SES-MOD-20000420-00658

ORIGINAL

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FCC/MELLON APR 20 2000

JASON S. ROBERTS
(202) 728-0401 Ext. 126
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April 20, 2000

Federal Communications Commission
International Bureau-Earth Stations
P.O. Box 358160
Pittsburgh, PA 15251-5160

RE: Globecomm Systems, Inc.
Station E990402
Application for Modification of License

Dear Sir or Madam:

Transmitted herewith and filed on behalf of Globecomm Systems, Inc. ("Globecomm") is an application on FCC Form 312 to modify the license of Station E990402, located at Hauppague, New York. By this application, Globecomm seeks authority to add the Hispasat C-1 satellite as a point of communication to E990402. Globecomm also seeks to correct information regarding the antenna model and local longitude for this station.

A check in the amount of one-hundred and thirty-five dollars ($135.00) is included for payment of the required filing fee.

Please direct any questions regarding this application to the undersigned.

Very truly yours,

Jason S. Roberts

Enclosure
cc: Mr. Gerry Johnston, Sr.
Mr. Milt Goldstein

FCC/MELLON APR 20 2000

FCC 312

Main Form

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS

Approved by OMB 3060-0678
Est Avg Burden Hours Per Response 11Hrs

FCC Use Only
File Number:

Call Sign:

Fee Number:

APPLICANT INFORMATION

1. Legal Name of Applicant Globecomm Systems, Inc		2. Voice Telephone Number (631)- 231-9800 X1279
3. Other Name Used for Doing Business (if any) N/A		4. Fax Telephone Number (631)- 231-1557
5. Mailing Street Address or P.O. Box 45 Oser Avenue	6. City Hauppauge	
ATTENTION: Gerry Johnston Sr	7. State/Country (if not U.S.A.) New York	8. Zip Code 11788-3816
9. Name of Contact Representative (If other than applicant) David A. Irwin		10. Voice Telephone Number (202)-728-0400
11. Firm or Company Name Irwin, Campbell And Tannenwald, P.C.		12. Fax Telephone Number (202)-728-0354
13. Mailing Street Address or P.O. Box 1730 Rhode Island Avenue, N.W. Suite 200	14. City Washington	
ATTENTION: David A. Irwin	15. State/Country (if not U.S.A.) DC	16. Zip Code 20036-3101

CLASSIFICATION OF FILING

17. Place an "X" in the box next to the classification that applies to this filing for both questions a. and b. Mark only one box for 17a and only one box for 17b.

a. ☒ a1. Earth Station
☐ a2. Space Station

b. ☐ b1. Application for License of New Station
☐ b2. Application for Registration of New Domestic Receive-Only Station
☐ b3. Amendment to a Pending Application
☒ b4. Modification of License or Registration
☐ b5. Assignment of License or Registration
☐ b6. Transfer of Control of License or Registration
☐ b7. Notification of Minor Modification
☐ b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite
☐ b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States
☐ b10. Other (Please Specific) _____

18. If this filing is in reference to an existing station, enter: Call sign of station: E990402	19. If this filing is an amendment to a pending application enter: (a) Date pending application was filed: December 01, 1999 (b) File number of pending application: SEC-LIC-19990913-01597

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Place an "X" in the box(es) next to all that apply.

☒ a. Fixed Satellite ☐ c. Radiodetermination Satellite ☐ e. Direct to Home Fixed Satellite

☐ b. Mobile Satellite ☐ d. Earth Exploration Satellite ☐ f. Digital Audi Radio Service g. Other (please specify) _____

21. STATUS: Place an "X" in the box next to the applicable status. Mark only one box.

☐ a. Common Carrier ☒ b. Non-Common Carrier

22. If earth station applicant, place an "X" in the box(es) next to all that apply.

☒ a. Using U.S. licensed satellites ☒ b. Using Non-U.S. licensed satellites

23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Mark only one box. Are these facilities:

☐ a. Connected to the Public Switched Network ☒ b. Not connected the Public Switched Network

24. FREQUENCY BAND(S): Place and "X" in the box(es) next to all applicable frequency band(s).

☐ a. C-Band (4/6 GHz)

☒ b. Ku-Band (12/14 GHz) ☒ c. Other (please specify) 13754-13790 MHz, 13794-13830 MHz, 13834-13870 MHz, 13874-13910 MHz

TYPE OF STATION

25. CLASS OF STATION: Place an "X" in the box next to the class of station that applies. Mark only one box.

☒ a. Fixed Earth Station ☐ b. Temporary-Fixed Earth Station ☐ c. 12/14 GHz VSAT Network ☐ d. Mobile Earth Station ☐ e. Space Station ☐ f. Other (Specify) _____

If space station applicant, go to Question 27.

26. TYPE OF EARTH STATION FACILITY Mark only one box.

☒ a. Transmit/Receive ☐ b. Transmit-Only ☐ c. Receive-Only

PURPOSE OF MODIFICATION OR AMENDMENT

27. The purpose of this proposed modification or amendment is to: Place and "X" in the box(es) next to all that apply.

☒ a – authorization to add new emission designator and related service

☐ b – authorization to change emission designator and related service

☐ c – authorization to increase EIRP and EIRP density

☒ d – authorization to replace antenna

☐ e – authorization to add antenna

☐ f – authorization to relocate fixed station

☒ g – authorization to changed assigned frequency(ies)

☒ h – authorization to add Points of Communication (satellites & countries)

☐ i – authorization to change Points of Communication (satellites & countries)

☐ j – authorization for facilities for which environmental assessment and radiation hazard reporting is required

☐ k – Other (Please Specify) _____

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 C.F.R. 1.1307?
If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application. ☐ YES ☒ NO

A Radiation Hazard Study must accompany all applications as an exhibit for new transmitting facilities, major modifications, or major amendments. Refer to OET Bulletin 65.

