October 22, 2001

Ms. Magalie R. Salas, Secretary
Federal Communications Commission
The Portals
445 12th Street, S.W. TW-A325
Washington, D.C. 20554

Re: IB Docket No. 00-248
Ex Parte

Dear Ms. Salas:

On October 18, 2001, Kalpak Gude, Ken Kashin, Mohammad Marashi and Harold Ng of PanAmSat Corporation ("PanAmSat"), accompanied by the undersigned counsel, met with Thomas Tycz, John Martin, Steven Spaeth, Sylvia Lam, and George Sharp of the International Bureau. In the meeting, PanAmSat distributed the enclosed "Interference Risk Assessment For Mispointing of Earth Station Antennas," which quantifies, for particular earth station sizes, the degree of mispointing required to produce interference to adjacent satellites. PanAmSat also distributed the enclosed specifications for a 1.2-meter antenna.

In connection with this presentation, PanAmSat described the resources it devotes to antenna installation matters. PanAmSat took the position that industry standards should be developed to address the antenna mispointing issue. PanAmSat also encouraged the Commission, for the reasons stated in PanAmSat's filings in this proceeding, to require applicants proposing to use non-standard antennas to provide statements in their applications from the operators of adjacent satellites. The statements would indicate that the proposed use of a non-standard antenna had been coordinated with the satellite operators.

Sincerely,

/s/ Joseph A. Godles
Joseph A. Godles
Attorney for PanAmSat Corporation

Attachments
Cc: Thomas Tycz
George Sharp
John Martin
Steven Spaeth
Sylvia Lam

Interference Risk Assessment
For
Mispointing of Earth Station Antennas

October 18, 2001

PanAmSat.

Topics of discussion:

1. **Earth Station Antenna Pointing Error and Loss**

2. **Earth Station Antenna Patterns**

3. **The Effect of Antenna Mispointing on Adjacent Satellite Interference**

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Antenna pointing ***is the orientation of the earth station antenna towards the satellite***

- **Automatic tracking Antenna**
  - Electrical/Mechanical tracking equipment steers the antenna;
  - Continuously tracking the satellite by homing in on the satellite beacon;
  - Tracking accuracy depends on the equipment pointing precision.

- **Fixed Mount Antenna**
  - Manual pointing of the antenna during the initial installation phase;
  - The mechanical alignment procedure may not be able to aim the antenna boresight perfectly at the satellite. Hence, there would be an antenna pointing error towards the desired satellite;
  - Antenna pointing error *is the difference in angle between the manually aimed boresight direction and the actual location of the satellite*
    - There would be a reduction of the maximum antenna gain in the direction of the satellite.
    - The mainlobe is being shifted towards the adjacent satellite. Hence, there is a potential to increase interference into the adjacent satellite.

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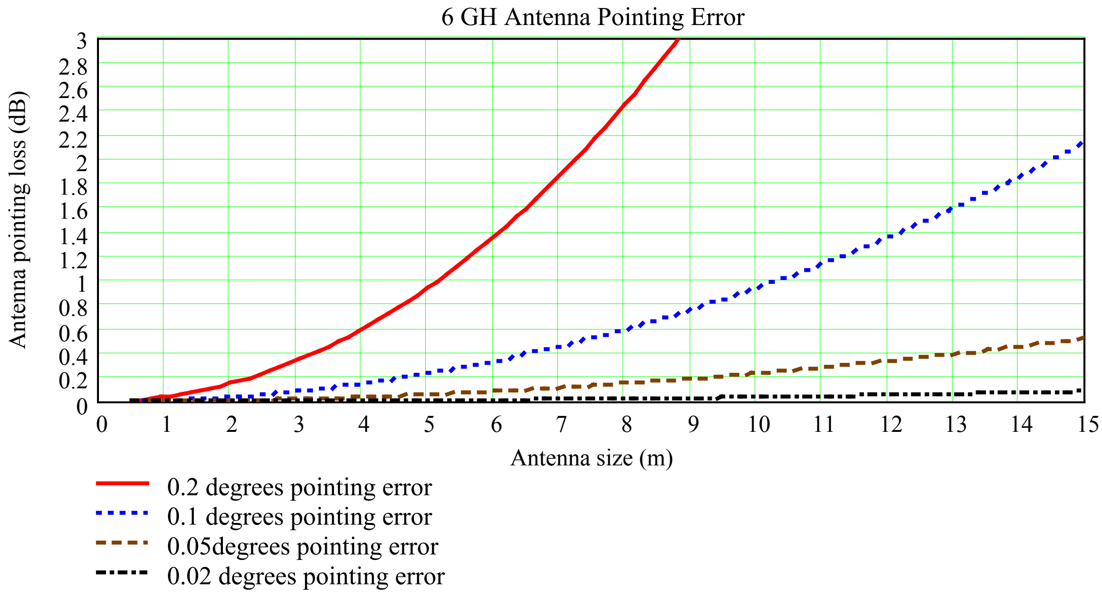

