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

In the matter of		
Amendment to Application of Motorola Satellite Communications, Inc. to Construct, Launch and Operate a Low Earth Orbit Satellite System	File Nos.	15-SAT-LA-94; 16-SAT-AMEND-94
Amendment to Application of TRW, Inc. to Construct a Non-Geostationary Satellite System in the Mobile-Satellite Service Above 1 GHz	File Nos.	17-SAT-LA-~~94~~-95; 18-SAT-AMEND-~~94~~

CONSOLIDATED COMMENTS OF HUGHES COMMUNICATIONS GALAXY, INC.

Hughes Communications Galaxy, Inc. ("HCG") hereby comments on the above-captioned amendments (the "Amendments") to the applications of Motorola Satellite Communications, Inc. ("Motorola"), and TRW, Inc. ("TRW") to construct, launch and operate low earth orbit ("LEO") satellite systems in the mobile satellite service ("MSS").[1/] Motorola has requested conditional licensing of MSS feeder links in the Ka band, at 29.1-29.3 GHz for uplinks and 19.4-19.6 GHz for downlinks. See Motorola Amendment at Tables R-1, R-8. TRW has requested conditional licensing of MSS feeder links in the Ka band at 29.7-30.0 GHz for uplinks and 19.8-20.1 GHz for downlinks. See TRW Amendment at Attachment A Figure 5.

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1. The Amendments were filed pursuant to the Commission's Report and Order in Mobile Satellite Service in the 1610-1626.5/248.3-2500 MHz Frequency Bands, FCC 94-261 (October 14, 1994) ("Big LEO Order").

HCG has an interest in these proceedings because it has pending before the Commission an application to construct, launch and operate SPACEWAY, a global network of satellites in the fixed satellite service ("FSS"), to be located in geostationary orbit ("GSO").[2/] HCG has requested authority to operate SPACEWAY at Ka band, using 19.2-20.2 GHz downlinks and 29.0-30.0 GHz uplinks in the United States, and 17.7-20.2 GHz downlinks and 27.5-30.0 GHz uplinks throughout the rest of the world.

At the outset, HCG emphasizes that it has no objection to the Iridium concept of a global, mobile low data-rate system, or the TRW concept of a global, mobile system, nor does HCG seek to delay licensing of L band spectrum or inter-satellite links to Motorola or TRW. However, HCG is very concerned about the serious issues raised by licensing Ka band spectrum for Motorola's and TRW's feeder links at this time.

While the Commission indicated in the Big Leo Order that it would process Motorola's and TRW's applications on an expedited basis, the Commission also made clear: "It is very likely that we will not be in a position to assign specific feeder link spectrum to any qualified applicant by our target date for licensing in January 1995." Id. ¶ 166. Considering that the 28 GHz Rulemaking, CC Docket No. 92-297, is still pending, and the fact that a number of significant feeder link spectrum issues remain to be resolved internationally, HCG strongly urges the Commission to defer licensing feeder link spectrum (whether conditionally or not) to Motorola and TRW until those issues have been properly addressed and are resolved.

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2. The original SPACEWAY application was filed on December 3, 1993, and amended on July 26, 1994.

I. Action on Motorola's and TRW's Feeder Links Could Prejudge Other Proceedings.

In January 1993, the Commission issued a Notice of Proposed Rulemaking to redesignate part of the Ka band for terrestrial use by the proposed LMDS service. In response, a wide range of satellite interests expressed concerns about the compatibility of the various proposed uses of the Ka band, including LEO feeder links, GSO FSS and Non-GSO FSS satellite systems and LMDS. Early this year, the Commission acknowledged that "sharing may not be possible for all proposed uses" of the Ka band,[3/] and it established a 28 GHz Negotiated Rulemaking Committee ("28 GHz NRMC") to seek consensus on technical rules that could accommodate services proposed at Ka band.[4/] LMDS Second NPRM at ¶ 34.

