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

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In the Matter of	)	
Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5 - 29.5 GHz Frequency Band, to Reallocate the 29.5 - 30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services	)	CC Docket No. 92-297
and	)	
Suite 12 Group Petition for Pioneer's Preference	)	PP-22

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COMMENTS OF HUGHES COMMUNICATIONS GALAXY, INC.

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EXECUTIVE SUMMARY

Hughes Communications, Inc. ("Hughes") supports the Commission's effort to facilitate a prompt resolution of this proceeding so that the Hughes Spaceway satellite system and other proposed uses of the 28 GHz band (27.5-30.0 GHz) can commence service to the public. However, the Commission's proposed band plan hinges entirely on the terms under which feeder links for non-geostationary mobile satellite service systems (NGSO MSS feeder links) and geostationary fixed satellite service systems (GSO FSS) will share 250 MHz of the same spectrum.

The Commission is correct in concluding that GSO FSS systems require access to a full 1000 MHz of the 28 GHz band. The technology is available today to allow GSO FSS satellites to provide breakthrough services to ultra small terminals that simply cannot be provided today in the currently used FSS bands. However, the ability to offer these high speed, broadband services to ubiquitously deployed terminals will likely be foreclosed by the Commission's current proposal, unless certain modifications are made to it.

In particular, the proposal to allow NGSO MSS feeder links to share 250 MHz of the 28 GHz band on first-come-first-served basis could effectively preclude GSO FSS use of this 250 MHz over a very large part of the United States. In the case of one MSS system, the prior implementation of a single feeder link earth station in Arizona could preclude GSO FSS use of the same frequencies in virtually all of the states west of the Mississippi. In the case of another MSS system, the prior implementation of feeder link earth stations in Los Angeles and New York could create similar areas where GSO FSS could not operate: one

area which stretches down the eastern seaboard from the tip of Maine to North Carolina, and out to Ohio, and one which includes almost all of California, Nevada, Arizona and Utah.

Hughes proposes two practical solutions to this NGSO MSS feeder link/GSO FSS sharing problem. First, the adoption of reverse band working to accommodate feeder links in the companion downlink band to the 28 GHz band (i.e., at 19.45-19.65 GHz) would relieve much of the current conflict in the 28 GHz band and allow the feeder links needs of at least two NGSO MSS systems to be accommodated. Second, Hughes offers a slight revision to the proposed band plan that capitalizes on the ability for LMDS to share the same spectrum as NGSO MSS feeder links, does not increase the amount of spectrum provided to any service, and allows the GSO FSS service to access a full 1000 MHz of spectrum without unreasonable constraints.

The failure to adopt a feasible method to facilitate GSO FSS and NGSO MSS feeder link sharing, such as reverse band working, could not only prevent GSO FSS networks from accessing 25% of the spectrum proposed to be allocated to them in the current band plan, but also would unduly constrain the development of GSO FSS systems at 28 GHz. Absent the adoption of the reverse band working principles outlined above, Hughes urges the Commission to modify its band plan to obviate the need for GSO FSS and NGSO MSS feeder link sharing.

Hughes urges the Commission not to resolve this proceeding without taking into account the spectrum allocation and regulatory decisions at WRC-95, which will commence in only 6 weeks. As a practical matter, the adoption at WRC-95 of 28 GHz proposals for accommodating NGSO MSS feeder links and NGSO FSS systems that are

different from any decision reached here would have a significant impact on the ability of any NGSO system (FSS or MSS) to take advantage of the priorities provided to it in the proposed band plan. As many parties to this proceeding have argued, the availability of a consistent, worldwide spectrum allocation is critical to the implementation of tomorrow's global satellite systems. Unless the Commission accounts for these possibilities in resolving this proceeding, the U.S. could be faced with a series of domestic spectrum use restrictions that would forestall the implementation of global systems that otherwise are consistent with the results of WRC-95.

It is premature to address the possibility of GSO FSS satellite spectrum auctions at 28 GHz. First and foremost, there is no reason to believe that the Commission cannot accommodate the needs of every qualified GSO FSS applicant in the current 28 GHz satellite processing round: the orbital arc is wide open. The Commission has been highly successful for over 20 years in resolving potential mutual exclusivity with respect to satellite applications and the Commission's long-standing application processing and qualification rules must be applied in the 28 GHz band as well. In addition, until all of the applications in the current processing round have been submitted, it is premature to conclude that another statutory prerequisite for holding an auction exists: that the primary use of the 28 GHz band by FSS will be for "subscriber services." Finally, before the Commission can consider using auctions for satellite spectrum, it must address the adverse international consequences that would likely result.

For these reasons, Hughes urges the Commission to consider the two alternatives Hughes has proposed to facilitate the resolution of this proceeding.

