Europe and Scandinavia; 41° E.L. serving Africa, Turkey, and the Arabian Peninsula; 48° E.L. serving Eastern Europe; 54° E.L. serving Western Russia; 101° E.L. serving Iran and the Indian subcontinent; 125° E.L. serving China; 149° E.L. serving Indonesia, the Philippines, and Southeast Asia; 164° E.L. serving Japan, Korea, and Taiwan; and 67° W.L. serving Central and South Americas. As noted, the number and position of the orbital locations requested are essential to allow the operation of a completely interconnected worldwide system. HCG is requesting 15 orbital locations in order to provide Ka band FSS and Ku band BSS services to the regions listed above while remaining compatible with the current BSS plan. If the BSS plan were to change, HCG would be willing to change the number of orbital positions requested as long as service delivery into all of the regions would not be compromised.

1. <u>Orbital Assignment Policies</u>

As a general rule, the Commission initially awards international FSS satellite system applicants a limited number of orbital positions in a given frequency band. This policy does not apply when an applicant proposes to provide international service to widely separated regions that cannot be adequately served from a single orbital location. In this application, HCG seeks the assignment of sufficient orbital locations to provide quality service to practically all of the world's inhabited areas.

Since the BSS portion of the proposed GALAXY/SPACEWAY™ system is a "non-standard" system without an orbital position allocation in the current BSS plan, it is required that the system will not interfere with the planned and existing BSS systems by any more than the degree permitted under current ITU radio regulations. To determine the degree of interference introduced by the proposed system, the Spectrum Orbit Utilization Program (SOUP) was utilized using the ITU database for BSS systems. Because the determination of

Overall Equivalent Protection Margin (OEPM) is different between Region 2 and Regions 1 & 3, two different versions of the SOUP program were used to determine the degree of interference in these regions. A summary of the results of the SOUP analysis can be found in APPENDIX B.

HCG's focus in selecting geosynchronous orbital positions for the proposed worldwide BSS service has been on the following areas: Western Europe and Scandinavia, Eastern Europe, Africa, and Turkey and the Arabian Peninsula, Western Russia, India, and Pakistan and Iran, China, South East Asia, and Philippines and Indonesia, Japan, Korea and Taiwan, Australia, and New Zealand and Papua New Guinea, and Central and South America.

In addition to the Ku band BSS service, the proposed satellites will provide Ka band FSS service, which requires the orbital position selection also ensure that undue interference is not introduced into existing Ka band services. The satellites dedicated to North American coverage will provide only Ka band services due to the existing Ku band BSS service provided by DIRECTV™.

2. Geosynchronous Orbital Location Selection for Region 2

In contrast to the Regions 1 & 3 BSS plan, the Region 2 BSS plan is not characterized by regular orbital location spacing as shown by the arrows to the right of the longitude line in Figures G-1 and G-2. The result is that the Region 2 allocations have the appearance of irregular scattering over the interval of interest. Consequently, suitable geosynchronous orbital locations for the designated service areas must be sought within the constraints established by the current plan allocation and the orbital constraints set by the Radio Regulations.

Since the proposed service area extends from Mexico through the entirety of South America, visibility considerations lead to the conclusion that the proposed service orbital location must be restricted to the region between 28° W.L. and 110° W.L. Within the arc of visibility, there are few gaps that would permit a new satellite to be introduced having the desired service area, except for two candidates: 49° W.L. and 67° W.L.

Figue G-1 GALAXY/SPACEWAY™ Ka Band (left of line) and Planned/Existing Ku Band BSS (right of line) Orbital Positions in Region 2

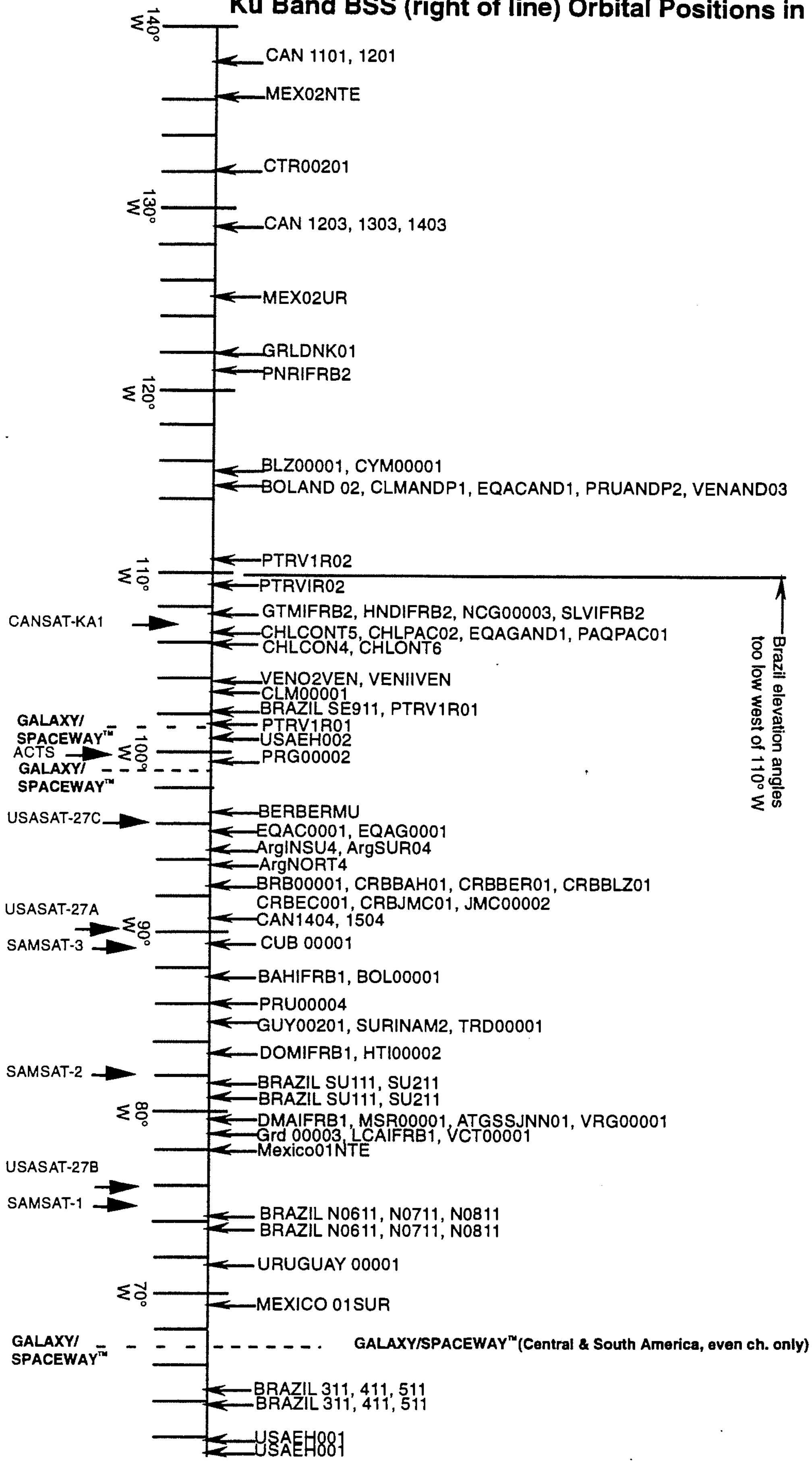


Figure G-1 (cont'd)

