

Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

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Federal Communications Commission
Office of Secretary

In the Matter of)
)
Application of Iridium LLC for Authority)
to Launch and Operate the MACROCELL)
Mobile Satellite System in the 2 GHz Band)
_____)

File No. 187-SAT-P/LA-97(96)

Received

JAN - 6 1998

Spectrum Policy Branch
International

COMMENTS OF
LOCKHEED MARTIN CORPORATION

Lockheed Martin Corporation ("Lockheed Martin"), by its attorneys, hereby submits its comments on the above-referenced application of Iridium LLC ("Iridium") which requests, among other things, authority to operate MSS feeder uplinks in the 29.1-29.5 GHz band.¹ Although Lockheed Martin does not oppose the operation of MACROCELL feeder links in the 29.1-29.25 GHz sub-band, Iridium's proposed use of the 29.25-29.5 GHz sub-band for MSS feeder uplinks is prohibited by Section 25.258(c) of the Commission's rules. Moreover, not only has Iridium failed to demonstrate that the MACROCELL System can share spectrum with GSO FSS licensees as required by the Commission's rules, but Iridium's proposed use of the 29.25-29.5 GHz band would significantly disrupt the gateway operations of Lockheed Martin's Astrolink™ System and GSO FSS operations generally. Accordingly, Lockheed Martin urges

¹ See *Application of Iridium LLC for Authority to Launch and Operate the MACROCELL Mobile Satellite System in the 2 GHz Band*, File No. 187-SAT-P/LA-97(96) (filed Sept. 26, 1997) ("*MACROCELL Application*").

the Commission to authorize MSS feeder uplink operations for Iridium's MACROCELL System in the 29.1-29.25 GHz band only.

I. BACKGROUND

On July 28, 1995, the Commission published its proposed 28 GHz band plan which indicated that NGSO MSS feeder link systems would be required to share the 29.1-29.25 GHz band with LMDS and the 29.25-29.5 GHz band with GSO FSS systems.² For nearly a year thereafter, the Commission and interested parties worked intensely to resolve the significant and complex interservice sharing issues which arose between NGSO MSS feeder links and LMDS and GSO FSS systems. The Commission's *28 GHz First Report and Order* represents the resolution of these difficult sharing issues.³

With respect to the 29.25-29.5 GHz band, the Commission concluded that GSO FSS systems could only share spectrum with *certain* MSS feeder uplinks. Accordingly, the Commission limited access to this band to only those NGSO MSS systems that:

- (i) "compensate for nodal regression due to the oblate shape of the Earth, and thus maintain constant successive sub-satellite ground tracks on the surface of the Earth;"⁴
- (ii) "demonstrate that their system can share with the authorized U.S. GSO/FSS systems operating in this band;"⁵ and

² See *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 and Suite 12 Group Petition for Pioneer's Preference*, 11 FCC Rcd 52 (1995).

³ See *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*, 11 FCC Rcd 19005, 19062-19070 (rel. July 22, 1996) ("*28 GHz First Report and Order*").

⁴ *Id.* at 19064.

⁵ *Id.*

(iii) operate subject to "coordination agreements with existing GSO/FSS parties."⁶

In contrast, the Commission placed no special restrictions on GSO FSS operations in this band. As a result, Lockheed Martin will utilize the 29.25-29.5 GHz band for gateway operations for its licensed Astrolink™ System, while other GSO FSS licensees plan to use this spectrum for service link operations. Lockheed Martin's gateway earth stations will interconnect the Astrolink™ System with high-capacity users and the existing terrestrial infrastructure, and therefore will require high availability. The Commission's restrictions on MSS feeder uplink operations in the 29.25-29.5 GHz band ensure that Astrolink™ gateway earth stations, and GSO FSS systems generally, can operate without significant interruption from NGSO MSS systems which are unable effectively to share feeder uplink spectrum.

II. IRIDIUM'S PROPOSED USE OF THE 29.25-29.5 GHZ BAND IS PROHIBITED BY THE COMMISSION'S RULES

Although Iridium proposes to utilize the entire 29.1-29.5 GHz band for MSS feeder uplinks, Section 25.258(c) of the Commission's rules provides that:

NGSO MSS satellites operating in [the 29.25-29.5 GHz] band *shall* compensate for nodal regression due to the oblate shape of the Earth, and thus maintain constant successive sub-satellite ground tracks on the surface of the Earth.⁷

⁶ *Id.* at 19035.

⁷ 47 C.F.R. § 25.258(c) (1997) (emphasis added).

Iridium's MACROCELL System cannot maintain repeating ground tracks and thus does not comply with the Commission's rule.

