Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands	)	IB Docket No. 02-364

JOINT REPLY COMMENTS OF L/Q LICENSEE, INC., GLOBALSTAR, L.P. AND GLOBALSTAR USA, L.L.C.

Of Counsel:

William F. Adler
Vice President, Legal and
Regulatory Affairs
Globalstar, L.P.
3200 Zanker Road
San Jose, CA 95134
(408) 933-4401

William D. Wallace
CROWELL & MORING LLP
1001 Pennsylvania Avenue, NW
Washington, DC 20004
(202) 624-2500

Their Attorneys

July 25, 2003

EXECUTIVE SUMMARY

The record in this proceeding does not demonstrate a need to modify the Big LEO band plan or reallocate Big LEO spectrum to another service. Iridium has not provided any facts that show a capacity constraint justifying expansion of spectrum for its Big LEO Mobile-Satellite Service ("MSS") system. Iridium claims that the existing band plan is unfair. But, in fact, the plan was adopted to accommodate Iridium's narrowband TDMA, bidirectional system design, with uplinks and downlinks in the same spectrum block.

Iridium claims that the circumstances underlying the adoption of the existing Big LEO band plan have changed because (1) burdensome sharing issues have not arisen with respect to the Global Navigation Satellite System ("GNSS") and Radio Astronomy Service ("RAS") and (2) substantial additional spectrum for MSS has been made available at 2 GHz. Neither point is true. GNSS and RAS still pose burdensome protection requirements for CDMA Big LEO systems, and Globalstar currently does not have access to spectrum at 2 GHz.

The Commission asked Iridium to demonstrate capacity constraints that required additional Big LEO spectrum. Iridium has offered pages of general information but no data responsive to the Commission's request. For example, it claims that it is providing service globally, and that its subscribership has increased since it commenced operations April 2001. But, it provides no factual evidence that these generalities impose a capacity constraint. Iridium claims that some of its satellites have reached 80% loading for short periods of time on several days in one

year, and that such peak loading will continue in the future; but, Iridium offers no actual numbers and no analysis of why its projections are accurate.

Iridium claims that recent U.S. military operations in the Middle East have taxed the capacity of its system. But, again, it offers no actual evidence of capacity constraints. Indeed, it submits statements from a Marine Corps report that claims Iridium phones were "highly reliable." Iridium also claims that its call drop rate in the Middle East improved because of access to additional spectrum, but provides no analysis of how it reached that conclusion. Information provided by Iridium to support its claim of capacity constraint in the Middle East shows that increasing service link spectrum by almost 50% did not increase Iridium's satellite capacity.

Iridium claims to have difficulty competing with other MSS systems in its current spectrum assignment, but has offered nothing more than general assertions that are true of other wireless and satellite systems as well. Iridium makes much of the fact that it cannot provide ATC in its L-band spectrum, but as Globalstar has demonstrated, expanding Iridium's L-band spectrum will still not make it feasible for Iridium to provide ATC with its bidirectional system. In short, Iridium has provided no concrete facts from which the Commission could find that the Iridium system is spectrum constrained.

The Comments of Cornell University indicate that there is very real potential for interference from Iridium L-band downlinks operating in expanded spectrum into RAS sites. The problem lies in Iridium's confessed inability to control its frequency assignments on a regional basis and its claim to use non-RAS-impinging

beams only outside of the RAS field-of-view. Because Iridium's channel usage cannot be controlled, the "field-of-view" for RAS sites has to be considered the entire earth because *any* one of the Iridium non-geostationary satellites will be illuminating each RAS site, wherever it is located at any time. This record indicates that Iridium cannot protect RAS sites if it operates downlinks below its existing operating band at 1621.35-1626.5 MHz.

As the future Big LEO band plan, Iridium recommends that the Commission assign to Iridium the 1615.35-1626.5 MHz band, assign to Globalstar the 1610-1615.35 MHz and 2483.5-2490 MHz bands, and reallocate for other services the 2490-2500 MHz band. Adoption of this band plan would eviscerate Globalstar's business plan for the United States, and would make it virtually impossible for Globalstar to provide the existing and future services described in its Joint Comments. This plan must be rejected.

Another reason to reject Iridium's band plan is Iridium's admitted inability to adhere to various band plans regionally. As a member of the International Telecommunication Union, the United States recognizes the sovereignty of other administrations over the use of radiofrequencies within their borders. Yet, Iridium admittedly cannot restrict any expanded spectrum usage to the United States, and has made no showing that any change to the Big LEO MSS band plan would be consistent with its authorizations in all other countries where the operations of Globalstar and Iridium would be affected.