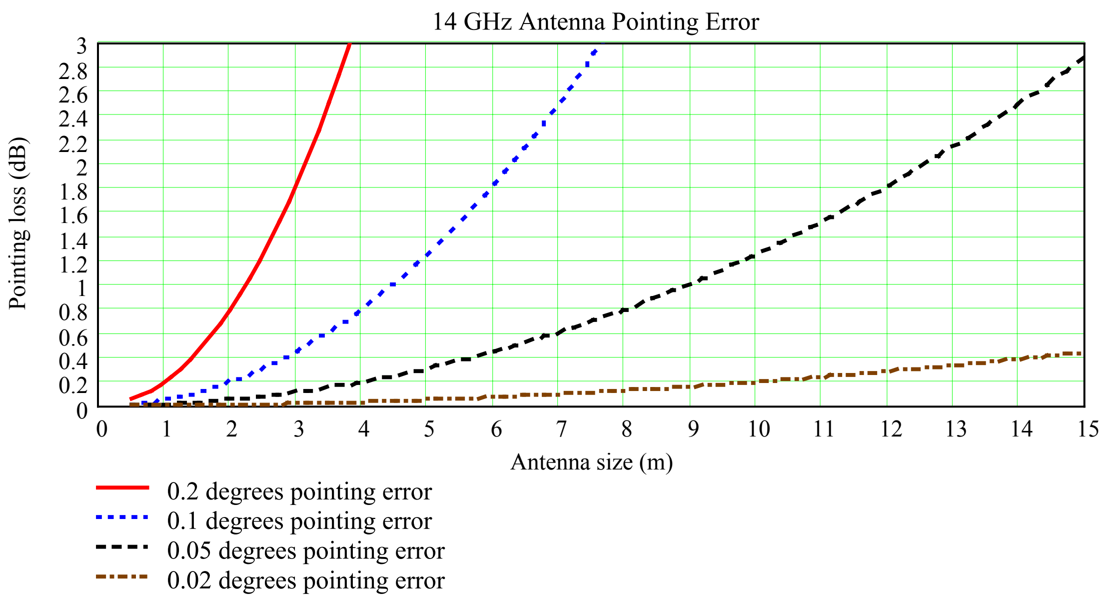

Earth Station Antenna Pointing Error and Loss

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Earth Station Antenna
Pointing Error (deg) and Loss (dB)
For Seven VSAT Antennas at 14.0 GHz

P-Error	Antenna Size (m)						
(deg)	2.4	1.8	1.2	0.98X0.56	0.98	0.96	0.89X0.62
0.05	0.08	0.05	0.02	0.01	0.01	0.01	0.01
0.1	0.32	0.18	0.08	0.06	0.05	0.05	0.04
0.15	0.73	0.41	0.18	0.13	0.12	0.10	0.09
0.2	1.30	0.73	0.32	0.23	0.21	0.18	0.16
0.25	2.06	1.14	0.50	0.36	0.23	0.28	0.25
0.3	3.01	1.66	0.73	0.51	0.47	0.40	0.36
0.35	4.17	2.28	0.99	0.70	0.63	0.55	0.50
0.4	5.56	3.01	1.31	0.92	0.83	0.72	0.65
0.45	7.25	3.86	1.66	1.17	1.06	0.92	0.83
0.5	9.23	4.83	2.06	1.44	1.31	1.13	1.02
0.55		5.96	2.51	1.76	1.56	1.38	1.24
0.6		7.23	3.01	2.10	1.90	1.65	1.48
0.7			4.17	2.89	2.61	2.26	2.03
0.8			5.56	3.83	3.46	2.99	2.68
0.9			7.23	4.94	4.44	3.83	3.43
1.0			9.23	6.22	5.59	4.80	4.30

Notes:
The 2.4-m and 1.8-m antennas are based on the antenna efficiency of the 1.2-m antenna.
The 1.2-m antenna mainlobe intersects the 29-25Log(θ) at 1.25-deg. at 14 GHz.
The four sub-meter small aperture antennas are based on the best-fit Bessel function of the measured antenna patterns.

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Earth Station Antenna Gain Patterns and The Shape of the Mainlobe

47 CFR Part 25 (FCC rules):

§25.209(a) The Gain of any antenna to be employed in transmission from an earth station in the fixed-satellite service shall lie below the envelope defined below:

(1) In the plane of the geostationary satellite orbit as it appears at the particular earth station location:

$29 - 25\log(\theta)$	dBi	$1^o \leq \theta \leq 7^o$
8	dBi	$7^o < \theta \leq 9.2^o$
$32 - 25\log(\theta)$	dBi	$9.2^o < \theta \leq 48^o$
-10	dBi	$48^o < \theta \leq 180^o$

where θ is the angle in degrees from the axis of the main lobe.

(g) The antenna performance standards of small antenna operating in the 12/14 GHz band with diameters as small as 1.2 meters starts at 1.25^o instead of 1^o as stipulated in paragraph (a) of this section.

