FCC/MELLON DEC 31 1991

18-DSSML-92

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December 31, 1991

RECEIVED
JAN
SATELLITE

BY HAND

Federal Communications Commission
Common Carrier Domestic Satellites
P.O. Box 358160
Pittsburgh, PA 15251-5160

Re: Request of Satellite Transponder Leasing Corporation for an Interim Orbital Assignment of the SBS-4 Satellite

Ladies and Gentlemen:

Enclosed on behalf of Satellite Transponder Leasing Corporation, licensee of the SBS-4 domestic communications satellite, are an original and nine copies of a request for an interim orbital assignment of SBS-4 to 83° W.L. Also enclosed is an FCC Form 155 and a check in the amount of $5,000.00 to cover the required filing fee.

Please contact one of us if there are any questions about this matter.

Sincerely yours,

Gary M. Epstein
James F. Rogers
John P. Janka

Enclosures

cc: Richard M. Firestone
James R. Keegan
Cecily C. Holiday

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of the Application of	)	
	)	
SATELLITE TRANSPONDER LEASING CORPORATION	)	
	)	
For Interim Assignment of the	)	File No.
SBS-4 Domestic Fixed-Satellite	)	
to the 83° W.L. Orbital Position	)	

REQUEST FOR INTERIM ORBITAL ASSIGNMENT

Satellite Transponder Leasing Corporation ("STLC") hereby requests an interim orbital assignment to 83° W.L. for its Ku band SBS-4 satellite (currently located and operating at 91° W.L.). The interim assignment would begin when SBS-4 is replaced by the Galaxy VII(H) hybrid satellite[1/] (scheduled for October 1992) and would last until SBS-4 reaches its end of life (expected to be August 1994). For the reasons given below, this interim assignment would constitute an efficient use of the radio spectrum and provide substantial public benefits.

Hughes Communications Galaxy, Inc. ("HCG") is STLC's sole stockholder and the ultimate licensee of the SBS-4, SBS-5, SBS-6, Galaxy and Westar fleet of domestic communications satellites. HCG is authorized to launch replacements for many of these satellites, including SBS-4. SBS-4 is a fully functioning Ku band satellite that provides essential VSAT services to thousands of end users. SBS-4's authorized replacement at 91°

1/ Galaxy VII(H) is licensed to STLC's parent, Hughes Communications Galaxy, Inc.

W.L. is a hybrid (combined C and Ku band) satellite known Galaxy VII(H).[2/]

As evidenced by the recent experiences of satellite operators, it is difficult to predict with certainty how long satellites will last. GTE recently relinquished the authorized replacement for ASC-1 because that satellite will have a longer than anticipated operational life. GE experienced the premature failure of Satcom 3-R at 131° and Satcom 4 at 82° before replacement capacity was available for either of those satellites.

In light of these uncertainties and the long lead times generally required for satellite construction, operators need to plan construction and launch schedules well in advance. Uncertainty in estimating a satellite's operational life and long construction and launch lead times make it difficult to avoid either a gap in service at an orbital location, or an overlap between the lifetimes of a replacement and the current satellite.

These replacement difficulties are compounded when an operator seeks to replace two single band satellites with one hybrid that contains both bands. When the two satellites being replaced have different end-of-service lives, the satellite operator must decide whether to replace both satellites before either has failed, replace both after one has failed, or wait until both have failed to replace them.

HCG has chosen the middle ground in replacing two single-band satellites at 91° with a hybrid, Galaxy VII(H).

[2/] See Hughes Communications Galaxy, 6 FCC Rcd 72 (1991).

Galaxy VII(H) will serve as a replacement for the C band Westar III, which has reached its end of life,[3/] and for the Ku band SBS-4, which is still operating. Launching Galaxy VII(H) slightly before the projected end of life of SBS-4 will ensure continuous Ku band service at 91°. Galaxy VII(H) is scheduled to be brought into service at 91° in October 1992 and SBS-4 is expected to reach its end of life in August 1994. Among other things, launching Galaxy VII(H) at that time will reduce the risk that SBS-4 will reach its end of life before successor capacity is available.[4/] Moreover, because C band capacity is now unavailable at 91°, the operation of Galaxy VII(H) in October 1992 will restore C band capacity at that location as soon as possible.

The launch of Galaxy VII(H) therefore will make SBS-4 redundant at 91° W.L. and leave that fully-functioning satellite without an orbital location from which to operate for the remainder of its useful life. STLC therefore now can make plans to fully utilize SBS-4 after it is replaced by Galaxy VII(H).[5/]

3/ Galaxy VI was Westar III's originally authorized replacement, but Galaxy VII(H) has been authorized to substitute for Galaxy VI. See Hughes Communications Galaxy, 6 FCC Rcd 72 (1991). Galaxy VI, which operated at 91° for a short period, is now providing seamless interim service at 99° pending the launch of Galaxy IV(H) in early 1993. See Hughes Communications Galaxy, 5 FCC Rcd 4497 (1990).

4/ On a number of occasions, other satellite operators have had to provide for emergency bridge capacity when satellites failed before replacement capacity was launched. It is anticipated that HCG's replacement strategy will obviate the need to address such problems.

5/ HCG previously indicated to the Commission that future plans for SBS-4 could be determined as the launch date for Galaxy VII(H) approached. See Reply of HCG to GE's Petition to

Based on current fuel estimates, SBS-4 should be available to provide service for approximately a 22 month period after it is replaced and before it reaches its end of life. An interim assignment of SBS-4 to 83° W.L. for this short period would constitute an efficient use of the radio spectrum and offer substantial public benefits. As discussed in more detail below, the 83° location is not currently occupied and unless SBS-4 were assigned to an interim orbital location, that fully-functioning satellite would have to lie dormant while its remaining life expired. From the 83° location, SBS-4 will be able to provide short-term and pre-emptible service that otherwise would be unavailable.

Grant of this interim request will allow the prompt and efficient provision of satellite services, but will not adversely affect the Commission's current orbital assignment plan.[6/] At Ku band, the 83° W.L. location was assigned to GTE's hybrid Contelsat 1 satellite. However, GTE has tendered the Contelsat 1 authorization for cancellation.[7/] Thus, 83° W.L. is available at Ku band. The 83° location is suitable because SBS-4 needs an interim assignment only until its end of life, currently projected to be August 1994. Moreover, STLC has no intention of seeking permission to locate SBS-4 there on a permanent basis.

Deny the Galaxy VII(H) Application at 12, File No. 20-DSS-P/LA-90 (filed May 18, 1990).

6/ <u>See</u> <u>1988 Orbit Assignment Plan</u>, 3 FCC Rcd 6972 (1988), <u>modified on recon.</u>, 5 FCC Rcd 179 (1990).

7/ <u>See</u> Letter from Terri D. Natoli of GTE to Secretary, Federal Communications Commission, dated July 24, 1991, File Nos. 1801/1802/1803-DSS-MP/ML-89.

Furthermore, the proposed temporary assignment of SBS-4 will not disrupt any satellites adjacent to 83° W.L. SBS-4 has operated successfully at 91° to date and the interference analysis attached as Exhibit A demonstrates that no adverse interference will be caused to the operations of GE's K-1 satellite at 85° or its K-2 satellite at 81°.

Grant of this request is consistent with Commission precedent and policy. The Commission has routinely authorized temporary orbit assignments outside of "processing rounds,"[8/] and has explained that such assignments are appropriate for the continued operation of satellites that have been replaced.[9/]

8/ See, e.g., GE American Communications, 6 FCC Rcd 31 (1991) (interim authority for Satcom C-1 at 139°); Hughes Communications Galaxy, 5 FCC Rcd 4497 (1990) (Galaxy VI interim authority at 99°); Satellite Transponder Leasing Corporation, 5 FCC Rcd 1651 (1990) (SBS-6 interim authority for 99°); Satellite Business Systems, File No. 170-DSS-MD/ML-84 (July 9, 1984) (interim authority to operate SBS-4 at 101°); Letter from Chief, Domestic Facilities Division to Terri B. Natoli of GTE (September 18, 1989) (interim use of GSTAR III).

9/ See 1983 Orbit Assignment Order, 94 FCC 2d 129, 140 (1983) ("Temporary authorizations may be granted for transitional arrangements, or for the continued operation of earlier launched satellites after their replacements.").

The current interim assignment of SBS-1 and SBS-2 is analogous because those satellites are operating beyond the ends of their license terms. In Satellite Transponder Leasing Corporation and Comsat General Corporation, 5 FCC Rcd 1651 (1990), the Commission authorized Comsat to operate SBS-1 and SBS-2 at 97° on an interim basis (instead of their assigned 74° location) until Telstar 401 is launched into 97° in 1992. Those satellites have reached the ends of their design lives and are operating in an inclined orbit. SBS-1's ten-year license expired in 1990 and SBS-2's ten-year license expired in 1991. See Comsat General Corporation, 4 FCC Rcd 3820, 3820 n.2 (1989).

An interim assignment of SBS-4 would serve the public interest by allowing users to obtain short-term capacity from that satellite during a period that it otherwise would be unavailable to provide service. Temporarily assigning SBS-4 to 83° W.L. will not disrupt the current orbit assignment plan, nor will it disrupt adjacent satellites. Instead, it will allow STLC to better meet customers' needs.

CONCLUSION

For the reasons set forth above, STLC respectfully requests that the Commission grant this request.

Respectfully submitted,

SATELLITE TRANSPONDER LEASING CORPORATION

By: [signature]
Jerald F. Farrell
Senior Vice President
Hughes Communications Galaxy, Inc.,
the sole stockholder of STLC

December 20, 1991

EXHIBIT A

ADJACENT SATELLITE INTERFERENCE ANALYSIS

This section presents the results of an analysis performed to determine the levels of interference generated between the Ku band payload of SBS-4 and other potentially adjacent satellites. The analyses used the computer program commonly known as the "George Sharp Adjacent Satellite Interference Program" (4/85 version).