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COMMENTS OF HUGHES COMMUNICATIONS, INC.

Hughes Communications, Inc. ("Hughes") submits these comments on the Commission's Third Notice of Proposed Rulemaking and Supplemental Tentative Decision in this proceeding (the "Notice").

I. INTRODUCTION

The Commission's Notice in this proceeding proposes to accommodate a wide range of uses for the so-called "28 GHz" band (27.5-30.0 GHz) by adopting a band plan that allocates a portion of the band for each of the following applications: (i) communications satellites that would operate in geostationary orbit and use the Ka band (28 GHz uplink and "20 GHz" (17.7-20.2 GHz) downlinks) to provide fixed satellite service (GSO FSS), (ii) communications satellites that would operate in non-geostationary orbit and use the Ka band to provide fixed satellite service (NGSO FSS), (iii) communications satellites that would

operate in non-geostationary orbit to provide mobile satellite service (MSS) and use the Ka band for so called "feeder links" between the satellites and large earth station hubs (NGSO MSS feeder links), and (iv) a cellular point-to-multipoint terrestrial microwave service called the Local Multipoint Distribution Service (LMDS). The need for a band plan arises because these various systems, as currently proposed, are not all able to share the same parts of the Ka band in the same geographic area.

In the more than two years since it issued the first NPRM in this proceeding, the Commission has worked with the Ka band applicants to resolve these conflicting system proposals. To this end, the Commission convened a Negotiated Rulemaking Committee ("NRMC") to seek to maximize co-frequency sharing among certain of these proposed systems. The NRMC was partially successful: it concluded that one of the three satellite uses --- NGSO MSS feeder links --- could share spectrum with LMDS under certain geographic and operational constraints.[1/]

The NRMC, however, never addressed the other significant conflict that was brewing before the Commission: whether or how NGSO MSS feeder links and GSO FSS could coexist in the same spectrum.[2/] Hughes has studied this issue at great length and has proposed methods that could maximize access to the Ka band by both GSO FSS and MSS feeder links. However, NGSO MSS feeder link proponents have responded that the Hughes

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1. *See Report of the LMDS/FSS 28 GHz Band Negotiated Rulemaking Committee,* September 23, 1995.

2. *See Report of the LMDS/FSS 28 GHz Band Negotiated Rulemaking Committee,* September 23, 1995, Addendum of Hughes Communications Galaxy, Inc., at 2.

proposals, while technically possible, are not an economically feasible way for GSO FSS and NGSO MSS feeder links to share spectrum on a co-primary basis.

The viability of the Commission's proposed band plan hinges entirely on the terms under which NGSO MSS feeder links and GSO FSS will share the same spectrum. The Commission correctly recognizes that at least 1000 MHz of the Ka band should remain allocated on a "primary" basis to meet the needs of GSO FSS systems. However, the proposed band plan provides that 250 MHz of this GSO FSS band segment also would be available on a primary basis to NGSO MSS feeder links. Under the current proposal, access to this 250 MHz is on a "first-come-first-served" basis. The prior implementation of NGSO MSS feeder links in that 250 MHz could foreclose GSO FSS use of that same 250 MHz over extremely large and heavily-populated areas of the United States. It therefore is imperative that the Commission adopt some method of ensuring that GSO FSS systems have access to a full 1000 MHz of spectrum.

Hughes offers two solutions to this GSO FSS/NGSO MSS feeder link conflict. First, as proposed by the Commission, MSS feeder links should be authorized to operate on a "reverse band" basis in the companion "downlink" part of the Ka band and the Commission should limit the number of MSS feeder link earth stations that are permitted to operate at Ka band. Under the Hughes reverse band working proposal, the current conflict between NGSO MSS feeder links and the GSO FSS would be solved, the feeder link needs of at least two NGSO MSS systems could be accommodated, and GSO FSS systems would have access to the full 1000 MHz without unreasonable constraints. Alternately, or in addition, the Commission should modify its band plan in a manner that does not change the amount of

spectrum that would be available to any one service, but would merely modify how certain services share the 28 GHz band.

As an experienced satellite operator whose application for the GSO FSS Spaceway system has been pending for almost two years, Hughes agrees with the Commission that the incompatibilities among proposed 28 GHz band systems should be resolved promptly. The desire for a speedy solution, however, must not cripple any one specific 28 GHz band application. Hughes therefore urges the adoption of its proposed solutions to the unresolved conflict between GSO FSS and NGSO MSS feeder link use of the same spectrum. Hughes's comments on these issues and the other issues raised in the Notice follow below.

