the zones, the allowable bank angle decreases with skew to 0° when skew reaches 25°
- Bank angles > 30° are never allowed

Return Link Budgets

- **Row 44 has made a number of changes to its technical parameters but has not included updated return link budgets in its latest amendments**
  - **Current return link budgets still reflect an unspread modulated signal versus a direct sequence spread signal with chipping rates as claimed in subsequent filings**
  - **Carrier noise bandwidth has changed a number of times**
  - **Power levels have been reduced by 2 dB**
  - **No return link budgets for edge of coverage**
    - **Important because service viability over intended coverage area is not clear given the 2 dB power reduction**