ALIEN OWNERSHIP

29. Is the applicant a foreign government or the representative of any foreign government?	☐ YES	☒ NO
30. Is the applicant an alien or the representative of an alien?	☐ YES	☒ NO
31. Is the applicant a corporation organized under the laws of any foreign government?	☐ YES	☒ NO
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	☐ YES	☒ NO
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	☐ YES	☒ NO
34. If any answer to questions 29, 30, 31, 32 and/or 33 is yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.		

BASIC QUALIFICATIONS

35. Does the applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exception with supporting documents.	☐ YES	☒ NO
36. Has the applicant or any party to this application had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, any explanation of the circumstances.	☐ YES	☒ NO
37. Has the applicant, or any party to this application, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal Court? If Yes, attach as an exhibit, an explanation of the circumstances.	☐ YES	☒ NO
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radios apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of the circumstances.	☐ YES	☒ NO
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If Yes, attach as an exhibit, an explanation of the circumstances.	☐ YES	☒ NO
40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, addresses and citizenship of those stockholders owning of record and/or voting 10 percent or more of the filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.		
41. By checking Yes, the undersigned certifies, that neither the applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 or the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 C.F.R. 1.2002(b) for the meaning of "party to the application" for these purposes.	☒ YES	☐ NO
42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. § 25.137, as appropriate. If no. proceed to question 43. See Schedule B, B2	☐ YES	☒ NO
42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? HISPASAT-1C Satellite @30° W.L		

43. Description. (Summarize the nature of the application and the services to be provided).

Globecomm Systems, Inc. desires to operate the existing uplink in the extended Ku-Band for their earth station license under call sign E990402, to provide digital data services to their clients. Globecomm also seeks to add the Hispasat C-1 satellite as a point of communication to E990402. In addition, this license codification corrects the antenna model and local longitude which was incorrectly referenced on the previous license grant for this station.

Exhibit No.	Identify all exhibits that are attached to this application.
A	Extended uplink Ku-Band (AOT-11)

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Place an "X" in the box next to applicable response.)

☐ a. Individual ☐ b. Unincorporated Association ☐ c. Partnership ☒ d. Corporation ☐ e. Governmental Entity ☐ f. Other (Please specify) _____

45. Typed Name of Person Signing	46. Title of Person Signing
Kenneth A. Miller	President

47. Signature	48. Date
Kenneth A Miller	April 20, 2000

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 AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

FCC 312

Schedule B

FEDERAL COMMUNICATIONS COMMISSION

APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS

(Technical and Operational Description)

(Place an "X" in one of the blocks below)

☐ License of New Station ☐ Registration of new Domestic Receive-Only Station ☐ Amendment to a Pending Application ☒ Modification of License/Registration ☐ Notification of Minor Modification

B1. Location of Earth Station Site. If temporary-fixed, mobile, or VSAT remote facility, specify area of operation and point of contact. If VSAT hub station, give its location For VSAT networks attach individual Schedule B, Page 1 sheets for each hub station and each remote station. Individually provide the Location, Points of Communications, and Destination Points for each hub and remote station.

B1a. Station Call Sign	B1b. Site identifier (HUB, REMOTE1, etc.)	B1c. Telephone Number	B1j. Geographic Coordinates N/S, Deg. - Min. - Sec. - E/W	B1k. Lat./Lon. Coordinates are:
		(631)-231-9800 X 1279	Lat. 40° 48' 54.1 N Lon. 73° 14' 17.8 W	☐ NAD-27 ☒ NAD-83
B1d. Mailing Street Address of Station or Area of Operation		B1e. Name of Contact Person		
45 Oser Avenue		Gerry Johnston Sr		

B1f. City	B1g. County	B1h. State	B1i. Zip Code	B1l. Site Elevation (AMSL)
Hauppauge	Suffolk	NY	11788-3816	33.5 Meters

B2. Points of Communications: List the names and orbit locations of all satellites with which this earth station will communicate. The entry "ALSAT" is sufficient to identify the names and locations of all satellite facilities licensed by the U.S. All non-U.S. licensed satellites must be listed individually.

Satellite Name and Orbit Location	Satellite Name and Orbit Location	Satellite Name and Orbit Location
HISPASAT-1C @ 30° W.L		
ALSAT		

B3. Destination points for communications using non-U.S. licensed satellites. For each non-U.S. licensed satellite facility identified in section B2 above, specify the destination point(s) (countries) where the services will be provided by this earth station via each non-U.S. license satellite system. Use additional sheets as needed.

Satellite Name	List of Destination Points
HISPASAT-1C @ 30° W.L	Brazil, Colombia, Chile, Peru Guatemala
ALSAT	

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B: (Technical and Operational Description)

B4. Earth Station Antenna Facilities: Use additional pages as needed.