The George Sharp program calculates, on a service by service basis, the interference power generated into each listed satellite service by other satellite services. The program then compares the resulting adjacent satellite interference level to an established interference objective for the particular desired service. The interference objectives used in the analysis presented herein are based on the recommendations of the FCC Advisory Committee on Reduced Spacing.

Because of the large number of Ku-band services investigated, the Ku-band analysis is divided into two sections. The analysis incorporates a worst-case assumption that the adjacent satellites are separated by two degrees. Spacings greater than two degrees will result in significant reductions in adjacent satellite interference. Other worst-case assumptions in the analyses are that all Ku-band services are co-frequency and co-polarized to each other. These assumptions were made due to the non-uniformity of Ku-band satellite channel plans. In many cases, there will exist frequency offsets and/or polarization isolation between adjacent Ku-band satellite services that will substantially reduce interference.

The interference analysis consists of three sections. The first section contains the input parameters for the interference analysis program. This section specifies the technical characteristics of the services supported by the potentially interfering satellites. The second section presents a computed thermal noise summary for each of the satellite links specified in the first section. The second section also specifies the carrier-to-intersatellite interference objective for each service type. The third section consists of a matrix which identifies the amounts by which the interference objectives of a particular service are exceeded when the service receives interference from another adjacent service.

The results of the analyses indicate that a significant interference potential (i.e., greater than 2dB) exists where television or wide-band data signals interact with narrowband SCPC (single-channel-per-carrier) signals. Such interference is not the result of the SBS-4 satellite design or of the services it will carry, but is rather an inherent characteristic of the two-degree spacing environment. Such interference can be readily contained through coordination arrangements made between adjacent satellite operators. Such arrangements can include coordinated assignment of carrier frequencies, segmentation of the operating frequency bands for specific service types, and proper selection of the satellite input attenuation levels.

In summary, the potential operation of SBS-4 will not create any exceptional or unusual interference problems with neighboring satellites. STLC remains prepared to engage in coordination discussions with the operators of any neighboring satellites in order to develop a mutually satisfactory operating environment.1

I N P U T   P A R A M E T E R S

12-19-91

:AR ER	COM- PANY	T Y P E	RF BAND- WIDTH (MHZ)	NO. OF CHAN	CODE RATE/ MOD. INDEX	BOT MOD. FREQ. (MHZ)	TOP MOD. FREQ. (MHZ)	AVE. TALKER LEVEL (DBMO)	CPAND PREMP NOISE WEIGH (DB)	P H A S E	DATA RATE (MBPS)	CHAN. SPACE (MHZ)	TRANSPONDER FREQUENCY UP (GHZ)	TRANSPONDER FREQUENCY DN (GHZ)	POL U P	POL D N	EARTH STATION TRANSMITTER POWR (DBW)	EARTH STATION TRANSMITTER DIAM (M)	EARTH STATION TRANSMITTER GAIN (DB)	--SATELLITE--- RECEIVER GAIN (DB)	--SATELLITE--- RECEIVER TEMP (K)	--SATELLITE--- XMTR EIRP (DBW)	-EARTH STATION RECEIVER DIAM (M)	-EARTH STATION RECEIVER GAIN (DB)	-EARTH STATION RECEIVER TEMP (K)
1	SBS4	1	27.000	1	2.333	.025	4.200	.0	12.8	0	.000	.000	14.250	11.950	0	1	18.5	6.1	57.1	29.9	650.	46.5	1.8	44.8	285
2	SBS4	1	27.000	1	2.333	.025	4.200	.0	12.8	0	.000	.000	14.250	11.950	0	1	18.5	6.1	57.0	29.9	650.	42.0	2.4	47.3	285
3	SBS4	1	36.000	1	2.333	.025	4.200	.0	12.8	0	.000	.000	14.250	11.950	0	1	19.0	2.4	48.5	30.0	650.	47.0	5.0	53.8	285
4	SBS4	2	1.029	25	.750	.000	.000	.0	.0	4	1.544	1.300*	14.250	11.950	0	1	-.5	5.0	55.3	27.3	650.	25.0	5.0	53.8	285
5	SPC3	0	36.000	1872	.407	.012	7.868	-15.0	-10.3	0	.000	36.000	14.250	11.950	0	1	25.9	10.0	61.3	27.3	1000.	37.9	10.0	59.3	214
6	SPC3	2	1.029	20	.750	.000	.000	-9.3	.0	4	1.544	1.300*	14.250	11.950	0	1	6.6	5.0	55.3	27.3	750.	25.0	5.0	53.8	234
7	SPC3	2	36.000	1	.000	.000	.000	-14.5	.0	4	60.000	.000	14.250	11.950	0	1	20.4	9.2	60.5	27.3	750.	41.8	9.2	59.0	257
8	SPC3	0	36.000	1872	.727	.012	7.868	-17.0	-10.3	0	.000	36.000	14.250	11.950	0	1	16.7	10.0	61.3	27.3	1000.	38.2	10.0	59.3	214
9	SPC3	0	17.500	432	1.224	.012	1.796	-20.0	.0	0	.000	18.000	14.250	11.950	0	1	14.0	7.0	58.2	27.3	1000.	32.4	7.0	56.0	251
10	SPC3	0	20.700	432	1.690	.012	1.796	-20.0	.0	0	.000	18.000	14.250	11.950	0	1	14.0	7.0	58.2	27.3	1000.	32.4	7.0	56.0	251
11	SPC3	2	72.000	1	.000	.000	.000	-12.7	.0	4	125.000	.000	14.250	11.950	0	1	29.0	7.0	58.2	27.3	1000.	42.4	7.0	56.0	251
12	SPC3	2	72.000	1	.000	.000	.000	-12.7	.0	4	125.000	.000	14.250	11.950	0	1	25.9	10.0	61.3	27.3	1000.	42.4	10.0	59.3	214
13	SPC3	2	7.600	8	.000	.000	.000	.0	.0	2	6.312	9.000	14.250	11.950	0	1	17.8	4.5	54.3	27.3	1000.	30.0	4.5	53.0	316
14	SPC3	2	15.150	4	.500	.000	.000	.0	.0	2	6.312	18.000	14.250	11.950	0	1	17.8	4.5	54.3	27.3	1000.	33.0	4.5	53.0	316
15	SPC3	2	1.030	46	.750	.000	.000	-9.3	.0	4	1.544	1.500*	14.250	11.950	0	1	-3.1	9.2	60.5	27.3	1000.	23.4	9.2	59.0	250
16	GE	1	30.000	1	2.620	.025	4.200	57.0	12.8	0	.000	.000	14.250	11.950	0	1	25.5	7.7	59.5	27.5	800.	47.0	5.5	55.0	365
17	GE	1	24.000	1	2.540	.025	4.200	47.0	12.8	0	.000	.000	14.250	11.950	0	1	25.5	7.7	59.5	27.5	800.	43.0	3.0	50.0	365
18	GE	1	24.000	1	2.540	.025	4.200	47.0	12.8	0	.000	.000	14.250	11.950	0	1	25.5	7.7	59.5	27.5	800.	46.0	2.0	46.4	365
19	GE	2	45.700	1	.875	.000	.000	11.8	.0	4	80.000	.000	14.250	11.950	0	1	23.4	10.0	61.6	27.5	800.	43.0	10.0	60.4	165
20	GE	2	8.800	1	1.000	.000	.000	12.8	.0	2	8.800	.000	14.250	11.950	0	1	25.5	7.7	59.5	27.5	800.	43.0	3.0	50.0	255
21	GE	2	1.029	20	.750	.000	.000	7.5	.0	4	1.544	1.300*	14.250	11.950	0	1	-.6	10.0	61.5	27.5	800.	24.0	10.0	60.4	165
22	GE	3	.064	100	.875	.000	.000	10.1	.0	2	.056	.500*	14.250	11.950	0	1	-.3	5.0	55.6	27.5	800.	18.0	5.0	54.4	165

