EXHIBIT A

FCC FORM 442 AND SUPPORTING DOCUMENTATION FOR ALOHA NETWORKS, INC.'S REQUEST FOR SPECIAL TEMPORARY AUTHORITY

Approved by OMB
3060-0065
Expires 9/30/98

FEDERAL COMMUNICATIONS COMMISSION

FCC FORM 442

FOR FCC USE ONLY

APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER THAN BROADCAST)

SECTION I

APPLICANT NAME (Last, first, middle initial)
Aloha Networks, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters - refer to Instruction (2) on reverse of form)
P.O. Box 29472

MAILING ADDRESS (Line 2) (if required) (Maximum 35 characters)

CITY
San Francisco

STATE OR COUNTRY (if foreign address)	ZIP CODE	CALL SIGN OR FILE NUMBER
California	94129-0472	

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in FCC Fee Filing Guides. Enter in Column (B) the Fee Multiple, if applicable. Enter in Column (C) the result obtained from multiplying the value of the Fee Type Code in Column (A) by the number entered in Column (B), if any.

	(A) FEE TYPE CODE	(B) FEE MULTIPLE (if required)	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
(1)	E A E		$	

SECTION II — To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

	(A) FEE TYPE CODE	(B) FEE MULTIPLE (if required)	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
(2)			$	
(3)			$	
(4)			$	
(5)			$	

ADD ALL AMOUNTS SHOWN IN COLUMN C, LINES (1) THROUGH (5), AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE. →

TOTAL AMOUNT REMITTED WITH THIS APPLICATION OR FILING
$

FOR FCC USE ONLY

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

APPROVED BY OMB
3060-0065
Expires 9/30/98

APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER THAN BROADCAST)

1. Applicant's Name and Post Office address (Street address, city, state, and ZIP Code. See instruction No. 4)

Aloha Networks, Inc.
P.O. Box 29472
San Francisco, CA 94129-0472

DO NOT WRITE IN THIS BLOCK
File No.

2(a). Application for (check only one box)

[X] New station [ ] Modification of existing authorization

2(b). For Modification indicate below:
File No: Call Sign:

3. Application for Modification: Check the box beside all particulars to be modified. Check either addition or replacement to indicate whether the change is an addition or a replacement of parameters in the current authorization.

[ ] FREQUENCY - [ ] addition or [ ] replacement?
[ ] EMISSION - [ ] addition or [ ] replacement?
[ ] POWER - [ ] addition or [ ] replacement?
[ ] LOCATION - [ ] addition or [ ] replacement?

[ ] OTHER PARTICULARS - addition or replacement? (Describe below or in attached EXHIBIT No. ______)

4. Particulars of Operation (see instruction below)

Frequency (state whether kHz or MHz) (A)	POWER (B)	(C)	(D)	EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (kHz) (G)
14000-14500 MHz	2.8 dBW	37.5 dBW	Peak	2M40G2D	QPSK	2.4 MHz
14000-14500 MHz	2.8 dBW	40.0 dBW	Peak	2M40G2D	QPSK	2.4 MHz
14000-14500 MHz	2.8 dBW	41.9 dBW	Peak	2M40G2D	QPSK	2.4 MHz
14000-14500 MHz	2.8 dBW	44.3 dBW	Peak	2M40G2D	QPSK	2.4 MHz
14000-14500 MHz	2.8 dBW	46.1 dBW	Peak	2M40G2D	QPSK	2.4 MHz
14000-14500 MHz	2.8 dBW	56.5 dBW	Peak	2M40G2D	QPSK	2.4 MHz

(A) List each frequency or frequency band separately. (If more space is required, attach as EXHIBIT No.__________)
(B) Insert maximum RF. output power at the transmitter terminals. Specify units.
(C) Insert maximum effective radiated power from the antenna (If pulsed emission, specify peak power). Specify units.
(D) Insert "MEAN" or "PEAK" (See definitions in Part 5).
(E) List each type of emission separately for each frequency. (See Section 2.201 of FCC Rules)
(F) Insert as appropriate for the type of modulation:
(1) the maximum speed of keying in bauds;
(2) maximum audio modulating frequency;
(3) frequency deviation of carrier;
(4) pulse duration and repetition rate.
For complex emissions, describe in detail in the space provided below.
(G) Describe how the necessary bandwidth was determined in space provided below.

5(a). Proposed location of transmitter and transmitting antenna (check only one box to indicate type of operation):

☐ FIXED/BASE ☐ MOBILE ☐ BASE AND MOBILE

5(b). If permanently located at a FIXED location, give below:

State	County	City or Town

Number and street (or other indication of location)

5(c). If mobile, describe the exact area of operation

5(b)(1). Enter geographical coordinates exact to the nearest second (see instruction 10)

North Latitude (DD-MM-SS)	West Longitude (DD-MM-SS)
° CONUS ' "	°CONUS ' "

5(c)(1). Enter geographical coordinates of the approximate center of mobile operation (see instruction 10.)

North Latitude	West Longitude
° ' "	° ' "

5(d). Datum (see instruction 10): .... ☐ NAD 27 ☒ NAD 83

6. Is a directional antenna (other than radar) used? ☒ YES ☐ NO
   If "YES", give the following information:
   (a) Width of beam in degrees at the half-power point See Exhibit A
   (b) Orientation in horizontal plane ________ (c) Orientation in vertical plane ________

7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ YES ☒ NO
   If "YES", attach as EXHIBIT No. ________ a narrative statement describing the government project, agency and contact number.

8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ YES ☒ NO
   If "YES", attach as EXHIBIT No. ________ the following information: Provide the contract number and the name of the foreign government concerned.

9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project). ☐ YES ☒ NO
   If "YES", attach as EXHIBIT No. ________ a narrative statement provding the following information:
   (a) A description of the nature of the research project being conducted.
   (b) A showing that the communications facilities requested are necessary for the research project involved.
   (c) A showing that existing communications facilities are inadequate.

10. If all the answers to items 7, 8, and 9, are "NO", attach as EXHIBIT No. G a narrative statement describing in detail the following:
   (a) The complete program of research and experimentation proposed including description of equipment and theory of operation.
   (b) The specific objectives sought to be accomplished.
   (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

11(a). Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application: 6 months
   (b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required: ________

12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact (see instruction 11)? ☐ YES ☒ NO
   If "YES", attach as EXHIBIT No. ________ an Environmental Assessment as required by Section 1.1311.

13. List below transmitting equipment to be installed (if experimental, so state):

MANUFACTURER	MODEL NUMBER	NO. OF UNITS
CHANNEL MASTER	See Exhibit A	

14. Is the equipment listed in Item 18 capable of station identification pursuant to Section 5.152? ☐ YES ☐ NO

15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? ☐ YES ☐ NO

If "YES", give the following (see instruction 9):

(a) Overall height above ground to tip of antenna is __________ meters.

(b) Elevation of ground at antenna site above mean sea level is __________ meters.

(c) Distance to nearest aircraft landing area is __________ kilometers.

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

(e) Submit as EXHIBIT No. __________ a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

16. Applicant is: *(Check only one box)*

☐ INDIVIDUAL ☐ ASSOCIATION ☐ PARTNERSHIP ☒ CORPORATION

☐ OTHER (describe in space provided below)

17. Is applicant a foreign government or a representative of a foreign government? ☐ YES ☒ NO

18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission? ☐ YES ☒ NO

If "YES", attach as EXHIBIT No. __________ a statement giving call sign of license or permit revoked and relate circumstances.

19. Will applicant be owner and operator of the station? ☐ YES ☐ NO

20. Give name, title, and telephone number (include area code), and Internet e-mail address (if applicable) of person who can best handle inquiries pertaining to this application.

21. APPLICANT ANTI-DRUG ABUSE CERTIFICATION:

By checking "YES", the individual applicant certifies that he or she is eligible for this license. This requires that he or she is not subject to a denial of federal benefits, including FCC benefits, as a result of a drug offense conviction pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862. A non-individual applicant, e.g., corporation, partnership or other unincorporated association, certifies that no party to the application is subject to a denial of federal benefits, pursuant to that section. For definition of a "party" for these purposes, see 47 CFR 1.2002(b). ☐ YES ☐ NO

22. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM
A	Antenna Parameters				
B	Radiation Hazard Study				
C	Demonstration of FCC Compliance				
D	Adjacent Satellite Analysis				
E	Antenna Patterns				
F	Acknowledgement Harmful Interference				
G	Experimental Program Description				

23 CERTIFICATION:

Attention: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

(a) Copies of FCC Rule Parts 2 and 5 are on hand; and
(b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
(c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
(d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission:
   (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
   (2) that the applicant will be authorized to operate on any basis other than experimental, and
   (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

(e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
(f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
(g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this ____________ day of ____________ , 19 ____

Name of Applicant ______________________________
(must correspond with name given on page 1)

By ______________________________ ______________________________
(print) (signature)

Title ______________________________

Check appropriate classification:

☐ Individual applicant ☐ Member of applicant partnership

☐ Authorized employee ☐ Office of applicant corporation or association

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. Code, Title 18 Section 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specified by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered by the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to 47 CFR 0.459 of the FCC Rules and Regulations. Your response is required to obtain this authorization.

