ORIGINAL

SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP

1440 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-2111

TEL: (202) 371-7000
FAX: (202) 393-5760

DIRECT DIAL
(202) 371-7230
DIRECT FAX
(202) 371-7996

FIRM/AFFILIATE OFFICES
BOSTON
CHICAGO
HOUSTON
LOS ANGELES
NEWARK
NEW YORK
PALO ALTO
SAN FRANCISCO
WILMINGTON
BEIJING
BRUSSELS
FRANKFURT
HONG KONG
LONDON
MOSCOW
PARIS
SINGAPORE
SYDNEY
TOKYO
TORONTO

EX PARTE OR LATE FILED

March 2, 2000

RECEIVED

MAR 02 2000

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

VIA HAND DELIVERY

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

Re: ***Ex Parte* Submission of Northpoint Technology, Ltd.**
ET Docket No. 98-206, RM-9147, RM-9245

Dear Ms. Salas:

Pursuant to 47 CFR § 1.1206 of the Commission's rules, Northpoint Technology, Ltd. hereby submits six copies of the attached letter to Julius Knapp dated March 2, 2000 for filing in the above-referenced proceedings.

If you have any questions concerning this matter, kindly contact the undersigned.

Respectfully submitted,

Antoinette Cook Bush
Counsel for Northpoint Technology, Ltd.

Attachment

No. of Copies rec'd 0+6
List ABCDE

SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP

1440 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-2111

TEL: (202) 371-7000
FAX: (202) 393-5760

DIRECT DIAL
(202) 371-7230
DIRECT FAX
(202) 371-7996

FIRM/AFFILIATE OFFICES

BOSTON
CHICAGO
HOUSTON
LOS ANGELES
NEWARK
NEW YORK
PALO ALTO
SAN FRANCISCO
WILMINGTON

BEIJING
BRUSSELS
FRANKFURT
HONG KONG
LONDON
MOSCOW
PARIS
SINGAPORE
SYDNEY
TOKYO
TORONTO

March 2, 2000

VIA HAND DELIVERY

Julius P. Knapp
Chief, Policy and Rules Division
Office of Engineering and Technology
Federal Communications Commission
The Portals, 445 12th Street, S.W.
Washington, D.C. 20554

Re: ***Ex Parte* Submission of Northpoint Technology, Ltd.**
ET Docket No. 98-206, RM-9147, RM-9245

Dear Mr. Knapp:

In a recent meeting with representatives of Northpoint Technology, Inc. ("Northpoint"), we discussed the DirecTV, Inc. January 17, 2000, Ex Parte submission describing the Canadian 3-D Model of the DBS antenna and you asked our opinion of this model. On February 3, 2000, DirecTV submitted an Ex Parte filing (attached) wherein DirecTV admits it did not actually use the 3-D model in its engineering calculations of the interaction of its DBS system and Northpoint. This was actually apparent from its January 17, 2000 presentation. The antenna is described by 8 planes, or gross slices of the antenna separated by 22.5 degrees. None of these planes are with respect to the horizon. Actual application of the 3-D model to terrestrial systems would require extensive programming and coordinate transformation algorithms.

Thus, in evaluating the Canadian 3-D model, it is important to note this model was explicitly developed for "time varying" sources of interference, a clearly different case than the non-time varying transmissions of Northpoint.

Given the above design goals of the 3-D model and the fact that DirecTV now acknowledges that it did not actually use 3-D model, the model in its calculations, we suggest that the Commission should disregard the DirecTV presentations made using the 3-D model.

Should you have any questions or need additional information, please feel free to contact me.

Sincerely yours,

Antoinette Cook Bush
Counsel for Northpoint Technology, Inc.