Section 25.258(c) reflects the Commission's appropriate conclusion, based on the extensive record of the 28 GHz rulemaking proceeding, that only NGSO MSS systems that incorporate repeating ground tracks can effectively share feeder link spectrum with GSO FSS systems. Joint comments submitted by Motorola Satellite Communications, Inc. and Iridium LLC support this conclusion, indicating that a typical GSO FSS uplink would cause unacceptable interference into LEO satellite systems (which do not employ repeating ground tracks) unless extensive mitigation measures were employed.⁸ However, systems that employ repeating ground tracks, such as TRW's Odyssey™ System, *can* share spectrum with GSO FSS systems. The orbit architecture of systems with repeating ground tracks and the smaller number of feeder link earth stations needed as a result of higher orbit altitude permit these systems to share feeder link spectrum with GSO FSS operations such as Astrolink™ gateways. In view of the Motorola/Iridium analysis and other relevant information, the Commission properly limited the use of the 29.25-29.5 GHz band to NGSO MSS systems with repeating ground tracks.

The plain language of Section 25.258(c) prohibits the use of the 29.25-29.5 GHz band for feeder uplinks of NGSO MSS systems that cannot maintain repeating ground tracks, such as Iridium's MACROCELL System.² Accordingly, the Commission should authorize MACROCELL feeder uplink operations in the 29.1-29.25 GHz band only.

⁸ See Joint Comments of Motorola Satellite Communications, Inc. and Iridium, Inc., CC Docket No. 92-297 (Sept. 7, 1995) at App. 2. This analysis, which relates to the 66-satellite IRIDIUM® system, is equally applicable to the 96-satellite MACROCELL System.

² Iridium has requested a waiver of Section 25.258(c), but has failed to provide legal justification supporting the grant of such a waiver. See *MACROCELL Application* at Exhibit D. Moreover, as discussed below, Iridium has failed to demonstrate how the MACROCELL System

III. IRIDIUM HAS FAILED TO ESTABLISH THAT MACROCELL FEEDER UPLINKS CAN SHARE SPECTRUM WITH GSO FSS LICENSEES

The Commission's rules could not be clearer with respect to the requisite showing for NGSO MSS applicants seeking to utilize the 29.25-29.5 GHz band:

NGSO MSS systems applying to use the 29.25-29.5 GHz band, for feeder link earth station uplink, will have to demonstrate that their system can share with the authorized U.S. GSO/FSS systems operating in this band.¹⁰

Iridium has not provided the required technical showing in its MACROCELL System application.

Although Iridium suggests that it is "reasonable to conclude that successful coordination is possible," Iridium provides no technical basis or other support for this conclusion.¹¹ Moreover, in its brief overview of sharing issues, Iridium incorrectly assumes that no GSO FSS licensees will deploy ubiquitous user terminals in the 29.25-29.5 GHz band.¹² Since Iridium has failed to demonstrate that the MACROCELL System can share with GSO FSS licensees as required by the Commission's rules, the Commission is not at liberty to grant Iridium's request to use the 29.25-29.5 GHz band for feeder uplinks.

Iridium's inability to make the requisite technical demonstration is not surprising in view of the consistent assertions by Motorola/Iridium that NGSO MSS feeder uplinks could not share spectrum with GSO FSS systems. Throughout the 28 GHz rulemaking proceeding,

and GSO FSS systems could effectively share spectrum if such a waiver was granted. Therefore, the Commission should reject Iridium's waiver request.

¹⁰ 47 C.F.R. § 25.258(d) (1997).

¹¹ See *MACROCELL Application* at A-38 - A-40.

¹² See *id.* at A-39.

Motorola/Iridium maintained that their NGSO MSS system could not share feeder uplink spectrum with GSO FSS operations generally, and that it could not share spectrum even with GSO FSS gateways if another NGSO MSS system (*i.e.*, Odyssey™) were to operate feeder uplinks in the same band.¹³ The assertions made by Motorola/Iridium with respect to the 66-satellite IRIDIUM® System are equally true with respect to Iridium's 96-satellite MACROCELL System.¹⁴

Iridium's request to utilize the 29.25-29.5 GHz band, constitutes a fundamental departure from technical the consistent assertions made by Motorola/Iridium throughout 28 GHz rulemaking proceeding. Iridium seeks to rewrite the record created in the 28 GHz proceeding and suggests, without technical support, that its MACROCELL System will be able to share feeder uplink spectrum with GSO FSS systems. The Commission should not accept Iridium's unsupported sharing claims and, in view of the consistent technical assertions of Motorola/Iridium, should restrict MACROCELL's feeder uplink operations to the 29.1-29.25 GHz band.