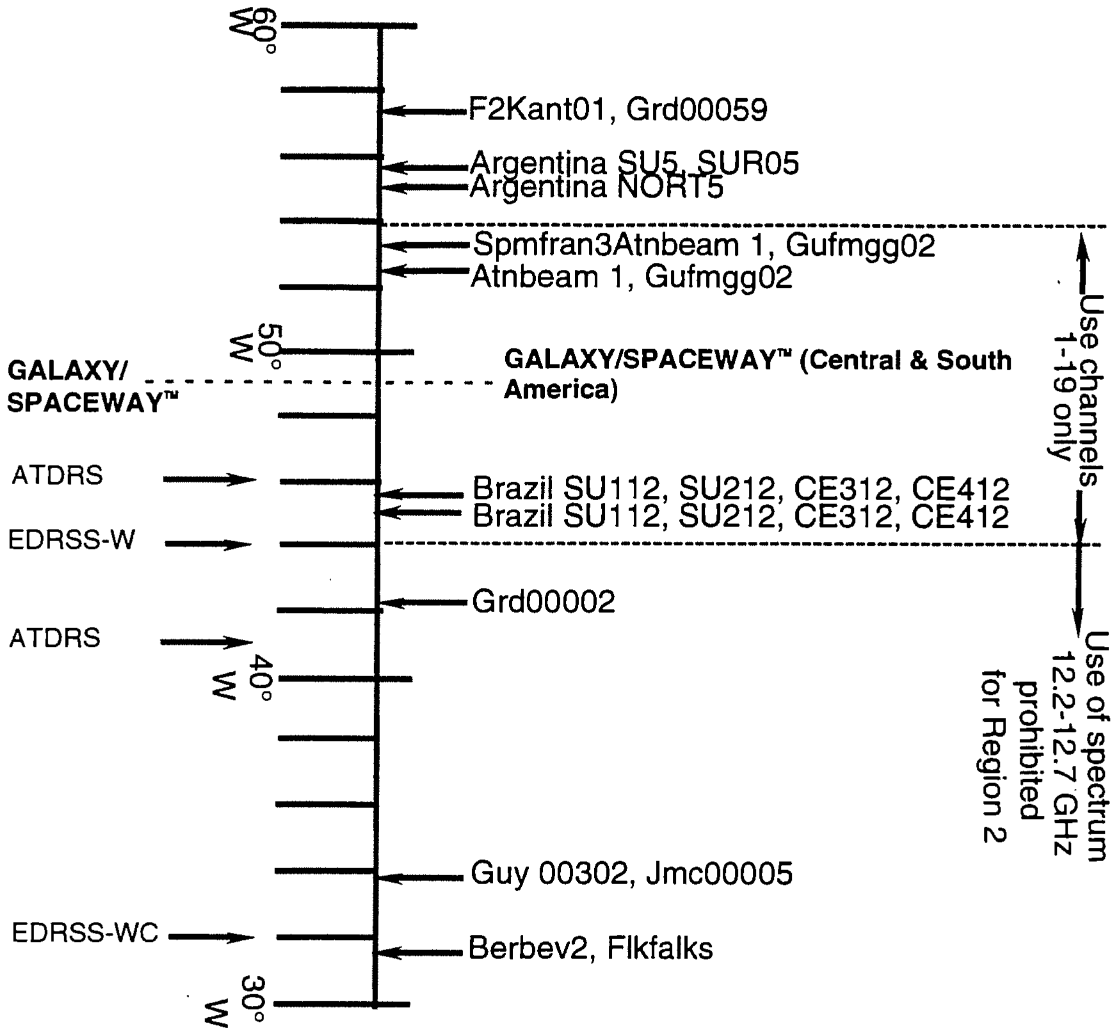


Figure G-2 GALAXY/SPACEWAY™ Ka Band (left of line) and Planned/Existing Ku Band BSS (right of line) Orbital Positions in Region 1 and 3

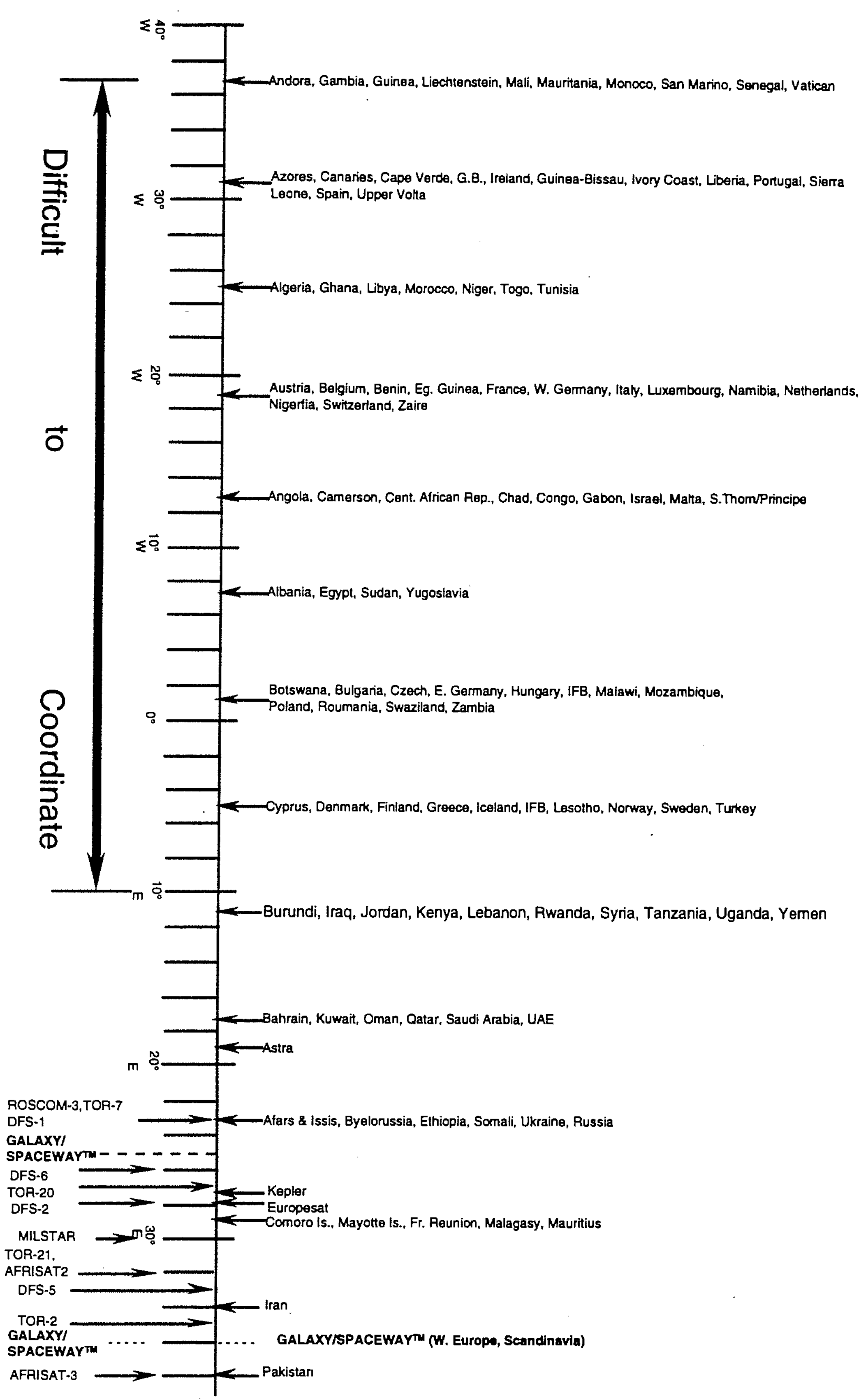


Figure G-2 (cont'd)