Attachments

cc: Harry Ng (IB)
Dale Hatfield (OET)
Bruce A. Franca (OET)
James R. Burtle (OET)
Thomas Derenge (OET)
Geraldine Matise (OET)
Kathleen Ham (WTB)
Thomas P. Stanley (WTB)
Michael Pollak (WTB)
Donald Abelson (IB)
Thomas S. Tycz (IB)
Linda L. Haller (IB)
Kimberly M. Baum (IB)
Ari Fitzgerald (OC)

ORIGINAL

LATHAM & WATKINS
ATTORNEYS AT LAW
1001 PENNSYLVANIA AVE., N.W.
SUITE 1300
WASHINGTON, D.C. 20004-2505
TELEPHONE (202) 637-2200
FAX (202) 637-2201

PAUL R. WATKINS (1899 - 1973)
DANA LATHAM (1898 - 1974)

CHICAGO OFFICE
SEARS TOWER, SUITE 5800
CHICAGO, ILLINOIS 60606
PHONE (312) 876-7700, FAX 993-9767

HONG KONG OFFICE
SUITE 2205A, 22ND FLOOR
NO. 9 QUEEN'S ROAD CENTRAL
HONG KONG
PHONE + 852-2522-7886, FAX 2522-7006

LONDON OFFICE
ONE ANGEL COURT
LONDON EC2R 7HJ ENGLAND
PHONE + 44-171-374 4444, FAX 374 4460

LOS ANGELES OFFICE
633 WEST FIFTH STREET, SUITE 4000
LOS ANGELES, CALIFORNIA 90071-2007
PHONE (213) 485-1234, FAX 891-8763

MOSCOW OFFICE
ULITSA GASHEKA, 7, 9TH FLOOR
MOSCOW 123056, RUSSIA
PHONE + 7-095 785-1234, FAX 785-1235

NEW JERSEY OFFICE
ONE NEWARK CENTER, 18TH FLOOR
NEWARK, NEW JERSEY 07101-3174
PHONE (973) 639-1234, FAX 639-7298

NEW YORK OFFICE
885 THIRD AVENUE, SUITE 1000
NEW YORK, NEW YORK 10022-4802
PHONE (212) 906-1200, FAX 751-4864

ORANGE COUNTY OFFICE
650 TOWN CENTER DRIVE, SUITE 2000
COSTA MESA, CALIFORNIA 92626-1925
PHONE (714) 540-1235, FAX 755-8290

SAN DIEGO OFFICE
701 "B" STREET, SUITE 2100
SAN DIEGO, CALIFORNIA 92101-8197
PHONE (619) 236-1234, FAX 696-7419

SAN FRANCISCO OFFICE
505 MONTGOMERY STREET, SUITE 1900
SAN FRANCISCO, CALIFORNIA 94111-2562
PHONE (415) 391-0600, FAX 395-8095

SILICON VALLEY OFFICE
135 COMMONWEALTH DRIVE
MENLO PARK, CALIFORNIA 94025
PHONE (650) 328-4600, FAX 463-2600

SINGAPORE OFFICE
20 CECIL STREET, SUITE 25-02
THE EXCHANGE, SINGAPORE 049705
PHONE + 65-536-1161, FAX 536-1171

TOKYO OFFICE
INFINI AKASAKA, 8-7-15, AKASAKA, MINATO-KU
TOKYO 107-0052, JAPAN
PHONE +813-3423-3970, FAX 3423-3971

RECEIVED
FEB - 3 2000
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

EX PARTE OR LATE FILED

February 3, 2000

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

Re: *ET Docket No. 98-206; DA 99-494; Diversified Communication Engineering, Inc., File Nos. 6001-EX-MR-1998, 0094-EX-ST-1999; Call Sign WA2XMY;* ***EX PARTE***

Dear Ms. Salas:

This is to advise you that, in response to a request from Commission staff, on Monday, January 24, 2000, Tuesday, February 1, 2000 and Wednesday, February 2, 2000, representatives of DIRECTV, Inc. ("DIRECTV") provided some clarifying information to Harry Ng of the International Bureau regarding the sources of antenna patterns used in previous DIRECTV *ex parte* multimedia presentations that are on file with the Commission.

Specifically, DIRECTV informed Mr. Ng that (i) one source was data from a manufacturer of DIRECTV equipment; (ii) that a second source was ITU-R 10-11S data supplied by Canada for use in NGSO-FSS sharing analyses; (iii) that the Canadian data was taken in many planes suitable for building a 3-D model and for getting a feel for the overall antenna pattern (though not suitable for use in making detailed engineering calculations); (iv) that none of the eight planes of the Canadian data match the horizontal plane when looking up at a satellite; and (v) that the "butterfly" patterns in the presentation came from measured DIRECTV manufacturer data first presented to the Commission in a 1994 submission regarding terrestrial interference in the DBS downlink band, and were used for detailed engineering calculations contained in DIRECTV filings. DIRECTV also provided references for two publicly available ITU documents that provide 3-D antenna pattern information, 4-9-11/172 (25 June 1998) (from Canada) and 10-11S/240 (13 October 1999) (from Special Rapporteur Group 8). A copy of the latter document was provided to Mr. Ng.