(a) Site ID*	(b) Antenna ID**	(c) Quantity	(d) Manufacturer	(e) Model	(f) Antenna Size (meters)	(g) Antenna Gain Transmit and/or Receive (____dBi at____GHz)
AOT-11		1	VERTEX	9.0 KPK	9.0 M	58.4 dBi at 12 GHz
						60.3 dBi at 14 GHz

B5. Antenna Heights and Maximum Power Limits: (The corresponding Antenna ID in tables B4 and B5 applies to the same antenna)

(a) Antenna ID**	(b) Antenna Structure Registration No.	Maximum Antenna Height (c) Above Ground Level (meters)	Maximum Antenna Height (d) Above Mean Sea Level (meters)	(e) Building Height Above Ground Level (meters)***	(f) Maximum Antenna Height Above Rooftop (meters)***	(g) Total Input Power at antenna flange (Watts)	(h) Total EIRP for all carriers (dBW)
AOT-11		9.0 M	39.0	N/A	N/A	118.0	81.0

Notes: * If this is an application for a VSAT network, identify the site (Item B1b, Schedule B, Page 1) where each antenna is located. Also include this Site-ID on Schedule B, Page 5.

** Identify each antenna in VSAT network or multi-antenna station with a unique identifier, such as HUB, REMOTE1, A1, A2, 10M, 12M, 7M, etc. Use this same antenna ID throughout tables B4, B5, B6, and B7 when referring to the same antenna.

*** Attach sketch of site or exemption, See 47 CFR Part 17.

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B: (Technical and Operational Description)

B6. Frequency Coordination Limits: Use additional pages as needed.

(a) Antenna ID*	(b) Frequency Limits (MHz)	(c) Range of Satellite Arc Eastern Limit**	(d) Range of Satellite Arc Western Limit**	(e) Antenna Elevation Angle Eastern Limit	(f) Antenna Elevation Angle Western Limit	(g) Earth Station Azimuth Angle Eastern Limit	(h) Earth Station Azimuth Angle Western Limit	(i) Maximum EIRP Density toward the Horizon (dBW/4kHz)
AOT-11	13754.00 – 13790.00	2.0° W.L.	130.0°W.L.	5.4°	16.2°	102.5°	246.8°	-1.39
	13794.00 – 13830.00	2.0° W.L.	130.0°W.L.	5.4°	16.2°	102.5°	246.8°	-1.39
	13834.00 – 13870.00	2.0° W.L.	130.0°W.L.	5.4°	16.2°	102.5°	246.8°	-1.39
	13874.00 – 13910.00	2.0° W.L.	130.0°W.L.	5.4°	16.2°	102.5°	246.8°	-1.39
	11700.00 – 12200.00	2.0° W.L.	130.0°W.L.	5.4°	16.2°	102.5°	246.8°	

Notes: * Provide the ANTENNA-ID from table B4 to identify the antenna to which each frequency band and orbital arc range is associated.

** If operating with geostationary satellites, give the orbital arc limits and the associated elevation and azimuth angles. If operating with non-geostationary satellites, give the notation "NON-GEO" for the satellite arc and give the minimum operational elevation angle and the maximum azimuth angle range.

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B: (Technical and Operational Description)

B7. Particulars of Operation (Full particulars are required for each r.f. carrier): Use additional pages as needed.

(a) Antenna ID*	(b) Frequency Limits (MHz)	(c) T/R Mode **	(d) Antenna Polarization (H,V,L,R)	(e) Emission Designator	(f) Maximum EIRP per Carrier (dBW)	(g) Maximum EIRP Density per Carrier (dBW/4kHz)	(h) Description of Modulation and Services
AOT-11	13754.00 – 13790.00	T	H, V	15M4G7D	72.0	36.1	Digital Data , 16QAM 7/8 FEC 45,000 kbps
AOT-11	13794.00 – 13830.00	T	H, V	15M4G7D	72.0	36.1	Digital Data , 16QAM 7/8 FEC 45,000 kbps
AOT-11	13834.00 – 13870.00	T	H, V	15M4G7D	72.0	36.1	Digital Data , 16QAM 7/8 FEC 45,000 kbps
AOT-11	13874.00 – 13910.00	T	H, V	15M4G7D	72.0	36.1	Digital Data , 16QAM 7/8 FEC 45,000 kbps
AOT-11	11700.00 – 12200.00	R	H, V	15M4G7D			Digital Data , 16QAM 7/8 FEC 45,000 kbps
AOT-11	13754.00 – 13790.00	T	H, V	18M0G7D	72.0	35.5	Digital Data, 16QAM 3/4 FEC 45,000 kbps
AOT-11	13794.00 – 13830.00	T	H, V	18M0G7D	72.0	35.5	Digital Data, 16QAM 3/4 FEC 45,000 kbps
AOT-11	13834.00 – 13870.00	T	H, V	18M0G7D	72.0	35.5	Digital Data, 16QAM 3/4 FEC 45,000 kbps
AOT-11	13874.00 – 13910.00	T	H, V	18M0G7D	72.0	35.5	Digital Data, 16QAM 3/4 FEC 45,000 kbps
AOT-11	11700.00 – 12200.00	R	H, V	18M0G7D			Digital Data, 16QAM 3/4 FEC 45,000 kbps

Notes: * Provide the ANTENNA-ID from table B4 to identify the antenna to which each frequency band and emission is associated. For VSAT networks, include frequencies and emissions for all HUB and REMOTE units.