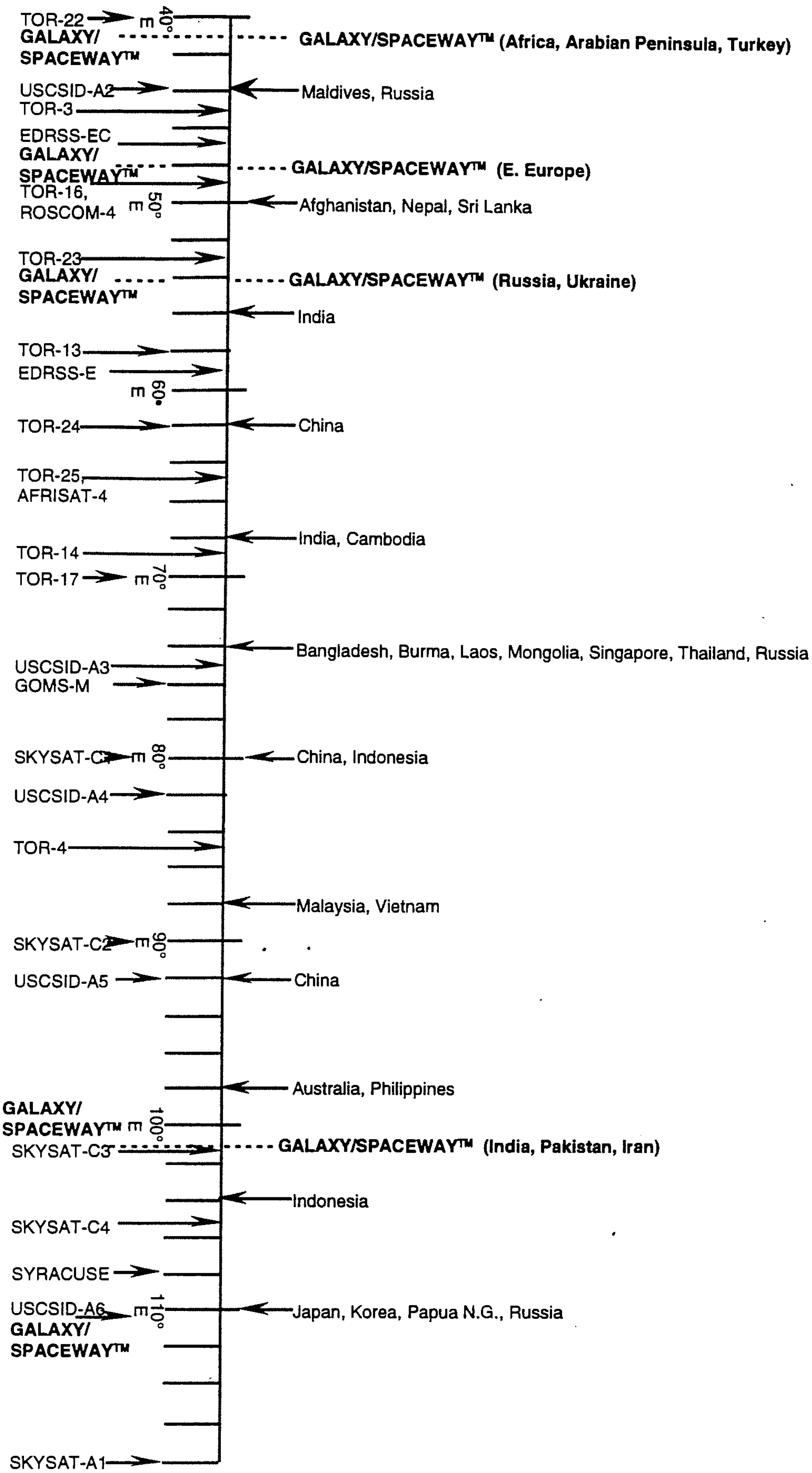
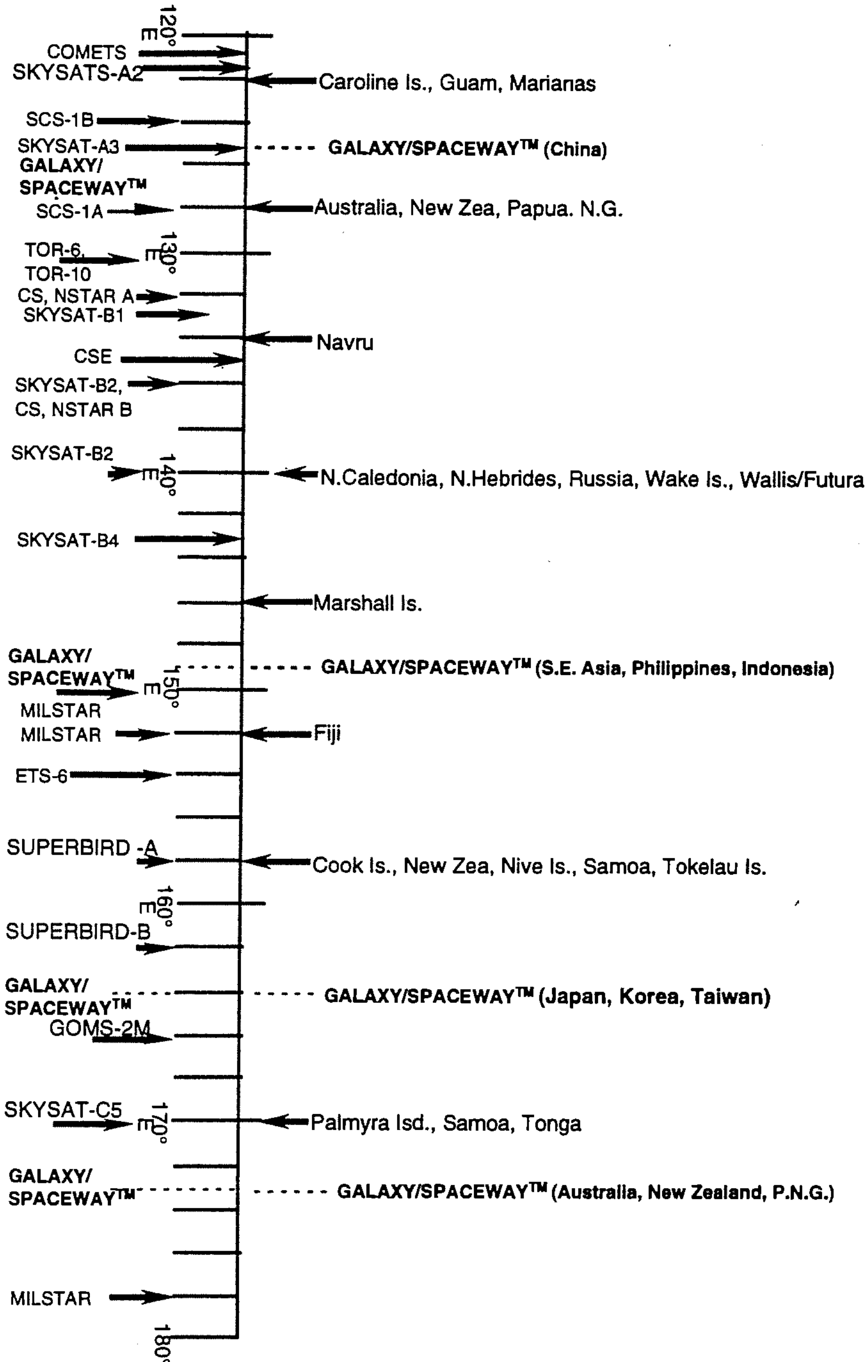


Figure G-2 (cont'd)



(a) Consideration of the 49° W.L. and 67° W.L. Positions

The 49° W.L. orbital location was determined from the Orbital Constraints set by the Radio Regulations [Annex 7, AP30 (Orb-85)-275]. Any BSS satellite serving Region 2 that involves an orbital position different from that prescribed by the Region 2 plan cannot occupy an orbital position any further east than 44° W.L. The region 54° W.L. < orbit < 44° W.L. is constrained in spectrum use to the frequency band 12.2 to 12.5 GHz (which corresponds to Channels 1 thru 19). The gap which occurs at 49° W.L. can be used to obtain the desired Latin America coverage by excluding the 12.5 to 12.7 GHz frequency band.