No. of Copies rec'd 0+1
List A B C D E

While DIRECTV does not consider this information to be "new" information that must be disclosed under 47 C.F.R. § 1.1204(10)(iii) of the Commission's *ex parte* rules, DIRECTV nevertheless is doing so in an abundance of caution. Please contact the undersigned with any questions.

Very truly yours,

James H. Barker
of LATHAM & WATKINS

Counsel for DIRECTV, Inc.

INTERNATIONAL TELECOMMUNICATION UNION

RADIOCOMMUNICATION STUDY GROUPS

Document 11/137(Rev.1)-E
30 June 1999
Original: English

Source: Document 11/137

Study Group 11

DRAFT NEW RECOMMENDATION ITU-R BO.[DOC. 11/137]

REFERENCE BSS EARTH STATION ANTENNA PATTERNS FOR USE IN INTERFERENCE ASSESSMENT INVOLVING NON-GEOSTATIONARY SATELLITES IN FREQUENCY BANDS COVERED BY APPENDIX S30

(Question ITU-R 93/11)

The ITU Radiocommunication Assembly,

considering

a) that for earth station antennas in the broadcasting-satellite service (BSS) the reference antenna radiation patterns for GSO BSS receive antennas in Annex 5 to Appendix S30 of the Radio Regulations were used to develop the BSS Plans and prescribe a reference radiation pattern which represents an envelope of the side lobes;

b) that such reference radiation patterns are necessary for interference calculations involving fixed or transportable BSS receivers and geostationary satellites to ensure adequate protection of the BSS Plans;

c) that in circumstances where there are multiple interfering sources whose positions vary substantially with time, the level of interference received inevitably depends on the troughs as well as the peaks in the gain pattern of the victim BSS earth station antenna;

d) that for BSS earth stations, suitable reference radiation patterns are needed for use in assessing interference from non-GSO FSS systems;

e) that to facilitate computer simulations of interference, the reference patterns should cover all off-axis angles from 0° to ±180° in all planes;

f) that the reference patterns should be consistent with the results of measurements on a wide range of consumer BSS earth station antennas;

g) that it is appropriate to establish different reference patterns for different ranges of antenna sizes;

h) that the patterns may exhibit characteristics that may be important when modelling non-GSO interference, for example in the case of small offset-fed antennas,

recommends

1 that for calculations of interference generated by non-GSO FSS satellites into BSS earth station antennas, the reference earth station antenna radiation patterns described in Annex 1 should be employed;

2 that the methodology described in Annex 2 be used to convert the relative azimuth and elevation angle of the NGSO satellite under investigation into the same coordinate system as employed for the three-dimensional antenna pattern;

3 that the following NOTES be considered part of this Recommendation.

NOTE 1 - The cross-polarization radiation pattern may be of importance in non-GSO interference calculations. This issue requires further study.

NOTE 2 - This Recommendation is based on measurements and analysis of paraboloid antennas. If new earth station antennas are developed or are considered for use in the broadcasting-satellite service, the reference antenna patterns in this Recommendation should be updated accordingly.

ANNEX 1

Reference BSS antenna radiation patterns

For $11 \le D/\lambda \le 25.5$

$$G(\varphi) = G_{max} - 2.5 \times 10^{-3} \cdot \left(\frac{D\varphi}{\lambda}\right)^2 \qquad 0 \le \varphi < \varphi_m$$

$$G(\varphi) = G_1 \qquad \varphi_m \le \varphi < 95\lambda/D$$

$$G(\varphi) = 29 - 25 \cdot \log(\varphi) \qquad 95\lambda/D \le \varphi < 36.3°$$

$$G(\varphi) = -10 \qquad 36.3° \le \varphi < 50°$$

for $56.25° \le \theta < 123.75°$

$$G(\varphi) = M_1 \cdot \log(\varphi) - b_1 \qquad 50° \le \varphi < 90°$$

$$G(\varphi) = M_2 \cdot \log(\varphi) - b_2 \qquad 90° \le \varphi < 180°$$

where: $M_1 = \dfrac{2 + 8 \cdot \sin(\theta)}{\log\left(\dfrac{90}{50}\right)}$ and $b_1 = M_1 \cdot \log(50) + 10$

