

6. REGULATORY QUALIFICATIONS

6.1 LEGAL QUALIFICATIONS

HCI's legal qualifications are a matter of record before the Commission, and HCI will provide any additional information regarding its legal qualifications that the Commission may require.

6.2 COMPLIANCE WITH INTELSAT ARTICLE XIV

HCI recognizes that the SpaceCast™ system may be subject to consultation requirements under Article XIV of the INTELSAT Agreement and will provide appropriate information to facilitate any such consultations.

6.3 NON-COMMON CARRIER STATUS

To the extent that HCI provides SpaceCast™ service directly to end users, HCI intends to operate the majority of the SpaceCast™ capacity on a non-broadcast, non-common carrier basis, in substantially the same manner that DBS and DTH service is provided today by other service providers. To the extent that HCI sells or leases SpaceCast™ capacity to its customers for their own transmissions, HCI will do so on an individualized basis and will not hold itself out to serve the public indiscriminately. In accordance with the Commission's DISCO I Report and Order, 11 FCC Rcd. 2429, 2436 (1996), and Section 25.114(c)(14), HCI elects to offer the entire capacity of the SpaceCast™ system on a non-common carrier basis.

THIS PAGE INTENTIONALLY LEFT BLANK

Milestone Schedule

7. MILESTONE SCHEDULE

HCI proposes to implement the SpaceCast™ system according to the following plan. The dates by which the following goals are scheduled to be achieved are as follows.

Table 7-1. SpaceCast™ Major Milestones

Milestone	Milestone Completion (Months After Authority to Proceed)
Commence construction of first satellite	ATP + 12
Construction of first satellite complete	ATP + 44
First satellite launch	ATP + 45
First satellite in service	ATP + 48
Subsequent satellites	Every 6 months thereafter

THIS PAGE INTENTIONALLY LEFT BLANK

System Cost

8. PROJECTED SYSTEM COST

Table 8-1 provides the estimated capital investment and first year operating expenses for SpaceCast™. The capital expenditure for space and ground segments is projected to be \$1.635 billion, which includes the construction cost of the satellite and the respective launch vehicle service, launch insurance, and associated ground equipment costs. Satellite costs are derived estimates from the manufacturer, Hughes Space and Communications Company, a unit of Hughes Electronics Corporation. The costs of the launch vehicle and other associated items are based on industry practice. The ground segment costs are based on projected costs for modification of existing Network Operation Control Centers and TT&C Earth stations. Customer equipment costs are not included as part of that equipment cost.

Table 8-1. SpaceCast™ Investment

Capital Expenditures	\$M
• Spacecraft (6), launch and insurance	\$1,545
• Satellite Control	45
• Network Operations & Control	20
• Customer Equipment Development	25
	<hr/>
	\$1635
First year operating cost	45
Total	\$1680

THIS PAGE INTENTIONALLY LEFT BLANK

9. FINANCIAL QUALIFICATIONS

Hughes Communications Inc. is an indirect wholly-owned subsidiary of Hughes Electronics Corporation (HE), a large aerospace, electronics manufacturing, and satellite communications company. HE, in turn, is an affiliate of General Motors Corporation (GM). As demonstrated in Appendix D, containing the consolidated financial statements of HE, HE has sufficient current assets to fund the construction, launch, and first-year operating costs of the SpaceCast™ satellite system.

THIS PAGE INTENTIONALLY LEFT BLANK

10. ENGINEERING CERTIFICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's Rules, that I have either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge and belief.

By:



Daniel P. Sullivan, Ph.D.

Vice President, Engineering

Hughes Communications, Inc.

September 24, 1997

THIS PAGE INTENTIONALLY LEFT BLANK

11. WAIVER AND CERTIFICATIONS

In accordance with Section 304 of the Communications Act of 1934, as amended, 47 U.S.C. 304, HCI hereby 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.

HCI certifies that neither the Applicant nor any of its shareholders, nor any of its officers or directors, nor any party to this application is subject to a denial of Federal benefits pursuant to authority granted in Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. § 862.