THERMAL NOISE SUMMARY

		EARTH - TO - SPACE				SPACE - TO - EARTH				C/KT - (DB/HZ)			C/N - (DB)			TOTAL THERMAL NOISE			SINGLE ENTRY INTER-FERENCE OBJECTIVE		
CAR-RIER	COM-PANY	EIRP (DBW)	POINT-ING LOSS (DB)	SPACE LOSS* (DB)	RCV G/T (DB/K)	EIRP (DBW)	POINT-ING LOSS (DB)	SPACE LOSS* (DB)	RCV G/T (DB/K)	UP	DN	TOTAL	UP	DN	TOTAL	(PWOP)	S/N (DB)	EB/KT (DB)	(PWOP)	S/I (DB)	C/I (DB)
1	SBS4	75.6	.3	207.8	1.8	46.5	.0	206.1	20.3	97.9	89.3	88.7	23.6	14.9	14.4		50.6			=52.4	22.0
2	SBS4	75.5	.3	207.8	1.8	42.0	.1	206.1	22.8	97.8	87.2	86.8	23.5	12.8	12.5		48.7			=52.4	22.0
3	SBS4	67.5	.0	207.8	1.9	47.0	.2	206.1	29.3	90.2	98.6	89.6	14.6	23.0	14.0		50.2			=52.4	22.0
4	SBS4	54.8	.3	207.8	-.8	25.0	.2	206.1	29.3	74.5	76.6	72.4	14.3	16.4	12.3			9.2			22.0
5	SPC3	87.2	.5	207.8	-2.7	37.9	.2	206.1	36.0	104.8	96.2	95.6	29.2	20.6	20.1	6324.	52.0		1000.	60.0	
6	SPC3	61.9	.3	207.8	-1.5	25.0	.2	206.1	30.1	80.9	77.4	75.8	20.8	17.3	15.7			12.7			21.8
7	SPC3	80.9	.5	207.8	-1.5	41.8	.2	206.1	34.9	99.7	99.0	96.3	24.2	23.4	20.8			18.6			27.2
8	SPC3	78.0	.5	207.8	-2.7	38.2	.2	206.1	36.0	95.6	96.5	93.0	20.0	20.9	17.5	2286.	56.4		1000.	60.0	
9	SPC3	72.2	.3	207.8	-2.7	32.4	.2	206.1	32.0	90.0	86.7	85.0	17.6	14.3	12.6	6276.	52.0		1000.	60.0	
10	SPC3	72.2	.3	207.8	-2.7	32.4	.2	206.1	32.0	90.0	86.7	85.0	16.8	13.5	11.9	3292.	54.8		1000.	60.0	
11	SPC3	87.2	.3	207.8	-2.7	42.4	.2	206.1	32.0	105.0	96.7	96.1	26.4	18.1	17.5			15.1			25.0
12	SPC3	87.2	.5	207.8	-2.7	42.4	.2	206.1	36.0	104.8	100.7	99.3	26.2	22.1	20.7			18.3			25.0
13	SPC3	72.1	.3	207.8	-2.7	30.0	.2	206.1	28.0	89.9	80.3	79.9	21.1	11.5	11.0			11.8			19.2
14	SPC3	72.1	.3	207.8	-2.7	33.0	.2	206.1	28.0	89.9	83.3	82.4	18.1	11.5	10.6			11.4			16.2
15	SPC3	57.4	.5	207.8	-2.7	23.4	.2	206.1	35.0	75.0	80.7	74.0	14.9	20.6	13.8			10.8			21.8
16	GE	85.0	.3	207.8	-1.5	47.0	.2	206.1	29.4	104.0	98.7	97.6	29.2	23.9	22.8		60.3			=59.4	28.0
17	GE	85.0	.3	207.8	-1.5	43.0	.2	206.1	24.4	104.0	89.7	89.5	30.2	15.9	15.7		52.9			=53.1	22.0
18	GE	85.0	.3	207.8	-1.5	46.0	.1	206.1	20.8	104.0	89.2	89.0	30.2	15.4	15.2		52.4			=53.1	22.0
19	GE	85.0	.5	207.8	-1.5	43.0	.2	206.1	38.2	103.8	103.5	100.6	27.2	26.9	24.0			21.0			27.0
20	GE	85.0	.3	207.8	-1.5	43.0	.2	206.1	25.9	104.0	91.2	91.0	34.5	21.8	21.6			21.6			25.0
21	GE	60.9	.5	207.8	-1.5	24.0	.2	206.1	38.2	79.7	84.5	78.4	19.5	24.4	18.3			15.3			22.0
22	GE	55.3	.3	207.8	-1.5	18.0	.2	206.1	32.2	74.3	72.5	70.3	26.2	24.5	22.2			22.2			20.0

*** F O O T N O T E S ***

I N P U T   P A R A M E T E R S

SIGNAL TYPE INDEX	POLARIZATION TYPE INDEX
0 = FDM/FM	0 = HORIZONTAL
1 = TV/FM	1 = VERTICAL
2 = DIGITAL	
3 = SCPC/PSK	2 = 20 DEG CANTED HORIZONTAL
4 = SCPC/FM	3 = 20 DEG CANTED VERTICAL
5 = CSSB/AM	
6 = SS/PSK	4 = LEFT-HAND CIRCULAR
	5 = RIGHT-HAND CIRCULAR

POLARIZATION ISOLATION MATRIX

DESIRED \ INTERFERING SENSE	0	1	2	3	4	5
0	.0	6.0	.0	4.0	3.0	3.0
1	6.0	.0	4.0	.0	3.0	3.0
2	.0	4.0	.0	6.0	3.0	3.0
3	4.0	.0	6.0	.0	3.0	3.0
4	1.5	1.5	1.5	1.5	.0	6.0
5	1.5	1.5	1.5	1.5	6.0	.0

SPECTRA ASSUMMED FOR INTERFERENCE INTO SCPC & PSK

TV/FM: 2 DEG. ADV. COMM. MASK

FDM/FM: GAUSSIAN, EXCEPT FOR THOSE MARKED
WITH "+" UNDER SIGNAL TYPE

* INDICATES SCPC AND SMALL FDMA CARRIERS WHOSE TRANSPONDER
FREQUENCY PLANS AVOID +- 3.5 MHZ AT THE TRANSPONDER CENTER.

"PLAN" UNDER CHANNEL SPACING INDICATES A FIXED FREQUENCY PLAN.

T H E R M A L   N O I S E   S U M M A R Y

\+ POINTING LOSS INCLUDED IN THERMAL NOISE ONLY, NOT IN INTERFERENCE CALCULATIONS.

* FREE SPACE LOSS (20 DEG ELEV. ANG.) & ATMOSPHERIC LOSSES
= 207.6 +   .2 DB (UPLINK)
= 205.9 +   .2 DB (DOWNLINK)

= FOR TV/FM, INDICATES THE OBJECTIVE'S EQUIVALENT LEVEL FOR INTERFERENCE FROM ITSELF.
FOR COMPARISON ONLY, NOT USED AS THE SINGLE ENTRY OBJECTIVE.

FAILS TO MEET SINGLE ENTRY INTERFERENCE OBJECTIVE (DB) 12-19-91

2.0 DEGREE SPACING New FCC pattern, 29-25 LOG(A) ; A = GEOCENTRIC ANGLE

INTERFERING

WANTED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																1						
2	1		1													2		1				
3					2						3	1				2	2	2		2		
4	6	3	6		6						1					9	8	9		4		
5																						
6	5	1	5													6	3	5				
7																						
8																						
9																						
10																						
11																						
12																						
13	4		5													5	2	4				
14																						
15	2		3		3											6	5	6		1		
16																						
17																						
18																						
19																						
20	1		1													1						
21	1		1													3	2	3				
22																						

FAILS TO MEET SINGLE ENTRY INTERFERENCE OBJECTIVE (DB) 12-19-91

4.0 DEGREE SPACING New FCC pattern, 29-25 LOG(A) ; A = GEOCENTRIC ANGLE

WANTED \ INTERFERING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						
3																						
4																2	1	1				
5																						
6																						
7																						
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15																						
16																						
17																						
18																						
19																						
20																						
21																						
22																						

12-19-91

FAILURE SUMMARY*
(NUMBER)

	SATELLITE SPACING		
	2.00 DEG	4.00 DEG	.00 DEG
TOTAL COMBINATIONS	484	484	484
TOTAL FAILURES	47	3	0
FAILS BY:			
.0 - 1.5 DB	13	2	0
1.5 - 2.5 DB	9	1	0
2.5 - 3.5 DB	7	0	0
3.5 - 4.5 DB	3	0	0
4.5 - 5.5 DB	6	0	0
5.5 - 6.5 DB	6	0	0
6.5 - 7.5 DB	0	0	0
7.5 - 8.5 DB	1	0	0
8.5 - 9.5 DB	2	0	0
MORE THAN 9.5 DB	0	0	0

(PERCENT)

	SATELLITE SPACING		
	2.00 DEG	4.00 DEG	.00 DEG
TOTAL FAILURES	9.7 %	.6 %	.0 %
FAILS BY:			
.0 - 1.5 DB	2.7 %	.4 %	.0 %
1.5 - 2.5 DB	1.9 %	.2 %	.0 %
2.5 - 3.5 DB	1.4 %	.0 %	.0 %
3.5 - 4.5 DB	.6 %	.0 %	.0 %
4.5 - 5.5 DB	1.2 %	.0 %	.0 %
5.5 - 6.5 DB	1.2 %	.0 %	.0 %
6.5 - 7.5 DB	.0 %	.0 %	.0 %
7.5 - 8.5 DB	.2 %	.0 %	.0 %
8.5 - 9.5 DB	.4 %	.0 %	.0 %
MORE THAN 9.5 DB	.0 %	.0 %	.0 %

*New FCC pattern, 29-25 LOG(A) ; A = GEOCENTRIC ANGLE

Approved by OMB
3060-0440
Expires 2/28/93

FEDERAL COMMUNICATIONS COMMISSION

FEE PROCESSING FORM

FOR FCC USE ONLY	

Please read instructions on back of this form before completing it. Section I MUST be completed. If you are applying for concurrent actions which require you to list more than one Fee Type Code, you must also complete Section II. This form must accompany all payments. Only one Fee Processing Form may be submitted per application or filing. Please type or print legibly. All required blocks must be completed or application/filing will be returned without action.

SECTION I

APPLICANT NAME (Last, first, middle initial)
Hughes Communications Galaxy, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters - refer to Instruction (2) on reverse of form)
1001 Pennsylvania Ave., NW, Ste. 1300

MAILING ADDRESS (Line 2) (If required) (Maximum 35 characters)
LATHAM & WATKINS c/o John Janka

CITY
Washington

STATE OR COUNTRY (If foreign address)	ZIP CODE	CALL SIGN OR OTHER FCC IDENTIFIER (If applicable)
DC	20004	SBS-4

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)	B F Y	0 0 0 1	$ 5,000.00	

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
$ 5,000.00	

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
SATELLITE TRANSPONDER LEASING CORPORATION	)	File No. 18-DSS-ML-92
	)	
Application For Interim Assignment of the SBS-4 Domestic Fixed Satellite	)	

PETITION TO DENY OF
GE AMERICAN COMMUNICATIONS, INC.

Philip V. Otero
Alexander P. Humphrey
GE AMERICAN COMMUNICATIONS, INC.
Four Research Way
Princeton, N.J. 08540
(609) 987-4016

February 21, 1992

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Summary

In this matter, GE American Communications, Inc. ("GE Americom") petitions the Commission to deny the application of Satellite Transponder Leasing Corporation ("STLC") to reassign the SBS-4 satellite to 83° W.L. In the first instance, STLC has not met its burden of demonstrating why it should be allowed to operate SBS-4 in an unassigned orbital location instead of using an available location assigned to STLC or its parent, Hughes Communications Galaxy, Inc. ("HCG"). Most importantly for GE Americom, operation of SBS-4 at 83° would cause significant interference to small-antenna services provided by GE Americom's Satcom K-2 and K-1 satellites located at 81° and 85° W.L. respectively.