where: $M_2 = \dfrac{-9 - 8 \cdot \sin(\theta)}{\log\left(\dfrac{180}{90}\right)}$ and $b_2 = M_2 \cdot \log(180) + 17$

for $0° \le \theta < 56.25°$ and $123.75° \le \theta < 180°$

$$G(\varphi) = M_3 \cdot \log(\varphi) - b_3 \qquad 50° \le \varphi < 120°$$

$$G(\varphi) = M_4 \cdot \log(\varphi) - b_4 \qquad 120° \le \varphi < 180°$$

where: $M_3 = \dfrac{2 + 8 \cdot \sin(\theta)}{\log\left(\dfrac{120}{50}\right)}$ and $b_3 = M_3 \cdot \log(50) + 10$

where: $M_4 = \dfrac{-9 - 8 \cdot \sin(\theta)}{\log\left(\dfrac{180}{120}\right)}$ and $b_4 = M_4 \cdot \log(180) + 17$

for $180° \le \theta < 360°$

$G(\varphi) = M_5 \cdot \log(\varphi) - b_5$ $\qquad 50° \le \varphi < 120°$

$G(\varphi) = M_6 \cdot \log(\varphi) - b_6$ $\qquad 120° \le \varphi < 180°$

where: $M_5 = \dfrac{2}{\log\left(\dfrac{120}{50}\right)}$ and $b_5 = M_5 \cdot \log(50) + 10$

where: $M_6 = \dfrac{-9}{\log\left(\dfrac{180}{120}\right)}$ and $b_6 = M_6 \cdot \log(180) + 17$

where:

D = Antenna diameter

λ = Wavelength expressed in the same unit as the diameter

φ = Off-axis angle of the antenna relative to boresight, in degrees

θ = Planar angle of the antenna, in degrees (0° azimuth is the horizontal plane)

$$G_{max} = 20 \cdot \log\left(\frac{D}{\lambda}\right) + 8.1 \quad \text{dBi}$$

$$G_1 = 29 - 25 \cdot \log\left(95 \cdot \frac{\lambda}{D}\right) \quad \text{dBi}$$

$$\varphi_m = \frac{\lambda}{D} \cdot \sqrt{\frac{G_{max} - G_1}{0.0025}} \quad \text{degrees}$$

For $25.5 < D/\lambda \le 100$

$G(\varphi) = G_{max} - 2.5 \times 10^{-3} (D\varphi/\lambda)^2$ dBi $\qquad$ for $0 < \varphi < \varphi_m$

$G(\varphi) = G_1$ $\qquad$ for $\varphi_m \le \varphi < (95\lambda/D)$

$G(\varphi) = 29 - 25 \log \varphi$ dBi $\qquad$ for $(95\lambda/D) \le \varphi < 33.1°$

$G(\varphi) = -9$ dBi $\qquad$ for $33.1 < \varphi \le 80°$

$G(\varphi) = -4$ dBi $\qquad$ for $80° < \varphi \le 120°$

$G(\varphi) = -9$ dBi $\qquad$ for $120 < \varphi \le 180°$

where:

$G_{max} =$ 20 log (D/λ) + 8.1 dBi

$G_1 =$ 29 - 25 log (95λ/D) dBi

$\varphi_m = \lambda/D \sqrt{\dfrac{G\max - G1}{0.0025}}$

For D/λ > 100

$G(\varphi) = G_{max} - 2.5 \times 10^{-3} (D\varphi/\lambda)^2$ dBi	for $0 < \varphi < \varphi_m$
$G(\varphi) = G_1$	for $\varphi_m \leq \varphi < \varphi_r$
$G(\varphi) = 29 - 25 \log \varphi$ dBi	for $\varphi_r \leq \varphi < 10°$
$G(\varphi) = 34 - 30 \log \varphi$ dBi	for $10° \leq \varphi < 34.1°$
$G(\varphi) = -12$ dBi	for $34.1° \leq \varphi < 80°$
$G(\varphi) = -7$ dBi	for $80° \leq \varphi < 120°$
$G(\varphi) = -12$ dBi	for $120° \leq \varphi \leq 180°$