The undersigned certifies individually and for HCI that all of the statements made in this Application are true, complete, and accurate to the best of his information, belief and knowledge, and are made in good faith.

Respectfully submitted,

Hughes Communications, Inc.

By:



Gerald F. Farrell

President

September 24, 1997

THIS PAGE INTENTIONALLY LEFT BLANK

12. CONCLUSION

For the reasons set forth in this Application, HCI respectfully requests that the Commission promptly grants this application to enable HCI to bring to the public the significant benefits described above at the earliest possible time.

Respectfully submitted,

Hughes Communications, Inc.

By:



Jerald F. Farrell

President

September 24, 1997

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A
Transmission Characteristics

APPENDIX A: TRANSMISSION CHARACTERISTICS

SpaceCast™ link budget information is provided in Tables A-1 thru A-6. The RF communication links include the following: V-band, Ku-band, satellite telemetry, and satellite command. Uplinking sites will use 2.5 meter terminals (V-band and Ku-band). Dual band receive terminals (V-band and Ku-band) will be 1 meter (39 inches). User terminals as small as 45 cm (18 inches) can also be used for receive only service at a lower data rate. The satellite ground stations use 7-meter antennas for telemetry and command.

In all cases, the link budget calculations place the transmitting terminal of interest at the satellite antenna beam edge. All cases show a positive margin at the indicated availability values.

The V-band link budgets are given in Tables A-1-a and b and A-3-a and b. Table A-1-a contains the link for a 1 meter receive terminal, and Table A-1-b contains the link for a 45 cm receive terminal. A New York City uplink to Boston downlink was picked as being representative of the links that SpaceCast™ will provide. In both cases, a 2.5 meter uplink terminal with a 50 Watt HPA can generate an uplink EIRP of 73.0 dBW under clear conditions and 75.5 dBW under rain conditions. The satellite EIRP per carrier is 62.0 dBW. The link margin of 0.0 dB (or 0.1 dB) for clear-sky uplink and rainy downlink conditions indicates that the specified link availability objective can be met; the same is true for all link budgets presented in this Appendix. Budgets for a Tokyo uplink to Honolulu ground relay and on to Seattle are provided in Tables A-3-a and b. The link budgets show 10 carriers uplinked from a 2.5 meter ground terminal. Both Tokyo and Honolulu uplink

EIRPs per carrier are 63.0 and 65.5 dBW (50 Watt HPA) under clear and rain conditions, respectively. The satellite EIRP per carrier is 62.0 dBW.

Ku-band link budgets are given in Tables A-2, A-4-a, and A-4-b using $1^\circ \times 3^\circ$ beams. A Miami uplink to New York City downlink was picked as being representative of the links that SpaceCast™ will provide at Ku-band. A 2.5 meter terminal with a 100 Watt HPA is used to provide an uplink EIRP of 67.5 dBW under clear conditions and 68.5 dBW under rain conditions. The satellite EIRP per carrier is 54.7 dBW. A Singapore uplink to Midway ground relay and further on to Seattle downlink also was picked. Singapore uplink EIRPs per carrier are 67.5 and 68.5 dBW (100 Watt HPA) under clear and rain conditions, respectively. Midway uses a 50 Watt HPA and provides uplink EIRPs per carrier of 64.5 and 65.5 dBW under clear and rain conditions, respectively. The satellite EIRP per carrier is 54.7 dBW.

Tables A-5 and A-6 contain information regarding the satellite telemetry & command links. Dry geographical regions are selected along with favorable elevation angles for the satellite operational control facilities to provide high reliability TT&C links. The telemetry and command links will use Ku-band frequencies for transfer orbit and on-station service.