The orbital position for the Central and South American satellites could be moved further westward if it were not for the Ka band FSS service plan to provide inter-regional service to Western Europe. The 49° W.L. position is essentially the only location, within two degrees, where both Western Europe and the eastern United States can be served along with Central America (including all of Mexico) and South America. The elevation angles in Europe in the range of 10° to 25° are low, but acceptable for critical international traffic. The ability of GALAXY/SPACEWAY™ to meet the trans-Atlantic demand for ubiquitous service hinges on the use of the 49° W.L. position.

The 67° W.L. orbital location was determined from the Ku band BSS Orbital Constraints interference considerations set by the Radio Regulations [Annex 1, AP 30 (Orb-85) -202]. It is 4.5° east of URG0001 and 3° west of BRAZIL311, 411, and 511. However, the 67° W.L. position is 2° east of the MEX01SUR beam and the antenna sidelobe interferes with this Mexico beam. However, since the MEX01SUR beam only uses the odd channels (1,3,..,31), the 67° W.L. location can be used to obtain the desired Latin America coverage by using the even-numbered channels for Ku band BSS.

The two geosynchronous positions noted above were evaluated to determine the maximum EIRP that can be tolerated on the downlink without degrading the OEPM for any planned beam by more than 0.25 dB. The results of this evaluation are summarized in Table G-1 and G-2 below.

Table G-1 GALAXY/SPACEWAY™ BSS Beams for 49° W.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Mexico	55
Central America	55
South America (North)	51
South America (Central)	55
South America (South)	55

Table G-2 GALAXY/SPACEWAY™ BSS Beams for 67° W.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Bermuda	55
Caribbean	53
Mexico	55
South America (North)	54.5
South America (Central)	55
South America (South)	53.5
Central America	55

Since the EIRP of the proposed new BSS service would be in the range of 50-55 dBW, it is seen that in no case would any planned BSS beam experience a degradation in OEPM by more than 0.25 dB. Only in the South America (North) beam at 49° W.L., the

Caribbean beam at 67° W.L. and the South America (South) beam at 67° W.L. will the EIRP need to be restricted to a value less than 55 dBW (51, 53 and 53.5 dBW respectively).

(b) <u>Consideration of the 101° W.L. and 99° W.L. Positions (Ka Band Only)</u>

The requested 101° W.L. orbital location presents a number of technical advantages, such as fifty state U.S. coverage and minimization of rain outages. This location provides a minimum elevation angle at the U.S. east coast of about 27° and a minimum elevation angle at Hawaii of about 17°. It also provides service to Alaska with a minimum elevation angle of approximately 8°. High elevation angles on the east coast are required to overcome the greater rain attenuation in this region. This high elevation angle will also allow customer, on-site antennas to clear obstructions without expensive antenna towers, an especially critical feature as the GALAXY/SPACEWAY™ terminals will be mass marketed for general consumer use.

HCGs' projected service demands require an additional 1000 MHz of Ka band spectrum in the North American region beyond that requested at 101° W.L. HCG has not proposed to seek that additional spectrum at 101° W.L., but is seeking the 99° W.L. location instead. The 99° W.L. location is important because it affords the benefits of the 101° W.L. location including excellent coverage of Canada. In addition, because HCG already operates the Galaxy IV(H) C and Ku band satellite at 99° W.L., HCG would be able to achieve economies in stationkeeping. Because coverage of Canada is more technically demanding in terms of elevation angles than coverage of the U.S., HCG has determined that the acceptable range for these two satellites would be from 97° to 103° W.L. As a result, HCG requests 101°

W.L. and 99° W.L. as the optimal orbital locations for GALAXY/SPACEWAY™ North American services.

3. Geosynchronous Orbital Location Selection for Regions 1 & 3

Figures G-2 shows the existing BSS plan orbital allocations (arrows to the right of the longitude line) for Regions 1 & 3. The orbital allocations for Regions 1 & 3 are spaced in regular 6° intervals (with three exceptions) over the arc serving these regions. The three non-planned BSS Systems are: Astra at 19.2° E.L., Kepler at 28.5° E.L., and Europesat at 29° E.L. The Ka band orbital positions (arrows to the left of the longitude line) that have been filed for over the arc from 27° E.L. to 180° E.L. are also shown.

Over the arc from 37° W.L. to 10° E.L., a new BSS system must be introduced either coincident or within 1° to the east of the BSS planned orbital positions. This constraint means that to avoid undue interference those channels which are used by the BSS planned allocations can not be used by the GALAXY/SPACEWAY™ system. Consequently, the arc from 37° W.L. to 10° E.L. is highly undesirable because it is rigidly constrained and offers little opportunity for any further use of the BSS spectrum.

The existing BSS plan employs easterly-looking beams exclusively so the assigned satellite orbital positions always lie to the west of the assigned service area. (The only exception to this pattern is found in the non-standard BSS satellites serving Europe: Astra at 19.2° E.L., Kepler at 28.5° E.L., and Europesat at 29° E.L.). Consequently, it is possible to identify geosynchronous orbital positions lying to the east of the desired service area employing westerly-looking beams that will exhibit little or no impact on the existing allocations when a proposed beam is introduced. This is exactly the same approval that has been followed by ASTRA, Kepler, & Europesat in placing their BSS European service.

(a) <u>Consideration of the 36° E.L., 41° E, 48° E.L., 54° E.L., 101° E.L., 125° E.L., 149° E.L., 164° E.L., and 173° E.L. Positions</u>

In the arc between 13° E.L. and 35° E.L. it is virtually impossible to introduce another European BSS satellite without unduly affecting one of the three non-Plan BSS systems described above. This consideration led to the adoption of the 36° E.L. position as the most promising for the Western Europe & Scandinavia BSS service. The results from the modified SOUP program for this position has shown that the interference levels introduced by the Western Europe & Scandinavia beams at 55 dBW are acceptable.

All other candidate orbital positions were also evaluated with the modified SOUP program to determine the maximum EIRP that can be tolerated on the downlink without degrading the OEPM for any planned or existing beam by more than 0.25 dB. The BSS service areas to be served by the GALAXY/SPACEWAY™ system in ITU Regions 1 & 3 are indicated in Tables G-3 to G-11, along with the corresponding geosynchronous orbital locations selected to serve those areas. In all cases, the selected orbital locations lie to the east of their respective service areas, and employ westerly looking beams allowing GALAXY/SPACEWAY™ system to utilize peak on-axis EIRPs in the range of 50 - 55 dBW without generating any undue interference with beams found in the current BSS plan.

Table G-3 GALAXY/SPACEWAY™ BSS Beams for 36° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Western Europe	55
Scandinavia	55

Table G-4 GALAXY/SPACEWAY™ BSS Beams for 41° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
North West Africa	55
North East Africa	55
West Central Africa	55
East Central Africa	55
South Africa	55
Arabian Peninsula	55
Turkey	55

Table G-5 GALAXY/SPACEWAY™ BSS Beams for 48° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Eastern Europe	55

Table G-6 GALAXY/SPACEWAY™ BSS Beams for 54° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Western Russia	55
Ukraine	55

Table G-7 GALAXY/SPACEWAY™ BSS Beams for 101° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
India	55
Pakistan	55
Iran	55

Table G-8 GALAXY/SPACEWAY™ BSS Beams for 125° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
West China	55
East China	55
North China	55

Table G-9 GALAXY/SPACEWAY™ BSS Beams for 149° E.L. Orbital Position

Beams	Maximum Allowable EIRP
Thailand, Laos, Cambodia, and	55
Indonesia/Singapore	55
Philippines	55

Table G-10 GALAXY/SPACEWAY™ BSS Beams for 164° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
Japan	54.5
Korea	55
Taiwan	55

Table G-11 GALAXY/SPACEWAY™ BSS Beams for 173° E.L. Orbital Position

Beams	Maximum Allowable EIRP (dBW)
West Australia	55
East Australia	55
New Zealand	55
Papua New Guinea	55

Since the EIRP of the proposed new BSS service would be in the range of 50-55 dBW, it is seen that in no case would any planned BSS beam experience a degradation in OEPM by more than 0.25 dB. Only in the Japan beam at 164° E.L. will the EIRP need to be restricted to 54.5 dBW.