The original plan for the 28 GHz NRMC called for satellite/LMDS issues to be addressed for the first 30 days, and LEO satellite/GSO satellite issues to be addressed in the last 30 days of the Negotiated Rulemaking. Unfortunately, that never happened. The 28 GHz NRMC never considered whether LEO and GSO satellite systems could share the spectrum on a co-frequency basis. Moreover, after significant analysis, the 28 GHz NRMC did not find a solution to the satellite/LMDS sharing question.[5/]

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3. Local Multipoint Distribution Service, Second Notice of Proposed Rulemaking, FCC 94-12 at ¶ 34 (February 11, 1994) ("LMDS Second NPRM"). The Commission explicitly acknowledged the contention of Calling Communications (now Teledesic) that its Ka band LEO system would be incompatible with other satellite services. Id.

4. While TRW does not seek spectrum at 27.5-29.5 GHz, TRW actively participated as a member of the 28 GHz NRMC, and its plans for MSS feeder links will likely be affected by the findings regarding interservice sharing in that proceeding.

5. Although Motorola and the LMDS proponent Suite 12 Group reached a compromise that would accommodate each others' system, the 28 GHz NRMC did not reach consensus on that compromise.

In the LMDS Second NPRM, the Commission explained that if only some of the services proposed at 28 GHz could be accommodated, the Commission would need additional information to develop a sufficient record to choose which services to license at that band. The Commission also indicated that if the 28 GHz NRMC did not achieve consensus, the Commission would establish a pleading cycle to allow all interested parties the opportunity to demonstrate the public interest benefits of their proposed services and to address issues such as the spectrum needs and efficiencies of the competing services. The 28 GHz NRMC concluded on September 23, 1994 and the Commission has not yet begun the pleading cycle that was described in the LMDS Second NPRM.

HCG's concern is simple: licensing Ka band feeder links (whether conditionally or not) to Motorola or TRW at this time could preordain the outcome of the pending 28 GHz Rulemaking (CC Docket 92-297). In fact, the Commission had this very concern fewer than 18 months ago when it declined to license the 29.3-29.5 GHz band to Norris Satellite Communications while the 28 GHz Rulemaking remained pending. The requests of Motorola and TRW are no different.[6/]

II. LEO MSS Feeder Links at Ka Band Could Displace GSO FSS System Operations.

Both ITU-R Task Group 4/5 ("TG 4/5") to the WRC-95 Conference Preparatory Meeting and Interim Working Group 4 ("IWG 4") of the Commission's Industry Advisory Group on WRC-95 recently delivered reports that address the possibility of spectrum sharing between LEO MSS feeder links and GSO FSS systems (respectively, "TG 4/5 Report" and "IWG 4 Report"). With respect to Ka band sharing, each of these groups of

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6. See Norris Satellite Communications, Inc., Memorandum Opinion and Order, FCC 93-341 at ¶ 4 (July 20, 1993). Of course, Motorola is free to construct the Iridium system under its current Section 319(d) waiver, and TRW could seek the same authority.

technical experts recognized that co-directional sharing may be possible with the implementation of "interference reduction mechanisms" by MSS feeder link operators. IWG 4 Report at § 4.1. See also TG 4/5 Report at 17 ("Codirectional sharing [at bands above 17.7 GHz] requires the Non-GSO/MSS feeder link network to take certain actions to reduce interference to and from GSO/FSS networks.").[7/]

The proposals to license Motorola's and TRW's feeder links raise two primary issues.

First, no analysis or test data are available to confirm that the interference reduction mechanisms alluded to by TG 4/5 and IWG 4 actually will work in practice. As IWG 4 has recognized, these aspects of its report require further study. In particular, the computer simulations conducted by TG 4/5 to analyze GSO/LEO interference have not considered the types of ubiquitous, small-dish FSS systems that are now on file at the FCC, such as SPACEWAY and Teledesic.