** Indicate whether the earth station transmits or receives in each frequency band.

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B: (Technical and Operational Description)

If VSAT Network, provide the SITE-ID (Item B1b) of the station that B8-B13 are in response to (HUB, REMOTE1, etc.): . . . . .

B8. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with **geostationary** satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurements? If NO, provide as an exhibit, a technical analysis showing compliance with two-degree spacing policy.	☒ YES	☐ NO
B9. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with **non-geostationary** satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurement?	☐ YES	☐ NO
B10. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	☐ YES	☒ NO
B11. Is frequency coordination required? If YES, attach a frequency coordination report as an exhibit.	☐ YES	☒ NO
B12. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as an exhibit.	☐ YES	☒ NO
B13. FAA Notification - (See 47 CFT Part 17and 47 CFT Part 25.113(c)) **Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation?** **FAILURE TO COMPLY WITH 47 CFT PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION**	☐ YES	☒ NO

Remote Control Point Location:

B10a. Street Address			
B10b. City	B10c. County	B10.d. State/Country	B10e. Zip Code
B10f. Telephone Number	B10g. Call Sign of Control Station (if appropriate)		

EXHIBIT A

ENTENDED UPLINK KU-BAND

EXHIBIT A

GLOBECOMM Systems Earth Station (E990402) Hauppauge, New York Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band Analysis and Calculations

1. Background

This Exhibit is presented to show that the proposed satellite earth station application for Hauppauge, New York is in compliance with the intent of FCC REPORT & ORDER 96-377. It will show that the proposed earth station will not impact shipboard radiolocation operations (RADAR) and the NASA space research activities that are also in the 13.75 - 14.0 GHz Band.

Table 1. Earth Station Characteristics

• Coordinates (NAD 83):	40° 48' 54.1" N, 73° 14' 17.8" W
• Ground Elevation:	110 feet above mean sea level
• Satellite Location for Earth Station:	Hispasat 1-C, 30° W. L
• Frequency Band:	13.75-14.0 GHz for uplink 11.7 – 12.2 GHz for downlink
• Polarizations:	Dual linear, V and H
• Modulation	Eight Carriers, Digital Data 45 Mbps Carrier, 16QAM, ¾ FEC & 7/8 FEC,
• Maximum Required Uplink EIRP:	Emission Designator 18M0G7D & 15M4G7D
• Operational Frequencies	EIRP per Carrier of 72.0dBW 13.772 GHz (2), 13.812 GHz (2)
• Antenna Size:	13.852 GHz (2), 13.892 GHz (2)
- Antenna Type/Model:	9.0-meters in Diameter
- Gain:	Vertex, Ku-Band
• RF power into Antenna Flange:	60.3 dBi
• Elevation Angle:	- 27.8 dBW/4 kHz Digital Carrier
• Side Lobe Antenna Gain:	25.6° at an Azimuth of 124.8°
	32- 25*log(θ), or ≥ -10 dB

Because the above spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth station and both Navy Department and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in five areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, (2) Data Relay Satellites, (3) Precipitation Radar, (4) Altimeters, and (5) Scatterometers.

Summary of Coordination Issues:

1) Potential Impact to Government Radiolocation (Shipboard RADAR)
2) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)
3) Potential Impact to NASA/NASDA Operations (Precipitation RADAR)
4) Potential Impact to NASA Operations (Altimeters)

2. Potential Impact to Government Radiolocation (Shipboard RADAR)

Radiolocation operations (RADAR) may occur anywhere in the 13.4 - 14 GHz frequency band onboard ocean going United States Navy ships. The Federal Communication Commission (FCC) order 96-377 allocates the top 250 MHz of this 600 MHz band to the Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of -167 dBW/M^2/4 kHz for the RADAR.

The closest distance to the Atlantic Ocean from the Hauppauge, New York earth station site is approximately 13.3 miles. The calculation of the power spectral density at this distance is given in the next two subsections.

The RADAR characteristics used for the calculations are presented in Table 2.

Table 2. RADAR Characteristics

Transmitter parameters	
Transmitter Power*	250kWatts
Frequency Range	13.40 – 14.00 GHz
Spectral Density Transmitted at the Tuned Frequency	
Pulse Width** 0.5 μsecond	25.8 dBW/4 kHz
Pulse Width* 1.0 μsecond	28.8 dBW/4 kHz
Pulse Width** 2.0μsecond	31.8 dBW/4 kHz
Pulse Rate*	1200 pulses per second
Emission Characteristics	SinX/X Roll Off
Mode of Operation	Pulse Doppler Detection
Antenna Parameters	
Shape*	Circular and Parabolic
Physical Size*	1.5 M^2
Antenna Gain at 14 GHz*	44.3 dB
Antenna Motion*	360° Rotation in Detection Mode Track Mode after Target Lock-on and Weapon-on
Effective Area of Antenna Main Beam*	1.0 M^2
Side Lobe Gain *	-10.0 dB
Antenna height	51 feet
Receiver Parameters	
Noise Figure*	8 dB
Doppler Filter for Mach 1	31 kHz
Interference Criteria	-167dBW/M^2/4 kHz

2.1 RADAR Side Lobe to Earth Station Side Lobe

For this analysis the following formula was used to determine the interference signal coupled to the RADAR receiver.