(b) Consideration of the 25° E.L. Position (Ka band only)

Coverage of all of Europe and Africa from the 25° E.L. position is very important from a technical standpoint. The performance at this position is optimal because most of the population would be served with elevation angles greater than 25°, with the worst case being 15° in the northern portions of Scandinavia. Relocation of the satellite to the east by more than 2° would be detrimental to service in northern locations. Africa is nearly centered in the footprint. There, elevation angles will range from 40° at the tips of South Africa and Tunisia, to 90° for the sub-satellite point, in Zaire. High elevation angles are important in southern and central Africa, which tend to be tropical with heavy rainfall. Finally, the western limit of the satellite position is set by the ability to serve India, deemed to be an important area of affinity with Europe and Africa. Elevation angles in this tropical country range from a low of 12° in the eastern part to 32° in the west. Movement to the west by more than 2° would eliminate much of the eastern part of India and therefore is undesirable.

(c) Consideration of the 110° E.L. Position (Ka band only)

The 110° E.L. position is optimal for the Asia-Pacific region. A satellite could be relocated within a larger band of approximately 10° without seriously impacting coverage at the extremities. However, when one examines the coverage requirements, it is clear that any significant movement of the position will exclude some users and their markets. The western limit is set by service to New Zealand and some Pacific islands, while the eastern limit is set by desired connectivity to the Middle East and Eastern Europe. The northern locations in Asiatic Russia and Japan are also very sensitive to relocation of the satellite longitude. Therefore, the acceptable range for this region is 112° to 108° E.L.

(d) Additional Consideration of the 173° E.L. Position

The Ka band service function of the 173° E.L. position is to offer single-hop connectivity between the west coast of the U.S. and the Pacific Rim. This orbital position is in a very narrowband that is popular among international satellite operators such as INTELSAT and Inmarsat. However, access to 173° E.L., or a position in very close proximity to it, is viewed as critical to the success of this particular satellite.

4. Availability of Preferred Locations

Based on HCGs' review of the ITU's Space Network List dated June 7, 1994, Ka band systems have been identified that are within 2° of the proposed orbital locations for the GALAXY/SPACEWAY™ network. Those systems are listed below.

DFS-1 at 23.5° E.L. and DFS-6 at 26° E.L. are located 1.5° and 1°, respectively, from the proposed 25° E.L. position. TOR-2 at 35° E.L. is located 1° away from the proposed 36° E.L. position. TOR-22 at 40° E.L. is located 1° away from the proposed 41° E.L. position. EDRSS-EC at 47° E.L., ROSCOM-4 at 49° E.L., and TOR-16 at 49° E.L. are located 1° away from the proposed 48° E.L. position. TOR-23 at 53° E.L. located 1° away from the proposed 54° E,L. position. SKYSAT-C3 at 101.5° E.L. is located 0.5° away from the proposed 101° E.L. position. USCSID-A6 is located at the same orbital location as the proposed 110° E.L. position. SKYSAT-A3 at 124.7° E.L. is located 0.3° away and SCS-1B AT 124° E.L. is located 1° away from the proposed 125° E.L. position. EASTSAT is located at the same orbital position as the proposed 164° E.L. position. Coordination with these systems will be required.

NASA's Advanced Communications Technology ("ACTS") satellite is now located at 100.3° W.L. As the frequencies which HCG requests for its

GALAXY/SPACEWAY™ satellites (29.0 - 30.0 GHz uplink; 19.2 - 20.2 GHz downlink) overlap in part with the frequencies used and planned for use by ACTS, the potential exists for adjacent satellite interference if the GALAXY/SPACEWAY™ satellites are operated only 0.7 degrees away. HCG has begun to coordinate with NASA the proposed operation of GALAXY/SPACEWAY™ at 101° W.L. HCG anticipates that operation of GALAXY/SPACEWAY™ will commence after completion of ACTS program operations in 1998. If the GALAXY/SPACEWAY™ North American satellites are launched while ACTS is still in operation, HCG will take such steps as are necessary to avoid unacceptable interference into ACTS during any interval of simultaneous operations.

5. Miscellaneous and Alternatives

The requested orbital locations are critical to the feasibility of the GALAXY/SPACEWAY™ global network. Due to the service and connectivity requirements, assignment flexibility is generally limited to within 2° of each Ka band only requested location. However, to be non-interfering with the present BSS plan, there is no flexibility in orbital assignments for the Ku band BSS requested locations.

Each GALAXY/SPACEWAY™ satellite will be capable of orbital relocations during its lifetime, in order to accommodate possible orbital reassignments by the Commission. Propellant is provided for one orbital shift at one degree per day. Any such shifts, however, would cause severe disruptions in GALAXY/SPACEWAY™ services and as set forth above, would affect the ability of the system to function as designed. The ground network associated with each satellite is expected to consist of hundreds of thousands of terminals. These earth stations would have to be repointed in case of a change in orbital location. This would result in a significant cost and disruption of service to GALAXY/SPACEWAY™ users.

In summary, based on HCG's considerable analysis, the assignment of each of the orbital locations requested is essential to allow the operation of a completely interconnected worldwide network of highly efficient geostationary FSS and BSS satellites.

ITEM H. Schedule

1. Contract Milestones

The dates by which the following matters are expected to be resolved are as follows:

a. Spacecraft RFP issued – no RFP will be used to procure construction of the spacecraft.
b. Spacecraft contractor selected – Hughes Space and Communications Company, a unit of Hughes Electronics Corporation, has already been selected as the contractor.
c. Spacecraft contract executed – appropriate authorizations executed within ninety days after grant of construction permit by the FCC.
d. Launch service contract executed – within eighteen months after grant of authorization from the FCC.

2. Spacecraft Milestones

HCG proposes to implement the GALAXY/SPACEWAY™ global system according to the plan indicated in Figure H-1. The dates by which the following goals are scheduled to be achieved areas follows:

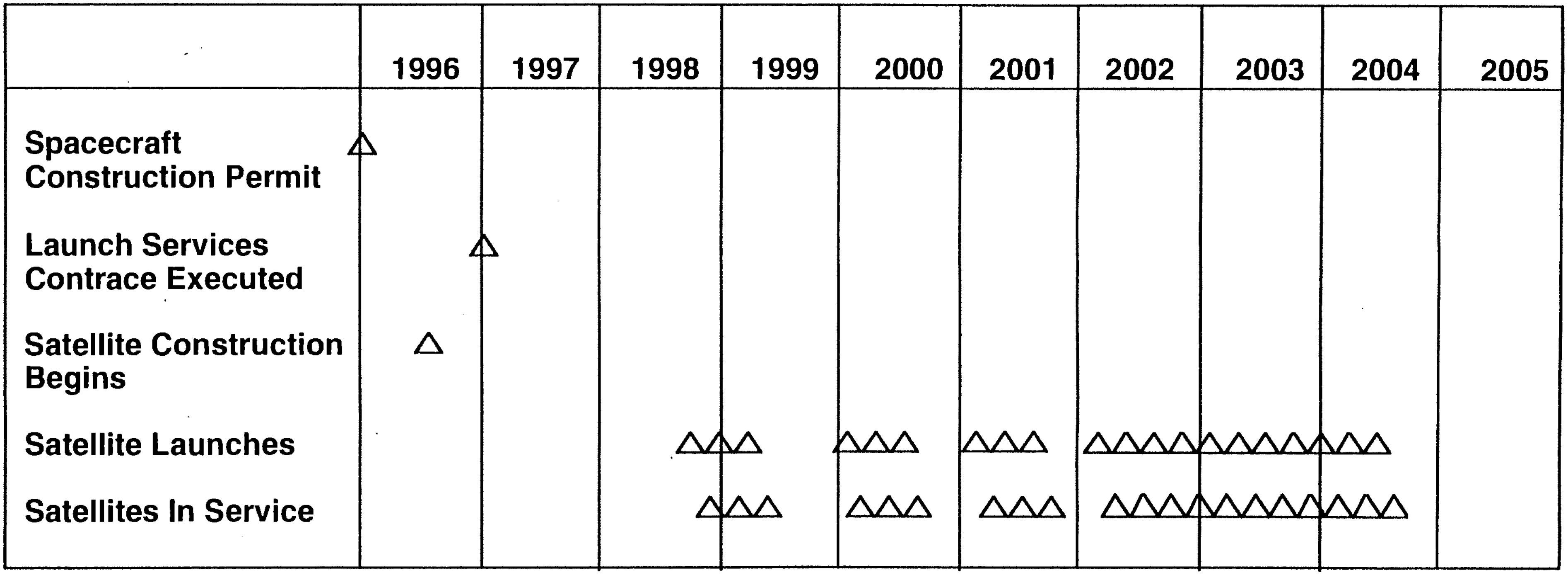
a. Construction of the first spacecraft begins within one hundred eighty days of the grant of the construction permit.