STLC has offered no compelling business reason to locate SBS-4 at 83° W.L. and plans to offer the same services there that it could provide out of many other unoccupied Ku-band locations without interference.

Because this application is devoid of public interest justifications, it should be denied. GE Americom proposes that SBS-4 instead be located at 95° W.L. pending launch of Galaxy III(H), assuming the latter satellite is approved.

RECEIVED

FEB 2 1 1992

Federal Communications Commission
Office of the Secretary

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of SATELLITE TRANSPONDER LEASING CORPORATION Application For Interim Assignment of the SBS-4 Domestic Fixed Satellite	)	File No. 18-DSS-ML-92

PETITION TO DENY OF GE AMERICAN COMMUNICATIONS, INC.

GE American Communications, Inc. ("GE Americom") hereby opposes the application of Satellite Transponder Leasing Corporation ("STLC") for an interim, twenty-two month assignment of its Ku-band SBS-4 satellite to 83° W.L. STLC has not demonstrated why it should be permitted to operate SBS-4 in an unassigned orbital location instead of using an available location assigned STLC or its parent, Hughes Communications Galaxy, Inc. ("HCG"). Operation of SBS-4 at 83° W.L. will interfere with services provided to tens of thousands of users of GE Americom's Satcom K-2 and K-1 satellites, located at 81° W.L. and 85° W.L., respectively, and is not otherwise in accord with the public interest. STLC has not shown any tangible benefits to the public that would accrue to location of SBS-4 at 83° instead of other available orbital positions, including locations assigned to STLC or HCG. GE Americom proposes that SBS-4 be located at 95° W.L. until the launch of Galaxy III(H), assuming that satellite is approved by the Commission.

Introduction

STLC has filed this application following the decision of HCG to deploy Galaxy VII(H) at 91° nearly two years prior to the end of SBS-4's useful life at that location. STLC seeks a location from which it can continue to operate SBS-4 until that satellite expires. See STLC Application at 4.

GE Americom has no objection per se to the early replacement of SBS-4 with Galaxy VII(H). GE Americom also recognizes HCG's interest in making productive use of what will then become excess Ku-band capacity on SBS-4.

As a domestic satellite operator, GE Americom believes that the public is best served if domestic satellite operators make optimal use of their spacecraft until the end of each spacecraft's operating lifetime. For this reason, GE Americom wishes to be cooperative towards the efforts of other domestic satellite operators to deploy any excess satellite inventory as they best see fit, as long as such efforts do not adversely affect GE Americom and otherwise comport with Commission policies. It should go without saying that if a satellite operator wishes to move a satellite from its properly assigned location prior to that satellite's end of life, the operator should bear a special burden to show that such relocation does not prejudice other operators and their customers. And in particular, the Commission should strictly enforce its policy barring temporary use of unassigned orbital locations absent a clear demonstration that use of the proposed substitute location for the satellite has "substantial, tangible benefits to the public, . . . does not adversely affect other domestic satellite carriers," and is otherwise consistent with Commission policies and the public interest. See Comsat General Corp., 2 FCC Rcd 4570, 4572 (1987).

STLC cannot meet this burden insofar as it seeks a temporary assignment of SBS-4 to 83° W.L.

As the technical exhibits attached to its request make clear, SBS-4, if assigned to 83° W.L., will inflict unacceptable interference upon GE Americom's customers that use small aperture antennas to receive services via GE Americom's Satcom K-1 and K-2 satellites.[1]

The only justification that STLC offers for moving SBS-4 from its assigned location at 91° W.L. is that this satellite will become "redundant" as a result of HCG's decision to effect an early launch of Galaxy VII(H).[2] STLC makes no showing of any compelling need to place SBS-4 between Satcom K-1 and K-2 at 83° W.L., as opposed to any number of other available Ku-band orbital locations. Instead, STLC merely claims that SBS-4, if

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1 In prior and pending applications, HCG has recognized the importance of a customer base using small antennas: e.g., Application, File No. 20-DSS-P/LA-90, at 7 ("tens of thousands of VSAT antennas pointed at SBS-4"); Request for Interim Orbital Assignment, File No. 19-DSS-ML-92, at 2 ("burgeoning growth of VSAT networks"), 3 ("users begin to take advantage of the benefits of VSAT technology"); Request for Interim Assignment of Orbit Location, File No. 1841-DSS-MISC-89 at 2 ("growth of VSAT networks throughout the United States").

2 Request for Interim Orbital Assignment ("Request") at 3.

assigned to 83° W.L., will offer generic "short-term and preemptible service that would otherwise be unavailable."[3] But these services can certainly be provided from other orbital locations and are today effectively provided from many authorized locations in the arc.

In particular, temporary use of SBS-4 at 95° would be much more consistent with both Commission orbital assignment policies, and the often stated desire of STLC and HCG to begin service at a permanently assigned location as soon as possible.[4] First of all, STLC does not need an unassigned location for SBS-4. Assuming the Commission approves HCG's application to launch Galaxy III(H) into 95°, HCG effectively would have been assigned rights to use the Ku-band half of that location subject to launch of the hybrid. But in these circumstances there is no reason why STLC should not use 95° -- an assigned location -- as the temporary home of SBS-4 instead of 83° -- an unassigned location.

Second, use of SBS-4 at 95° would facilitate more rapid commencement of service at STLC/HCG's assigned locations. We recognize that the same day that STLC requested authority to move SBS-4 to 83°, HCG also requested authority to move SBS-6 to 95°. GE Americom is stating its concerns regarding the latter

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[3] Request at 4.

[4] E.g., in File No. 19-DSS-ML-92 (SBS-6), STLC, referring to HCG's launches of its hybrid satellites in 1993-94, stated: "STLC's and HCG's customers . . . are in need of [VSAT] services before HCG can launch this capacity." Request for Interim Orbital Assignment at 3.

application in a separate filing. We would note, however, that HCG's expressed purpose for relocation of SBS-6 is to "allow [users who want long term capacity at 95°] to begin to take advantage of the benefits of VSAT technology as early as February 1993".[5] However, SBS-4 will be available for service at 95° W.L. four months earlier than could be provided by SBS-6[6] and will therefore even more fully meet HCG's stated objective in moving SBS-6 to 95° W.L. "In order to begin to serve this growing demand as soon as possible...".[7] This approach also would free HCG to move SBS-6 to its permanently assigned location at 72° more rapidly so that HCG could begin to build its satellite business there.[8]

Given the lack of any compelling reason for locating SBS-4 at 83° W.L. and the harm that will be inflicted on GE Americom's Satcom K-1 and K-2 services and customers, such an assignment is surely not in the public interest. Accordingly, the Commission should deny HCG's request.

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5 Request for Interim Orbital Assignment, File No. 19-DSS-ML-92 (SBS-6), at 3.

6 SBS-4 will be available in October 1992. Request at 1.

7 Request For Interim Orbital Assignment, File No. 19-DSS-ML-92 (SBS-6), at 3 (emphasis supplied).

8 GE Americom recognizes that SBS-4 may have several months left after the launch of Galaxy III(H) assuming both that SBS-4 completes its expected life, and that Galaxy III(H) is launched on its current schedule. However, such overlap is not unusual in the course of replacing satellites and is part of the cost HCG should accept with its decision regarding the launch date of Galaxy III(H).

I.

LOCATING SBS-4 AT 83° WOULD CREATE UNACCEPTABLE INTERFERENCE

Operation of SBS-4 at 83° W.L., even for an interim period, would inflict unacceptable interference upon the operations of GE Americom's Satcom K-1 and K-2 satellites and would cause reduced picture quality and seriously impaired data service to tens of thousands of users who receive broadcasts from these satellites.

Although the transponders used on SBS-4 are 20 watts, compared to the 45-watt transponders of Satcom K-1 and K-2, the SBS-4 transponders shape the beams in such a fashion as to cause interference levels, when measured in terms of Effective Isotropic Radiated Power (EIRP), comparable to levels associated with 45-watt transponders in some parts of the U.S.[9]

It is GE Americom's understanding that SBS-4 operates with all ten transponders horizontally polarized and that there is spectrum overlap between these transponders and the horizontal transponders on GE Americom's Satcom K-1 and K-2 satellites. This means that the eight horizontally-polarized transponders on

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[9] In the most aggravated situation, SBS-4 could be used so that five transponders can be transmitted over a spotbeam centered over the Northeastern United States or the West Coast, producing a <u>minimum</u> of 50 DBW of EIRP. <u>World Satellite Almanac</u>, Long ed. (1991) at 500-501. The EIRP value for the transponders of Satcom K-1 and K-2, by comparison, is a <u>maximum</u> 52 DBW. <u>Ibid</u>. at 484-487. (emphasis supplied).

both Satcom K-1 and K-2 would be vulnerable to cofrequency interference from SBS-4 in the absence of the protection which cross-polarity provides. As shown by GE Americom's attached Technical Study, the interference caused by assignment of SBS-4 to 83° W.L. would result in significant shortfalls in performance for both video and data services presently being provided on the Satcom K-1 spacecraft for both the CONUS and the spot beam operating mode of SBS-4. For Primestar, certain video services would suffer perceptible degradation of quality if SBS-4 operated in the CONUS mode and even greater degradation if it operated in the spot beam mode. For either mode of SBS-4, data services presently provided and contemplated on Satcom K-1 would suffer unacceptable interference and drop substantially below minimum customer requirements. Placement of SBS-4 at 83° W. L. and use of its transponders for video transmission would preclude use by GE Americom of large portions of the spectrum of all 8 horizontally polarized (downlink) transponders on Satcom K-2 for SCPC traffic.