IV. IRIDIUM'S USE OF THE 29.25-29.5 GHZ BAND WOULD SIGNIFICANTLY DISRUPT ASTROLINK™ GATEWAY OPERATIONS

If Iridium's request to operate MACROCELL feeder links in the 29.25-29.5 GHz band were granted, it would have a significant negative impact on Lockheed Martin's use of the band and could effectively preclude Astrolink™ gateway operations in this spectrum. Lockheed

¹³ See Joint Reply Comments of Motorola Satellite Communications, Inc. and Iridium, Inc., CC Docket No. 92-297 (filed Oct. 10, 1995) at 12-15; *see also* Joint Comments of Motorola Satellite Communications, Inc. and Iridium, Inc., CC Docket No. 92-297 (filed Sept. 7, 1995) at 11-15.

¹⁴ There are no material differences between the two LEO MSS systems with respect to their ability to share feeder uplink spectrum with GSO FSS systems.

Martin is already engaged in detailed coordination with TRW concerning the shared use of this band and is confident that coordination of Odyssey™ feeder link earth stations and Astrolink™ gateway earth stations can be achieved. Successful coordination of these earth stations, including full use of the 29.25-29.5 GHz band in both polarizations by Astrolink™ gateways, is possible because Odyssey™ employs repeating ground tracks and will require only two feeder link earth stations in the United States.

Sharing is much more problematic with LEO systems such as MACROCELL. For example, the in-line interference into the MACROCELL System would be significantly greater than into Odyssey's MEO architecture because of differences in orbit altitudes. MACROCELL's LEO design would also require significantly more feeder link sites, effectively eliminating the possibility of geographic separation as a viable technique for sharing with Astrolink™ gateways and virtually precluding sharing with GSO FSS operations generally.

Although Iridium has failed to provide information concerning the number and location of feeder link earth stations for the 96-satellite MACROCELL System, the following TRW/Motorola submission to ITU Working Party 4A depicting Odyssey™ and IRIDIUM® feeder link exclusion zones suggests that a similar combination of Odyssey™ and MACROCELL feeder link operations in the 29.25-29.5 GHz band would prohibit GSO FSS operations in substantial portions of the continental United States, including the most significant U.S. population centers which the Astrolink™ System and other GSO FSS licensees may serve.