Second, these reports are clear that, at a minimum, without "specific characteristics and specific operational capabilities" yet to be articulated, and without certain operational constraints (such as geographic exclusion zones of undetermined size), Ka band sharing between LEO feeder links and GSO FSS systems is not possible. Neither Motorola's nor TRW's Amendment appears to contemplate changes of the types needed to permit sharing. HCG's analysis indicates that the current Motorola and TRW designs will not permit co-frequency sharing with FSS systems such as SPACEWAY.[8/]

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7. The reports conclude that reverse band operations in the uplink portion of the Ka band are impractical. TG 4/5 Report at 13, IWG 4 Report at § 4.2.

8. Indeed, Motorola's technical exhibit to its Amendment addresses certain Ka band sharing issues, but does not address Iridium's ability to coexist with SPACEWAY. Amendment at Exhibit 5. In fact, in that exhibit, Motorola states its intention to avoid rather than share frequencies used by GSO FSS networks operated by other

III. MSS Feeder Links Can Be Accommodated Outside the Ka Band.

The Ka band has long been considered the expansion band for the development of FSS broadband applications. FSS service in the C and Ku bands has grown rapidly, and those bands are experiencing congestion and saturation. Recent interest in the Ka band for both GSO and LEO FSS systems has highlighted the importance of maintaining this band for broadband services.

The Ka band offers several technical advantages for broadband FSS applications over the currently used C and Ku bands. The shorter wavelength in that band allows certain design advantages and a wide range of spectrum-efficient techniques to be employed, including:

- high data-rate interactive services through small dishes;
- smaller spacecraft components and hardware;
- wider information bandwidth RF components;
- higher gain antennas for the same physical size aperture, which reduce conditions for interference from or into other systems; and
- small spot beams for high ratio frequency reuse.

The inherent benefits of the Ka band were recognized by NASA over a decade ago, and its Advanced Communications Technology Satellite (ACTS) program, which is approaching one billion dollars in total investment, has been serving as a Ka band testbed for broadband FSS communications applications since September 1993.

Access to the Ka band for broadband services that use ubiquitous, small-diameter earth stations will be essential to the development of the Global Information Infrastructure. The 28 GHz Rulemaking has generated serious concerns that the unique

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countries. Id. at 2. TRW's Amendment does not appear to address GSO FSS coordination at all.

benefits of the Ka band may be lost in the push to allow many potentially incompatible services to share the band. TG 4/5 recognized the unique ability of the Ka band to support ultra-small earth terminals when it quickly rejected a proposal to consider the 29.5-20.0 GHz portion of the Ka band, sought by TRW, as a location for MSS feeder links. However, the following ten frequency bands below 17.7 GHz have been deemed suitable by TG 4/5 and IWG 4 for possible feeder link use:

4.5-4.8 GHz	10.7-10.95 GHz
5.0-5.25 GHz	11.2-11.45 GHz
6.65-6.725 GHz	12.75-13.25 GHz
6.725-7.025 GHz	13.75-14.0 GHz
7.025-7.075 GHz	15.4-15.7 GHz

TG 4/5 Report at 22-23, IWG 4 Report at 24-25. Strong consideration should be given to placing the LEO MSS feeder links in one or more of these bands, to avoid precluding use of the Ka band for broadband FSS. The availability of the Ka band for FSS broadband services would be severely reduced by licensing MSS feeder links at Ka band before it is demonstrated that LEO MSS and FSS systems can share the same frequencies.

The explosive growth in demand for MSS feeder link spectrum in the recent round of LEO amendments foretells of further increases in feeder link bandwidth needs in the future.[9/] There simply is not enough spectrum available for the Commission to license all LEO MSS feeder links at Ka band and to make other spectrum available for GSO FSS operations. Since LEO MSS feeder links do not appear to be capable of employing dual

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9. TRW's request has grown from 100 to 300 MHz, and Motorola's request has grown from 100 MHz to 200 MHz, see LMDS Second NPRM at ¶¶ 13 n. 4 and 19. Constellation's and Loral's requests have grown from 66 MHz each to 200 MHz each, see id. at ¶ 19. Ellipso's request has grown from 66 MHz to 300 MHz, see Big LEO Order at ¶ 164.

polarization at Ka band, the amount of spectrum needed by Constellation, Globalstar and Ellipso at Ka band would be double the amount they need at C or Ku band. Based on IWG 4 estimates, the Ka band spectrum needed to meet the feeder link demands of the first generation of Motorola, TRW and others is shown on the table below.