A. <u>STLC's Interference Studies Proceeded on Incorrect Assumptions</u>

GE Americom appreciates the fact that STLC presented its interference analysis on a worst case basis as related to frequency and polarization, assuming that the transponders on SBS-4 and those on Satcom K-1 and K-2 were both co-polarized and operated on identical frequencies. This indeed appears to be the case. The analysis, however, did not consider the real world case in terms of antenna sizes actually used because STLC ignored the actual use made of Satcom K-1 and K-2 and erroneously assumed that antennas no smaller than two meters would be used for video services and three meters for data services. In fact, it is well known that Ku-band video and data services are typically provided on antennas that are smaller than two and three meters, respectively.

As GE Americom's Technical Study shows, STLC's calculations, when extrapolated to an environment of small-aperture antennas, could cause significant shortfalls from the viewability standards adopted by the Commission's Two-Degree Spacing Advisory Committee and endorsed by STLC's own study.[10] While the conclusions drawn from the STLC's calculations might be valid for antennas with apertures of two meters or more, they are the best demonstration themselves of the interference that will be inflicted on smaller antennas.

B. <u>Harmful Interference Will Be Inflicted Upon GE Americom's Video and Data Services</u>

The primary customer of Satcom K-1 is Primestar, the first venture using the statutory license granted under the Satellite Home Viewer Act amendments to the Copyright Act to offer mass market video services directly to consumer homes. Primestar first began offering services to the general public in 1991 and has enrolled thousands of subscribers to date by providing

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10 Request, Attachment A, "Adjacent Satellite Interference Analysis," at 1.

consumers video programming, decoders and small (one meter) antennas all for one monthly subscriber fee. With healthy growth rates, Primestar can expect to be a strong participant in satellite based distribution of video programming. It is GE Americom's understanding that the antennas used by the majority of viewers of Primestar's video services are one meter in diameter, four times smaller in area than the sizes assumed by STLC. The Commission's Advisory Committee on two-degree spacing established a single entry protection ratio of 22 dB as the minimum for video signals. Although the majority of Primestar's antennas comply with the technical standards of the Commission's two-degree spacing rule in their ability to block the signals of adjacent satellites, the completely unnecessary location of SBS-4 at 83° W.L. would result in cofrequency interference upon some of Satcom K-1's horizontally polarized transponders, resulting in a shortfall of at least 3 dB below the Advisory Committee's protection ratio standard.

In order to eliminate this interference and restore viewability to the 22 dB protection ratio recommended by the Advisory Committee, we believe that Primestar's antenna sizes would have to be substantially increased. It appears that the one-meter dish-style antennas supplied by Primestar for reception of video programming would have to be increased to 1.4 meters. This is a substantial increase in size, since a 1.4 meter antenna is almost twice as large in area as a one-meter antenna. Moreover, since a 1.4 meter antenna is not a size of standard manufacture, it is probable that Primestar would be obliged to fund significant design and manufacturing costs, as it did with the one-meter antenna, to have a 1.4 meter antenna developed and manufactured. Alternatively, it could be required to order the next larger standard dish antenna which is 1.8 meters. 1.8 meter dishes are three times as large in area as are the one-meter dishes which Primestar currently uses. Primestar's antenna costs could be more than doubled by the need to avoid interference from SBS-4.[11]

Furthermore, the acquisition and installation of antennas three times as large would likely meet with substantial customer resistance. As the Commission is aware, there are important aesthetic and zoning issues related to antenna size as well as additional expense. Further, larger dishes can reasonably be expected to pose more risk of injury to installers as well as higher maintenance costs because larger antennas are more vulnerable to environmental conditions such as windstorms.

In short, we believe that the operation of SBS-4 at 83° could seriously disrupt the activities of Primestar and cause unnecessary burdens and expense for thousands of Primestar customers.

Interference caused by SBS-4 would be even more harmful for those small antennas that receive data services from

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[11] A 1.0 meter antenna costs in the neighborhood of $110, and a 1.8 meter antenna approximately $250.

horizontally-polarized channels on Satcom K-1 and K-2, for which the Advisory Committee established a 20 dB protection ratio. Typically, the shortfalls from the required 20 dB will be approximately 9 dB corresponding to an eight-fold increase in interference levels and concomitantly a 1.4 dB degradation of system performance, which corresponds to increases in system error rates of as much as 3 orders of magnitude, a level clearly unacceptable under any circumstances. GE Americom's customers should not be subject to this level of interference because all of them are using antennas which are 2° compliant.

Given the failure of STLC to present any compelling business need to use the 83° W.L. orbital location over other available locations, the interference inflicted on Satcom K-1 and K-2 renders reassignment of SBS-4 satellite to such a location contrary to the public interest. To eliminate the interference to data services it would be necessary to increase the power of uplinking antennas thereby decreasing the usable capacity of the satellite and sacrificing its efficiency.

II.

THERE IS NO PUBLIC INTEREST REASON FOR TEMPORARY ASSIGNMENT OF SBS-4 TO 83° W.L.

STLC has presented no evidence of a compelling business necessity to locate SBS-4 at 83° W.L. The only justification offered by STLC for this location is that its use would provide certain generic and unidentified "substantial public benefits."[12] STLC does not explain, much less quantify these "substantial public benefits." Rather, STLC merely indicates that SBS-4, if located at 83° W.L., would be able to "provide short-term and preemptible service that otherwise would be unavailable."[13] It is manifest that such short-term and preemptible service can be provided from any available Ku-band orbital location. We urge the Commission to review STLC's minimal justification for occupying the 83° W.L. location against the fact that GE Americom has been operating Satcom K-1 and K-2 at their current locations since the mid-1980's and that its customers there merit protection against unnecessary interference.

There is no Ku-band service at 83° W.L., and thus there are no customers whose needs for short-term and preemptible service must be continued at that location. Although GTE Spacenet's Contelsat 1 spacecraft was assigned to 83° W.L. in the 1988 Orbital Assignment proceedings,[14] GTE tendered the Contelsat application for cancellation prior to constructing the satellite. Accordingly, in the time span covered by the last processing round, there never has been any Ku-band traffic at 83° W.L.

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[12] Request at 4.

[13] Ibid.

[14] Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, 3 FCC Rcd 6972 (1988), recon., 5 FCC Rcd 179 (1990), modified sub nom. American Satellite Co., 5 FCC Rcd 1186 (1990).

Moreover, STLC seeks to place SBS-4 at 83° W.L. for only twenty-two months and does not plan to replace it.

The Commission's test for temporary use of an unassigned orbital assignment is set forth in Comsat General Corp.[15] There, the inquiry is whether the "applicant can demonstrate that the temporary assignment 'contributes to the Commission policy objective of achieving more efficient utilization of the orbit and spectrum resource' and 'only if substantial, tangible benefits to the public are demonstrated and [the temporary assignment] does not adversely affect other domestic satellite carriers or the Commission processing of. . . applications.'"[16]

The Commission should apply the Comsat General test to discourage the temporary assignment of satellites to unassigned orbital locations where, as in the case of assigning SBS-4 to 83° W.L., the satellite is not being used to replace an existing satellite and no follow-on capacity is planned. Making temporary assignments in these circumstances is analogous to permitting applicants to begin construction of satellites before the Commission has made a determination that construction is in the public interest. Both temporary assignments and construction activities raise expectations on the part of the public and the carrier as to the continuation or origination of service. In the

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15 Comsat General Corporation, 2 FCC Rcd 4570, (1987) (footnote omitted), quoting Satellite Business Systems, Mimeo No. 5207 (July 9, 1984).

16 2 FCC Rcd at 4572

case of a temporary assignment, the existence of current customers at the time permanent follow-on authority was requested would place the Commission in a difficult position.

As the Commission stated: "the Congressional intent and objective underlying [Section 319(a)] was to discourage applicants from making large investments and using such investments as 'improper pressure' on the licensing agency."[17] A temporary assignment similarly constitutes an investment in services that could be used, in the prosecution of follow-on authority, to exert undue pressure on the Commission to authorize permanent service.

It is clear that the Comsat General test for temporary authorization, when applied in this fashion, calls for denial of STLC's request with respect to SBS-4. STLC can show at best that a temporary assignment of SBS-4 to 83° W.L. utilizes otherwise unassigned orbit and spectrum resource, although it is subject to doubt that utilization of spectrum with the interference that SBS-4 would inflict on existing services could be called "efficient."

But even if STLC satisfies the first prong of the Comsat General test of efficient spectrum utilization, it is clear that it cannot satisfy the remainder. For example, STLC fails to show "substantial, tangible benefits to the public" if SBS-4 were

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[17] See Patton Communications Corp., 81 FCC 2d 336, 337 (1980), quoting WSAV, Inc., 10 RR 402 (1955).

located at 83° W.L. STLC merely makes broad and unspecific reference to providing "short-term and preemptible service that otherwise would be unavailable." However, short-term and preemptible service can be provided at many other unassigned Ku-band locations not solely from 83° W.L.

STLC also fails to show that locating SBS-4 at 83° W.L. will not adversely affect GE Americom. Although its exhibit does show a lack of interference, STLC assumed antenna sizes larger than those currently in use for Satcom K-1 and K-2 services. When applied to the actual environment, as GE Americom explains herein, there is interference.

Having failed on the face of its application to meet the test specified in Comsat General, STLC's application for a temporary assignment should be denied.