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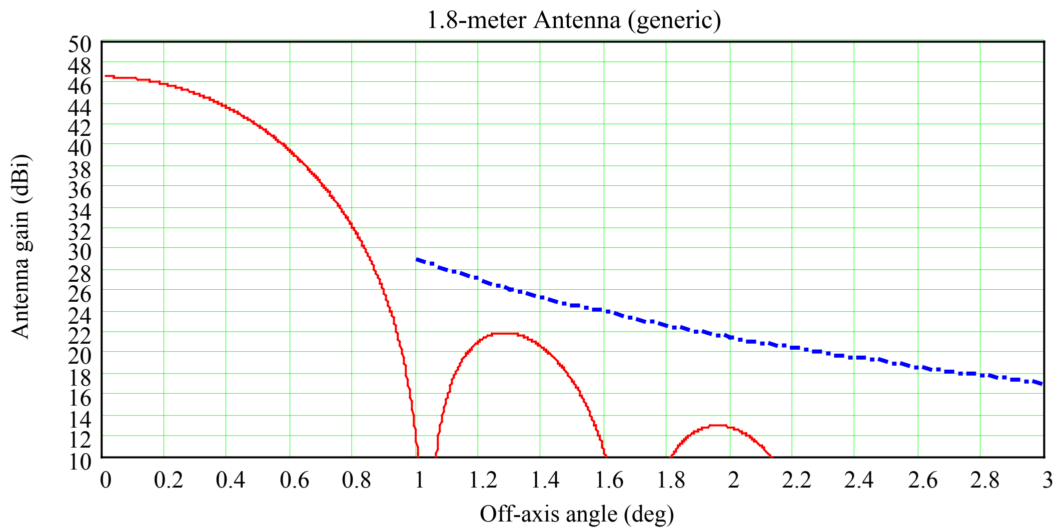
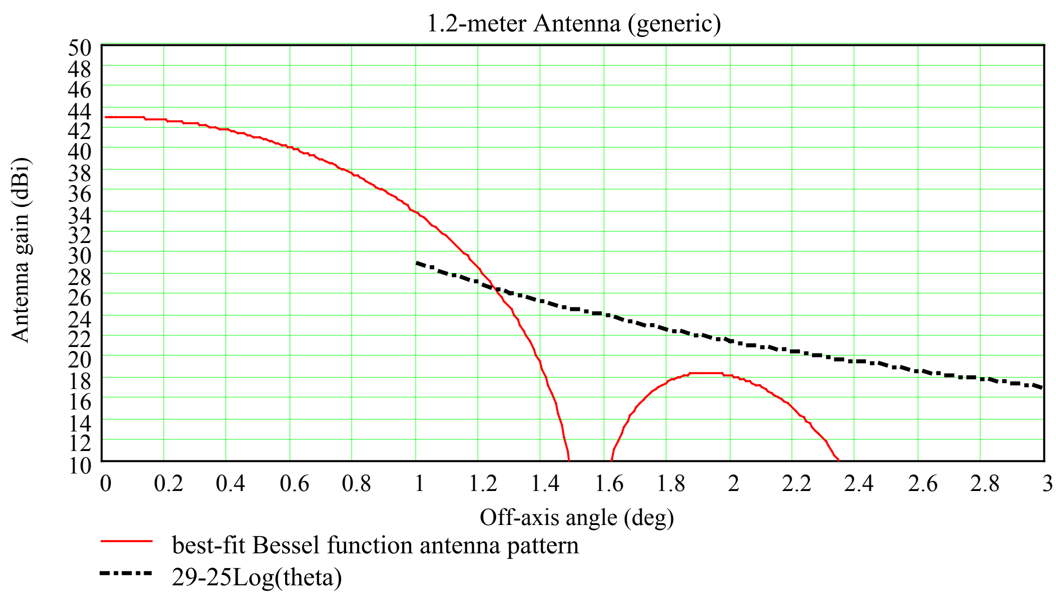
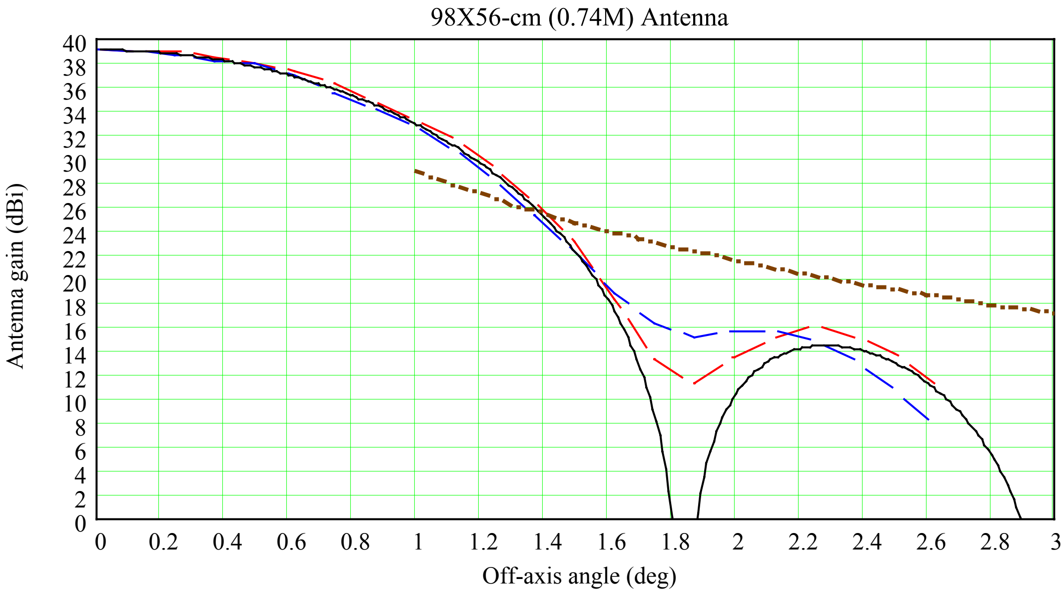
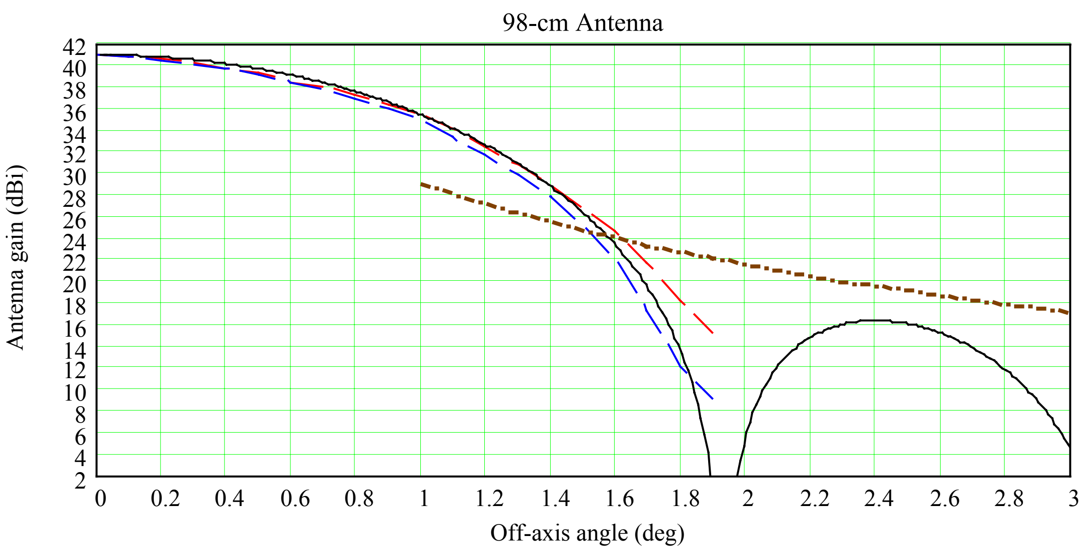
Examples of Typical Earth Station Antenna Patterns