II. PROPOSED BAND PLAN

Hughes supports the Commission's proposed band plan with one important caveat: the feasibility of the current proposal hinges *entirely* on how NGSO MSS feeder links are accommodated in the Ka band and the terms on which GSO FSS systems are allowed to use 25% of their proposed 1000 MHz primary allotment. Significantly, the Commission's proposal *will not* meet the needs of the GSO FSS satellite industry unless the spectrum needs of NGSO MSS feeder links are accommodated in a manner that does not unduly constrain use of the 250 MHz of the band proposed to be "shared" by GSO FSS and NGSO MSS feeder links.

A. Continued GSO FSS Access To 1000 MHz Of The 28 GHz Band Is Essential To The Development of a Global Information Infrastructure

The Commission is correct that GSO FSS satellite systems require continued access to at least 1000 MHz of 28 GHz spectrum.[3] This is the minimum amount needed for GSO FSS expansion and is equivalent to the amount of spectrum that is currently available today for GSO FSS in other bands that are heavily utilized. Allowing continued access to at least 1000 MHz by GSO FSS systems is critical not only to the success of current 28 GHz band GSO proposals, but also to the development of a Global Information Infrastructure ("GII"). The 28 GHz band has long been considered to be both the expansion band for accommodating growth in existing GSO FSS services and the location for the development of new GSO FSS high capacity and broadband services. FSS service in the C and Ku bands has grown rapidly, and the C band in particular, is experiencing congestion and saturation. Moreover, insufficient bandwidth now exists in the FSS bands that are used today to accommodate new high-capacity and broadband FSS networks, like Hughes's Spaceway system. Finally, in terms of cost and service flexibility, the 28 GHz band is the only frequency band able to accommodate systems that will provide high capacity service to the broadest possible segment of users through inexpensive, very small satellite terminals that can be deployed ubiquitously.

1. 28 GHz Provides Essential Expansion Capacity For FSS Services

FSS satellite systems need continued access to at least 1000 MHz of 28 GHz spectrum because the 28 GHz band provides much needed expansion capacity for services

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3. Notice at ¶¶ 54, 55.

that are provided today through larger and more expensive terminals at C and Ku band. Ku band satellites are widely used today to support the video, voice and data networks that are essential to many businesses. Since Hughes installed the first Ku band "VSAT" private business network in the U.S. in 1982, VSAT networks have become critical to the day-to-day operations in a variety of industry segments, including many Fortune 500 companies, and the financial services, automobile manufacturing, retail and petroleum industries, to name a few. Worldwide, over 166,000 VSAT networks are in operation today and this industry is growing at a rate of about 30% per year. Continued substantial growth for Ku band services will likely come from corporations, schools and other large institutions that need to establish private video networks, and from the continued use of satellites to provide the inventory monitoring and point-of-sale credit card verification that are essential to many businesses. Most C band satellites are used primarily to provide video distribution for cable systems and broadcast television networks across the country. Need for FSS capacity will continue to increase substantially as new television networks (e.g. Fox, United Paramount, Warner Brothers) and "special interest" programmers (e.g. the SCI-FI Channel, the History Channel, the Food Network, the Travel Channel) continue to proliferate. Increased demand also will come from the direct-to-home (DTH) and direct broadcast satellite (DBS) industries which rely heavily on C band capacity for their video backhaul needs.

The 28 GHz band therefore provides a "pressure relief" valve for the growing congestion in the presently used FSS bands. Today, domestic FSS service is provided by approximately 30 GSO satellites that operate in all or part of the 1000 MHz of capacity in the C and Ku bands that is available for domestic service. And as the Commission correctly

notes, most FSS systems being proposed today are C and Ku band "hybrids" that operate across this full 1000 MHz.[4] Many of the C and Ku band orbital locations that are suitable for U.S. domestic service are committed to operational or planned GSO systems. In the not too distant future, the 28 GHz band will be critical to the accommodation of both additional similar and functionally new FSS networks.[5]

2. The 28 GHz Band Is The Only Band Suitable For Innovative, New High Capacity and Broadband FSS Services

The 28 GHz band offers several technical advantages that allow for the implementation of broadband and high capacity FSS applications that otherwise could not be provided in the presently used FSS bands. The shorter wavelength in the higher band affords certain design advantages, including:

- cost effective and ultra small terminals
- small satellite spot beams that facilitate frequency reuse
- wider bandwidth and high date rate services.

These advantages support the development of attractive satellite services that will change the way in which individuals and small businesses communicate.

The 28 GHz band provides the first real opportunity to provide affordable two-way, broadband satellite services directly to homes and small businesses, users for whom satellite VSAT service is currently unaffordable. There are a number of reasons why the 28

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4. Notice at ¶ 55.