Table A-1-a. V-Band Link: New York U/L to Boston D/L - 1 m Receive Terminal

SUMMARY of Uplink Budget					SUMMARY of Downlink Budget				
Sat. Long. @ -60 deg East	Clear		Rain	Units	Terminal Location & Size:	Clear		Rain	Units
Terminal Location & Size:	New York	2.5		meter	Boston	1.00			meter
Site Elevation Angle	40.8			deg	Site Elevation Angle	39.8			deg
Site Altitude (ASL)	0.0			km	Site Altitude (ASL)	0.0			km
Frequency	48.7			GHz	Frequency	41.0			GHz
Link Availability			99.70	%	Link Availability			98.80	%
Application Data Rate	155			Mbps	Link Data Rate	155			Mbps
Station Transmitter Power	50.0			W	Satellite TWTA Rating	100			W
Transmitter Pwr (dBW)	17.0			dBW	Sat. Transmit Power	20.0			dBW
Uplink Power Back-off	2.5		0	dB	Sat. HPA Backoff	2.0			dB
# of Amplified Carriers	1				# of Amplified Carriers	10			
Station Transmitter Losses	1.0			dB	Transmitter Total losses	1			dB
Station Antenna Diameter	2.50			m	Sat. Min. Ant. Gain	55.0			dBi
Station Peak Antenna Gain	59.5			dBi	Total EIRP per beam	72.0			dBW
Total EIRP per beam		73.0	75.5		Operating EIRP/carrier		62.0	62.0	dBW
Operating EIRP per carrier		73.0	75.5	dBW	Space Loss		216.2	216.2	dB
Space Loss		217.7	217.7	dB	Atm. (Gas + Cloud) Attenuation		2.6	2.8	dB
Atm. (Gas + Cloud) Att.		4.6	4.8	dB	Rain Attenuation			3.4	dB
Rain Attenuation			14.7	dB	User Ant. Pointing Losses		0.5	0.5	dB
Pointing and Pol. Loss		0.5	0.5	dB	Recvr. Antenna Gain				dBi
Sat. Antenna Gain	55.0			dBi	System Noise Temp	448.1		581.8	'K
System Noise Temp	649.2			'K	System Noise Temp	26.5		27.6	dBK
System Noise Temp	28.1			dBK	Station G/T		23.8	22.6	dB/K
Satellite G/T		26.4	26.4	dB/K	Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz
Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz	Noise BW		83.0	83.0	dBHz
Noise BW		83.0	83.0	dBHz	C/N (Thermal)		12.0	7.3	dB
C/N (Thermal)		22.2	9.8	dB	Uplink Conditions	clear	rain	clear	
Total U/L C/I	15.0			dB	Downlink Conditions	clear	clear	rain	
U/L C/I(o)		98.0	98.0	dB/Hz	U/L C/I(No) (dB/Hz)	105.2	92.8	105.2	dB/Hz
Thermal U/L C/I(No)		105.2	92.8	dB/Hz	U/L C/I(o) (dB/Hz)	98.0	98.0	98.0	dB/Hz
Total D/L C/I	15.0			dB	U/L C/I(No+Io) (dB/Hz)	97.2	91.7	97.2	dB/Hz
D/L C/I(o)		98.0	98.0	dB/Hz	D/L C/I(No) (dB/Hz)	95.0	95.0	90.3	dB/Hz
Thermal D/L C/I(No)		95.0	90.3	dB/Hz	D/L C/I(o) (dB/Hz)	98.0	98.0	98.0	dB/Hz
Required Eb/No	6.5			dB	D/L C/I(No+Io) (dB/Hz)	93.2	93.2	89.6	dB/Hz
Effective Data Rate	174			Mbps	Total C/I(No+Io) (dB/Hz)	91.8	89.4	88.9	dB/Hz
Data Rate (dB)	32.4			dB (bps)	Required C/No (dB/Hz)	88.9	88.9	88.9	dB/Hz
Required C/I(No+Io)		88.9	88.9	dB/Hz	Margin (dB)	2.9	0.5	0.0	dB