$$P_r = P_t * G_t * G_r * S * \Lambda^2 / (4\Pi * R)^2$$

Where,

P_r = Earth Station spectral density signal at RADAR receiver front end, dBW/4kHz

P_t = Earth Station transmitted spectral density, -27.8 dBW/ 4kHz or $1.66X10^{-3}$ Watts/4 kHz

G_r = Gain of RADAR antenna in direction of the Earth Station antenna, -10 dB or 0.1

G_t = Gain of Earth Station antenna in direction of RADAR antenna, -10 dB or 0.1

S = Shielding Factor for berm and buildings in the vicinity of the earth station antenna, -15 dB or 0.0316

Λ = Wavelength of transmitted signal, -16.7 dB/M or 0.0213 meter

R = Minimum separation distance of antennas, meters: 13.3 miles or 21,409 meters

If we assume that the RADAR threshold sensitivity is based on a receiver bandwidth of 1 MHz and a noise figure of 8 dB, the RADAR receiver sensitivity would be –106 dBm/MHz or –160 dBW/4 kHz. The calculation for the side lobe-to-side lobe antenna orientation for the minimum separation distance shows that the interference level is well below the sensitivity of the RADAR receiver. The calculated level is – 204.8 dBW/4 kHz. This level is 44.8 dB below the sensitivity of the RADAR receiver.

From the results of the calculations and analysis of the RADAR side lobe to Earth Station side lobe antenna orientation case, it can be concluded that this case will not produce interference to the RADAR. Also, this case represents the most likely relative antenna orientation.

2.2 RADAR Main Beam to Earth Station Side Lobe

This relative antenna orientation is not very likely but it represents the most difficult to analyze with respect to the interference criteria as presented in the FCC Report & Order 96-377. Because of this the Comsearch technical staff reviewed the interference criteria with respect to the shipboard RADAR. The review led to the conclusion that the interference criteria for shipboard RADAR had to be evaluated with respect to more than just the levels from the proposed Earth Station. The evaluation also had to include the electromagnetic environment the RADAR transmitter was creating at the RADAR receiver from the terrain and objects in the area of the Earth Station antenna. These RADAR echoes have to be compared with the levels generated by the proposed Earth Station and the interference criteria of the FCC Report & Order.

In the Hauppauge, New York area the same structures that provide shielding for the signals generated by the proposed Earth station also create very efficient RADAR targets with large cross sectional areas. A RADAR antenna beam width of one-degree in the horizontal and vertical plane will illuminate a target with a circular cross sectional area of 2400 M^2 at a range of one mile. The buildings in the vicinity of the proposed Earth Station will produce large reflections to the RADAR receiver. The RADAR signal reflected back to the RADAR receiver would far exceed the signal generated from the proposed Earth Station and the interference criteria of FCC Report & Order 96-377.

Whether the RADAR signals reflected by the terrain and buildings or the signal generated by the proposed Earth Station degrade the RADAR performance or produce false alarms is very doubtful. The RADAR in question has Doppler processing that looks for moving targets with specific velocity characteristics that both the stationary terrain, buildings and Earth Station signals will not possess. The RADAR signals reflected and the Earth Station signals are not high enough to saturate the receiver, effect AGC performance and/or change the front-end noise characteristics of the system. Therefore, normal performance of the RADAR should be expected off the coast of Long Island even in the presence of the proposed Earth Station transmissions.

In order to show a comparison between the Earth Station signal generated toward the ocean, RADAR reflections and the FCC Report & Order 96-377 criteria, calculations were performed and presented in graphical form at the end of this Section. The United States Navy RADAR is a classified system and therefore many of the parameters for the system were not known and could not be obtained. Therefore, good engineering judgement was used in assuming values. Table 2 lists the values used in the calculations. Assumed values used in the calculations are denoted with a (*). Values marked (**) were assumed, but not used in the calculations. Parameters used in the calculation of the radiated Earth Station signals were taken from the values in Table 1 of this report. Propagation of signals beyond the line-of sight used techniques derived from NBS Technical Note 101.

To determine the RADAR reflection signal the reflection surface was assumed to be at the Earth Station location rather than at the shoreline. The following formula was used.

$$P_r = P_t * G_t * G_r * \Lambda^2 * \Sigma / (4\Pi)^3 * R^4$$

Where,

P_r = RADAR reflected spectral density signal at receiver front end, dBW/4kHz
P_t = RADAR transmitted spectral density for a 1 μsecond pulse width, 28.8 dBW/4kHz or 758 Watts/4 kHz
G_t = Gain of RADAR transmit antenna, 44.3 dB, or 26,915
G_r = Gain of RADAR receive antenna, 44.3 dB, or 26,915
Λ = Wavelength of transmitted signal, -16.7 dB/M, or 0.0213 meters
Σ = RADAR cross-sectional area of the object causing reflection, 10 dB/ M^2, or 10 $meter^2$
R = Range of target to RADAR, dB/M

The level of the Earth Station signal at the RADAR is calculated from the following formula:

$$P_d = (P_e * G_e) * S * OH / (4\Pi) * R^2)$$

And,

$$P_{re} = P_d * A_r$$

Where,
P_{re} = Power spectral density at radar receiver from the earth station, dBW/4kHz
A_r = Effective area of RADAR antenna, dB/M^2 0 dB for RADAR main beam, or 1 $meter^2$