Proponent	Proposed Feeder Link Spectrum (MHz each direction)	Feeder Link Spectrum Needed at Ka Band (MHz each direction)
AMSC	200	200
Constellation	200	400
Globalstar	200	400
Ellipso	300	600
Iridium	200	200
Odyssey	300	300
TOTAL	**1,400**	**2,100**[10/]

Frequency sharing among more than two LEO MSS gateway uplinks may not be feasible, and has not been proposed by any of the LEO MSS applicants. As the above table shows, licensing of spectrum at Ka band for all of the LEO MSS systems currently proposed would foreclose use of that spectrum for other services. Accordingly, input is needed in the 28 GHz Rulemaking proceeding to address why this much spectrum is needed for MSS feeder links and whether more efficient approaches are available.

LEO MSS feeder link operations derive little if any benefit by operating at 28 GHz. Significantly, of the six LEO MSS applicants, only one, Motorola, has insisted on using the Ka band for its feeder links; three have proposed C or Ku band systems, and TRW

10. This assumes that two LEO MSS systems cannot share the same feeder link frequencies.

and AMSC, which have proposed Ka band, are not averse to considering the other bands. See TRW Amendment at 7 n. 10; AMSC Amendment at 31 (File Nos. 19-SAT-LA-94, 20-SAT-AMEND-94). HCG applauds the flexibility that TRW and AMSC have shown in responding to FSS/MSS sharing issues. Indeed, the 28 GHz NRMC unanimously recommended that the Commission seek other spectrum, outside the Ka band, for Ellipso, Loral and Constellation feeder links.

IV. Conclusion.

Considering that the issues raised in the 28 GHz Rulemaking still are outstanding, that much analysis still needs to be done on LEO/GSO sharing, and that neither Motorola nor TRW has proposed any concrete method by which sharing might be accomplished, it is premature to license Ka band feeder links to Motorola or to TRW at this time, even on a conditional basis. To do so could preordain the results of other pending Commission proceedings.

The Ka band offers a unique national resource for broadband satellite services as a natural expansion band for current C and Ku band services. Every effort must be made to maintain the band for spectrally efficient broadband FSS applications that are already on file and are proposed for implementation as early as 1998. These FSS systems are critical to enable the important role that satellites can play in building the Global Information Infrastructure.

The 28 GHz NRMC did not address, much less resolve, the issue of LEO/GSO spectrum sharing. The 28 GHz Rulemaking has been established as the mechanism for addressing the optimal use of the 28 GHz band, now that all proposed uses of that band cannot be accommodated there. Granting Ka band feeder link assignments while that proceeding is pending could prejudge its outcome. In conclusion, HCG strongly urges

the Commission not to license Ka band feeder links to Motorola or to TRW at this time, even on a conditional basis.

HCG has participated in the 28 GHz Rulemaking proceeding, in the 28 GHz NRMC, and in TG 4/5 and IWG 4. HCG remains fully committed to participate in the resolution of these issues and in finding suitable spectrum for LEO MSS feeder links.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I have this 22nd day of December, 1994, caused copies of the foregoing "COMMENTS OF HUGHES COMMUNICATIONS GALAXY, INC." to be served by first class mail, postage prepaid, upon the following:

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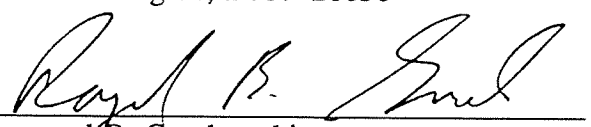

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