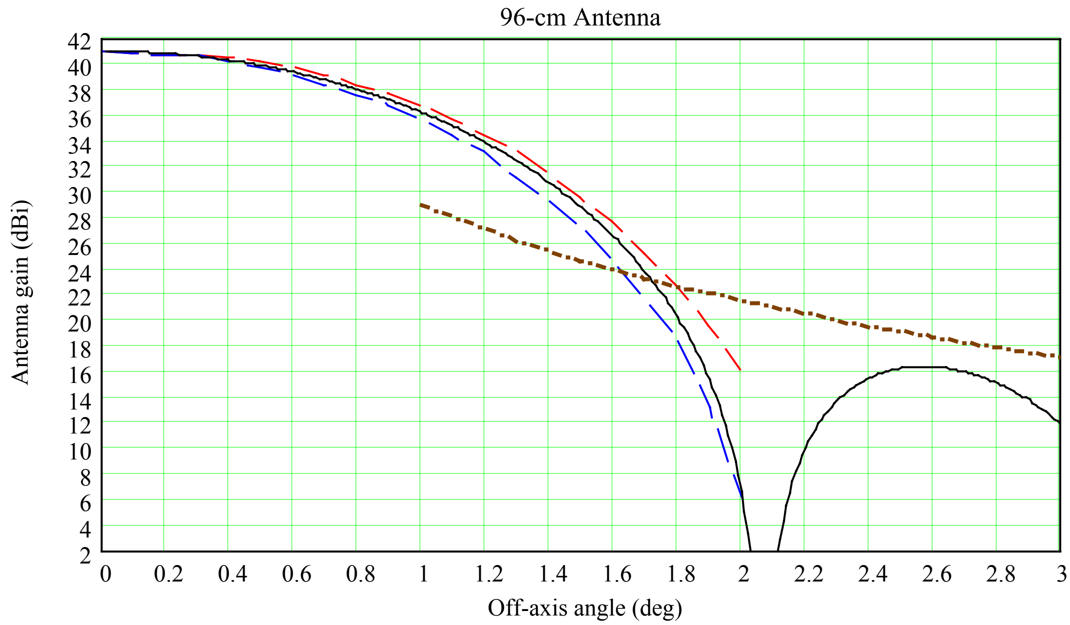


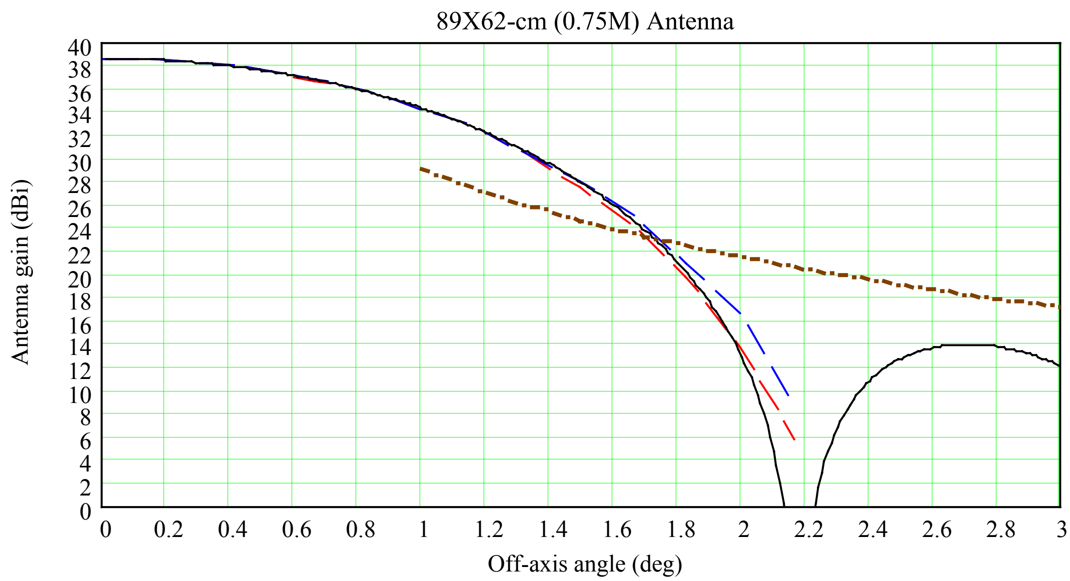






(top-dashed) measured antenna pattern (left-side)
(bottom-dashed) measured antenna pattern (right-side)
(solid) best-fit Bessel function antenna pattern
(dash-dotted) 29-25Log(theta)