P_d = Earth Station radiated power spectral density at the RADAR, $dBW/M^2/4kHz$
P_e = Earth Station transmitter spectral density, -27.8 dBW/4kHz or $1.66X10^{-3}$ Watts/4 kHz
G_e = Gain of Earth Station antenna in the direction of the ocean, -10 dB or 0.1,
S = Shielding factor measured at each location, -15 dB or 0.0316
OH= Over-the-horizon propagation loss factor from NBS Technical Note 101, dB

Comments on the calculations: The cross-sectional area of the target which is the terrain, buildings and trees near the earth station site was assumed to be 10 M^2. This is a very conservative estimate based on the size of the buildings in the areas and the very large surface area that the RADAR antenna would illuminate even at close ranges. At a one mile range the surface area illuminated would be 2400 M^2. The effective area of the antenna was taken to be 1 M^2 this corresponds to a gain of 44.3 dB at 14 GHz and allows the direct comparison of the received spectrum density of the radar reflection, the earth station radiated signal and the FCC interference criteria. OH loss is a function of the antenna heights. The heights of the two antennas used for the OH loss were 20' for the Earth Station and 51' for the radar antenna.

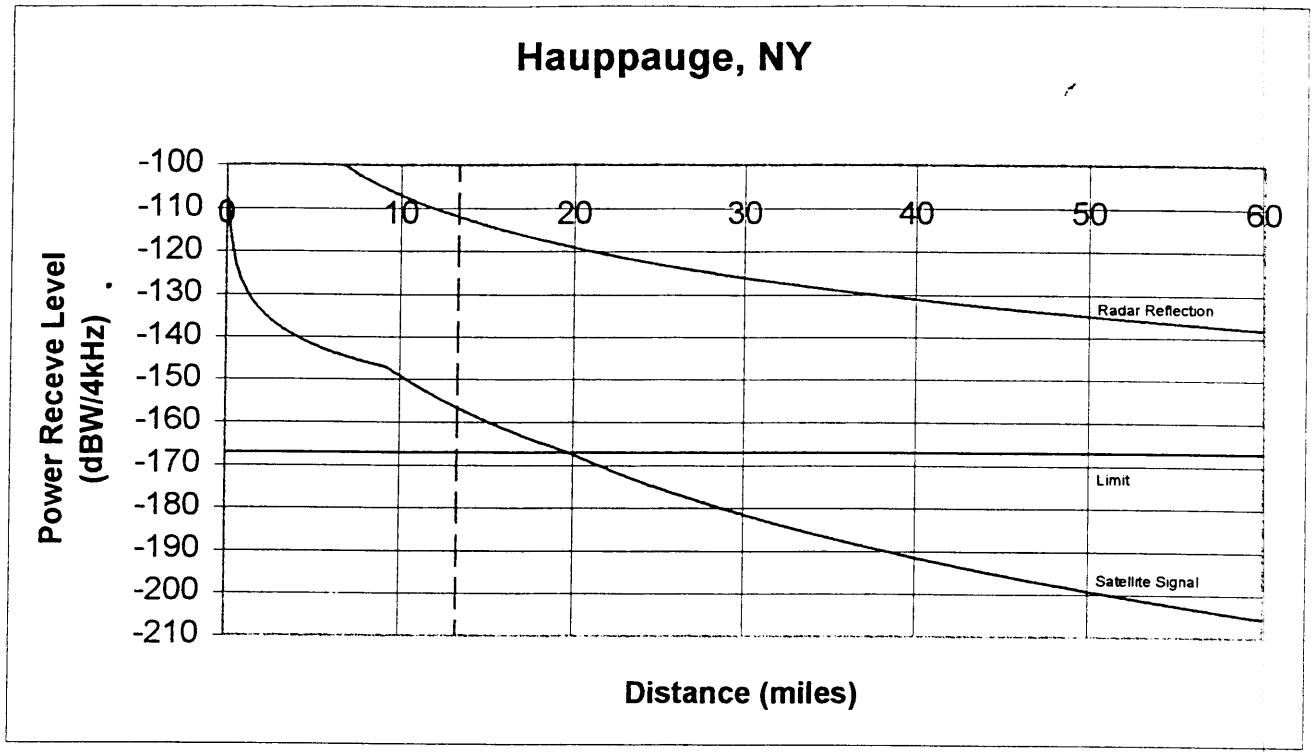
Table 3. Interference levels for Main Beam to Side Lobe

Distance Miles	Shielding dB	Earth Sta. Signal dBW/4 kHz	RADAR Echo dBW/4 kHz
13.3	15	-156.7	-112.0
15.0	15	-159.9	-114.1
20.0	15	-167.5	-119.1

2.3 RADAR Interference Conclusions

The calculations and analysis performed shows that the signal generated by the proposed Earth Station in the direction of the ocean should have no degrading effect to the operation of RADAR sharing the same frequency band on board United States Navy Ships. The reason for this conclusion is two-fold. First, the interference criteria of FCC order 96-377 does not properly take into account the operation of a RADAR as a transmit and receive system. The criterion as set up is more appropriate for a system that is a receive-only system. The criterion evaluates the earth station signal without considering the relative signal strength of the RADAR signal echo compared to it. As shown in the analysis above for areas like Hauppauge, new York where there will be terrain and man-made structures in the vicinity of the Earth Station the RADAR echoes will exceed the earth station signal by orders of magnitude. This is true when the main beam of the RADAR antenna is directed at the Earth Station. When the main beam of the RADAR is not directed at the Earth Station, the signal emitted from the Earth Station coupled to the RADAR receiver will be well below the threshold of the receiver. Second, the RADAR system contains Doppler processing which will cause the RADAR to ignore stationary targets such as those produced by the echoes from the buildings and terrain as well as the emissions from the Earth Station.