5. The 28 GHz band was one of the bands domestically allocated for FSS use in 1973 in order to address concerns that insufficient spectrum would be available at C band to accommodate domestic satellite operations. *See In Re Establishment of Domestic Communication-Satellite Facilities by Non-Governmental Entities*, 25 FCC 2d 718, (¶¶ 1-5) (1970); *In Re Amendment of Part 2 of the Commission's Rules to Conform with Space WARC 1971*, 39 FCC 2d 959 (1973).

GHz band expands the availability of satellite services. First, the nature of this higher frequency band supports the use of transmit-receive antennas significantly smaller than those in use in the C or Ku bands, given the 2° spacing objective for GSO FSS systems.

Second, the spot beams and on-board satellite baseband processors possible on 28 GHz band satellites allow for an unparalleled level of spectrum reuse. In particular, satellite customers can have access to "bandwidth on demand." The innovative Spaceway baseband processor equipped satellite operates as a node that connects all of the users and avoids the cost and delay involved in implementing the "spoke and hub" VSAT networks that are common today. Users can freely communicate with each other through a spacecraft regardless of whether they have access to the terrestrial network and without being part of a predefined community of users. As a result, hundreds of thousands of new users will be able to simultaneously access satellite networks in the near future. Because of the widespread availability of satellite technology that is possible, Hughes anticipates an explosive growth in satellite services at 28 GHz band.

The inherent technical benefits of the 28 GHz band thus will support the growing demand for high capacity communications, which require more bandwidth that is typically used today on C and Ku band satellites. Several factors are contributing to the strong growth in demand for high capacity satellite communications. For example, the processing power and speed of personal computers have increased several fold over just the past few years, and the number of PC users who access on-line services, databases, bulletin boards and electronic mail has grown substantially in the past few years. This market is expected to continue to exhibit strong growth, particularly since the proliferation of Internet

users and Internet content providers (over 45,000 World Wide Web sites now exist) is creating a boom in home and office PC communications. Many businesses use the Internet for their communications needs since it is more cost effective method than their own private networks.[6]

Another factor contributing to the increased demand for high data-rate satellite communications is the increasing availability of affordable "desktop" videoconferencing equipment (such as Intel's ProShare line) that requires a higher speed communications link than ordinary telephone lines. The proliferation of videotelephony equipment, along with the continued strong demand for personal computers, is facilitating a trend toward distributed work habits in many businesses, which in turn will increase the demand for access to high data-rate communications services. For example, a significant and growing portion of the U.S. workforce conducts its work activities from home. This "work-at-home" market of approximately 39 million homes includes self-employed individuals as well as "telecommuters." Many companies are implementing telecommuting programs, which promise to relieve traffic congestion and provide employees with greater flexibility in balancing the demands of family and work schedules. The trend toward work-at-home, and telecommunicating in particular, will increase the demand for high-bandwidth interactive communications, such as those to be provided by the Hughes Spaceway system.

Many home telecommuters, PC users and Internet and on-line service users are seeking higher speed communications links in order to enhance their productivity, and in

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6. *See* "Companies Use Web Hoping to Save Millions," *New York Times*, July 17, 1995, at D6, col. 1.

order to effectively transmit and receive increasingly large multimedia files that cannot be accommodated over the existing telephone network. The deployment of high capacity communications facilities available to most home PC and many office PC users simply has not kept pace with the technology that gives rise to this demand. As a result, limits within the existing telecommunications infrastructure restrict the ability of PC users to transfer and access large files in a timely fashion. The high capacity and ubiquitous service capabilities of satellites can solve many of the current constraints on the ability to fully use the Internet, such as the limited, low speed access available to most users and the lack of an ability to "multicast" a communication or file to multiple users simultaneously.

Although terrestrial services, such as ISDN, are being deployed to meet high-speed data transmission requirements, these services will not be universally available. Both the cost and practicalities of constructing a high-speed terrestrial data network throughout the United States are prohibitive. Moreover, advanced terrestrial networks which had announced ambitious deployment plans have been scaled back for technological and economic reasons. As a result, substantial numbers of U.S. citizens, particularly those in suburban and rural residential areas, will be underserved by the terrestrial network for quite some time. GSO FSS satellite systems, such as Spaceway, offer an ability to cost-effectively meet the voice, video and data transmission requirements of these end users.

The viability of using GSO FSS satellites to provide high-speed interactive services has been demonstrated by nearly two years of successful experiments on the 28 GHz band NASA ACTS satellite. As long as the GSO FSS service is provided access to sufficient

spectrum, GSO satellites will be able to help fill the needs of home and small business users by providing affordable telecommunications services that are unmet by terrestrial facilities.