96-cm Antenna
Antenna gain (dBi)
Off-axis angle (deg)
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3


89X62-cm (0.75M) Antenna
Antenna gain (dBi)
Off-axis angle (deg)
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3

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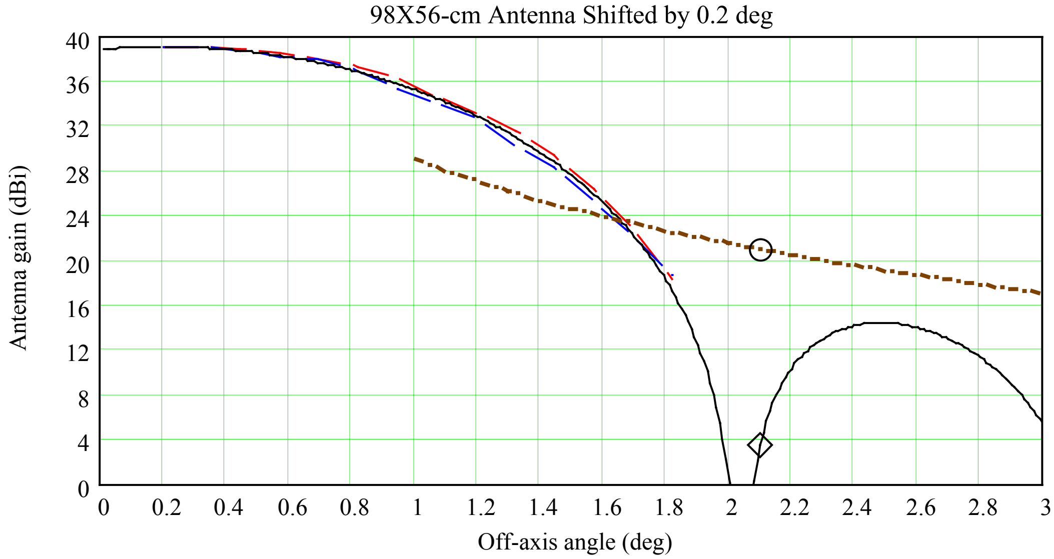
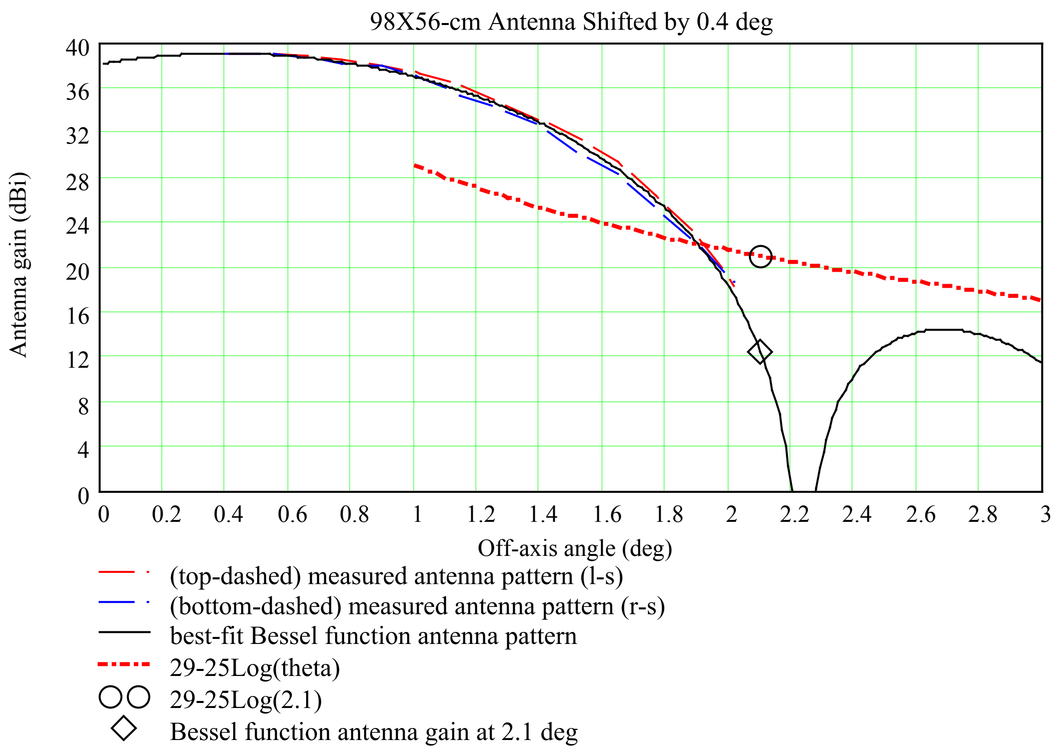
The Effect of Antenna Mispointing Relative to a Satellite at 2.1 degrees [1]





Note: (1) This is the topocentric angle for two satellites separated by 2 degrees minus the satellite station-keeping tolerance of 2X0.05 degrees