b. Construction of the first spacecraft expected to be completed within thirty-six months of commencement of construction and in no event later than forty-eight months after commencement.

c. Spacecraft launch within six months following the completion of construction.

d. Spacecraft in service within sixty days after respective launch.

Figure H-1 GALAXY/SPACEWAY™ Global System Schedule Milestones



ITEM I. System Costs

Table I-1 sets out in detail the estimated capital investment and annual operating costs for the twenty GALAXY/SPACEWAY™ satellites for a lifetime of 15 years. The total cost of the space and ground segments is projected to be $5.1 billion, which includes the construction cost of twenty spacecraft and the respective launch, launch vehicle service, launch insurance, associated ground equipment, and pre-operating expenses. The satellite costs are based on estimates from the manufacturer, the Hughes Space and Communications Company, a wholly-owned subsidiary of Hughes Aircraft Company (HAC). The costs of the launch vehicle and other associated items are based on current industry practice. The ground segment costs are based on projected costs for modifications to Hughes's OCC in El Segundo, and the Fillmore, Castle Rock, and Spring Creek TT&C earth stations and the construction of hubs to provide an interface with the terrestrial PSTN. Separate communication earth stations (end user terminals) are not part of this Application, and are not considered in the projected costs. HCG expects that there will be no satellite incentive payment for a successful launch.

Table I-1: GALAXY/SPACEWAY™ Investment and Operating Costs

Capital Expenditures ($M)		
Spacecraft (20), Launch, Insurance	$ 4,606.00	
Tracking, Telemetry & Control	482.00	
Total Capital Expenditures	$ 5,088.00	
Operating Expenses ($M)		
Annual Expense		
Year(s) Relative to Launch:	1	$188.00
	2	772.00
	3	1,417.00
	4	2,163.00
	5	2,647.00
	6	3,127.00
	7	3,624.00
	8	4,144.00
	9	4,519.00
	10	4,833.00
	11	5,143.00
	12	5,471.00
	13	5,939.00
	14	6,421.00
	15	6,788.00

Operating costs include the costs associated with the OCC, TT&C, general and administrative costs, on-orbit insurance and marketing. Nominal annual inflation is included in the estimation of operating costs. Pre-operating expenses during the construction period are estimated to be $83 million.

ITEM J. Financial Qualifications

1. Source of Funds

As set forth above, the GALAXY/SPACEWAY™ network is a global, integrated, hybrid FSS/BSS satellite system that will operate in geostationary orbit. At each assigned orbital location, the GALAXY/SPACEWAY™ network will provide regional service as well as provide interconnection to the other parts of the system at different orbital locations. Thus, this system includes components of three different satellite services that the Commission now licenses: domestic FSS, international FSS, and BSS.

The Commission has adopted different financial qualification standards for each of these three services. For domestic FSS, the Commission requires a demonstration that the applicant has current assets and operating income sufficient to cover the construction, launch and first year of operation costs of the proposed system. See 47 CFR § 25.140(b)-(e). For international FSS, the Commission allows an applicant either to meet the domestic FSS standard or to make a two-stage financial showing, the first of which is the identification of possible financiers[6]. For BSS systems, the Commission historically has not required a prior demonstration of financial qualifications, but has relied instead on the applicant meeting strict due diligence milestones after the system is authorized. HGG clearly meets whatever test is applied here.

The estimated construction, launch and first year operating costs for the GALAXY/SPACEWAY™ network are set forth in Item I above. The financial resources available to HCG are evidenced by the many satellite systems that HCG and its affiliates have

[6] See Separate Systems Order, 101 F.C.C. 2d 1046 at ¶ 235 (1985).

launched and operated to date. More specifically, HCG, Inc. is a wholly-owned subsidiary of Hughes Communications, Inc. ("HCI"), which, in turn, is a wholly-owned subsidiary of Hughes Aircraft Company ("HAC"). HAC, in turn, is a wholly-owned subsidiary of Hughes Electronics Corporation ("HEC"). HEC, in turn, is a wholly owned subsidiary of General Motors Corporation. Exhibit J contains the consolidated 1994 financial statements of HEC, which demonstrate that it has more than sufficient current assets and operating income to fund the costs of this system. When HCG filed its July 1994 amendment to the SPACEWAY™ system, it attached as Exhibit J-2 a letter from the President of HCI that confirms the financial support of HCI and HEC for the GALAXY/SPACEWAY™ global network and describes other possible financing sources. The statements in that letter remain true and correct. Since total system costs for GALAXY/SPACEWAY™ have not increased since that July 1994 filing, that letter remains fully applicable. In addition to the financial support available to HCG as part of the General Motors organization, the HCG GALAXY/SPACEWAY™ global network will likely include strategic equity partners in various countries.

In sum, no matter what test is applied, HCG is financially qualified.

2. Revenues

HCG's estimate of revenues from GALAXY/SPACEWAY™ operations is set forth in Table J-1, below.

Table J-1: GALAXY/SPACEWAY™ Revenue Projections

Years Relative to Launch	Annual Revenue ($M)
1	101.00
2	534.00
3	1,333.00
4	2,568.00
5	4,073.00
6	5,831.00
7	7,797.00
8	9,922.00
9	11,873.00
10	13,522.00
11	14,865.00
12	15,978.00
13	17,177.00
14	18,503.00
15	19,467.00

Overall system revenue projections for the satellite demonstrate that the system will generate sufficient revenues to recover all the operating costs and depreciation. These projections also reflect what is required to achieve a rate of return appropriate for the risk that HCG faces, given the expected demand, market penetration and system capacity.

ITEM K. Legal Qualifications

The legal qualifications of HCG are demonstrated in its FCC Form 430 dated September 8, 1995, which is on file with the Commission.

ITEM L. Type of Operations

HCG proposes to sell and/or long term lease the capacity on the GALAXY/SPACEWAY™ satellites on a non-common carrier basis pursuant to the Commission's decisions in Domestic Fixed-Satellite Transponder Sales, 90 F.C.C.2d 1238 (1982), and Martin Marietta Communications Systems, 60 Rad. Reg. 2d (P&F) 779 (1986), based on specialized customer requirements.

HCG will also retain the flexibility to convey capacity to affiliated or non-affiliated entities for common carrier or resale use. Thus, although common carrier services may be offered to the public using capacity on the GALAXY/SPACEWAY™ satellites, they will not be offered by the applicant.

ITEM M. Compliance with INTELSAT Article XIV Obligations

As set forth above, HCG intends to use the GALAXY/SPACEWAY™ system to provide a wide range of services.