In sum, access by GSO FSS satellite systems to at least 1000 MHz of the 28 GHz band at each orbital location will allow advanced communications services rapidly to be provided in areas (i) where such services would not otherwise be available for many years due to the inherent cost and delay in building the broadband terrestrial network, (ii) where it never will be economically feasible for a terrestrial network to be constructed, and (iii) where there is insufficient FSS spectrum available at C and Ku band. Thus, in particular, continued access to at least 1000 MHz of the 28 GHz band through small FSS earth stations will be essential to the development of the GII.

B. Feasibility Of The Proposed Band Plan Hinges On The Terms For Accommodating NGSO MSS Feeder Links

Hughes supports the Commission's efforts to reach a compromise band segmentation that provides for the reasonable needs of all 28 GHz band proponents. As set forth above, the Commission's proposal to allow GSO FSS access to 1000 MHz of spectrum is critical to the ability of those satellite systems to meet the demand for service. However, the feasibility of the band plan hinges *entirely* on the terms under which NGSO MSS feeder links will be allowed to share 250 MHz of the band with GSO FSS services.

1. The Current FSS/MSS Feeder Link Sharing Proposal Could Preclude GSO FSS Operations In The Shared Band

Hughes strongly urges the Commission to reconsider its proposal that NGSO MSS and GSO FSS systems share 250 MHz of the 28 GHz band on a "first-come-first-served" basis at 29.25-29.50 GHz. The Commission has not proposed any standards to

facilitate sharing between NGSO MSS feeder links and GSO FSS uses of the band. The absence of any standards and the "first-come first-served" spectrum assignment scheme proposed for this part of the 28 GHz band could effectively preclude GSO FSS systems from using at least 25% of the spectrum that is proposed for them on a primary basis.

As long as NGSO MSS systems are free to implement their feeder link segments on first-come-first served basis, they have absolutely no incentive to do so in a manner that facilitates use of the band by other systems. In fact, without the adoption of effective sharing criteria, the implementation of just two NGSO MSS feeder link earth station complexes could effectively wipe out access to the "shared" band by GSO systems in a large, heavily populated portion of the United States.

Absent the adoption of other interference mitigation techniques for NGSO MSS systems, use of the 28 GHz band by NGSO MSS feeder links will result in large geographic "exclusion zones" where, in order to avoid interference, GSO FSS earth stations would not be allowed to operate. Based on data provided by NGSO MSS proponents, the magnitude of these "exclusion zones" for cases involving Hughes's proposed GSO FSS Spaceway system and NGSO MSS feeder link complexes for both the Motorola Iridium and the TRW Odyssey systems are as follows. A single Iridium feeder link complex at Chandler, Arizona would create an exclusion zone about *2600 miles* in diameter that would encompass almost all of the states west of the Mississippi.[7] Likewise, the implementation of Odyssey feeder link complexes would create two exclusion zones, each about *1100 miles*