where:

$$G_{max} = 20 \log (D/\lambda) + 8.1 \text{ dBi}$$

$$G_1 = -1 + 15 \log D/\lambda \text{ dBi}$$

$$\varphi_m = \lambda/D \sqrt{\frac{G\max - G1}{0.0025}}$$

$$\varphi_r = 15.85 (D/\lambda)^{-0.6} \text{ (degrees)}$$

ANNEX 2

Geometric conversions for use with the 3D antenna model

1 Introduction

This annex provides the supplemental orbital geometry to be used in conjunction with the 3D patterns. The position of the NGSO satellite under investigation is determined in the same coordinate system as the antenna pattern definition. In order to be able to use this 3D model in NGSO interference studies, it is necessary to translate the azimuth and elevation of the interfering NGSO satellite into the off-axis and planar angles upon which the 3D model is based.

2 Computation of off-axis angle

In Figure 1, "P" is the location of the GSO earth station, "N" is the location of the NGSO satellite, and "S" is the intersection of Plane II (defined below) and the boresight of the receiving earth station.

Construction steps:

- draw Plane I tangential to earth surface at "P";
- draw Plane II through "N" perpendicular to Plane I and perpendicular to the projection of the GSO boresight onto Plane I;
- connect the dots.

In Figure 1, "A" is the projection of "N" and "B" is the projection of "S" on Plane I; "S" is the intersection of the boresight on Plane II, "C" is a point on SB such that NC is parallel to AB.

The assumed input parameters are:

- <SPB, the elevation angle of the GSO satellite at P, ($0° \leq$ elevation(GSO) $\leq + 90°$).
- <NPA, the time varying elevation angle of the NGSO satellite at P, ($0° \leq$ elevation(NGSO) $\leq + 90°$).
- <BPA, the time varying relative azimuth of the NGSO satellite at P, (clockwise assumed positive, $-180° \leq$ azimuth $\leq + 180°$).
- The distance PN from the earth station to the NGSO satellite (NOTE - Since the object is to determine angles which are dependent only on the ratio of distances, the actual distance is not essential but PN is used as a reference since it can be computed from known parameters if needed (e.g. in the determination of the path loss)).
- By construction, <NAP, <SBP, <NAB, <SBA, <NCB, and <ABP are all right angles.

The required output parameter for this first stage is:

- <SPN, the off-axis angle to the NGSO satellite.

By conventional solution of triangles:

PA = PN.cos(<NPA)

NA = PN.sin(<NPA) = CB

AB = PA.sin(<BPA) = NC

PB = PA.cos(<BPA)

SB = PB.tan(<SPB)

PS = PB.sec(<SPB)

NS = $\sqrt{(NC^2 + (SB-CB)^2)}$

<SPN = $\arccos((PN^2 + PS^2 - NS^2)/(2.PN.PS))$

3 Computation of planar angle

The reference plane (corresponding to $\theta = 0°$) assumed here is based on a standard mounting of the offset fed antenna with the feed assembly mounted at the bottom edge of the antenna. It is anticipated that this mounting arrangement will apply to the majority of such antennas. Other mounting arrangements will result in a different reference plane.

For the second stage of the computation, rotate Plane II about the axis NC so that the resulting Plane III is perpendicular to the GSO station boresight. Let "G" be the intersection of Plane III and the boresight, ND and GE are perpendicular to the join of Plane I and Plane III, PGH is the antenna reference plane, and "A" is the vertical projection of the NGSO satellite onto Plane I as before (see Figure 2).

The known parameters are:

- <GPE, the elevation of the GSO satellite at P, (= <SPB of the previous construction).
- <GPN, the off-axis angle (= <SPN in computed in first construction).
- The distance PN from the earth station to the NGSO satellite as before.
- The distance NA from the previous construction.
- By construction, <PGN and <PGE are right angles, <GEP = <NDA = $\pi/2$ - <GPE, and ND = CE.

The required output parameter is:

<HGN (= - <GNC), the planar angle of the NGSO satellite relative to the zero degree plane of the antenna model (plane PGH corresponding to a standard bottom mounted offset feed assembly).

NOTE - For this standard orientation, the alignment of the zero degree plane embraces the local horizontal at "P" and is not parallel to the GSO arc at the wanted satellite.