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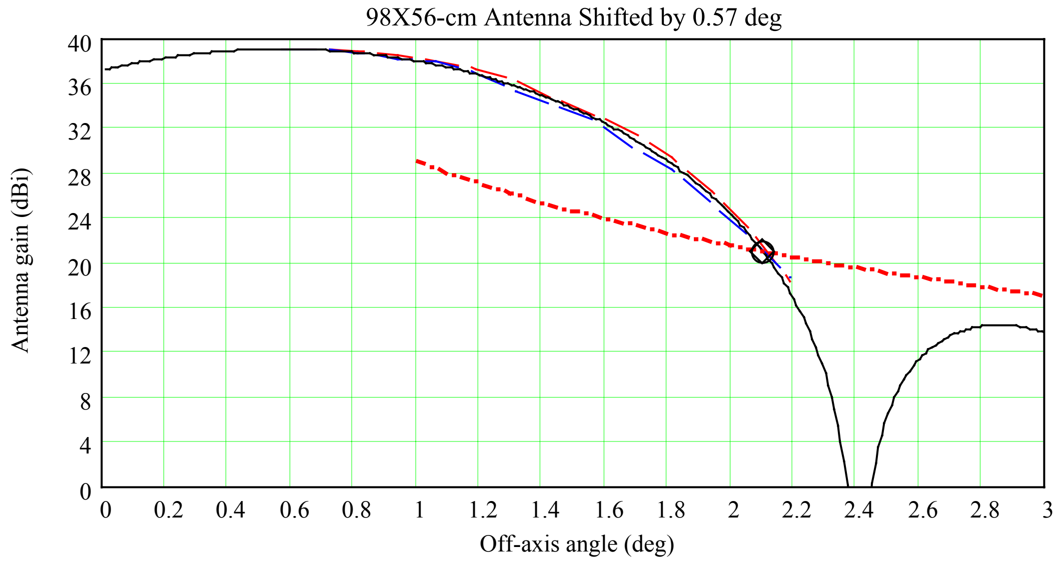
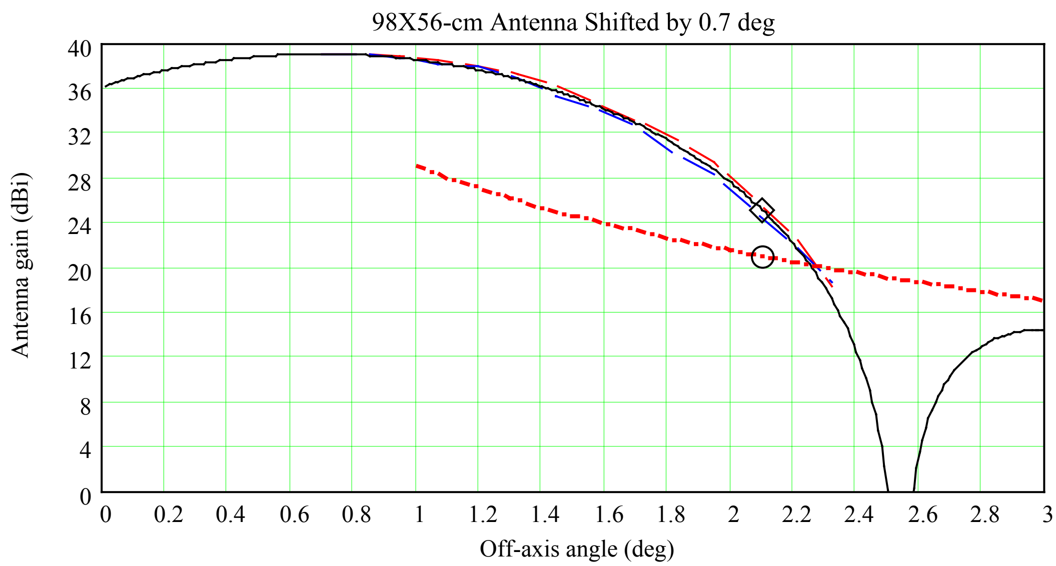

98X56-cm Antenna Shifted by 0.57 deg
Antenna gain (dBi)
Off-axis angle (deg)
0
4
8
12
16
20
24
28
32
36
40
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3


98X56-cm Antenna Shifted by 0.7 deg
Antenna gain (dBi)
Off-axis angle (deg)
0
4
8
12
16
20
24
28
32
36
40
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3