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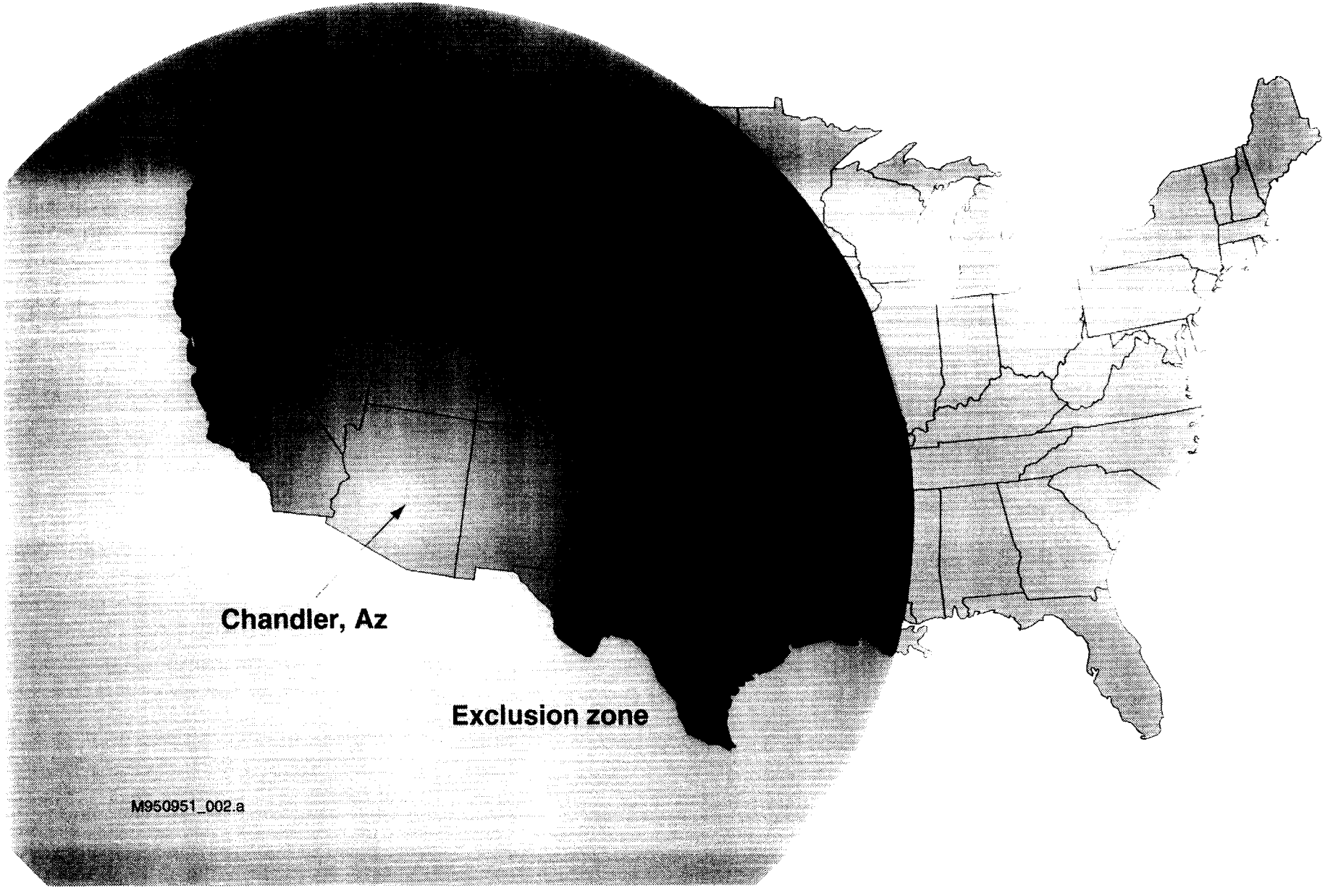
7. Hughes understands that Motorola desires to utilize only 50 MHz of the 250 MHz that the Commission has proposed for shared GSO FSS and NGSO MSS feeder link use, as described more fully in note 14.

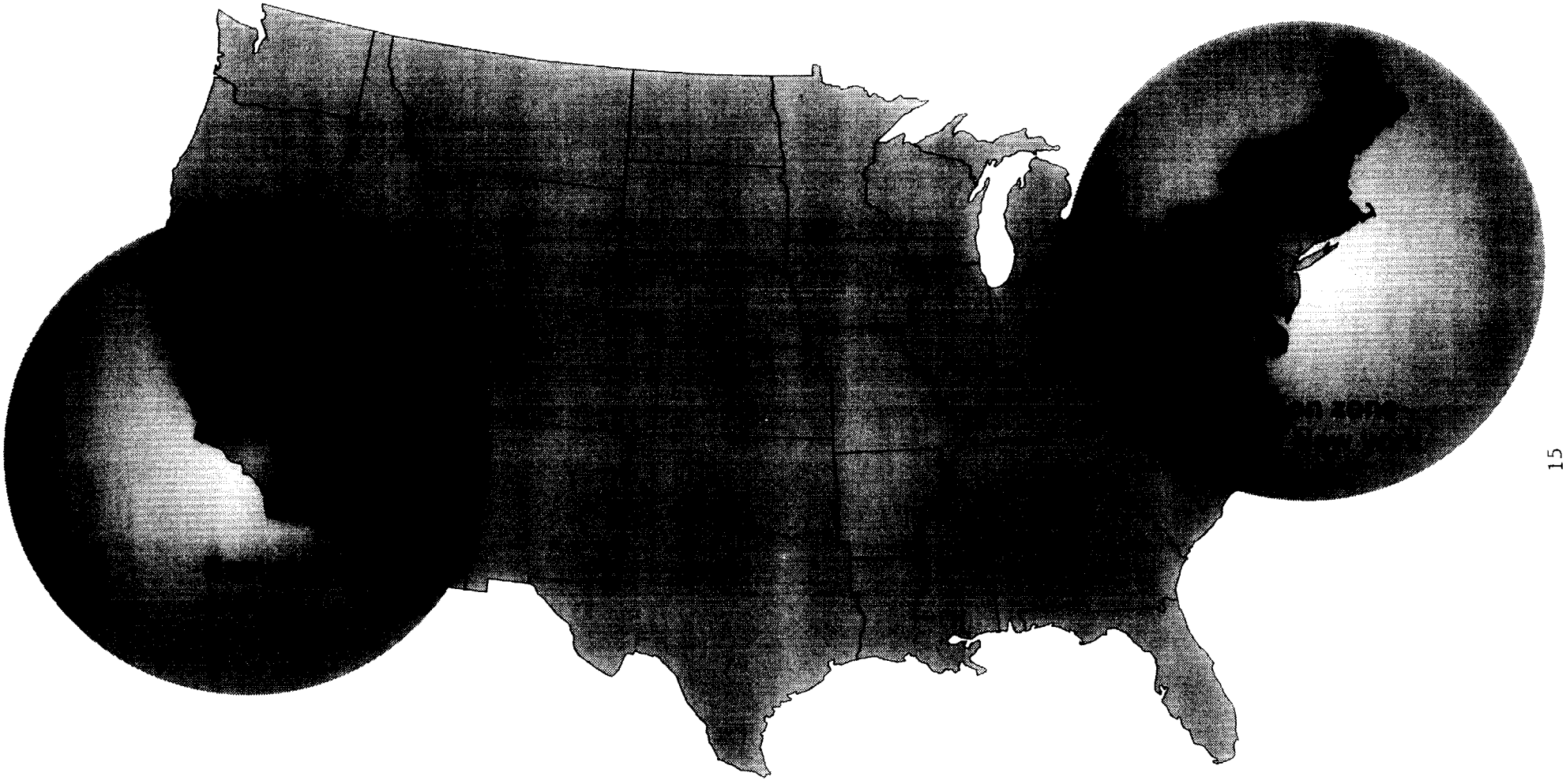
in diameter. Location of the Odyssey complexes as proposed in New York and Los Angeles could effectively preclude FSS operations in the *entire* 250 MHz of "shared" spectrum within exclusion zones that, in one case, stretch down the eastern seaboard from the tip of Maine to North Carolina, and out to Ohio, and in the other case include almost all of California, Nevada, Arizona and Utah. The following two maps graphically depicts the vast magnitude of these exclusion zones. The implementation of NGSO MSS feeder link sites in other parts of the world would likely result in additional similar exclusion zones.