Public reporting burden for this collection of information is estimated to average four (4) hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0065), Washington, DC 20554. **DO NOT send completed applications to this address.** Individuals are not required to respond to this collection unless it displays a currently valid OMB control number.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

Exhibit A

Summary of Transmit Antenna Parameters

1. Channel Master - 0.45 m Ku-Band Antenna

Operating Frequency (Tx)	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	3.0° @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx)	34.7 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP	37.5 dBW or 9.7 dBW/4 kHz

2. Channel Master - 0.60 m Ku-Band Antenna

Operating Frequency (Tx):	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	2.4° @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx):	37.2 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP:	40.0 dBW or 12.2 dBW/4 kHz

3. Channel Master - 0.75 m Ku-Band Antenna

Operating Frequency (Tx):	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	1.9° @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx):	39.1 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP:	41.9 dBW or 14.1 dBW/4 kHz

4. Channel Master - 1.0 m Ku-Band Antenna

Operating Frequency (Tx):	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	1.5° @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx):	41.5 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP:	44.3 dBW or 16.5 dBW/4 kHz

5. Channel Master - 1.2 m Ku-Band Antenna

Operating Frequency (Tx):	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	1.2° @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx):	43.3 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP:	46.1 dBW or 18.3 dBW/4 kHz

6. TBD – 4.5 m Ku-Band Antenna

Operating Frequency (Tx):	13.75 – 14.50 GHz
Polarizations:	Linear
3 dB Beamwidth (Tx)	0.35^{0} @ 14.3 GHz
Modulation	Digital, 2.4 MHz
Gain (Tx):	53.7 dBi
RF power into Antenna Flange:	1.91 Watts or -25 dBW/4 kHz
Antenna Uplink EIRP:	56.5 dBW or 28.7 dBW/4 kHz

Exhibit B

Radiation Hazard Analyses
(4.5m, 1.2m, 1.0m, 0.75m, 0.60m, & 0.45m)

Analysis of Non-Ionizing Radiation for a 4.5 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 4.5 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	4.5	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Subreflector Diameter	Ds	61.0	cm
Area of Subreflector	As	II * Ds**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	53.7	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.55	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 577.1 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 0.107 Watts/meters**2
= 0.011 mWatts/cm**2

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 240.5 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 0.264 Watts/meters**2
= 0.026 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation:(5)

Transition region Power Density,(Tt) = Wn * Rn / Rt (5)
= 0.026 mWatts/cm**2

4. Region between Main Reflector and Subreflector

Transmissions from the feed assembly are directed toward the subreflector surface, and are reflected back toward the main reflector. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the subreflector and the reflector surfaces can be calculated by determining the power density at the subreflector surface. This can be determined from the following equation:(6)

Power Density at Feed Flange,(Ws) = 4 * P / As (6)
= 2.614 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the subreflector. The area is now the area of the main reflector aperture and can be determined from the following equation:(7)

Power Density at the Main Reflector Surface,(Wm) = 4 * P / Sa (7)
= 0.480 Watts/meters**2
= 0.048 mWatts/cm**2

6. Region between Main Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation:(8)

Power Density between Reflector and Ground,(Wg) = P / Sa (8)
= 0.120 Watts/meters**2
= 0.012 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 577.1 meters	0.011	Satisfies FCC MPE
2. Near Field (Rn) = 240.5 meters	0.026	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.026	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	2.614	Potential Hazard
5. Main Reflector	0.048	Satisfies FCC MPE
6. Between Main Reflector and Ground	0.012	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 577.1 meters	0.011	Satisfies FCC MPE
2. Near Field (Rn) = 240.5 meters	0.026	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.026	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	2.614	Satisfies FCC MPE
5. Main Reflector	0.048	Satisfies FCC MPE
6. Between Main Reflector and Ground	0.012	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that harmful levels of radiation will not exist in regions normally occupied by the public or the earth station's operating personnel. The transmitter will be turned off during antenna maintenance so that the FCC MPE of 5.0 mW/cm**2 will be complied with for those regions with close proximity to the reflector that exceed acceptable levels.

Analysis of Non-Ionizing Radiation for a 0.45 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 0.45 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	0.45	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Feed Flange Diameter	Df	7.6	cm
Area of Feed Flange	Fa	II * Df**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	34.7	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.65	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 5.8 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 13.467 Watts/meters**2
= 1.347 mWatts/cm**2

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 2.4 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 31.439 Watts/meters**2
= 3.144 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation:(5)

Transition region Power Density,(Tt) = Wn * Rn / Rt (5)
= 3.144 mWatts/cm**2

4. Region between Feed Assembly and Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation:(6)

Power Density at Feed Flange,(Wf) = 4 * P / Fa (6)
= 168.413 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation:(7)

Power Density at the Reflector Surface,(Ws) = 4 * P / Sa (7)
= 48.037 Watts/meters**2
= 4.804 mWatts/cm**2

6. Region between Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation:(8)

Power Density between Reflector and Ground,(Wg) = P / Sa (8)
= 12.009 Watts/meters**2
= 1.201 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 5.8 meters	1.347	Potential Hazard
2. Near Field (Rn) = 2.4 meters	3.144	Potential Hazard
3. Transition Region Rn < Rt < Rf, (Rt)	3.144	Potential Hazard
4. Between Feed Assembly and Antenna Reflector	168.413	Potential Hazard
5. Main Reflector	4.804	Potential Hazard
6. Between Reflector and Ground	1.201	Potential Hazard

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 5.8 meters	1.347	Satisfies FCC MPE
2. Near Field (Rn) = 2.4 meters	3.144	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	3.144	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	168.413	Potential Hazard
5. Main Reflector	4.804	Satisfies FCC MPE
6. Between Reflector and Ground	1.201	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4. and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

The proposed earth station will be installed at the Aloha Networks facility. The antenna facility should be surrounded by a fence, which will restrict any public access to the site. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth stations to inform those in the general population, who may be working or otherwise present in or near the direct path of the main beams.

Aloha Networks, Inc. will ensure that the main beam of the antenna will be pointed at least one diameter away from any buildings, or other obstacles in those areas that exceeds the MPE levels.

Finally, the earth station operating personnel will not have excess to areas that exceed the MPE levels, while the earth station is in operation. The transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mW/cm**2 will be complied with for those regions in close proximity to the reflector, and normally occupied by operating personnel.

Analysis of Non-Ionizing Radiation for a 0.6 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 0.6 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	0.6	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Feed Flange Diameter	Df	7.6	cm
Area of Feed Flange	Fa	II * Df**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	37.2	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.65	n/a

1. <u>Far Field Distance Calculation</u>

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 10.3 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 7.578 Watts/meters**2
= 0.758 mWatts/cm**2

2. <u>Near Field Calculation</u>

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 4.3 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 17.689 Watts/meters**2
= 1.769 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation:(5)

Transition region Power Density,(Tt) = Wn * Rn / Rt (5)
= 1.769 mWatts/cm**2

4. Region between Feed Assembly and Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation:(6)

Power Density at Feed Flange,(Wf) = 4 * P / Fa (6)
= 168.413 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation:(7)

Power Density at the Reflector Surface,(Ws) = 4 * P / Sa (7)
= 27.021 Watts/meters**2
= 2.702 mWatts/cm**2

6. Region between Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation:(8)

Power Density between Reflector and Ground,(Wg) = P / Sa (8)
= 6.755 Watts/meters**2
= 0.676 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 10.3 meters	0.758	Satisfies FCC MPE
2. Near Field (Rn) = 4.3 meters	1.769	Potential Hazard
3. Transition Region Rn < Rt < Rf, (Rt)	1.769	Potential Hazard
4. Between Feed Assembly and Antenna Reflector	168.413	Potential Hazard
5. Main Reflector	2.702	Potential Hazard
6. Between Reflector and Ground	0.676	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 10.3 meters	0.758	Satisfies FCC MPE
2. Near Field (Rn) = 4.3 meters	1.769	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	1.769	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	168.413	Potential Hazard
5. Main Reflector	2.702	Satisfies FCC MPE
6. Between Reflector and Ground	0.676	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4. and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

The proposed earth station will be installed at the Aloha Networks facility. The antenna facility should be surrounded by a fence, which will restrict any public access to the site. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth stations to inform those in the general population, who may be working or otherwise present in or near the direct path of the main beams.

Aloha Networks, Inc. will ensure that the main beam of the antenna will be pointed at least one diameter away from any buildings, or other obstacles in those areas that exceeds the MPE levels.

Finally, the earth station operating personnel will not have excess to areas that exceed the MPE levels, while the earth station is in operation. The transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mW/cm**2 will be complied with for those regions in close proximity to the reflector, and normally occupied by operating personnel.