While current INTELSAT procedures assume that no economic harm will be caused to INTELSAT by any FSS system carrying traffic that is not interconnected to the public switched network, for traffic that is interconnected to the public switched network, INTELSAT now requires an economic coordination for any FSS separate system that will carry more than 8000 bearer circuits per satellite.

Current U.S. policy, however, calls for this limitation to be removed entirely by January 1997, well before GALAXY/SPACEWAY™ is expected to commence service. See e.g. Alpha Lyracom, DA 94-192 (released March 8, 1994). In any event, HCG acknowledges that the FSS side of GALAXY/SPACEWAY™ will need to be coordinated with INTELSAT.

The proposed international services will fully comply with the current INTELSAT Article XIV(d) coordination requirements. Technical coordination with INTELSAT under Article XIV(e) of the INTELSAT Agreement for the BSS service will also be conducted.

ITEM N. Public Interest Considerations

Grant of this Application will serve the public interest in several important respects. First, GALAXY/SPACEWAY™ represents a new and innovative way to use of portions of the Ka band that have been unused for commercial satellite services thus far. As evidenced by the current cut-off window for the filing of Ka band satellite applications, the Commission consistently has sought to encourage the vigorous development and use of the Ka band to "develop[ ] new markets and services". Norris Satellite Communications, 7 FCC Rcd 4289, 4290 (1992). GALAXY/SPACEWAY™ will spur the development of such new markets and services, both domestically and internationally.

Second, the GALAXY/SPACEWAY™ network will provide a new global telecommunications capability that will play a vital part of the rapidly expanding international telecommunications marketplace. Through GALAXY/SPACEWAY™ consumers and commercial end users will gain access to a range of worldwide communications services at affordable prices and virtually on demand. Many of these services, such as high speed data sharing and technical/medical imaging, will operate in a similar fashion to the Ka band experiments currently being conducted as part of NASA's ACTS program. The GALAXY/SPACEWAY™ global network will be an essential element in the creation of a Global Information Infrastructure.

Third, GALAXY/SPACEWAY's™ innovative design as a non-standard BSS system which does not interfere with the current BSS plan will make efficient use of a scarce resource, the Ku band spectrum. With GALAXY/SPACEWAY™, emerging BSS direct-to-home markets can be served on a regional or global basis. Furthermore, the dual payload design of GALAXY/SPACEWAY™ satellites creates a flexible platform to adapt to the needs of continually evolving satellite marketplace.

Fourth, the proposed system will significantly advance the state-of-the- art in satellite technology. Customers will be able to take advantage of Hughes' innovative technology, with features such as multibeam coverage, on-board satellite switching/processing, satellite interconnectivity, frequency cross strapping and steerable communications beams. These capabilities will allow customers to use small, inexpensive earth terminals to access a wide range of cost effective communications services. The system will dramatically reduce both transmission time and time required to gain access to satellite channels. In addition, the system will simplify video programming distribution, and permit customers to receive potentially hundreds of channels of local, regional or global DTH programming. The technological advancement of GALAXY/SPACEWAY™ will provide a platform of true "convergence" in the telecommunications marketplace.

Finally, the Commission should acknowledge that, as the architect and operator of GALAXY/SPACEWAY™, Hughes is an experienced, reliable, and financially sound satellite operator. Hughes' track record as an industry leader shows that it is well situated to maximize the potential for success of a new satellite system. Hughes is committed to the GALAXY/SPACEWAY™ vision, and will carry out the Commission's policy of ensuring that satellite authorizations are used to provide service promptly and effectively. Grant of this Application will provide the public with the long-term assurance it needs that satellite providers will be able to provide state-of-the-art, reliable satellite communication services and to compete effectively with other providers of telecommunication services into the next century.

All of these factors demonstrate that Hughes is legally, financially and technically qualified to operate the proposed SPACEWAY network and that grant of this application will serve the public interest, convenience and necessity.

In sum, no matter what test is applied, HCG is financially qualified.

2. Revenues

HCG's estimate of revenues from GALAXY/SPACEWAY™ operations is set forth in Table J-1, below.

Table J-1: GALAXY/SPACEWAY™ Revenue Projections

Years Relative to Launch	Annual Revenue ($M)
1	101.00
2	534.00
3	1,333.00
4	2,568.00
5	4,073.00
6	5,831.00
7	7,797.00
8	9,922.00
9	11,873.00
10	13,522.00
11	14,865.00
12	15,978.00
13	17,177.00
14	18,503.00
15	19,467.00

Overall system revenue projections for the satellite demonstrate that the system will generate sufficient revenues to recover all the operating costs and depreciation. These projections also reflect what is required to achieve a rate of return appropriate for the risk that HCG faces, given the expected demand, market penetration and system capacity.

ITEM K. Legal Qualifications

The legal qualifications of HCG are demonstrated in its FCC Form 430 dated September 8, 1995, which is on file with the Commission.

ITEM L. Type of Operations

HCG proposes to sell and/or long term lease the capacity on the GALAXY/SPACEWAY™ satellites on a non-common carrier basis pursuant to the Commission's decisions in Domestic Fixed-Satellite Transponder Sales, 90 F.C.C.2d 1238 (1982), and Martin Marietta Communications Systems, 60 Rad. Reg. 2d (P&F) 779 (1986), based on specialized customer requirements.

HCG will also retain the flexibility to convey capacity to affiliated or non-affiliated entities for common carrier or resale use. Thus, although common carrier services may be offered to the public using capacity on the GALAXY/SPACEWAY™ satellites, they will not be offered by the applicant.

ITEM M. Compliance with INTELSAT Article XIV Obligations

As set forth above, HCG intends to use the GALAXY/SPACEWAY™ system to provide a wide range of services.

While current INTELSAT procedures assume that no economic harm will be caused to INTELSAT by any FSS system carrying traffic that is not interconnected to the public switched network, for traffic that is interconnected to the public switched network, INTELSAT now requires an economic coordination for any FSS separate system that will carry more than 8000 bearer circuits per satellite.

Current U.S. policy, however, calls for this limitation to be removed entirely by January 1997, well before GALAXY/SPACEWAY™ is expected to commence service. See e.g. Alpha Lyracom, DA 94-192 (released March 8, 1994). In any event, HCG acknowledges that the FSS side of GALAXY/SPACEWAY™ will need to be coordinated with INTELSAT.

The proposed international services will fully comply with the current INTELSAT Article XIV(d) coordination requirements. Technical coordination with INTELSAT under Article XIV(e) of the INTELSAT Agreement for the BSS service will also be conducted.

ITEM N. Public Interest Considerations

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All of these factors demonstrate that Hughes is legally, financially and technically qualified to operate the proposed SPACEWAY network and that grant of this application will serve the public interest, convenience and necessity.

CONCLUSION

For the foregoing reasons, HCG respectfully requests that the Commission grant this Application.

Respectfully submitted,

HUGHES COMMUNICATIONS GALAXY, INC.

By: [signature]
Carl A. Brown
Senior Vice President

Date: 9/29/95

ANTI DRUG ABUSE ACT CERTIFICATION

HCG certifies that neither HCG, nor its parent company, Hughes Communications, Inc. ("HCI"), nor any of the officers or directors of HCG or HCI, is subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti Drug Abuse Act of 1988, 21 U.S.C. § 853a.

HUGHES COMMUNICATIONS GALAXY, INC.

By: [signature]
Carl A. Brown
Senior Vice President

Date: 7/29/95

CERTIFICATION AND SIGNATURE

HCG 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 construction and launch and operating authority in accordance with this Application. All statements made in the attached exhibits are a material part hereof, and are incorporated herein as if set out in full in this Application.

The undersigned certifies individually and for HCG that the statements made in this Application are true, complete, and correct to the best of his knowledge an belief, and are made in good faith.