Exclusion Zone Around Iridium Feeder Link Earth Site



Exclusion Zone Around Odyssey Feeder Link Earth Site

HUGHES



M950951_001.a

Moreover, the Commission's current proposal places no effective constraints on the number of NGSO MSS feeder link earth station complexes in the United States that can use the shared 29.25-29.5 GHz band. For example, under the proposed MSS/LMDS sharing rules, the Commission proposes to limit to eight the number of feeder link complexes that may share the 29.1-29.25 band with LMDS, and, based on the Notice, those same facilities are expected also to access 50 MHz of the shared GSO FSS band. Moreover, although the Commission has indicated that it intends to accommodate the feeder link needs of no more than two NGSO MSS systems in this shared 250 MHz (presumably TRW and Motorola), the proposed plan does not prevent a third or fourth MSS system from seeking access to this band either today or in the future and further aggravating the situation.[8] GSO FSS systems therefore have no assurance that *any* significant part of this 250 MHz will be available for them. To the contrary, the substantial exclusion zones created by random feeder link earth station deployment pose an unprecedented barrier to GSO FSS deployment in the proposed 250 MHz "shared" band.

Moreover, the Commission's current proposal would create a "race to the recorder's office," providing MSS systems with an unfair and a substantial head start because

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8. For example, if the US is not successful at WRC-95 in obtaining sufficient C and Ku band feeder link spectrum for MCHI/Ellipso, Loral/Qualcomm, AMSC and Constellation, the Commission indicates that it may allow those MSS systems to use the Ka band for feeder links. *See In re Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.52483.5-2500 MHz Frequency Bands* (Report and Order), 9 F.C.C. Rcd 5936, 5997-5998 (1994) ("Big Leo Order").

they already are conditionally licensed.[9] It would violate principles of due process and procedural fairness to provide this type of advantage to one set of applicants whose 28 GHz frequency requests not yet been subjected to a "cut off" deadline, particularly when other potentially mutually exclusive applications have been held in abeyance for almost two years.[10]

Nor should the inherent spectral inefficiency of NGSO MSS systems be allowed to retard the development of more efficient GSO FSS systems. In contrast to the

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9. When the Commission proposed to license TRW and Motorola on a conditional basis, HCG objected on the grounds that licensing MSS feeder links at that time could bias the outcome of this 28 GHz proceeding and displace GSO FSS operations in the same part of the Ka band. Hughes therefore urged the Commission not to provide MSS applicants with an advantage over other pending applicants for the Ka band. *See Consolidated Comments of Hughes Communications Galaxy, Inc.*, FCC File Nos. 15-SAT-LA-95; 16-SAT-AMEND-95; 17-SAT-LA-95; 18-SAT-AMEND-95 (filed December 22, 1994). Three Big LEOs now have conditional licenses and three more may be licensed by January 1996. In contrast, the SPACEWAY system, which was filed in December 1993, has just gone on public notice and is part of a processing round that will not likely be completed until early next year.