Analysis of Non-Ionizing Radiation for a 0.75 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 0.75 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.75/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	0.75	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Feed Flange Diameter	Df	7.7	cm
Area of Feed Flange	Fa	II * Df**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	39.1	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.65	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 16.0 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 4.807 Watts/meters**2
= 0.481 mWatts/cm**2

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 6.7 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 11.222 Watts/meters**2
= 1.122 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation:(5)

Transition region Power Density,(Tt) = Wn * Rn / Rt (5)
= 1.122 mWatts/cm**2

4. Region between Feed Assembly and Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation:(6)

Power Density at Feed Flange,(Wf) = 4 * P / Fa (6)
= 164.067 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation:(7)

Power Density at the Reflector Surface,(Ws) = 4 * P / Sa (7)
= 17.293 Watts/meters**2
= 1.729 mWatts/cm**2

6. Region between Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation:(8)

Power Density between Reflector and Ground,(Wg) = P / Sa (8)
= 4.323 Watts/meters**2
= 0.432 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 16.0 meters	0.481	Satisfies FCC MPE
2. Near Field (Rn) = 6.7 meters	1.122	Potential Hazard
3. Transition Region Rn < Rt < Rf, (Rt)	1.122	Potential Hazard
4. Between Feed Assembly and Antenna Reflector	164.067	Potential Hazard
5. Main Reflector	1.729	Potential Hazard
6. Between Reflector and Ground	0.432	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 16.0 meters	0.481	Satisfies FCC MPE
2. Near Field (Rn) = 6.7 meters	1.122	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	1.122	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	164.067	Potential Hazard
5. Main Reflector	1.729	Satisfies FCC MPE
6. Between Reflector and Ground	0.432	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelineshave been exceeded (or met) in the regions of Table 4. and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

The proposed earth station will be installed at the Aloha Networks facility. The antenna facility should be surrounded by a fence, which will restrict any public access to the site. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth stations to inform those in the general population, who may be working or otherwise present in or near the direct path of the main beams.

Aloha Networks, Inc. will ensure that the main beam of the antenna will be pointed at least one diameter away from any buildings, or other obstacles in those areas that exceeds the MPE levels.

Finally, the earth station operating personnel will not have excess to areas that exceed the MPE levels, while the earth station is in operation. The transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mW/cm**2 will be complied with for those regions in close proximity to the reflector, and normally occupied by operating personnel.

Analysis of Non-Ionizing Radiation for a 1.0 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 1.0 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	1.0	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Feed Flange Diameter	Df	7.7	cm
Area of Feed Flange	Fa	II * Df**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	41.5	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.63	n/a

1. <u>Far Field Distance Calculation</u>

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 28.5 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 2.643 Watts/meters**2
= 0.264 mWatts/cm**2

2. <u>Near Field Calculation</u>

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 11.9 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 6.170 Watts/meters**2
= 0.617 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation: (5)

Transition region Power Density, (Tt) = Wn * Rn / Rt (5)
= 0.617 mWatts/cm**2

4. Region between Feed Assembly and Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation: (6)

Power Density at Feed Flange, (Wf) = 4 * P / Fa (6)
= 164.067 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation: (7)

Power Density at the Reflector Surface, (Ws) = 4 * P / Sa (7)
= 9.728 Watts/meters**2
= 0.973 mWatts/cm**2

6. Region between Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation: (8)

Power Density between Reflector and Ground, (Wg) = P / Sa (8)
= 2.432 Watts/meters**2
= 0.243 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 28.5 meters	0.264	Satisfies FCC MPE
2. Near Field (Rn) = 11.9 meters	0.617	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.617	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	164.067	Potential Hazard
5. Main Reflector	0.973	Satisfies FCC MPE
6. Between Reflector and Ground	0.243	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 28.5 meters	0.264	Satisfies FCC MPE
2. Near Field (Rn) = 11.9 meters	0.617	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.617	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	164.067	Potential Hazard
5. Main Reflector	0.973	Satisfies FCC MPE
6. Between Reflector and Ground	0.243	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that harmful levels of radiation will not exist in regions normally occupied by the public or the earth station's operating personnel. The transmitter will be turned off during antenna maintenance so that the FCC MPE of 5.0 mW/cm**2 will be complied with for those regions with close proximity to the reflector that exceed acceptable levels.

Analysis of Non-Ionizing Radiation for a 1.2 Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 1.2 meter earth station system. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/ Uncontrolled environment are shown in Table 1. The General Population/ Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	0.2
300-1500	Frequency(MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure(MPE)

Frequency Range (MHz)	Power Density (mWatts/cm**2)
30-300	1.0
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5.0

Table 3 contains the parameters that are used to calculate the various power densities for the earth stations.

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	1.2	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Feed Flange Diameter	Df	18.0	cm
Area of Feed Flange	Fa	II * Df**2/4	cm**2
Frequency	Frequency	14250	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	1.91	Watts
Antenna Gain	Ges	43.3	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.67	n/a

1. <u>Far Field Distance Calculation</u>

The distance to the beginning of the far field can be determined from the following equation:(1)

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda (1)
= 41.0 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**2 (2)
= 1.929 Watts/meters**2
= 0.193 mWatts/cm**2

2. <u>Near Field Calculation</u>

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:(3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda) (3)
= 17.1 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2 (4)
= 4.504 Watts/meters**2
= 0.450 mWatts/cm**2

3. Transition Region Calculations

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance Rt can be determined from the following equation: (5)

Transition region Power Density, (Tt) = Wn * Rn / Rt (5)
= 0.450 mWatts/cm**2

4. Region between Feed Assembly and Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation: (6)

Power Density at Feed Flange, (Wf) = 4 * P / Fa (6)
= 30.023 mWatts/cm**2

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation: (7)

Power Density at the Reflector Surface, (Ws) = 4 * P / Sa (7)
= 6.755 Watts/meters**2
= 0.676 mWatts/cm**2

6. Region between Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation: (8)

Power Density between Reflector and Ground, (Wg) = P / Sa (8)
= 1.689 Watts/meters**2
= 0.169 mWatts/cm**2

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 41.0 meters	0.193	Satisfies FCC MPE
2. Near Field (Rn) = 17.1 meters	0.450	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.450	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	30.023	Potential Hazard
5. Main Reflector	0.676	Satisfies FCC MPE
6. Between Reflector and Ground	0.169	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessment
1. Far Field (Rf) = 41.0 meters	0.193	Satisfies FCC MPE
2. Near Field (Rn) = 17.1 meters	0.450	Satisfies FCC MPE
3. Transition Region Rn < Rt < Rf, (Rt)	0.450	Satisfies FCC MPE
4. Between Feed Assembly and Antenna Reflector	30.023	Potential Hazard
5. Main Reflector	0.676	Satisfies FCC MPE
6. Between Reflector and Ground	0.169	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

7. Conclusions

Based on the above analysis it is concluded that harmful levels of radiation will not exist in regions normally occupied by the public or the earth station's operating personnel. The transmitter will be turned off during antenna maintenance so that the FCC MPE of 5.0 mW/cm**2 will be complied with for those regions with close proximity to the reflector that exceed acceptable levels.

Exhibit C

Demonstration of Compliance with FCC Rules

Aloha Networks, Inc. seeks authority pursuant to Section 25.209(e) of the Commission's Rules, 47 C.F.R § 25.209(e), to operate a VSAT earth station antenna ranging from 0.45 to 1.2 meter in diameter. The antennas are the Channel Master 0.45m, 0.60m, 0.75m, 1.0m, and a 1.2 meter offset antenna system. As required by the rules attached are the following: (1) Exhibit D - Engineering analysis showing compliance with the two degree spacing policy for sub-meter VSAT antennas; (2) Exhibit E - Manufacturer antenna patterns for Mid Frequency Bands.

Exhibit D: 2° Adjacent Satellite - Technical Analysis

Table of Contents

1.0 Purpose

This Exhibit will provide the technical analysis showing the performance of the Channel Master antennas (0.45, 0.60, 0.75, 1.0, and 1.2 meter) and space system transmission characteristics are compliant with the Commission's two degree (2°) spacing policy. This Exhibit will show the adjacent satellite interference caused by transmissions from the Channel Master antenna (0.45 to 1.2-meter) will be no greater than an antenna compliant with the combined 47 C.F.R. § 25.209 and 25.212 for uplink EIRP density interference towards adjacent satellites spaced at two degree intervals of longitude in the azimuth axis and for proposed NGSO systems in the elevation axis.

2.0 Azimuth Axis System Performance

Exhibit E (Antenna Patterns) provides the measured performance data for the Channel Master 0.45, 0.60, 0.75, 1.0, and 1.2 meter antenna referenced in this Exhibit.