Alternatives exist for the use of SBS-4 that would permit it to provide short-term and preemptible service without interference. For example, if STLC believes that an additional orbital location in the eastern orbital arc is desirable for business reasons and to extend the lifetime of SBS-4, it could relocate SBS-4, with little transit time and expense, two degrees to 89° W.L. This would allow it to offer close-by protection for Ku-band service on Galaxy VII(H) and at the same time provide the "short-term and preemptible service that would otherwise be unavailable." Alternatively, STLC could locate SBS-4 at 95° W.L. to develop business that would be carried forward on Galaxy

III(H), in lieu of utilizing SBS-6 for that task, as proposed in the related File No. 19-DSS-ML-92.[18]

For the Commission to assign SBS-4 rather than SBS-6 to operate for an interim period at 95° W.L. would also serve what HCG identified as an important public interest in its request for an interim assignment of SBS-6, because the use of SBS-4 at that orbital location would permit "the early development of Ku-band services at 95° and the seamless transition of that traffic to Galaxy III(H) when that satellite is launched in 1994."[19] Although STLC has proposed to use SBS-6 to provide this interim service, the use of SBS-4 in lieu of SBS-6 at 95° would allow STLC to move SBS-6 to 72° W.L., the orbital location assigned to it by the Commission. This alternative would bring the public the timely benefits of Ku-band service at both 72° W.L. and 95° W.L. without inflicting interference upon Satcom K-1 and K-2 and, apparently, without interference to satellites adjacent to 95° W.L. Furthermore, SBS-4 will be available for relocation in October 1992[20] while SBS-6 will not be available until February

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[18] The 95° W.L. orbital location will be shortly available for Ku-band reassignment. Currently, SBS-3 has been assigned to provide Ku-band services at 95° W.L., but SBS-3 is reaching the end of its operational life and is operating in an inclined orbit. For this reason, the Commission has said that Comsat's authority to operate SBS-3 will terminate in 1992. Comsat General Corp., 6 FCC Rcd 3345 (1991).

[19] Request for Interim Orbital Assignment, File No. 19-DSS-ML-92 (SBS-6), at 3.

[20] Request at 1.

1993.[21] Thus, using SBS-4 instead of SBS-6 at 95° W.L. would permit HCG to begin even sooner "the early development of Ku-band services at 95° W.L."[22] and "to serve this growing demand <u>as soon as possible</u>"[23] (emphasis supplied) and permit SBS-6 to move to its assigned orbital location at 72° W.L. without further delay.

<u>Conclusion</u>

The interference that temporary assignment of SBS-4 at 83° W.L. would inflict on the users of services provided by Satcom K-1 and K-2, the lack of any compelling business need to locate SBS-4 at 83° W.L. rather than elsewhere and the failure of STLC to otherwise meet the <u>Comsat General</u> test require that STLC's request for a temporary assignment of SBS-4 to 83° W.L. be denied.

Respectfully submitted,

Philip V. Otero
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21 Request for Interim Assignment, File No. 19-DSS-ML-92 (SBS-6) at 1.

22 <u>Ibid.</u> at 3.

23 <u>Ibid</u>.

TECHNICAL APPENDIX

INTERFERENCE FROM THE SBS-4 SATELLITE

AT 83° WEST LONGITUDE

INTO THE K-1 SATELLITE

AT 85° WEST LONGITUDE

AND

INTO THE K-2 SATELLITE

AT 81° WEST LONGITUDE

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2/19/92

1.0 INTRODUCTION

It is demonstrated in this Technical Appendix that the proposed location and operation of the SBS-4 satellite at 83° West Longitude will cause excessive and harmful interference into GE Americom's K-1 satellite at 85° West Longitude and its K-2 satellite at 81° West Longitude. Placement of SBS-4 at 83° West Longitude and use of its transponders for video transmissions would cause excessive and harmful interference into the system on GE Americom's spacecraft in which television transmissions are received by antennas 1.0 meter in diameter. The Summary Table shows that interference from SBS-4 into this small dish video system will cause shortfalls of as much as 11.5 dB from the protection ratios established by the FCC's 2° Spacing Advisory Committee. Interference from video carriers on SBS-4, particularly Carrier #3 in the data base submitted to the FCC by Hughes Communications Galaxy, will result in shortfalls of as much as 9.5 dB from protection ratios established by the FCC's 2° Spacing Advisory Committee for Single Channel Per Carrier (SCPC) carriers. The Summary Table shown below lists a number of these shortfalls. Placement of SBS-4 at 83° West Longitude and use of its transponders for video transmissions would preclude use by GE Americom of large portions of the spectrum of all 8 horizontally polarized (downlink) transponders on K-1 for

Single Channel Per Carrier (SCPC) traffic. Large portions of the spectrum of all 8 horizontally polarized (downlink) transponders on K-2 would similarly be precluded from use for SCPC traffic.

The following sections contain examples of interference calculations that demonstrate the excessive interference from SBS-4 into K-1 and K-2.

2.0 INTERFERENCE FROM SBS-4 INTO GE AMERICOM'S SATELLITE SYSTEMS

2.1 INTERFERENCE INTO TELEVISION

Although transponder amplifier power on SBS-4 is 20 watts versus 45 watts on K-1, beam shaping on the former satellite results in EIRP radiated from SBS-4 to some areas of the United States that is comparable to or even greater than the EIRP radiated from K-1. Indeed, this fact is illustrated in the analysis of adjacent satellite interference filed by Hughes Communications Galaxy with the FCC to support its request to locate SBS-4 at 83° West Longitude. The EIRP listed for Carrier #3, a video carrier, is 47.0 dBW. The EIRP levels listed in the same data base for GE Americom range in value from 43.0 dBW to 47.0 dBW. In the analysis which follows it will be assumed that the EIRP levels of the interfered-with satellite (K-1) and the interfering satellite (SBS-4) are the same.

2.1.1 SINGLE ENTRY UPLINK INTERFERENCE

Video Carrier #3 is transmitted to SBS-4 by an uplink antenna 2.4 meters in diameter with a transmit gain of 48.5 dB. The power level into the antenna is 19.0 dBW, resulting in an uplink earth station EIRP level of 67.5 dBW and a corresponding Flux Density (W_I) of -95.5 dBW/m^2. For an earth station EIRP of 85.0 dBW for the wanted video carrier, the Saturation Flux Density of the wanted video carrier (W_w) equals -78.0 dBW/m^2 and the single entry ratio of carrier to uplink interference may be calculated:

$$
\begin{aligned}
W_w &= -78.0 \text{ dBW/m}^2 \\
W_I &= -95.5 \text{ dBW/m}^2 \\
\underline{\Delta G} &= \underline{27.0 \text{ dB}} \\
C/I &= 44.5 \text{ dB}
\end{aligned}
$$

2.1.2 SINGLE ENTRY DOWNLINK INTERFERENCE

As indicated above, it will be assumed that the EIRP levels of the interfering and interfered-with satellites are the same; that is $E_i = E_w$. Then the single entry ratio of carrier to downlink interference is given by:

$$E_w = E_w$$
$$E_t = E_w$$
$$\underline{\Delta G = 19.0 \text{ dB}}$$
$$C/I_d = 19.0 \text{ dB}$$

This calculation was performed for a receive antenna 1.0 meter in diameter with a gain of 40.5 dB and with sidelobe performance conforming to a 29-25 log Θ characteristic. It should be noted that if the sidelobe performance conformed to a 32-25 log Θ characteristic, then C/I_d would equal 16.0 dB.

2.1.3 TOTAL SINGLE ENTRY CARRIER-TO-INTERFERENCE RATIO, C/I_{TOTAL}

$C/I_{total} = C/I_u \oplus C/I_d$

For 29-25 log Θ sidelobe performance $C/I_{total} = 44.5 \oplus 19.0 = 19.0$ dB

For 32-25 log Θ sidelobe performance $C/I_{total} = 44.5 \oplus 16.0 = 16.0$ dB

The 2° Spacing Advisory Committee of the FCC has recommended a protection ratio of a single entry C/I of 22.0 dB for interference into television. It can therefore be seen that the shortfall for 29-25 log Θ sidelobe performance is 3 dB and 6 dB for 32-25 log Θ sidelobe performance.

It should be noted that the above calculations have assumed that SBS-4 would be operated in the CONUS mode. Publicly available references, such as the Communications Desk Reference Series for North American Ku-Band Satellites, indicate an alternate mode of operation of SBS-4 in which there would be downlink spot beam coverage. Satellite EIRP for the east spot beam would range from 50.5 dBW to 52.5 dBW. In such a spot beam mode of operation C/I_{total}

$$= 44.5 \oplus 13.5$$
$$= 13.5 \text{ dB}$$

for 29-25 log Θ sidelobe performance. For 32-25 log Θ sidelobe performance $C/I_{total} = 44.5 \oplus 10.5 = 10.5$ dB. The single entry protection ratio shortfalls would be 8.5 dB and 11.5 dB for 29-25 log Θ and 32-25 log Θ sidelobe performance respectively.