The above conclusion presupposes that the RADAR and earth station will both share the 13.75 – 14.0 GHz Band. The RADAR band of operation is 13.40 – 14.0 GHz. By operating the RADAR in the lower 350 MHz of the band any possibility of interference conflict to the RADAR is eliminated.



3. Potential Impact to NASA's Data Relay Satellite System (TDRSS)

The geographic location of the GLOBECOMM Systems Earth Station (E990402) in Hauppauge, New York is outside the 390 KM radius coordination contour surrounding NASA's White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the GLOBECOMM Earth Station at Hauppauge, New York.

The TDRSS space-to-space link (13.772 to 13.778 GHz) band is assumed to be protected if an earth station produces an EIRP less than 71dBW/6 MHz in this band. The 9.0-meter Earth Station antenna will have a carrier EIRP of 72 dBW/ 36 MHz, which equates to an EIRP of 64.2 dBW/ 6 MHz. Therefore, no interference to the TDRSS space-to-space link should occur when the Hauppauge Earth Station is transmitting.

4. Potential Impact to NASA/NASDA Operations (Precipitation RADAR)

The Tropical Rain Measuring Mission (TRMM) Precipitation RADAR (PR) operates at two frequencies 13793 and 13805 MHz with a bandwidth of 600 kHz at each frequency. The FCC Report and Order 96-377 grants NASA protection to the spacecraft borne sensors like those used for the TRMM in the 13.75 to 14.0 GHz band until January 1, 2000. The 9.0-meter antenna Earth Station system will have an EIRP of 54.2 dBW/ 600 kHz

The ITU-R SA. 1071 states that the recommended threshold of interference at the two TRMM frequencies is -150 dBW. The geographic location of the GLOBECOMM earth station antenna is outside the TRMM PR "ground truth" exclusion zones described in ITU-R SA. 1071. For the Hauppauge Earth Station antenna location, the antenna coupling to the space borne antennas can be earth station sidelobe to TRMM PR sidelobe, and earth station side lobe to TRMM PR main

beam. The coupling to the TRMM PR main beam is the worst case; therefore, it will be the one calculated. The calculation will be made for an overhead pass of the TRMM PR satellite having a ±17° cross-track scan. The calculation will be made for scan angles of 0°, 8.5° and 17° and an earth station elevation angle of 25.6°.

Table 4. Calculation Parameters for TRMM PR

The parameters for the calculation are:	
TRMM Range @0° Scan Angle:	350 km
TRMM Range @8.5° Scan Angle:	354 km
TRMM Range @ 17° Scan Angle:	366 km
TRMM Antenna Gain:	17.7dBi
Earth Station Elevation Angle:	25.6°
9.0-meter Antenna Gain:	60.3 dBi
Earth Station Side Lobe Antenna Gain:	32 - 25log(θ) or, ≥ -10 dB Where θ is the angle between the Earth Station antenna and the TRMM antenna.
Transmit Power	6.0 dBW/600 kHz
FSL* @ 350 km	166.2 dB
FSL @ 354 km	166.3 dB
FSL @ 366 km	166.6 dB

*FSL is free space loss

Table 5. TRMM PR Calculated Results

9.0-meter Antenna Transmit Power = - 6.0 dBW/600 kHz

Earth Station Antenna Elevation 25.6°					
Scan Angle	**ES Antenna Gain**	**TRMM Gain**	**FSL**	**Power Received**	**Margin**
0°	-10.0 dBi	17.7 dBi	166.2 dB	-164.5 dBW	+ 14.5 dB
8.5°	-10.0 dBi	17.7 dBi	166.3 dB	-164.6 dBW	+ 14.6 dB
17.0°	-9.9 dBi	17.7 dBi	166.6 dB	-151.1 dBW	+ 14.4 dB

From the calculated results for the TRMM PR the Hauppuage Earth Station will meet the interference criteria for its planned transmit power. The earth station is within ± 55° latitude, and the elevation angle is 25.6°, which is below the maximum of 71° recommended in the ITU-R SA.1071.

5. Potential Impact to NASA Altimeter Operations

There are two types of airborne RADAR altimeters operating in the 13.75 - 14.0 GHz band that are of concern with respect to interference from earth stations. They are the TOPEX-POSEIDON and the ERS-1/2. These RADAR altimeters are downward looking pulsed-RADAR installed on orbiting spacecraft. These systems are used to very precisely measure range from the satellite to the surface of the earth. In addition to the operational RADAR in this band, a number of other systems are planned in the future. The parameters for the operational RADAR in this band are listed below.