2.1 Antenna Performance in the Azimuth Axis

The measured data indicates that the 0.45, 0.60, 0.75, 1.0, and the 1.2 meter antenna are not compliant with the antenna pattern envelope specified in 47 C.F.R. § 25.209(a) from 1° to 1.7° for the azimuth axis. However, the Channel Master antennas will meet the 29-25Log(θ) specifications between 1.7° and 7° rather than 1.25° and 7° as specified in 47 C.F.R. § 25.209(g) for small antennas operating in the 12/14 GHz Band (Domestic FSS Ku-Band).

Domestic FSS Ku-Band satellites are spaced at 2° intervals of longitude with respect to the center of the earth. However, the angular separation of the satellites as viewed by earth stations from the surface of the earth is nominally 2.3°. Therefore, the antenna's compliance with the FCC requirements for angles 1.7° and greater will provide the required interference isolation performance toward adjacent satellites.

The Channel Master antennas referenced above are designed to use feeds to support either of the following configurations:

1) a single FSS (transmit/receive) satellite
2) a combination of FSS (transmit/receive) and BSS (receive only DBS) satellites in the mode where the antenna will only transmit and receive using a single FSS satellite, the satellites to be used for this operation are domestic satellites (assume to be full domestic arc).

2.2 Uplink Flange Density and Off-Axis EIRP Density

Combining 47 C.F.R. § 25.209 (Antenna performance standards) and 25.212 (Narrow-Band Transmissions in the Fixed-Satellite Services) provides the maximum EIRP density a digital VSAT earth station can transmit toward an adjacent satellite. 47 C.F.R. § 25.209(a) determines the maximum acceptable VSAT earth station transmit antenna gain toward the adjacent satellite as follows:

Maximum Transmit Antenna Gain at 2° = $29-25*\text{Log}_{10}(2^{\circ})$ dBi = 21.5 dBi

47 C.F.R. § 25.209© specifies a maximum acceptable digital VSAT earth station uplink power density at the antenna transmit flange of −14 dBW/4 kHz. Therefore, the maximum adjacent satellite interference (ASI) EIRP density can be determined by combining 47 C.F.R. § 25.209(a) and 25.212(c) in the following formula:
Maximum ASI EIRP Density = Max. Transmit Antenna Gain at 2° + Max.

Transmit Power Density at Antenna Flange = 21.5 dBi + (-14 dBW/4 kHz)
= 7.5 dBW/4 kHz

The following table provides the uplink flange density and EIRP density toward the two-degree adjacent satellites for all Aloha Networks proposed remote antenna system transmit data rates, modulation, transmit power, and bandwidth. A transmission line loss of 0.2 dB between the HPC (transmit HPA) and the antenna flange and the gains of each remote antenna at 2° boresight are used in calculating the uplink flange density and EIRP density.

2.3 Conclusion

Section 2 of this Exhibit showed that each of the remote antenna (0.45, 0.60, 0.75, 1.0, and 1.2 meter) are compliant with the 47 C.F.R. § 25.209 antenna pattern envelope in the direction of the adjacent satellites spaced at two degrees from the space satellite. The table in this Exhibit indicates in all transmission cases the uplink flange density is below the maximum specification of −14 dBW/4 kHz (47 C.F.R. § 25.212{c}). Also, the EIRP density in the direction of the adjacent satellites at two degrees of separation will be below the +7.5 dBW/ 4 kHz maximum EIRP density criteria for adjacent satellite interference required by the combination of 47 C.F.R. § 25.209 and 25.212. Therefore, for the critical adjacent satellite interference specification of EIRP density at two degrees from boresight, the remote antennas to be use by Aloha Networks, Inc. will provide performance equivalent to an antenna that is compliant with applicable 47 C.F.R. § 25 rules.

Table 1: Aloha Networks VSAT Uplink Flange and EIRP Density to 2° Adjacent Satellites

HPC to Antenna Loss: 0.2 Db

ANTENNA SIZE (M)	ANTENNA GAIN (DBI)	TRANSMIT DATA RATE (KBPS)	MODULATION	HPC POWER (WATTS)	CARRIER BANDWIDTH (KHZ)	UPLINK POWER (DBW/4 KHZ)	EIRP DENSITY AT 2° FROM BORESIGHT (DBW/4 KHZ)	MARGIN TO 7.5 DBW/4 KHZ EIRP DENSITY SPECIFICATION (DB)
0.45	34.7	129	QPSK	2	2400	-25.0	6.72	0.78
0.60	37.2	129	QPSK	2	2400	-25.0	2.22	5.28
0.75	39.1	129	QPSK	2	2400	-25.0	-0.88	8.38
1.00	41.5		QPSK	2	2400	-25.0	-11.68	19.18
1.20	43.3		QPSK	2	2400	-25.0	-12.68	20.18

3.0 Elevation Axis System Performance

The reflectors of the remote antennas are elliptically shaped. The antenna performance in the elevation axis is not a concern for the current Ku-Band geostationary (GEO) satellites but is a potential concern for proposed non-geostationary (NGSO) satellite systems which desire to use the same frequency band as the domestic US FSS Ku-Band used by Aloha Networks' VSAT networks. This section will address the interference into NGSO systems from the referenced Channel Master Remote Antenna elevation axis.

3.1 Antenna Performance in the Elevation Axis

As seen in Exhibit E (Antenna Patterns), the remote antennas transmit performance in the elevation axis are compliant with the 47 C.F.R. § 25.209 antenna pattern specification 32-25*$\log_{10}(\Theta)$ dBi starting at 2.5 degrees off boresight. Also from Exhibit E, at two degrees from boresight the gains of the 0.45 and 0.60-meter antennas are 31.7 and 27.2 dBi while 47 C.F.R. § 25.209 provides for an antenna gain of 24.5 dBi at two degrees, a difference of 7.2 dB for the 0.45m remote antenna and 2.7 dB for the 0.60m remote antenna.

Table 2: Antenna Gains @ 2° off Boresight (dB)

Antenna Size (m)	Gain @ 2° off Boresight (dB)	Margin Above the 47 C.F.R. § 25.209 (24.5 dBi) Gain Specification
0.45	31.7	7.2
0.60	27.2	2.7
0.75	24.1	-0.4
1.00	13.3	-11.2
1.20	12.3	-12.2

3.2 Uplink Flange Density and Off-Axis EIRP Density

The table (table 1) in this Exhibit indicates the maximum uplink flange density to be used for carrier transmission from the remote antennas is −25 dBW/4 kHz rather than the maximum allowable −14 dBW/4 kHz under 47 C.F.R. § 25.212 for narrow and/or wideband digital services. Therefore, the EIRP density at two degrees off boresight in the elevation axis will be the combination of the antenna performance and the maximum uplink flange density which equates to the following:

EIRP Density @ 2 off Boresight in the elevation axis

a) 0.45 m:	31.7 dBi + (- 25 dBW/4 kHz) = 6.7 dBW/4 kHz
b) 0.60 m:	27.2 dBi + (- 25 dBW/4 kHz) = 2.2 dBW/4 kHz
c) 0.75 m:	24.1 dBi + (- 25 dBW/4 kHz) = - 0.9 dBW/4 kHz
d) 1.0 m:	13.3 dBi + (- 25 dBW/4 kHz) = - 11.7 dBW/4 kHz
f) 1.2 m:	12.3 dBi + (- 25 dBW/4 kHz) = - 12.7 dBW/4 kHz

Also specified in 47 C.F.R. § 25.212 is the uplink flange density limit for narrow-band analog carriers. For these carriers the uplink flange density limit is -8 dBW/4 kHz. This is 6 dB higher than the digital service limit. Since the FSS Ku-Band is used by both analog and digital services the NGSO systems will need to be designed for the worst case analog FSS densities. Combining 47 C.F.R. § 25.209 and 25.212 for analog services the maximum off-axis EIRP density at two degrees in the elevation axis is:

Max. Elevation Axis EIRP Density at $2^o = 32-25\text{Log}(2^o)+(-8\ \text{dBW/4 kHz})$

$= 16.5\ \text{dBW/4 kHz}$

Therefore, the narrow-band analog off-axis EIRP density at 2^o is 16.5 dBW/4 kHz which is **9.8 dB higher** than the **6.7 dBW/4 kHz** maximum EIRP density.

3.3 ITU Recommendation

The ITU is working to provide recommended off-axis power density specifications for the operation of proposed NGSO systems using the same frequency band as the Region 2 FSS Ku-Band (11.7 to 12.2 GHz space to earth and 14.0 to 14.5 GHz earth to space) as Aloha Networks VSAT networks plans to utilize. Chapter 3 of the latest ITU CPM Report, prepared by the ITU for the WRC-2000, indicates that the off-axis EIRP density levels allowed are much less stringent than the combined levels from 47 C.F.R. § 25.209 and 25.212 (by over 10 dB). ITU-R document S.524 also discusses this issue as well. In the ITU documents, there are different levels specified for different carrier types, the FM-TV levels being over 11 dB more permissible.