Table A-1-b. V-Band Link: New York U/L to Boston D/L - 0.45 m Receive Terminal

SUMMARY of Uplink Budget					SUMMARY of Downlink Budget				
Sat. Long. @ -60 deg East	Clear		Rain	Units	Terminal Location & Size:	Clear		Rain	Units
Terminal Location & Size:	New York	2.5		meter	Boston	0.45			meter
Site Elevation Angle	40.8			deg	Site Elevation Angle	39.8			deg
Site Altitude (ASL)	0.0			km	Site Altitude (ASL)	0.0			km
Frequency	48.7			GHz	Frequency	41.0			GHz
Link Availability			99.70	%	Link Availability			98.60	%
Application Data Rate	26			Mbps	Link Data Rate	26			Mbps
Station Transmitter Power	50.0			W	Satellite TWTA Rating	100			W
Transmitter Pwr (dBW)	17.0			dBW	Sat. Transmit Power	20.0			dBW
Uplink Power Back-off	2.5		0	dB	Sat. HPA Backoff	2.0			dB
# of Amplified Carriers	1				# of Amplified Carriers	10			
Station Transmitter Losses	1.0			dB	Transmitter Total losses	1			dB
Station Antenna Diameter	2.50			m	Sat. Min. Ant. Gain	55.0			dBi
Station Peak Antenna Gain	59.5			dBi	Total EIRP per beam	72.0			dBW
Total EIRP per beam		73.0	75.5		Operating EIRP/carrier		62.0	62.0	dBW
Operating EIRP per carrier		73.0	75.5	dBW	Space Loss		216.2	216.2	dB
Space Loss		217.7	217.7	dB	Atm. (Gas + Cloud) Attenuation		2.6	2.8	dB
Atm. (Gas + Cloud) Att.		4.6	4.8	dB	Rain Attenuation			2.9	dB
Rain Attenuation			14.7	dB	User Ant. Pointing Losses		0.5	0.5	dB
Pointing and Pol. Loss		0.5	0.5	dB	Recvr. Antenna Gain				dBi
Sat. Antenna Gain	55.0			dBi	System Noise Temp	448.1		568.9	'K
System Noise Temp	649.2			'K	System Noise Temp	26.5		27.6	dBK
System Noise Temp	28.1			dBK	Station G/T		16.8	15.8	dB/K
Satellite G/T		26.4	26.4	dB/K	Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz
Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz	Noise BW		75.3	75.3	dBHz
Noise BW		75.3	75.3	dBHz	C/N (Thermal)		12.8	8.7	dB
C/N (Thermal)		29.9	17.5	dB	Uplink Conditions	clear	rain	clear	
Total U/L C/I	15.0			dB	Downlink Conditions	clear	clear	rain	
U/L C/I(o)		90.3	90.3	dB/Hz	U/L C/I(No) (dB/Hz)	105.2	92.8	105.2	dB/Hz
Thermal U/L C/I(No)		105.2	92.8	dB/Hz	U/L C/I(o) (dB/Hz)	90.3	90.3	90.3	dB/Hz
Total D/L C/I	13.4			dB	U/L C/I(No+Io) (dB/Hz)	90.1	88.4	90.1	dB/Hz
D/L C/I(o)		88.7	88.7	dB/Hz	D/L C/I(No) (dB/Hz)	87.0	85.2	82.9	dB/Hz
Thermal D/L C/I(No)		88.1	84.0	dB/Hz	D/L C/I(o) (dB/Hz)	88.7	88.7	88.7	dB/Hz
Required Eb/No	6.5			dB	D/L C/I(No+Io) (dB/Hz)	84.8	83.6	81.9	dB/Hz
Effective Data Rate	30			Mbps	Total C/I(No+Io) (dB/Hz)	83.7	82.4	81.3	dB/Hz
Data Rate (dB)	74.7			dB (bps)	Required C/No (dB/Hz)	81.2	81.2	81.2	dB/Hz
Required C/I(No+Io)		81.2	81.2	dB/Hz	Margin (dB)	2.4	1.1	0.1	dB