As above, by conventional solution of planar triangles:

NG = PN.sin(<GPN)

GE = PG.tan(<EPG)

ND = NA.cosec(<NDA) = NA.sec(<GPE)

<GNC = arcsin((GE-ND)/NG) = - <HGN

4 Quadrant conventions

The off-axis angle ϕ and the planar cut angle θ and their derivatives must be continuous across the quadrant boundaries with the caveat that, since the planar cuts of the 3D antenna pattern are defined between 0° and +180°, there will be transitions from, for example, a negative off-axis angle in a plane just below +180° to a positive off-axis angle in a plane just above 0°. This is illustrated in Figure 4 which corresponds to the situation where the NGSO satellite is at a lower elevation than the GSO satellite. Such a transition occurs near a relative azimuth angle of ±60° in this example. Figure 3 is the complementary situation - the NGSO satellite is at a higher elevation than the GSO satellite. In both figures, the relative azimuth is the running variable. The necessary adjustments to the computed off-axis and planar cut angles in order to conform with the quadrant and continuity constraints are given with each figure.

Adjustments for continuity and range:

a) Off-axis angle ϕ:

-180° ≤ azimuth < 180°	ϕ	=	+ <SPN

b) Planar angle θ:

-180° ≤ azimuth < 0°	θ	=	180° + <GNC
0° ≤ azimuth < +180°	θ	=	- <GNC

This example illustrates the 90° off-axis angle in the 90° planar cut - the offset feed spill-over region - which occurs at a relative azimuth of ±180°, i.e. when the NGSO satellite is behind the GSO earth station.

Adjustments for continuity and range:

a) Off-axis angle ϕ:

-180° ≤ azimuth < -60°	ϕ	=	+ <SPN
-60° ≤ azimuth < +60°	ϕ	=	- <SPN
+60° ≤ azimuth < +180°	ϕ	=	+ <SPN

b) Planar angle θ:

-180° ≤ azimuth < -60°	θ	=	180° - <GNC
-60° ≤ azimuth < 0°	θ	=	- <GNC
0° ≤ azimuth < +60°	θ	=	180° + <GNC
+60° ≤ azimuth < +180°	θ	=	+ <GNC

NOTE 1 - The planar angle for an NGSO satellite at a lower elevation angle than the GSO satellite would normally be computed as negative for small relative azimuths. However, since the planar cuts are not defined for negative angles, it is necessary to take the complement in both planar and off-axis angles.

NOTE 2 - For both situations (NGSO satellite above and below the GSO satellite), the planar angle transitions at 0° relative azimuth.

NOTE 3 - The transitions at ±60° azimuth will vary with the elevation angles of the GSO satellite and the NGSO satellite. This transition is easily determined with a suitable conditional branch statement on <GNC.

NOTE 4 - The above illustrates that the spill-over lobe at 90° off-axis in the 90° plane may also be encountered in this configuration (consider, for example, the reverse situation from Figure 3, i.e. GSO at 70° and NGSO at 20°, then the spill-over lobe is encountered at 180° relative azimuth as before).