3.4 Existing HNS Elliptical Antennas

Hughes Networks Systems (HNS) has an existing FCC license (call sign E900682) which includes an antenna with a dimension of 46 cm in the elevation axis compared to the higher dimensions for the Aloha Networks remote antennas. Therefore, there is already a licensed antenna with similar, and most likely worse, antenna pattern performance in the elevation axis. The HNS application indicates the maximum uplink flange density, which will be used with this antenna, is the maximum allowable in 47 C.F.R. § 25.212 of -14 dBW/4 kHz. HNS has deployed elliptical shaped VSAT antennas at many of its customer's sites including thousands of US based installations at Mobile gas stations.

3.5 Conclusion

For future NGSO system interference concerns, the Aloha Networks remote antenna applications will have off-axis EIRP density performance below currently operational FSS systems, FSS maximum limits and the ITU recommendations.

Exhibit E

Antenna Patterns for Channel Master Antennas

Transmit Mid Frequency Bands

CM 60cm Dish with Gamma-f OMT and Corrugated Feed, E Plane 10/22/96

60ku1375t145hhff.REP

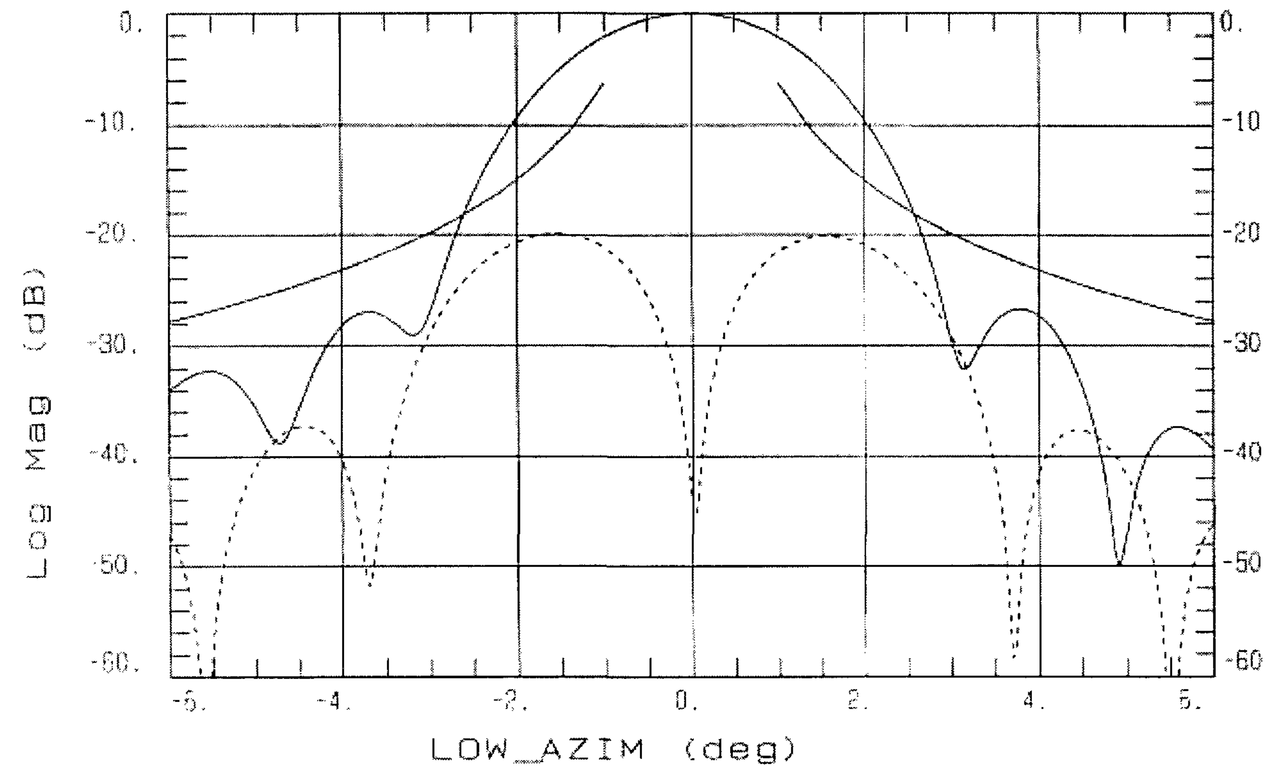
A: HH

FREQUENCY = 14.25 GHz

60ku1375t145vhff.REP

B: VH

FREQUENCY = 14.25 GHz



CM 60cm Dish with Gamma-f OMT and Corrugated Feed, E Plane 10/22/96

60ku1375t145hhff.REP

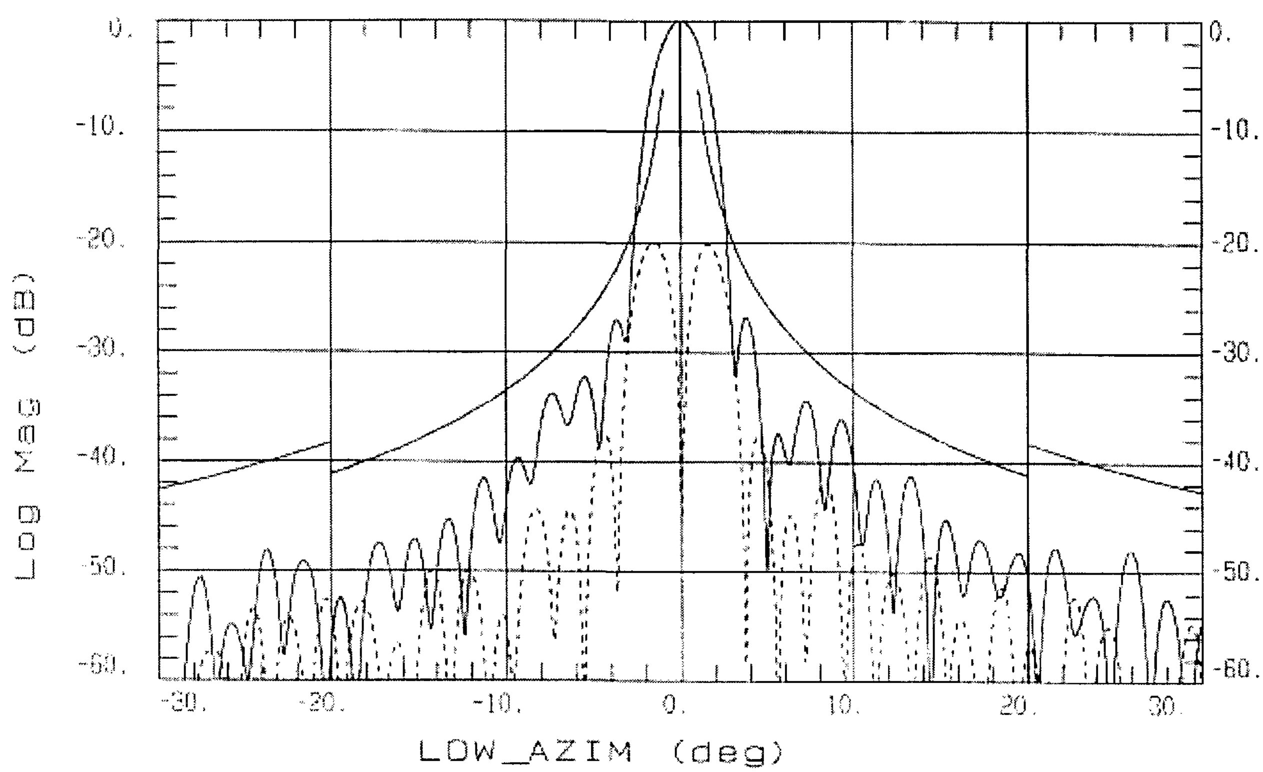
A: HH

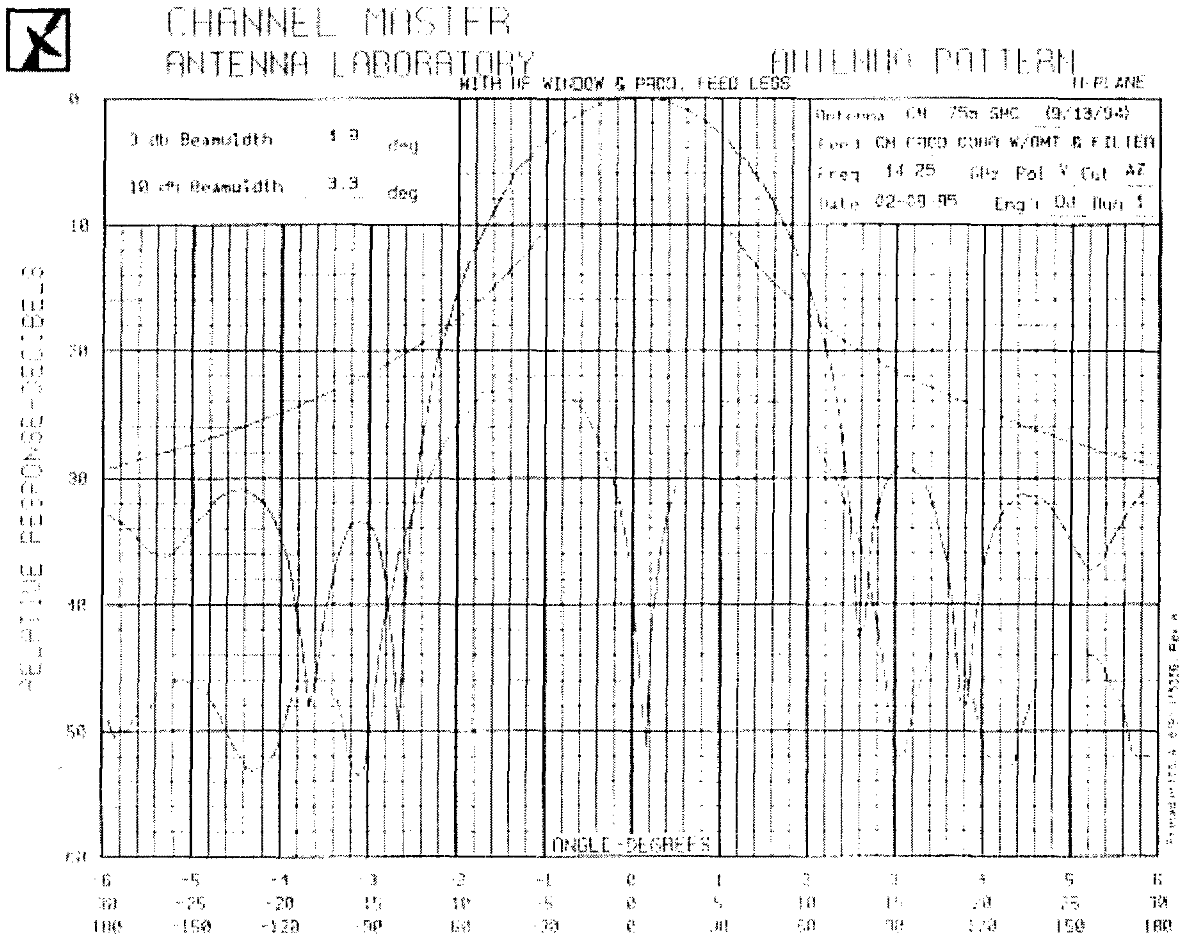
FREQUENCY = 14.25 GHz

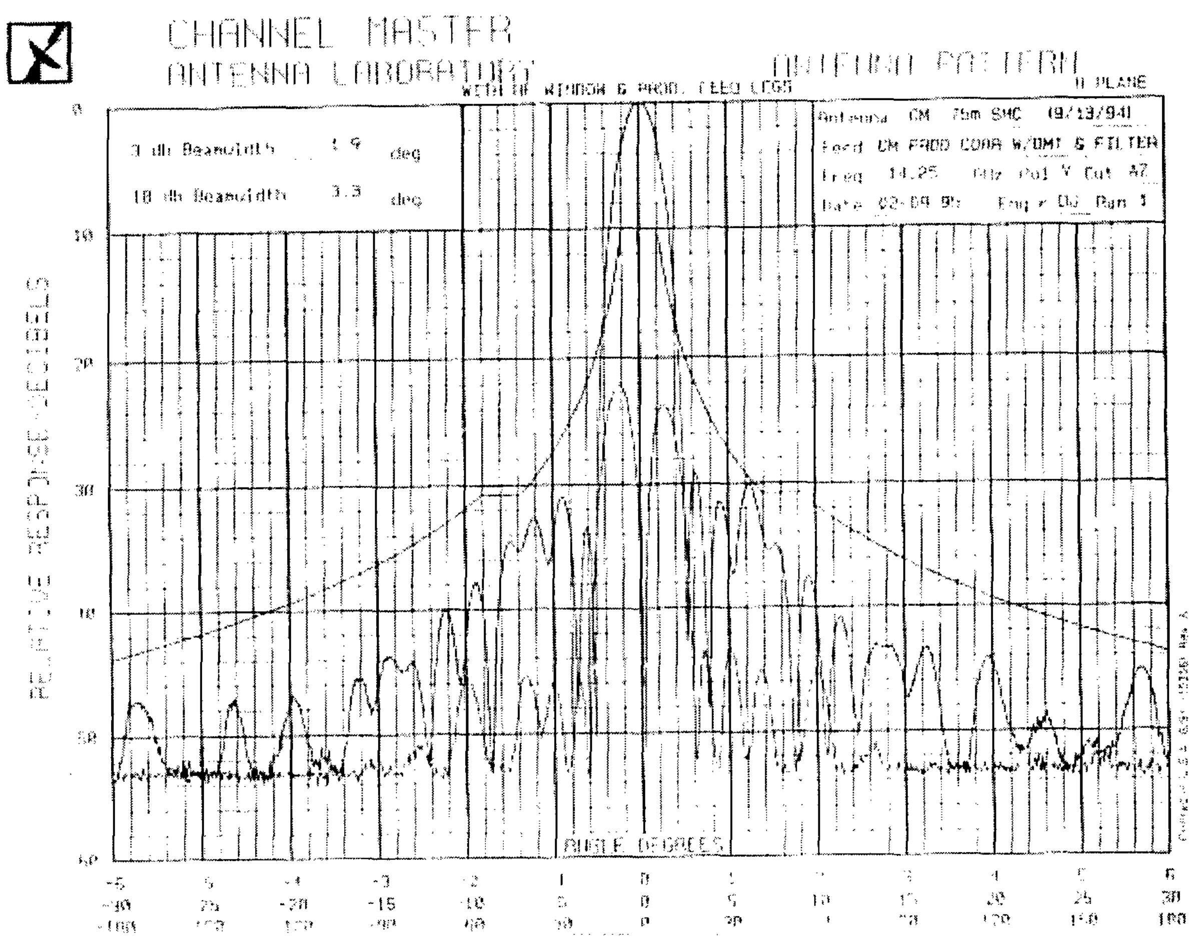