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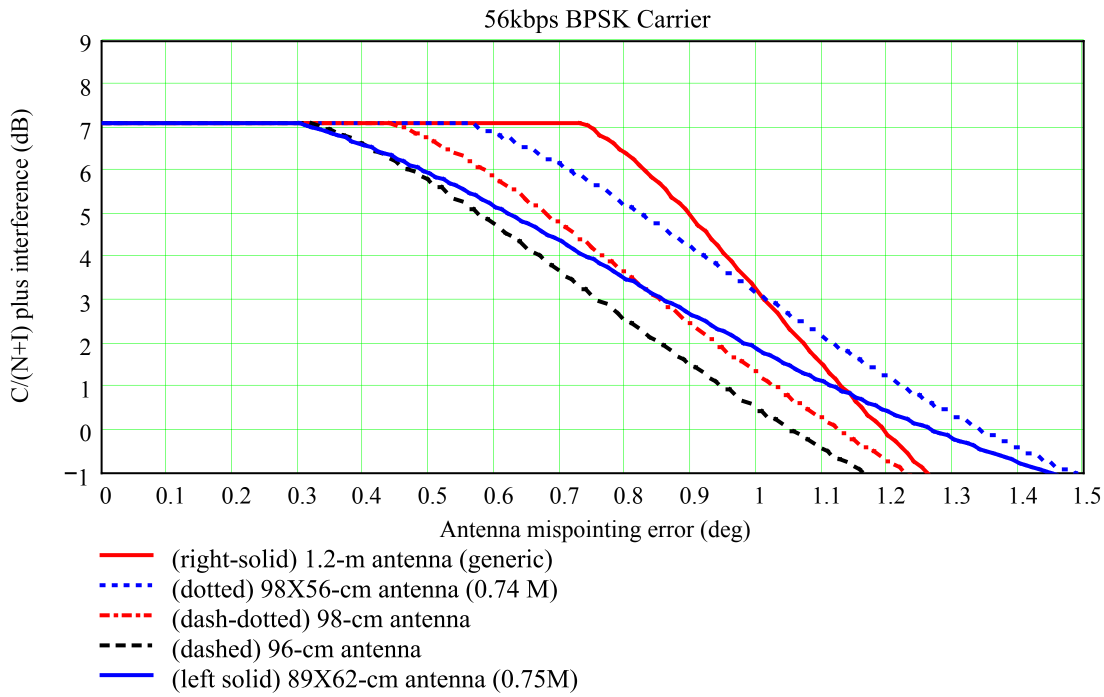
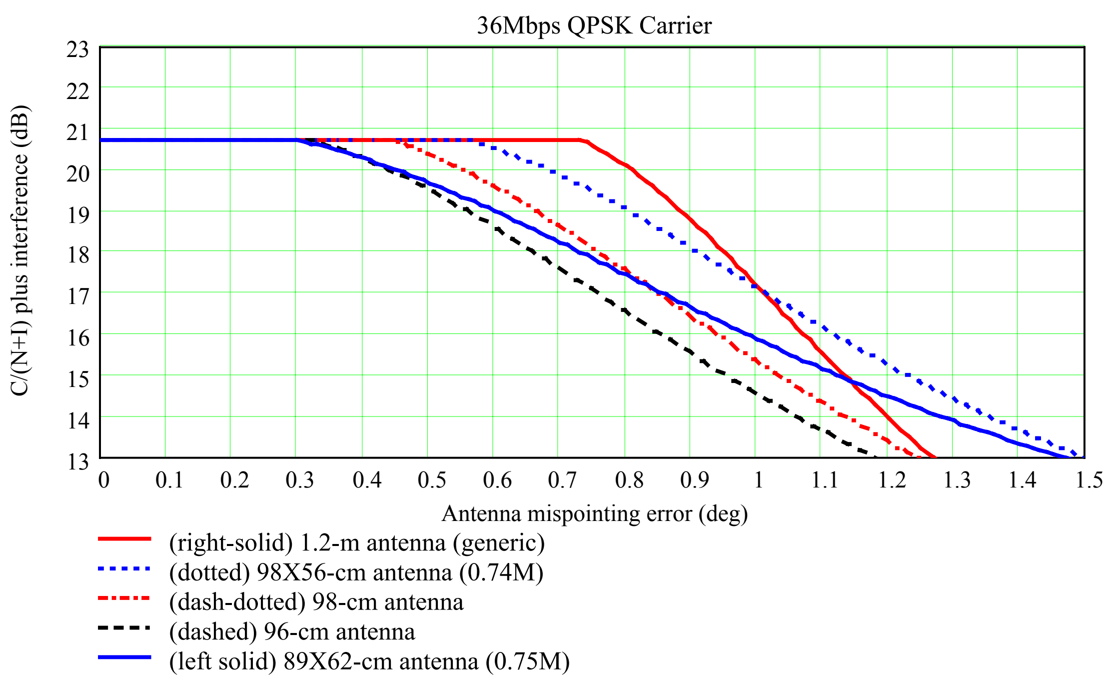
The Effect of Antenna Mispointing on the C/(N+I) for an Adjacent Satellite at 2-degree Spacing





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Conclusion

- Typical pointing tolerance for antenna size greater than or equal to 1.2-meter would not cause interference in excess of those permitted under the Commission rules.

- For antenna size smaller than 1.2-meter, the maximum acceptable antenna pointing error is:
  - proportional to the antenna size (in the geostationary-satellite orbit plane); and
  - inversely proportional to the mainlobe/29-25Log(θ) intersecting-point.

Antenna size (m)	Average intersecting-point (deg)	Maximum acceptable pointing error (deg)
0.98X0.56 (0.74)	1.38	0.56
0.98	1.58	0.43
0.96	1.72	0.32
0.89X0.62(0.75)	1.73	0.3

- Antenna misalignment greater that the maximum acceptable pointing error would cause harmful interference to the adjacent satellite. Worst yet, the interference level could be so severe that the victim satellite links would experience service outage.