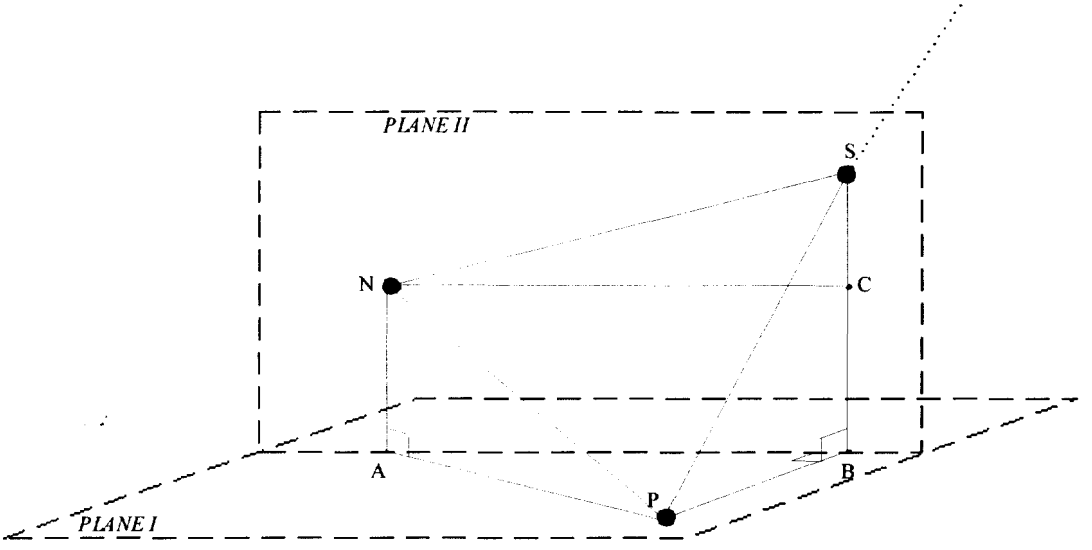

FIGURE 1
Geometry I of an exposure from an NGSO satellite

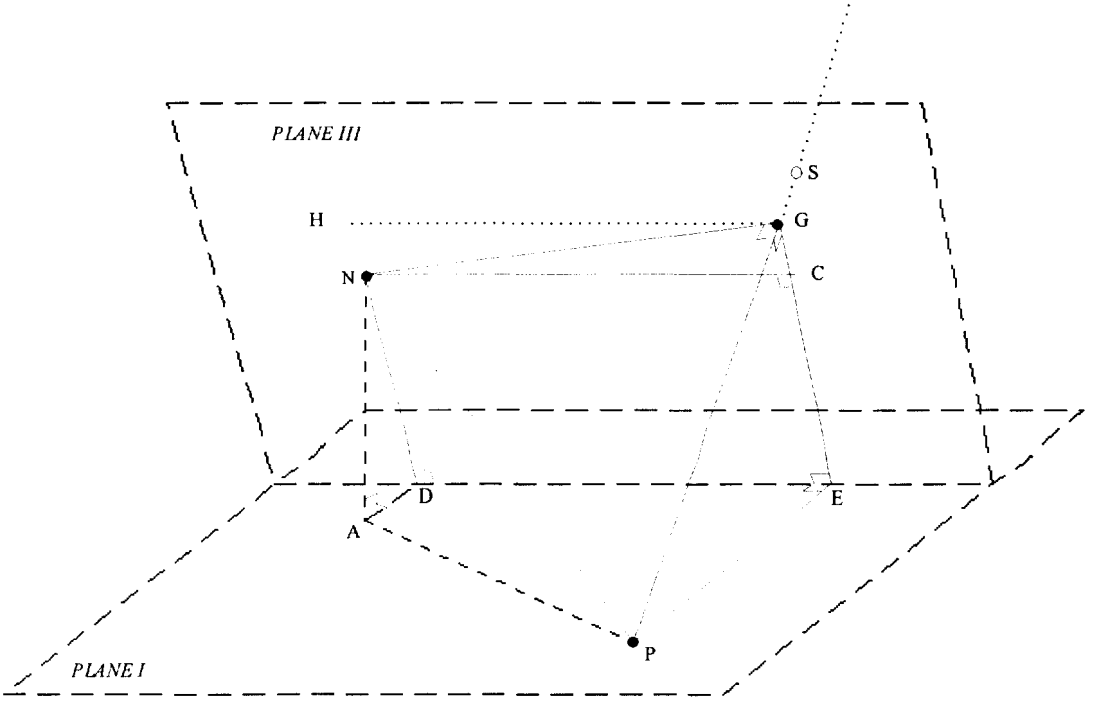

FIGURE 2
Geometry II of an exposure from an NGSO satellite

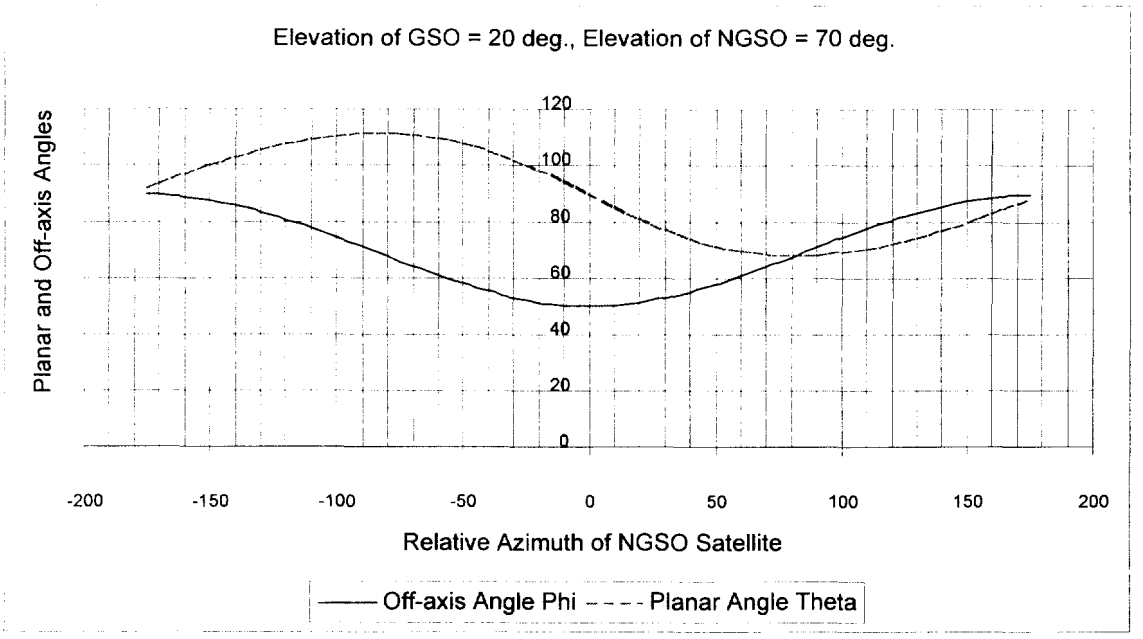

FIGURE 3