Table A-2. Ku-Band Link: Miami U/L to New York D/L - 1 m Receive Terminal

SUMMARY of Uplink Budget					SUMMARY of Downlink Budget				
Sat. Long. @ -60 deg East	Clear	Rain	Units		Clear	Rain	Units		
Terminal Location & Size:	Miami	2.5	meter		Terminal Location & Size:	New York	1.00	meter	
Site Elevation Angle	52.4		deg		Site Elevation Angle	40.8		deg	
Site Altitude (ASL)	0.0		km		Site Altitude (ASL)	0.0		km	
Frequency	13.0		GHz		Frequency	11.0		GHz	
Link Availability		99.70	%		Link Availability		99.70	%	
Application Data Rate	155		Mbps		Link Data Rate	155		Mbps	
Station Transmitter Power	100.0		W		Satellite TWTA Rating	150		W	
Transmitter Pwr (dBW)	20.0		dBW		Sat. Transmit Power	21.8		dBW	
Uplink Power Back-off	1.0	0	dB		Sat. HPA Backoff	0.0		dB	
# of Amplified Carriers	1				# of Amplified Carriers	1			
Station Transmitter Losses	0.3		dB		Transmitter Total losses	0.6		dB	
Station Antenna Diameter	2.50		m		Sat Min. Ant. Gain	33.5		dB	
Station Peak Antenna Gain	48.8		dB		Total EIRP per beam	54.7		dBW	
Total EIRP per beam		67.5	68.5		Operating EIRP/carrier		54.7	54.7	dBW
Operating EIRP per carrier		67.5	68.5	dBW	Space Loss		204.8	204.8	dB
Space Loss		206.1	206.1	dB	Atm. (Gas + Cloud) Attenuation		0.2	0.2	dB
Atm. (Gas + Cloud) Att.		0.3	0.3	dB	Rain Attenuation			0.9	dB
Rain Attenuation				dB	User Ant. Pointing Losses		0.4	0.4	dB
Pointing and Pol. Loss		0.4	0.4	dB	Recv. Antenna Gain		39.4		dB
Sat. Antenna Gain		33.5		dB	System Noise Temp		91.6	137.7	K
System Noise Temp		365.1		K	System Noise Temp		19.6	21.4	dBK
System Noise Temp		25.6		dBK	Station G/T		19.4	17.7	dB/K
Satellite G/T		7.4	7.4	dB/K	Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz
Boltzmann's Constant		-228.6	-228.6	dBW/K-Hz	Noise BW		83.0	83.0	dBHz
Noise BW		83.0	83.0	dBHz	C/N (Thermal)		14.3	11.6	dB
C/N (Thermal)		13.7	10.8	dB					
Uplink Conditions					clear	rain	clear		
Downlink Conditions					clear	clear	rain		
Total U/L C/I	14.1			dB	U/L C/(No) (dB/Hz)	96.7	93.8	96.7	dB/Hz
U/L C/(Io)		97.1	97.1	dB/Hz	U/L C/(Io) (dB/Hz)	97.1	97.1	97.1	dB/Hz
Thermal U/L C/(No)		96.7	93.8	dB/Hz	U/L C/(No+Io) (dB/Hz)	93.9	92.1	93.9	dB/Hz
Total D/L C/I	10.4			dB	D/L C/(No) (dB/Hz)	97.3	97.3	94.6	dB/Hz
D/L C/(Io)		93.4	93.4	dB/Hz	D/L C/(Io) (dB/Hz)	93.4	93.4	93.4	dB/Hz
Thermal D/L C/(No)		97.3	94.6	dB/Hz	D/L C/(No+Io) (dB/Hz)	91.9	91.9	90.9	dB/Hz
Required Eb/No		6.5		dB	Total C/(No+Io) (dB/Hz)	89.8	89.0	89.2	dB/Hz
Effective Data Rate		174		Mbps	Required C/No (dB/Hz)	88.9	88.9	88.9	dB/Hz
Data Rate (dB)		82.4		dB (bps)					
Required C/(No+Io)		88.9	88.9	dB/Hz	Margin (dB)	0.9	0.1	0.2	dB