60ku1375t145vhff.REP

B: VH

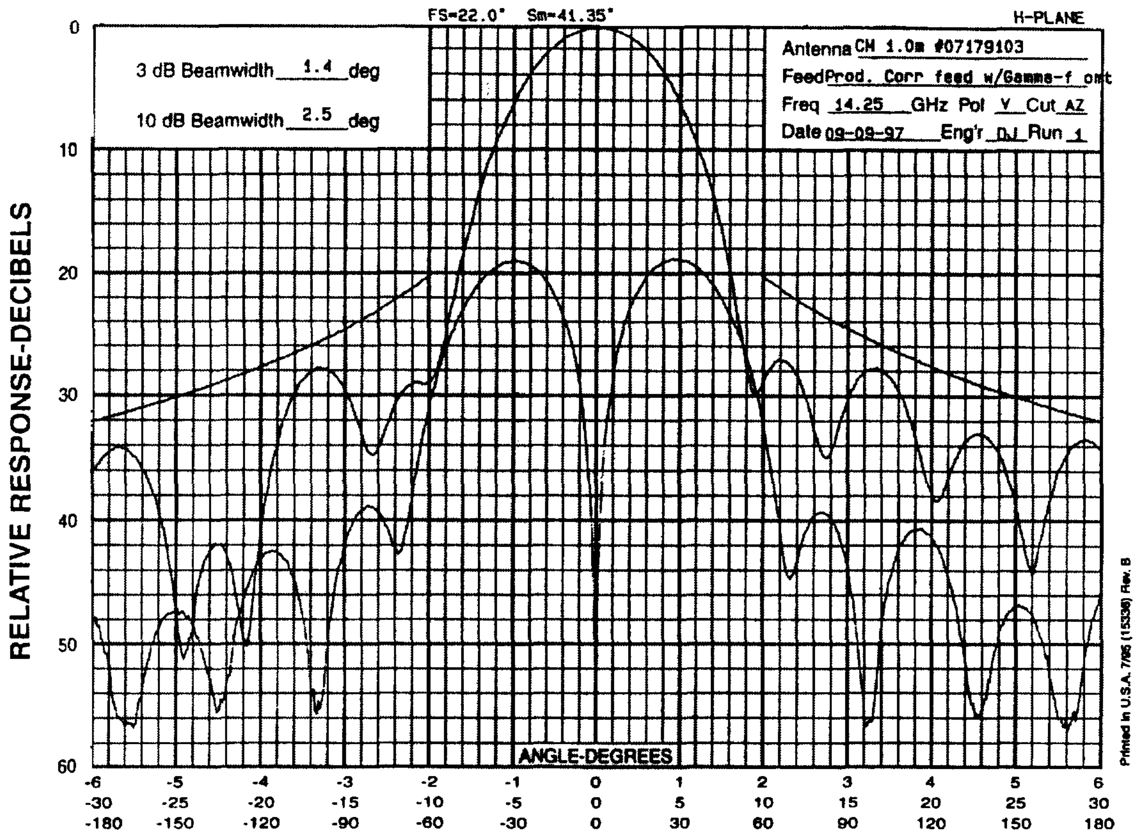
FREQUENCY = 14.25 GHz



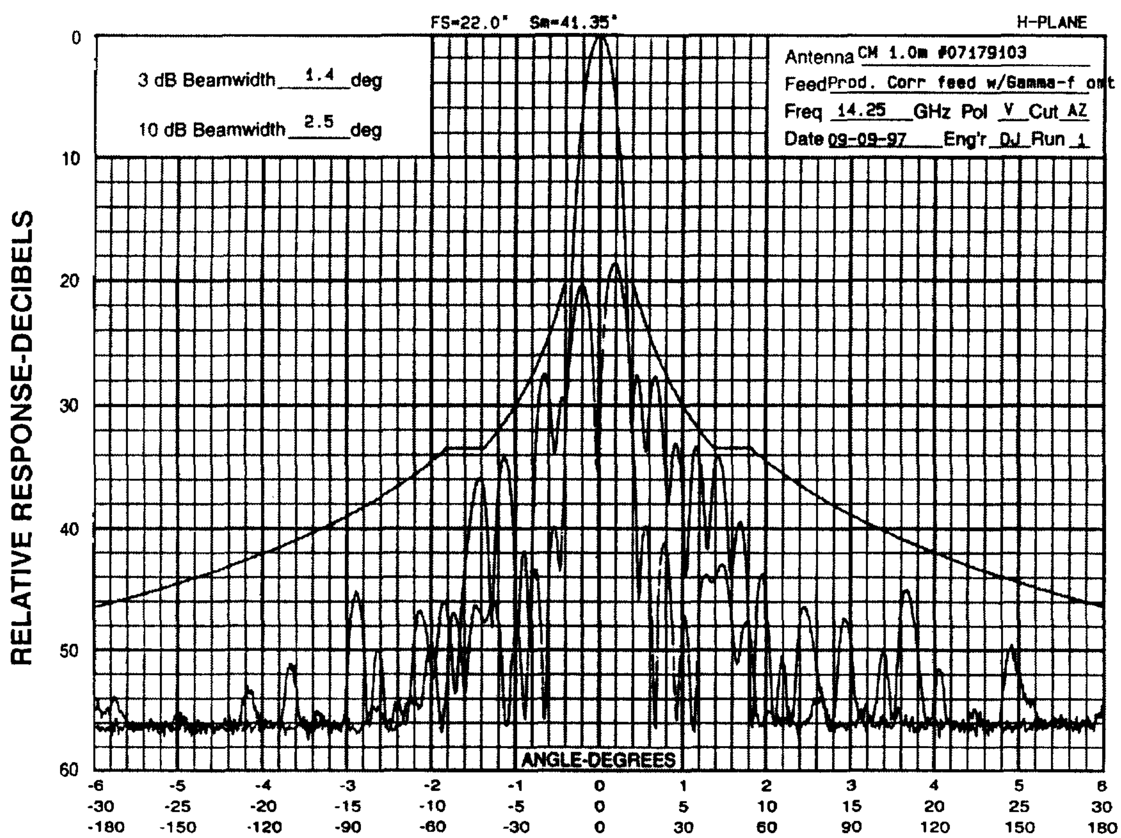

CHANNEL MASTER
ANTENNA LABORATORY
ANTENNA PATTERN
WITH HF WINDOW & PROD. FEED LEGS
3 db Beamwidth 1.9 deg
10 db Beamwidth 3.3 deg
Antenna CM 75m SMC (9/13/94)
Feed CM PROD COAX W/OMT & FILTER
Freq 14.25 GHz Pol V Cut AZ
Date 02-09-95 Eng'r DJ Run 1
RELATIVE RESPONSE-DECIBELS
ANGLE-DEGREES

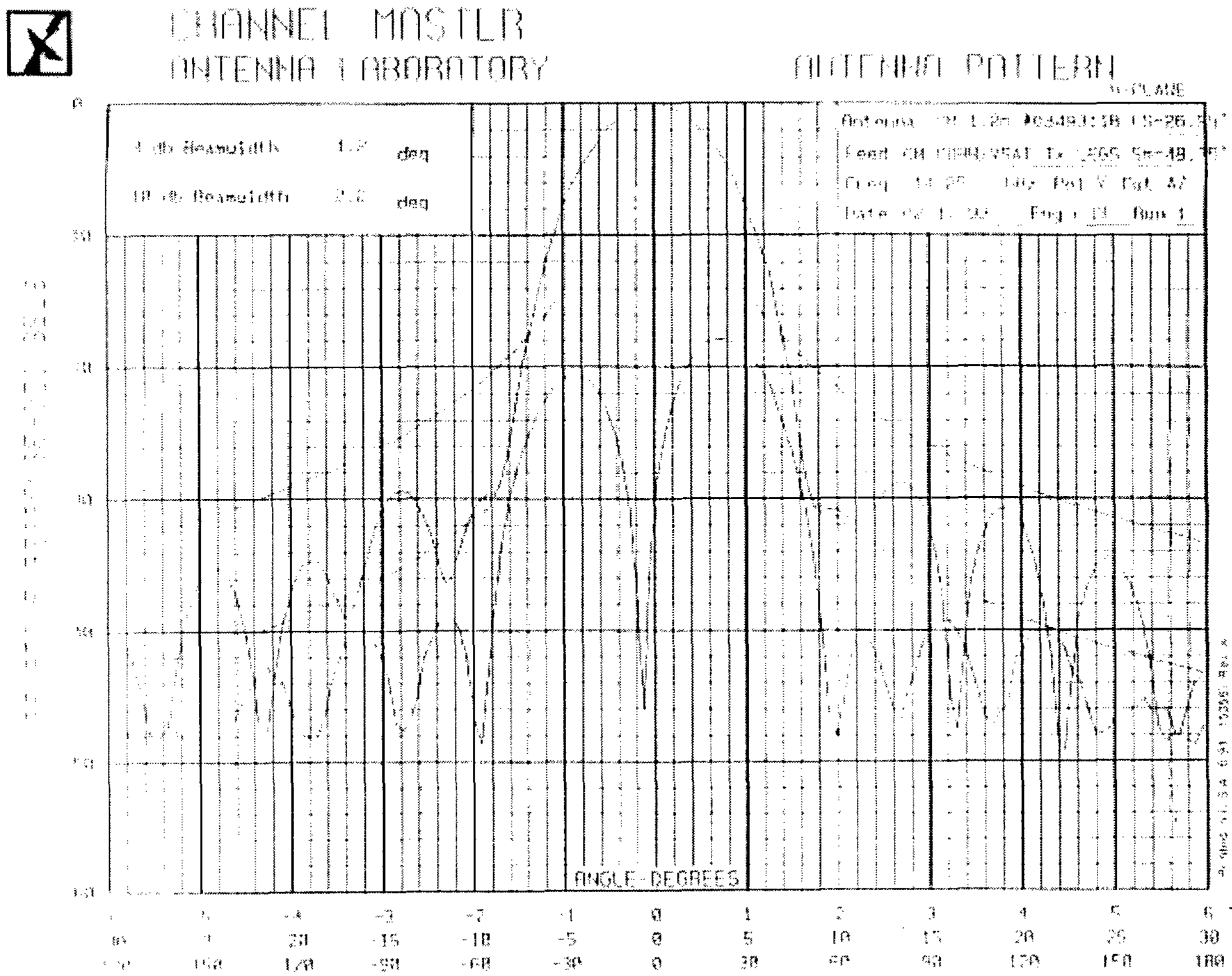

CHANNEL MASTER
ANTENNA LABORATORY
ANTENNA PATTERN
WITH HF WINDOW & PROD. FEED LEGS
H PLANE
3 db Beamwidth 1.9 deg
10 db Beamwidth 3.3 deg
Antenna CM 75m SMC (9/13/94)
Feed CM PROD COAX W/OMT & FILTER
Freq 14.25 GHz Pol V Cut AZ
Date 02-09-95 Eng'r DJ Run 1
RELATIVE RESPONSE-DECIBELS
ANGLE DEGREES