Planar cut and off-axis angles for NGSO satellite at 70° elevation and GSO satellite at 20° elevation

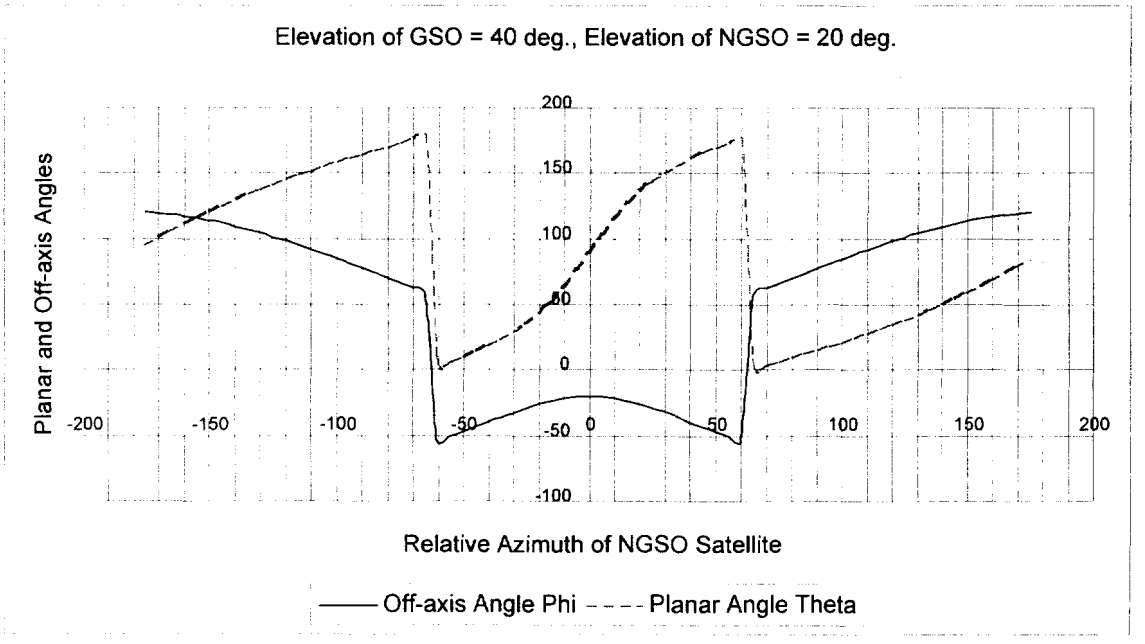

FIGURE 4

Planar cut and off-axis angles for NGSO satellite at 20° elevation, GSO satellite at 40° elevation