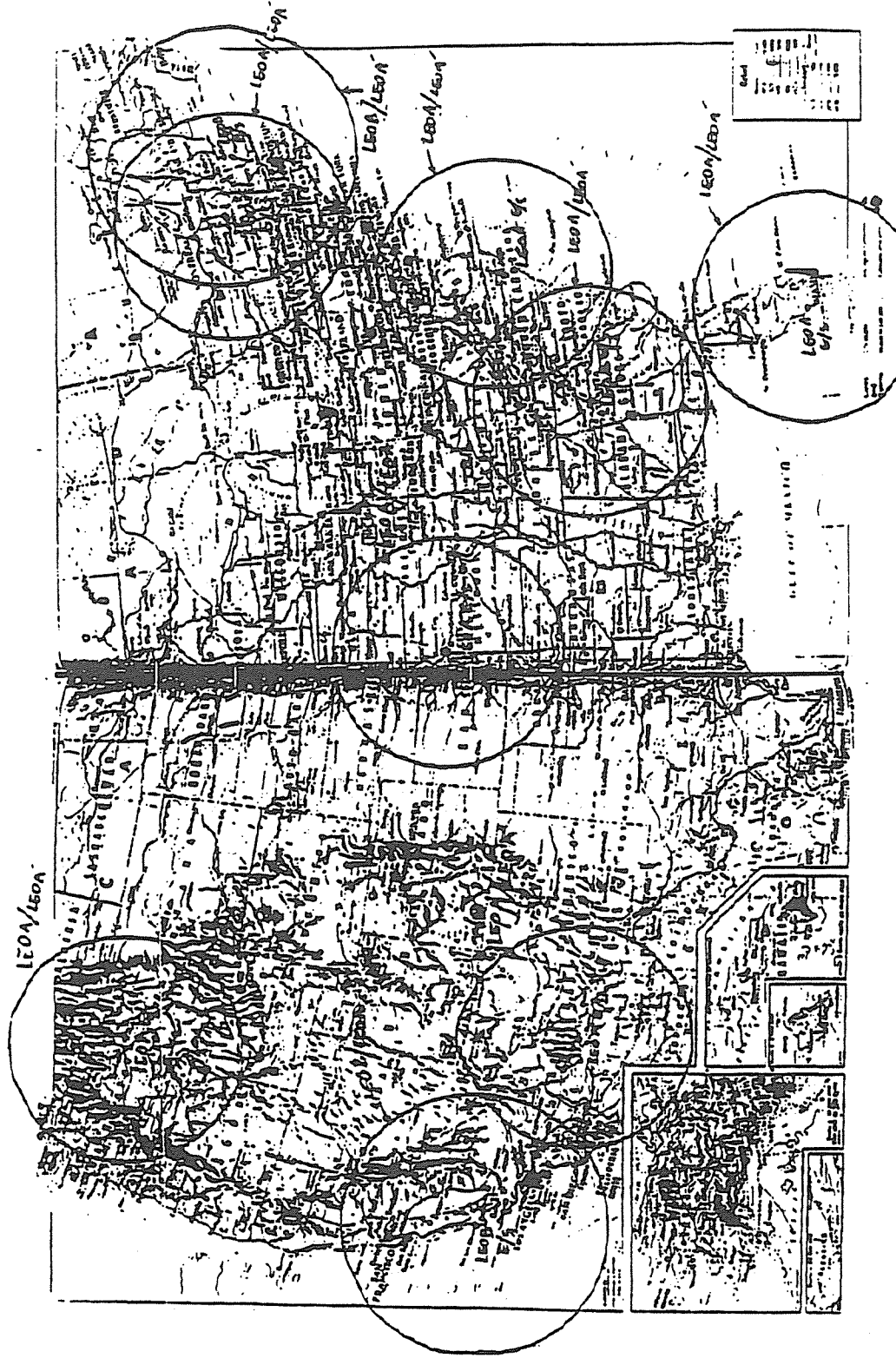


Figure 1: Required LEO A' Earth Station Separation From LEO A And LEO B Earth Stations
 (Case 1: LEO A and LEO A' Operate on Opposite Polarization)

Figure 1 also demonstrates that the constraints on Astrolink™ gateway and other GSO FSS operations by numerous NGSO MSS feeder link earth stations are cumulative.

Recognizing these facts, the Commission sought to preserve the viability of GSO FSS operations in the 29.25-29.5 GHz band by: (i) restricting access to the band to NGSO MSS systems employing repeating ground tracks; (ii) requiring NGSO MSS systems to demonstrate that they can share with existing GSO FSS licensees; and (iii) conditioning further NGSO MSS access on the successful coordination with GSO FSS parties.¹⁵ Iridium's MACROCELL System satisfies none of these requirements.

V. CONCLUSION

Iridium's request to utilize the 29.25-29.5 GHz band for MSS feeder uplinks does not comply with the Commission's rules because the MACROCELL System does not maintain repeating ground tracks and because Iridium has not demonstrated that MACROCELL can share feeder uplink spectrum with licensed GSO FSS systems. Furthermore, the proposed feeder links would significantly disrupt Astrolink™ gateway operations and GSO FSS operations generally.

¹⁵ See 47 C.F.R. § 25.258(c), (d) (1997); see also *28 GHz First Report and Order*, 11 FCC Rcd at 19035.

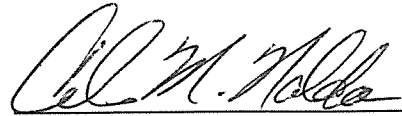
Accordingly, the Commission should permit MACROCELL feeder uplink operations in the 29.1-29.25 GHz band only.

Respectfully submitted,

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December 22, 1997

ENGINEERING CERTIFICATE

I hereby certify that I am the technically qualified person responsible for the preparation of the engineering information contained in the technical portions of the foregoing Comments of Lockheed Martin, that I am familiar with Part 25 of the Commission's rules, and that the technical information is complete and accurate to the best of my knowledge and belief.

A handwritten signature in cursive script that reads "Richard Barnett". The signature is written in black ink and is positioned above the printed name.

Richard J. Barnett, Ph.D., B.Sc.

President

Telecomm Strategies

December 22, 1997

CERTIFICATE OF SERVICE

I, Rayya K. Khalaf, a secretary at the law firm of Dow, Lohnes & Albertson, do hereby certify that on this 22nd day of December, 1997, the foregoing "Comments of Lockheed Martin Corporation" were served via first class mail (except where hand delivery is noted by an asterisk) to the following:

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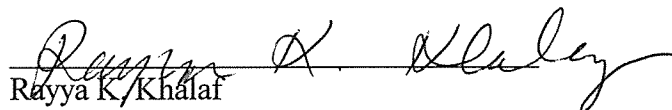
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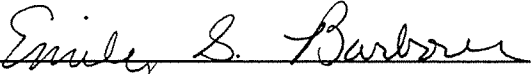

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CERTIFICATE OF SERVICE

I, Emily S. Barbour, hereby certify that a true and correct copy of the foregoing Comments was sent this 19th day of December, 1997, via first class mail, postage prepaid, to the following:

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December 19, 1997



Emily S. Barbour