2.2 INTERFERENCE INTO 768 KBPS DIGITAL DATA

2.2.1 SINGLE ENTRY UPLINK INTERFERENCE

As indicated above in Section 2.1.1, Video Carrier #3 is transmitted to SBS-4 by an uplink antenna 2.4 meters in diameter with a transmit gain of 48.5 dB. The power level into the antenna is 19.0 dBW, resulting in an uplink earth station EIRP level of 67.5 dBW and a corresponding Flux Density of -95.5 dBW/m^2. For the wanted 768 kBps digital data carrier under consideration here, the uplink earth station EIRP and Flux Density (W_w) are 50.3 dBW and -112.7 dBW/m^2 respectively. The parameters of the 768 kBps digital data carrier are:

Modulation	:	QPSK
Coding Rate	:	½
Noise Bandwidth	:	768 kHz

For such a digital data carrier offset by 1 MHz from the center of the interfering video carrier, the interfering power would be 17 dB down from saturation level that is -95.5 - 17 = -112.5 dBW/m^2 in a 100 kHz bandwidth and -103.7 dBW/m^2 in the 768 kHz bandwidth of the data channel. The single entry ratio of carrier to uplink interference is then given by:

W_w	=	-112.7 dBW/m^2
W_I	=	-103.7 dBW/m^2
ΔG	=	27.0 dB
C/I_u	=	18.0 dB

2.2.2 SINGLE ENTRY DOWNLINK INTERFERENCE

The desired or interfered-with 768 kBps digital data carrier is received by an antenna 1.8 meters in diameter with gain of 45.5 dB. E_w = 26.3 dBW. The EIRP of Video Carrier #3 equals 47.0 dBW. Therefore, for a 1 MHz frequency offset between the interfering video and the interfered-with data carrier, interference would be 17 dB below saturation (47 - 17 = 30 dBW) in a 100 kHz bandwidth and 38.9 dBW in the 768 kHz bandwidth of the data channel. C/I_d is given by:

$$
\begin{aligned}
E_w &= 26.3 \text{ dBW} \\
E_i &= 38.9 \text{ dBW} \\
\underline{\Delta G} &= \underline{24.0 \text{ dB}} \\
C/I_d &= 11.4 \text{ dB}
\end{aligned}
$$

2.2.3 TOTAL SINGLE ENTRY CARRIER-TO-INTERFERENCE RATIO, C/I_{TOTAL}

$$C/I_{total} = C/I_u \oplus C/I_d = 18.0 \oplus 11.4 = 10.5 \text{ dB}$$

The question of the appropriate protection ratio for interference into digital data channels has been addressed by the Advisory Committee for the Implementation of Reduced Orbital Spacings Between United States Domestic Fixed Satellites to The Federal Communications Commission (FCC 2°

Spacing Advisory Committee). The Phase One Report of that committee recommended that for SCPC digital data carriers of the type being considered here, the protection ratio be EB/I_o = 20 dB. For the modulation parameters of this interfered-with 768 kBps data channel, the protection ratio $C/I = EB/I_o = 20$ dB. That is, interference from video on SBS-4 at 83° West Longitude into 768 kBps digital data carriers on K-1 would result in a shortfall of 9.5 dB from the protection ratio established by the FCC's 2° Spacing Advisory Committee.

2.2.4 VIDEO SPECTRAL MASKS

It should be noted that the video spectral mask employed in the calculation of adjacent satellite into the 768 kBps channel is a mask developed by the scientists and engineers at the David Sarnoff Research Center. This mask was developed specifically to represent the spectrum of Ku-Band, as opposed to C-Band video transmissions. This mask is shown in Figure 1. Also shown in Figure 1 is the video spectral mask recommended for interference analysis by the FCC's 2° Spacing Advisory Committee. GE Americom has contended that the Advisory Committee's recommended mask is appropriate for C-Band transmissions. If GE Americom had elected to use the Advisory Committee's spectral mask, the calculated values of interference into the 768 kBps channel would have been 4 dB worse (C/I_{total} = 6.5 dB) and the protection ratio shortfall would be 13.5 dB.

3.0 CONCLUSION

The analyses presented in this document have demonstrated that excessive and harmful interference into GE Americom's satellite systems will result from the location and operation of SBS-4 at 83° West Longitude.

SUMMARY TABLE

INTERFERENCE FROM SBS-4 AT 83° WEST LONGITUDE INTO GE AMERICOM'S K-1 SATELLITE AT 85° WEST LONGITUDE AND INTO GE AMERICOM'S K-2 SATELLITE AT 81° WEST LONGITUDE

INTERFERING TRAFFIC: VIDEO (CARRIER #3 IN HUGHES' ANALYSIS)

K-1

#	Interfered-With Carrier	Protection Ratio (dB)	Single-Entry Carrier-To-Interference Ratio [(C/I_{SE})] (dB)	Margin (+) Or Shortfall (-) With Respect To Protection Ratio dB)
1.	Television (1 Meter Antenna, 29-25 Log Θ Sidelobe, SBS-4 in CONUS Mode)	22.0	19.0	-3.0
2.	Television (1 Meter Antenna, 32-25 Log Θ Sidelobe, SBS-4 in CONUS Mode)	22.0	16.0	-6.0
3.	Television (1 Meter Antenna, 29-25 Log Θ Sidelobe, SBS-4 in Spot Beam Mode)	22.0	13.5	-8.5
4.	Television (1 Meter Antenna, 32-25 Log Θ Sidelobe, SBS-4 in Spot Beam Mode)	22.0	10.5	-11.5
5.	56 kBps Digital Data (SBS-4 in CONUS Mode)	20.0	10.8	-9.2
6.	768 kBps Digital Data (SBS-4 in CONUS Mode)	20.0	10.6	-9.5
7.	T1 (1.544 MBps) Digital Data (SBS-4 in CONUS Mode)	20.0	11.1	-8.9

SUMMARY TABLE (Continued)

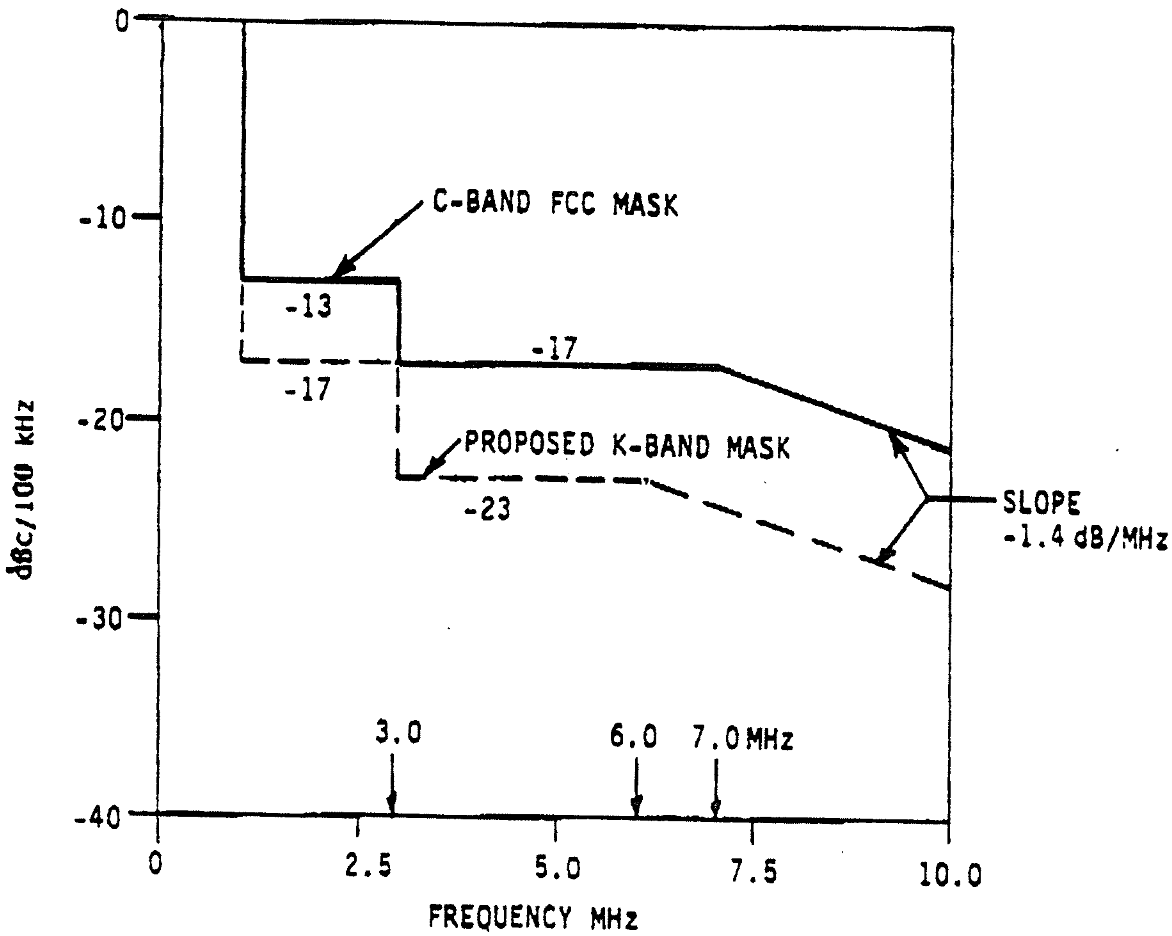
INTERFERENCE FROM SBS-4 AT 83° WEST LONGITUDE INTO GE AMERICOM'S K-1 SATELLITE AT 85° WEST LONGITUDE AND INTO GE AMERICOM'S K-2 SATELLITE AT 81° WEST LONGITUDE

INTERFERING TRAFFIC: VIDEO (CARRIER #3 IN HUGHES' ANALYSIS)

K-2

#	Interfered-With Carrier	Protection Ratio (dB)	Single-Entry Carrier-To-Interference Ratio [(C/I_{SB})] (dB)	Margin (+) Or Shortfall (-) With Respect To Protection Ratio dB)
1.	56 kBps Digital Data (SBS-4 in CONUS Mode)	20.0	16.3	-3.7
2.	256 kBps Digital Data (SBS-4 in CONUS Mode)	20.0	15.1	-4.9

FIG. 1 - SPECTRAL MASKS FOR INTERFERENCE ANALYSIS



Certificate of Service

I hereby certify that in the matter of Satellite Transponder Leasing Corporation Application for Interim Assignment of the SBS-4 Domestic Fixed Satellite, copies of the foregoing Petition to Deny of GE American Communications, Inc. was served by first-class mail, postage prepaid, on this 21st day of February, 1992, upon:

Gary Epstein, Esquire
James Rogers, Esquire
John Janka, Esquire
LATHAM & WATKINS
1001 Pennsylvania Avenue, N.W.
Suite 1300 South
Washington, D.C. 20004-2505

Wanda M. Latta (signature)

Wanda M. Latta

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TECHNICAL APPENDIX

SBS-4 Interference Analysis at 83° West Longitude

Introduction

STLC has evaluated the potential for adjacent satellite interference for its proposed move of SBS-4 to 83° W. Longitude. At this location it lies between G.E.'s K-1 and K-2 satellites. SBS-4 has 10 horizontally polarized Ku Band transponders with 43 MHz bandwidth and average saturated EIRP across Conus as shown in Table 1. Table 1 also compares the EIRP of the K-1 and K-2 satellites.