Table 6. Altimeter Interference Criteria

RADAR System	Frequency of Operation	Interference Criteria
TOPEX-POSEIDON (1)	13.60 GHZ ± 160 MHz	-117 dBW/320 MHz
TOPEX-POSEIDON (2)	13.65 GHz ± 160 MHz	-130 dBW/320 MHz
ERS -1/2	13.77 GHz ± 165 MHz	-120 dBW/330 MHz

The orbiting spacecraft, with the RADAR altimeter, is assumed to be at an altitude of 800 km. The slant range from the earth station to the spacecraft at the antenna elevation angle (25.6°) is 1851 km, when the earth station main beam illuminates the spacecraft. This is the worst case alignment of the Earth Station antenna and the spacecraft RADAR antenna. It will occur when the spacecraft travels through the main beam circle formed by the Earth Station antenna. The time it takes the spacecraft to travel through this circle in space is a function of the 20-dB beam width of the earth station antennas (the 20-dB beam width is used according to ITU Ap28 calculation methods) and the speed of the of the spacecraft. The spacecraft is traveling at 6.5 km/sec and the 20-dB beam width of the 9.0-meter antenna is estimated to be 0.37°. The diameter of the circle in space formed by the 9.0-meter antenna at a range of 1851 km is 12 km. The spacecraft will pass through the beam width of the earth station antenna in less than 2 seconds. During this time there may be a small blip of noise introduced into the RADAR display output but it would be so transitory it may go unnoticed.

The availability requirement for the NASA altimeter data is 95%, which assumes that the associated individual outages are brief and randomly dispersed over all observation times and areas. If the outage were due to only one earth station the 95% availability would not be a problem. However, the outage caused by multiple earth stations and other causes such as intense rainfall must be accounted for in determining the net availability of the system. The earth station interference will occur in a predictable manner for a given area so it cannot be considered random. Because of its predictability and relatively short time duration, Earth Stations should have very little impact on the operation of present RADAR altimeter systems, and processing circuits and/or procedures can be designed in future systems to minimize the effect of the interference from single or multiple earth stations.

In order to calculate the interference level to the altimeter radar, we will assume that the RADAR antenna side lobe gain toward the earth station antenna is -10 dB. Since the earth stations signal is narrow band compared to the RADAR bandwidth, the signals will be totally captured by the RADAR receiver. The following parameters are used in the calculation:

FSL for Earth Station Antenna:	180.7 dB
Atmospheric Absorption:	0.2 dB
EIRP 9.0-meter Earth Station Antenna:	72.0 dBW Digital Carrier

Table 7. Altimeter Calculated Results

Earth Station 25.6° Elevation for 72.0 dBW Digital Carrier		
RADAR Receiver	**Interference Level**	**Margin**
TOPEX-POSEIDON (1)	-118.5 dBW	+1.5 dB
TOPEX-POSEIDON (2)	-118.5 dBW	-1.5 dB
ERS-1/2	-118.5 dBW	-11.5 dB

The comparison of the calculated levels to the interference criteria indicates that there will be interference coupled to some of the altimeters. The highest interference levels will be to the ERS-1/2 altimeter. The Earth Station interference effect will occur for less than 2 seconds. Even though potential interference is predicted to be generated by the Earth Station at Hauppauge the net result does not prevent the 95% availability of the RADAR altimeter data. The satellites carrying the altimeters orbit the earth every 2 hours. If we assume that the satellite will pass through the Earth Station main beam on each orbit, which is extremely unlikely, there will be a loss of 2 seconds of data every 2 hours (7200 seconds). The loss in data availability for this condition is .027 %. And the data availability with the Earth Station operating is 99.973%. This is well above the 95 % data availability required and it is based on the very pessimistic assumption that the satellite will pass through the earth station main beam on each orbit.

The Hauppauge, New York Earth Station is located outside the TOPEX-POSEIDON critical exclusion zone as defined in the ITU-R Recommendation SA. 1071. The operational elevation look angle for the earth station is 25.6°. This elevation angle is below the 71°-elevation angle limitation required until January 1, 2001 in ITU-R Recommendation SA-1071.

6. Potential Impact to NASA Scatterometer Operations

Scatterometers are spacecraft borne RADAR type devices that measure the near surface vector winds over the ocean. Wind data over the oceans is considered a critical parameter in the determination of weather patterns and global climate. The overall availability requirement of the scatterometer system is similar to the altimeter RADAR. That is, some data loss is tolerable when interference signals exceed interference thresholds. The scatterometers can lose 1% of the ocean data from interference occurring systematically or 5% when the interference is occurring randomly. The scatterometers operate at a center frequency of 13995 MHz ± 1.44 MHz. There are two types of antenna modes of operation, fan beam and spot beam. For fan beam operations the aggregate interference threshold is - 174 dBW/2 kHz, while for spot beam operations, - 155 dBW/10 kHz. FSS earth stations should not exceed an EIRP density toward the scatterometer orbit (over the oceans) of 25 dBW in any 2 kHz band between 13.99356 GHz and 13.99644 GHz. The Earth Station at Hauppauge, New York can produce an EIRP that is greater than 25 dBW/2 kHz but not in the scatterometer frequency band. The Earth Station will operate at frequencies below the scatterometer's operational frequencies. Therefore, no interference is anticipated to the NASA scatterometers.

7. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that no interference will occur between the earth station at Hauppauge, New York and the U.S. Navy RADAR

operations. The results also show that there will be compatible operations with the NASA systems. The only potential interference condition occurs to the NASA altimeters but it is shown in this Exhibit that the data availability requirement of the altimeters will be little effected by the interference generated.