10. As presently proposed, the Ka band feeder links of Motorola and TRW are mutually exclusive with SPACEWAY. The Commission's public notice that accepted the Motorola and TRW applications for filing did not establish a cut-off for the filing of other Ka band proposals, and FCC rules at that time did not automatically act to establish a cut off. *See Reply of Hughes Communications Galaxy, Inc.*, FCC File Nos. 15-SAT-LA-95; 16-SAT-AMEND-95; 17-SAT-LA-95; 18-SAT-AMEND-95 (filed January 13, 1995), at 2-5. There simply is no basis for treating a pending Ka band NGSO MSS feeder link applicant differently than any qualified Ka band applicant who files an application by the September 29, 1995 deadline in the current processing round. Moreover, the Commission cannot resolve mutual exclusivity among qualified applicants in this band by establishing a "first-come-first-serve" scheme rather than resorting to the resolution processes mandated by Section 309 of the Communications Act. *See Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428, 450-52 (D.C. Cir. 1991) (Commission cannot adopt a rule which eliminates mutual exclusivity among qualified applicants and thereby select one applicant, but must consider all qualified applicants individually).

current NGSO MSS feeder link requests, each of which claims to require an exclusive 200 or 300 MHz feeder link assignment, any GSO system that complies with the Commission's decade-old 2° spacing policy would allow that same 200 or 300 MHz of spectrum to be reused at 180 orbital slots around the world with multiple GSO satellites at each slot. GSO systems could effectively turn up to 300 MHz into well over 54,000 MHz of useful spectrum, shared among numerous systems. However, absent adoption of effective and mutually acceptable sharing criteria, the assignment of the same 200 or 300 MHz of feeder link spectrum to one NGSO MSS system would provide that system with a "monopoly" over use of that spectrum throughout the world.

Placing limitations on how NGSO MSS feeder link systems may access spectrum is consistent with the policies that the Commission has developed for over two decades to ensure that U.S.-sponsored satellite systems would maximize use of the spectrum, through such spectrum management tools as 2 degree orbital spacing, standardization of frequency plans, and the adoption of antenna performance criteria. By accepting these system design constraints, dozens of different GSO FSS systems are able to use the same spectrum to serve the same geographic areas. Although the concept of minimum orbital spacing requirements is not applicable to NGSO systems, there is no reason that comparable spectrum sharing guidelines cannot be developed to maximize use of the Ka band by both feeder links for NGSO MSS systems and GSO FSS systems.

2. First Solution: Adopt Reverse Band Working to Facilitate Implementation Of The Proposed Band Plan

One practical solution to minimize the threat posed by MSS feeder links to GSO FSS system operations is to limit use of the Ka band for feeder links to no more than

two NGSO MSS systems, to limit the number of feeder link earth stations, and to require those systems to share spectrum with each other as much as possible. Hughes therefore fully supports the Commission's proposal to authorize MSS feeder links on a "reverse band basis," to accommodate feeder link systems in a part of the "companion" downlink band to the 27.5-30.0 GHz band (17.7-20.2 GHz), and to rely on other frequency bands below the Ka band to accommodate the feeder link requirements of other MSS systems.[11]

In particular, Hughes urges adoption of "reverse band working"(RBW)[12] for MSS feeder links in the downlink portion of the Ka band as a means to maximize access by multiple systems and to solve the NGSO MSS feeder link/GSO FSS problem with the current band plan. The feeder link needs of at least two NGSO MSS systems can be met on a reverse band basis by modifying the way in which NGSO MSS feeder links and GSO FSS systems access the downlink portion of the Ka band. The current band plan addresses only the frequencies that are available for Ka band uplinks; it does not address how the corresponding downlink band could be used.

Under the current band proposal, the 29.1-29.5 MHz band would be available for NGSO MSS feeder uplinks: 29.1-29.25 GHz would be shared with LMDS and the 29.25-29.5 portion would be shared with the GSO FSS. Under a "natural" uplink/downlink band pairing, the corresponding downlink band for MSS feeder links would be the 19.3-19.7 GHz band. The current conflict between MSS feeder link proposals and GSO FSS use of the

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11. Notice at ¶¶ 59-66.

12. Reverse band working is the principle of allowing one satellite system to use the same spectrum in one direction of transmission (e.g., uplink) while another system is allowed to use it in the opposite direction of transmission (i.e., downlink).