HUGHES COMMUNICATIONS GALAXY, INC.

By: [signature]
Carl A. Brown
Senior Vice President

Date: 9/29/95

CERTIFICATION OF PERSON RESPONSIBLE

FOR PREPARING ENGINEERING

INFORMATION SUBMITTED IN THIS APPLICATION

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.

By: [signature]

Bernard F. Vecerek, Ph.D.
Director
Galaxy Satellite Services
Hughes Communications Galaxy, Inc.

Date: 9-29-95

APPENDIX A

GALAXY/SPACEWAY™

Service Parameters and Link Analysis

Table A-1

Ka Band FSS High Powered Spot Beam Two-way Service

Performance Parameters

Performance Requirement, BER	1×10^{-10}
Beam Bandwidth	120 MHz
Modulation	QPSK
Uplink Data Rate	384 kpbs
Uplink Channel Bandwidth	500 kHz
Required Uplink E_b/N_o	8.0 dB
Downlink Data Rate	92 Mbps
Downlink Channel Bandwidth	120 MHz
Required Downlink E_b/N_o	5.0 dB
Earth Station Diameter	26 inches
Earth Station Amplifier Power	0.5 W
Loss to Antenna Input	0.5 dB
Earth Station Receive System Noise Temperature	24.4 dBk

Uplink Budget - High Powered Narrow Spot Beams (2-way Service)
Table A-1.a

Peak of Coverage	Clear	Rain
transmit power	-9.7 dBW	-3.0 dBW
transmit losses	0.5 dB	0.5 dB
ground transmit gain	44.5 dB	44.5 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-50.9 dB/m^2	-50.9 dB/m^2
atmospheric loss	1.0 dB	1.0 dB
uplink rain loss	0.0 dB	8.8 dB
satellite G/T	18.9 dB/K	18.9 dB/K
bit rate	55.9 dB Hz	55.9 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	11.7 dB	9.7 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	20.9 dB	20.9 dB
adjacent system (west) Eb/I	20.9 dB	20.9 dB
total Eb/I	9.3 dB	8.0 dB

Uplink Budget - High Powered Narrow Spot Beams (2-way Service)
Table A-1.b

Edge of Coverage	Clear	Rain
transmit power	-4.7 dBW	-3.0 dBW
transmit losses	0.5 dB	0.5 dB
ground transmit gain	44.5 dB	44.5 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-50.9 dB/m^2	-50.9 dB/m2
atmospheric loss	1.0 dB	1.0 dB
uplink rain loss	0.0 dB	3.8 dB
satellite G/T	13.9 dB/K	13.9 dB/K
bit rate	55.9 dB Hz	55.9 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	11.7 dB	9.7 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	20.9 dB	20.9 dB
adjacent system (west) Eb/I	20.9 dB	20.9 dB
total Eb/I	9.3 dB	8.0 dB

Downlink Budget - High Powered Narrow Spot Beams (2-way Service)
Table A-1.c

Peak of Coverage	Clear	Rain
transmit power	13.0 dBW	13.0 dBW
transmit losses	0.5 dB	0.5 dB
satellite transmit gain	46.5 dB	46.5 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-47.3 dB/m^2	-47.3 dB/m^2
atmospheric loss	1.1 dB	1.1 dB
downlink rain loss	0.0 dB	7.6 dB
terminal G/T	18.6 dB/K	16.4 dB/K
bit rate	79.6 dB Hz	79.6 dB Hz
Boltzmann's constant	-228.60 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	15.8 dB	6.0 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	18.5 dB	18.5 dB
adjacent system (west) Eb/I	18.5 dB	18.5 dB
total Eb/I	10.5 dB	5.0 dB

Downlink Budget - High Powered Narrow Spot Beams (2-way Service)
Table A-1.d

Edge of Coverage	Clear	Rain
transmit power	13.0 dBW	13.0 dBW
transmit losses	0.5 dB	0.5 dB
satellite transmit gain	41.5 dB	41.5 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-47.3 dB/m^2	-47.3 dB/m^2
atmospheric loss	1.1 dB	1.1 dB
downlink rain loss	0.0 dB	2.6 dB
terminal G/T	18.6 dB/K	16.4 dB/K
bit rate	79.6 dB Hz	79.6 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	10.8 dB	6.0 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	18.5 dB	18.5 dB
adjacent system (west) Eb/I	18.5 dB	18.5 dB
total Eb/I	8.4 dB	5.0 dB

Uplink Budget - Wide Area Spot Beams (2-way Service)
Table A-2.a

Peak of Coverage	Clear	Rain
transmit power	-9.7 dBW	-3.0 dBW
transmit losses	0.5 dB	0.5 dB
ground transmit gain	53.3 dB	53.3 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-50.9 dB/m^2	-50.9 dB/m^2
atmospheric loss	1.0 dB	1.0 dB
uplink rain loss	0.0 dB	6.7 dB
satellite G/T	7.4 dB/K	7.4 dB/K
bit rate	55.9 dB Hz	55.9 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	9.1 dB	9.1 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	29.7 dB	29.7 dB
adjacent system (west) Eb/I	29.7 dB	29.7 dB
total Eb/I	8.0 dB	8.0 dB

Uplink Budget - Wide Area Spot Beams (2-way Service)
Table A-2.b

Edge of Coverage	Clear	Rain
transmit power	-4.7 dBW	-3.0 dBW
transmit losses	0.5 dB	0.5 dB
ground transmit gain	53.3 dB	53.3 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-50.9 dB/m^2	-50.9 dB/m^2
atmospheric loss	1.0 dB	1.0 dB
uplink rain loss	0.0 dB	1.7 dB
satellite G/T	2.4 dB/K	2.4 dB/K
bit rate	55.9 dB Hz	55.9 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	9.1 dB	9.1 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	29.7 dB	29.7 dB
adjacent system (west) Eb/I	29.7 dB	29.7 dB
total Eb/I	8.0 dB	8.0 dB

Downlink Budget - Wide Area Spot Beams (2-way Service)
Table A-2.c

Peak of Coverage	Clear	Rain
transmit power	17.8 dBW	17.8 dBW
transmit losses	0.5 dB	0.5 dB
satellite transmit gain	35.0 dB	35.0 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-47.3 dB/m^2	-47.3 dB/m^2
atmospheric loss	1.1 dB	1.1 dB
downlink rain loss	0.0 dB	10.1 dB
terminal G/T	27.4 dB/K	25.2 dB/K
bit rate	79.6 dB Hz	79.6 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	17.9 dB	5.7 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	22.8 dB	22.8 dB
adjacent system (west) Eb/I	22.8 dB	22.8 dB
total Eb/I	12.2 dB	5.0 dB

Downlink Budget - Wide Area Spot Beams (2-way Service)
Table A-2.d

Edge of Coverage	Clear	Rain
transmit power	17.8 dBW	17.8 dBW
transmit losses	0.5 dB	0.5 dB
satellite transmit gain	30.0 dB	30.0 dB
dispersion loss	162.3 dB/m^2	162.3 dB/m^2
uplink effective isotropic area	-47.3 dB/m^2	-47.3 dB/m^2
atmospheric loss	1.1 dB	1.1 dB
downlink rain loss	0.0 dB	5.1 dB
terminal G/T	27.4 dB/K	25.2 dB/K
bit rate	79.6 dB Hz	79.6 dB Hz
Boltzmann's constant	-228.6 dBW/K/Hz	-228.6 dBW/K/Hz
thermal E_b/N_o	12.9 dB	5.7 dB
cross-pol E_b/N_o	17.5 dB	17.5 dB
adjacent beam co-pol Eb/I	18.0 dB	18.0 dB
adjacent system (east) Eb/I	22.8 dB	22.8 dB
adjacent system (west) Eb/I	22.8 dB	22.8 dB
total Eb/I	10.2 dB	5.0 dB