- There is a need to have regulations and/or industry standards to restrain the potential impact of antenna mispointing of small aperture terminals on adjacent satellites

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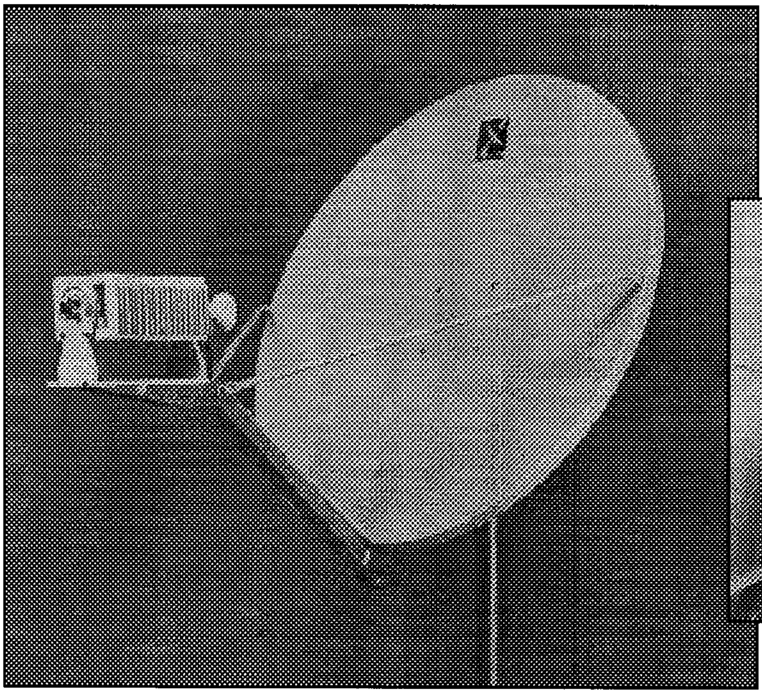
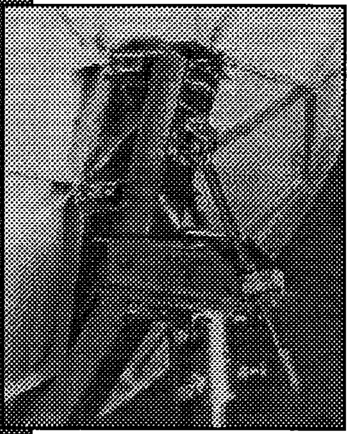
Channel Master®

TYPE 121

1.2m Receive-Transmit Offset Antenna System





Heavy-duty galvanized Az/El mount

FEATURES

- One-piece precision offset thermoset-molded reflector.
- Fine azimuth and elevation adjustments.
- Galvanized feed support arm and alignment struts.
- Factory pre-assembled mount.
- Galvanized or stainless hardware for maximum corrosion resistance.
- Available with a wide variety of C-Band and Ku-Band Rx-Tx feed assemblies and ODU mounting kits.

DESCRIPTION

The Channel Master Type 121 1.2m Rx-Tx Offset Antenna is a rugged commercial grade product suitable for the most demanding applications. The reflector is thermoset-molded for strength and surface accuracy. Molded into the rear of the reflector is a network of support ribs which not only strengthens the antenna, but also helps to sustain its critical parabolic shape necessary for transmit performance. Reflectors are available with hydrophobic coating or active de-icing for use in areas where snow buildup is a problem.

The Az/El mount is constructed from heavy-gauge steel to provide a rigid support to the reflector and feed support arm. Heavy-duty lockdown bolts secure the mount to any 2.88-3.00 in. O.D. mast and prevent slippage in high winds. Hot-dip galvanizing is standard for maximum environmental protection.

SPECIFICATIONS TYPE 121

1.2m Receive-Transmit Offset Antenna System

RF PERFORMANCE

		C-Band	Ku-Band
Effective Aperture		1.2m (48 in.)	1.2m (48 in.)
Operating Frequency	Tx	5.850 - 6.725 GHz	13.75 - 14.50 GHz
	Rx	3.400 - 4.200 GHz	10.70- 12.75 GHz
Polarization		Linear, Orthogonal	Linear, Orthogonal
Gain (±.3 dBi)	Tx	35.9 dBi @ 6.138 GHz	43.3 dBi @ 14.25 GHz
	Rx	32.0 dBi @ 3.913 GHz	41.8 dBi @ 11.95 GHz
3 dB Beamwidth	Tx	2.7° @ 6.1 GHz	1.2° @ 14.3 GHz
	Rx	4.2° @ 3.9 GHz	1.5° @ 12.0 GHz
Sidelobe Envelope (Tx, Co-Pol dBi)			
Mainbeam < Θ < 20°		29-25 Log Θ	29-25 Log Θ
20° < Θ < 26.3°		-3.5	-3.5
26.3° < Θ < 48°		32-25 Log Θ	32-25 Log Θ
48° < Θ < 180°		-10 (Typical)	-10 (Typical)
Antenna Cross-Polarization		>30 dB (on axis)	>30 dB (on axis)
Antenna Noise Temperature	10° El	60°K	45°K
	20° El	52°K	37°K
	30° El	50°K	34°K
VSWR		1.3:1 Max.	1.3:1 Max.
Isolation, Port-to-Port	Rx	60 dB Typical	70 dB Typical
	Tx	60 dB Typical	35 dB Typical
Feed Interface	Tx	CPR-137 or Type N	WR-75
	Rx	CPR-229	WR-75

MECHANICAL PERFORMANCE

Reflector Material		Glass Fiber Reinforced Polyester
Antenna Optics		One-Piece Offset Feed Prime Focus
Mount Type		Elevation over Azimuth
Elevation Adjustment Range		10°- 90° Continuous Fine Adjustment
Azimuth Adjustment Range		360° Continuous; ± 20° Fine Adjustment
Mast Pipe Interface		2.88-3.00 in.(73-76 mm) Diameter
Wind Loading	Operational	50 mi/h (80 km/h)
	Survival	125 mi/h (200 km/h)
Temperature		-50°C to 80°C
Humidity		0 to 100% (Condensing)
Atmosphere		Salt, Pollutants and Contaminants as Encountered in Coastal and Industrial Areas
Solar Radiation		360 BTU/h/ft²
Shock and Vibration		As Encountered During Shipping and Handling

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