Channel Master® Antenna Laboratory **Antenna Pattern**



Channel Master® Antenna Laboratory **Antenna Pattern**




CHANNEL MASTER
ANTENNA LABORATORY
ANTENNA PATTERN
3 dB Beamwidth
deg
10 dB Beamwidth
deg
Antenna
Feed
Freq
Pol V
Date
Run 1
ANGLE-DEGREES
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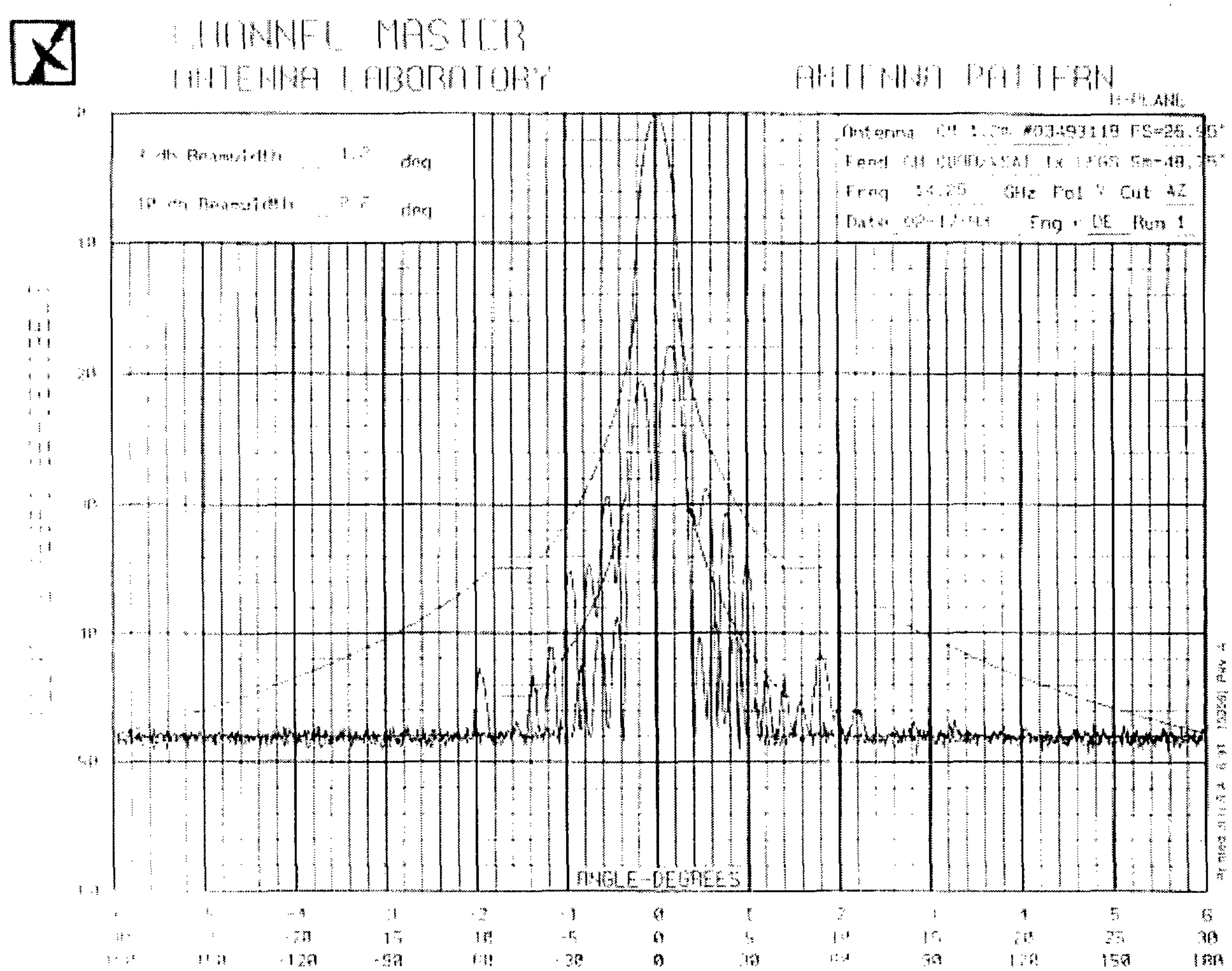
1
-5
0
5
-30
0
30


CHANNEL MASTER
ANTENNA LABORATORY
ANTENNA PATTERN
H-PLANE
3 dB Beamwidth
deg
10 dB Beamwidth
deg
Antenna
#03493119 FS=26.95°
Feed
Sm=48.75°
Freq 14.25 GHz Pol V Cut AZ
Date
Eng
DE
Run 1
ANGLE-DEGREES
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
-20
-15
-10
-5
0
5
10
15
20
25
30
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-90
-60
-30
0
30
90
120
150
180

CHANNEL MASTER
ANTENNA LABORATORY

ANTENNA PATTERN

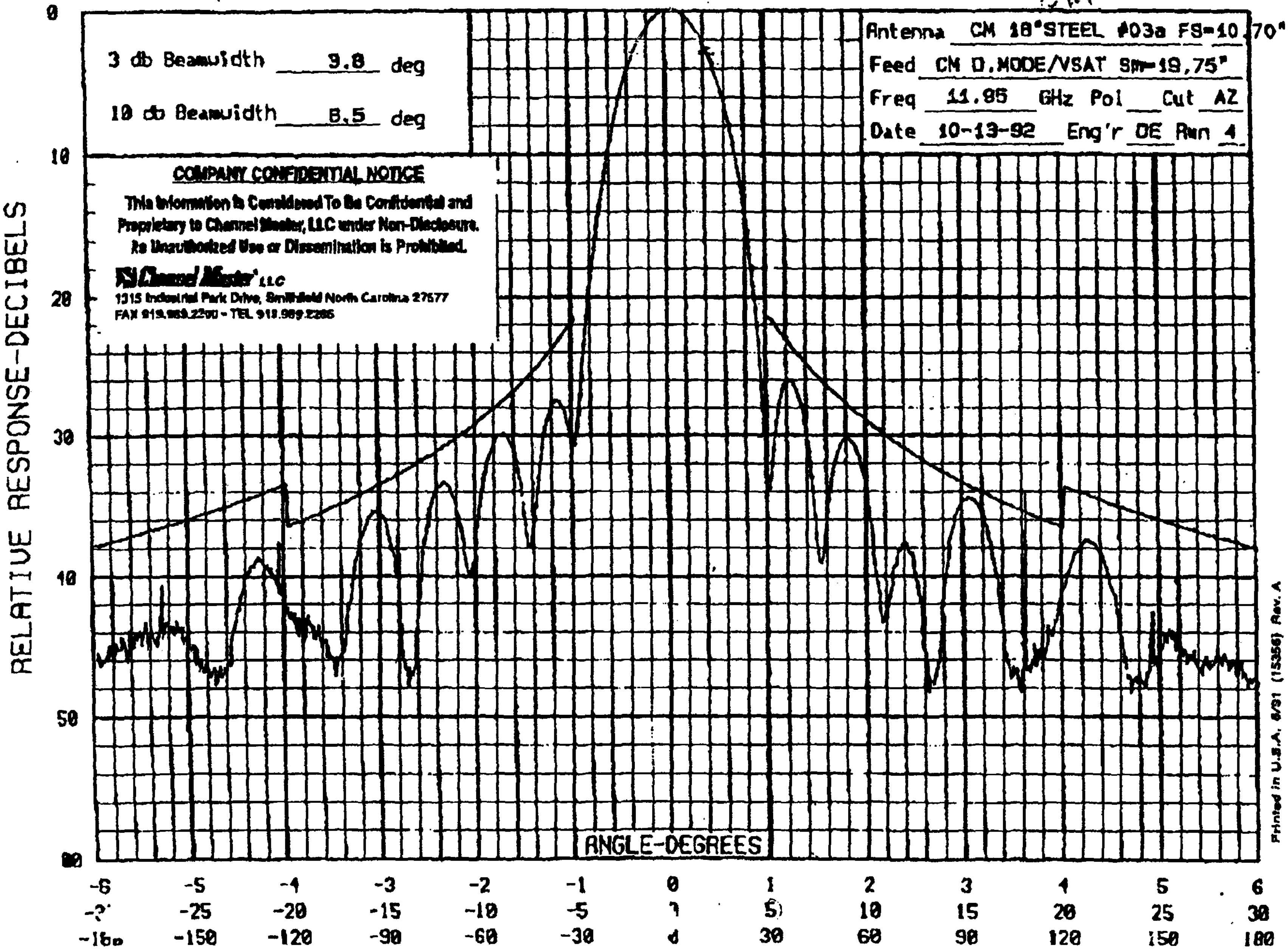

Exhibit G
Testing Program Description

Aloha Networks, Inc. is a VSAT network supplier which has developed advanced commercial VSAT services using the ALOHA access protocol. Aloha Networks has developed Spread ALOHA ® Multiple Access (SAMA™), a spread-spectrum multiple access technology that overcomes the current bottleneck in two-way digital wireless communication networks by providing an improved access methodology required for very large numbers of remote users. Aloha would like to perform some system testing in order to determine the operational viability of their new spread-spectrum based transmission scheme using sub-meter remote facilities.

Aloha proposes to employ a 4.5 meter hub earth station and VSAT terminals employing antennas ranging in size from 45 cm to 1.2 meters as remotes. Initially the hub and remotes will be collocated at their facilities in San Francisco, CA. Eventually up to 50-250 antennas will be located at positions in the continental United States (CONUS) to examine the impact of multiple remote users distributed across the country. Aloha believes there VSAT network access architecture and RF design will allow for sub-meter remote terminals however they would like to ensure proper system performance prior to launch of a commercial version on this product. Using a moderately large number of distributed remote terminals over a several month period will allow Aloha Networks to accurately analyze the product's performance and identify the feasibility of certain remote configurations and assist in the optimization of the design.