GE, ATT and Primestar filed petitions to deny STLC's proposed move for "technical" reasons based on erroneous analyses of potential adjacent satellite interference. The following analysis focuses on video interference into video since that is the main concern of GE & Primestar. ATT has only one transponder of interest which is discussed later.

Interference Calculations

Table 1 shows that the saturated EIRP for SBS-4 is in almost all cases less on SBS-4 than on K-1 or K-2 and by one to two dB over most of the country. Thus the statement of Primestar that their K-1 satellite has less EIRP than SBS-4 is incorrect. GE also made incorrect references to SBS-4's EIRP levels. For reference SBS-4 has 20 watt transponders as opposed to 45 watts for GE's K-1/K-2. While the SBS-4 antenna design is better it is not likely to be over 3 dB better as claimed by GE and Primestar. Data, as shown on Table 1, indicates that SBS-4 averages over 1.0 dB less than K-1/K-2.

TABLE 1

Average Saturation EIRP	SBS-4	Primestar K-1*	ATT K-2*
Washington, D.C.	46.5	46.6	47.2
Los Angeles	44.6	47.1	45.7
Chicago	45.0	45.4	46.6
Miami	41.6	41.7	43.4
Seattle	41.6	45.3	44.4

*Values obtained from GE marketing brochure

The required receive antenna sidelobe performance for 2° satellite spacing is 29-25 log Ø. Ø corresponds to the spacing between the two adjacent satellites as viewed from the earth station. Table 2 below shows the topographical angle for a satellite at 83° WL with adjacent satellites 2° away. Since Ø is about 2.2° (avg.), the antenna sidelobe performance for a 2° adjacent satellite is 20.4 dB, not 21.5 dB.

TABLE 2

TOPOGRAPHICAL ANGLE	
Washington, D. C.	2.25°
Los Angeles	2.21°
Chicago	2.24°
Miami	2.31°
Seattle	2.15°

SINGLE ENTRY UPLINK INTERFERENCE

Using the same Saturation Flux Density numbers as GE and a very conservative transmit antenna 2.4 m in diameter with a gain of 48.5 dBi, but accounting for the topographical separation, the single entry uplink interference is given by:

$$W_w = -78.0 \text{ dBW/m}^2$$
$$W_I = -95.5 \text{ dBW/m}^2$$
$$\Delta G = 28.1 \text{ dB}$$

$$C/I_u = 45.6 \text{ dB}$$

SINGLE ENTRY DOWNLINK INTERFERENCE

Assuming equal EIRP levels for the interfering and interfered-with satellites and a receive antenna 1.0 m in diameter with a gain of 40.5 dB, the single entry downlink interference is given by:

$$E_w = E_I$$
$$E_I = E_I$$
$$\Delta G = 20.1 \text{ dB}$$

$$C/I_d = 20.1 \text{ dB}$$

TOTAL SINGLE ENTRY CARRIER-TO-INTERFERENCE RATIO

$C/I_{total} = C/I_u + C/I_d = 45.6 + 20.1 = 20.1$ dB

It should be noted that due to the disparate interference power levels, the total C/I is effectively the downlink C/I_d.

ANALYSIS

The above C/I_d calculations were made for a 1.0 meter receive dish. Table 3, however, shows the data for dish sizes ranging from 0.75 to 1.8 meters.

TABLE 3

Selected Ku-Band Receive Antenna Characteristics

Antenna Diameter	.75	.9	1.0	1.2	1.8	(m)
Gain	37.1	39.5	40.5	42.1	45.6	(dBi)
C/I_d	16.7	19.1	20.1	21.7	25.2	(dB)
First null (12GHz)	3.1°	2.6°	2.3°	2.0°	1.3°	

This table is important because it shows that if the receive antennas are too small (i.e. less than .9 meters) there is almost no way to effectively coordinate co-frequency, adjacent, satellites of equivalent EIRP. Taken to an extreme, if a customer chose to use 0.2 meter dishes it would effectively eliminate co-frequency service in satellites 4 or more degrees away. This is the reason WARC and the FCC use 9° spacing for the BSS band. If high power into small dishes is required, spacing in excess of 2° is required. Conversely the FCC's policy of 2° spacing implies that the ground antennas should be greater than 1.0 meters. This is the dish size where the first antenna null is about 2.3° (which is also the average topographical angle with 2° spacing). Below this size the adjacent satellite lies in the main lobe of the receive antenna, not the sidelobe.

Table 3 also shows that for adjacent satellites of equivalent power, the minimum size receive antenna to achieve approximately 22 dB C/I is about 1.2 meters.

As to the actual facts in the case of STLC's possible interference into K-1/K-2, the analysis shows that for Primestar dishes of 1.0 m and larger, it would still be possible to coordinate video transmissions.

For example:

1) Antenna gain for 1.0 m dish = 40.5 dBi

2) Sidelobe gain for 1.0 m dish (2.2°) = 20.4 dBi

3) For satellites of equivalent EIRP and co-frequency
C/I = 20.1 dB (desired = 22 dB)

SBS-4 on average has 1.4 to 4 dB less EIRP than K-1/K-2 so the expected C/I would increase to 21.5 to 24.1 dB. In the event that SBS-4's co-frequency C/I did go below 22 dB, the center frequency of the SBS-4 transponders video can easily be shifted plus or minus 5 MHz to increase the isolation by up to 3 dB. This can be seen on Figure 1, which is a comparison of the horizontal transponders of SBS-4 and K-1/K-2. It is easily seen that none of the transponders are exactly aligned. Thus the available C/I protection to the Primestar dishes is 24.5 to 27.1 dB. This is well above the required 22 dB. STLC's opinion is that this is just routine coordination which can easily be accomplished.

ATT's data services on the vertical polarization on K-2 can be eliminated from the analysis since SBS-4 is only horizontally polarized. ATT has one horizontal transponder for data services on K-2. The frequencies of ATT's horizontal transponder on K-2 range from 12115.0 to 12169.0 MHz. The center frequencies of transponders 9 and 10 on SBS-4 are 12117.0 and 12166.0 MHz, respectively. The video frequencies on SBS-4 can be offset by up to 8 MHz. Data assigned $\pm$ 3.5 MHz away from a 2° adjacent satellite's video center frequency will not experience any degradation in service. By offsetting the video center frequencies on SBS-4 transponders 9 and 10 (in the range of 12109.0-12111.5 MHz on 9 and from 12172.5-12174.0 MHz on 10), SBS-4 will not cause interference to ATT's data services.

In addition, while the envelope of the sidelobe interfering power is described by a familiar equation [$P_I = 29 - 25 \log \emptyset$ (dB)], in actual practice the first null for a 1.0 m receive antenna occurs at about 2.3° or very close to the topographic separation angle in Table 2. Thus, the actual interfering power into the 1.0 (or 1.2) meter dishes will be considerably less than shown by the analysis. This is demonstrated every day by the ability of operators to coordinate adjacent services (where there is a will to do so) in spite of analytical results which say there will be a problem.

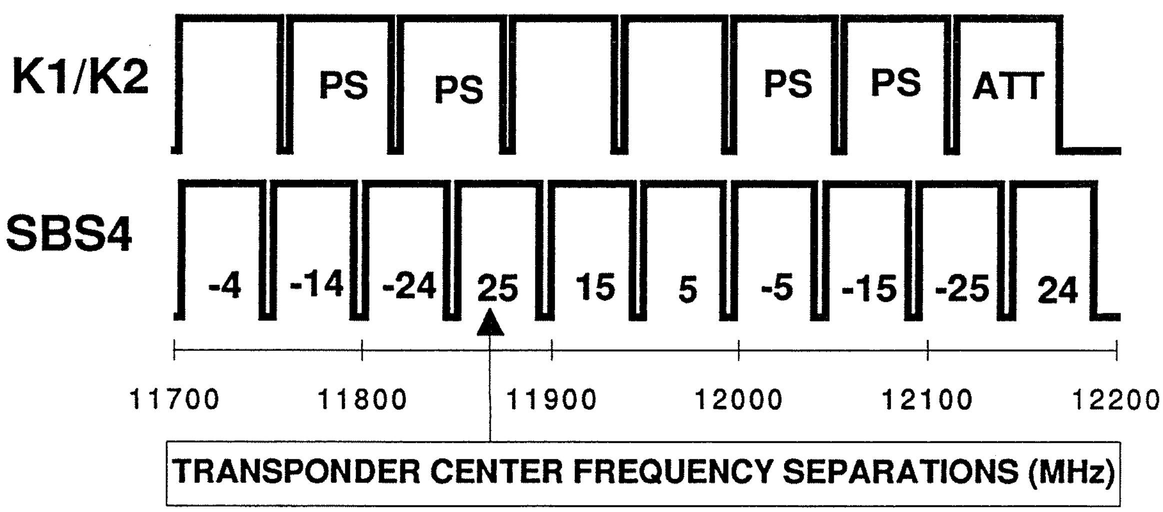

Figure 1. Frequency Plans for K1/K2 and SBS4

ENGINEERING CERTIFICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in the petition along with the Appendix and that it is complete and accurate to the best of my knowledge.

Dated this 9th day of April, 1992

By: [signature]

Bernard F. Vecerek, PhD
Manager, Systems Engineering
Hughes Communications Galaxy, Inc.

CERTIFICATE OF SERVICE

I, Camille D. Alexander, hereby certify that on this 15th day of April, 1992, copies of the foregoing "OPPOSITION OF SATELLITE TRANSPONDER LEASING CORPORATION" were mailed, postage prepaid, or delivered by hand to the following:

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