The record in this proceeding demonstrates that the Big LEO MSS spectrum should be retained for Big LEO MSS. The operational Big LEO systems are providing important and critical MSS services that are not being provided by any other system or service to commercial subscribers, public safety and critical infrastructure organizations, and the U.S. military.

Several parties with an interest in use of spectrum for unlicensed devices filed comments suggesting that the Commission designate some of the Big LEO MSS spectrum, particularly the 2483.5-2500 MHz band, for unlicensed use. All the unlicensed service advocates ignore that the Commission has just proposed an additional allocation of 225 MHz for unlicensed devices in the 5 GHz band. And, earlier this year, the Commission reallocated the 1910-1920 MHz band away from unlicensed service because it was not being used. There is no demonstrated need for taking Big LEO spectrum for unlicensed devices, and, based on this record, the Commission must preserve all Big LEO MSS spectrum for Big LEO MSS.

The National Telecommunications and Information Administration and Lockheed Martin Corporation suggested that the Commission allocate spectrum in the Big LEO band for U.S. government MSS systems. Given the amount of spectrum available for government MSS systems and the ability of the commercial MSS systems to offer the government encryption technologies, there is no reason to pursue this proposal.

All proposals to reallocate Big LEO spectrum should be rejected. The fact that Big LEO MSS systems have not achieved the market share that they predicted

when first proposed is irrelevant to whether the same amount of spectrum should remain allocated for satellite-delivered services. The Commission has recognized that it and the public must tolerate a longer ramp-up period for certain services in order to achieve the public interest benefits provided by the services. In light of the Commission's policy of allowing new services time to develop and gain acceptance in the marketplace, the Commission should preserve the opportunity for Big LEO systems to provide the recognized public interest benefits and maintain the Big LEO spectrum for Big LEO systems.

The record in this proceeding does not support modifying the Big LEO band plan nor reallocating any Big LEO spectrum to another service. If the Commission were to reconsider the Big LEO band plan, then it should generally adhere to the principles developed in the 1993 Big LEO Negotiated Rulemaking and 1994 rulemaking. If an alternative to the current band plan were justified on this record, Globalstar believes that there are approaches that would serve the public interest substantially better than Iridium's proposal. Before the Commission determines that a change to the current CDMA-TDMA band assignments is warranted, the Commission should allow time for Globalstar and Iridium to explore further a common proposal based on what they have learned in this proceeding and the information obtained as a result of their sharing CDMA Channels 8 and 9 in the Middle East Region under Iridium's recent grants of Special Temporary Authority.

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY i

I. IRIDIUM'S REVISIONIST HISTORY DOES NOT JUSTIFY MODIFICATION OF THE BIG LEO BAND PLAN. 1

II. THE RECORD DOES NOT SUPPORT MODIFICATION OF THE BIG LEO BAND PLAN AT THIS TIME. 8

A. Iridium's Rationales for Re-Examining the Big LEO Band Plan Do Not Demonstrate Changed Circumstances. 8

B. Iridium Failed to Demonstrate Capacity Constraints That Would Justify a Change in the Big LEO Band Plan 10

1. Iridium has customers in various parts of the globe that use its spectrum resources, but it has not shown that its service coverage has a bearing on whether it needs more spectrum. 11

2. Iridium claims that its subscribership has increased since Iridium commenced operations in April 2001, but has not demonstrated how this claim is relevant 11

3. Iridium has experienced periods of up to 30 minutes on a few days in some regions of the world where its peak loading reaches 80%. 13

4. Recent U.S. military operations in the Middle East region have allegedly taxed Iridium's system capabilities. 14

5. Iridium alleges, but has not demonstrated, that its call drop rate in the Middle East improved *because of* temporary access to additional spectrum. 15

6. Iridium claims to have difficulty competing with other MSS systems with only 5.15 MHz. 15

7. Iridium cannot provide ATC in 5.15 MHz. 17

8. Iridium's information does not show a need for additional spectrum. 18

C. Iridium Failed to Demonstrate That It Can Protect Radio Astronomy Sites If the Band Plan Were Changed. 19

D. The Public Interest Does Not Support Iridium's Proposed Big LEO Band Plan. 22

III. MODIFICATION OF THE EXISTING BAND PLAN WOULD VIOLATE INTERNATIONAL LAWS. 25

IV. THE RECORD DOES NOT SUPPORT REALLOCATION OF BIG LEO SPECTRUM TO OTHER SERVICES. 28

A. The Advocates of Unlicensed Services Have Not Justified Obtaining Access to Big LEO Spectrum. 29

B. The U.S. Government Does Not Need Access to Big LEO Spectrum for New MSS Systems. 32

C. The Commission Should Reject All Suggestions to Reallocate Big LEO Spectrum to Other Services. 33

V. THE COMMISSION SHOULD GRANT TIME FOR GLOBALSTAR AND IRIDIUM TO DISCUSS A COMMON BAND PLAN PROPOSAL. 35

VI. CONCLUSION 38

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands	)	IB Docket No. 02-364

JOINT REPLY COMMENTS OF L/Q LICENSEE, INC., GLOBALSTAR, L.P. AND GLOBALSTAR USA, L.L.C.

Pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. § 1.415), L/Q Licensee, Inc. ("LQL"), Globalstar, L.P. ("GLP"), and Globalstar USA, L.L.C. ("GUSA") (collectively, "Globalstar"), hereby submit these reply comments in response to the comments filed regarding the Notice of Proposed Rulemaking ("NPRM") in IB Docket No. 02-364.[1]

I. IRIDIUM'S REVISIONIST HISTORY DOES NOT JUSTIFY MODIFICATION OF THE BIG LEO BAND PLAN.

In its filed Comments, Iridium provides not one fact necessary to justify modification of the Big LEO Mobile-Satellite Service ("MSS") band plan. Instead, Iridium portrays the Big LEO band plan as one in which equity requires band

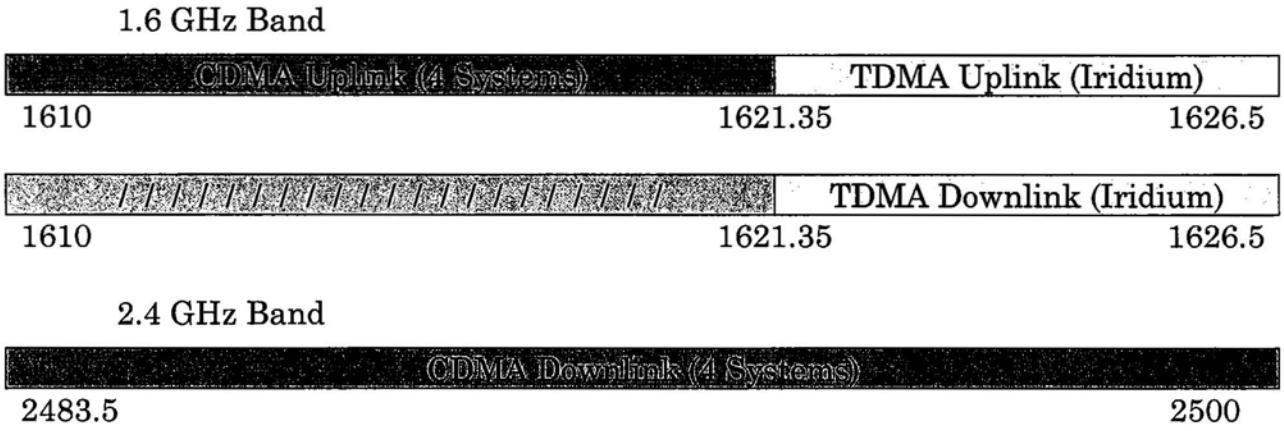
[1] See Report and Order and Notice of Proposed Rulemaking, FCC 03-15 (released Feb. 10, 2003), 18 FCC Rcd 1962, published at 68 Fed. Reg. 33666 (June 5, 2003). LQL, GLP and GUSA submitted "Joint Comments" on July 11, 2003.

realignments because Globalstar was licensed for 27.85 MHz of spectrum while Iridium only got 5.15 MHz. (Iridium Comments, at 5.) Iridium's description of the Big LEO band plan is misleading, at best. The Big LEO band plan was adopted *to accommodate Iridium*.

As Globalstar explained in its Joint Comments (at 22-25), Iridium had as much to do with the current spectrum assignments as anyone because it voluntarily insisted upon the terms and conditions underlying the current band plan. And those terms and conditions are not as Iridium represents; indeed, the technology Iridium sought to accommodate imposes more limitations on Iridium services than the 5.15 MHz bandwidth. The amount of raw spectrum available to a system, in and of itself, is determinative of absolutely nothing. It is only a starting point for developing a successful business, just as iron ore is the starting point for constructing an automobile.

First, Iridium chose a narrowband TDMA system design with uplinks and downlinks in the same spectrum block. This design did not appeal to any other prospective Big LEO MSS system; however, it did allow Iridium to extract the equivalent of 10.30 MHz of unshared spectrum from its exclusive block of 5.15 MHz. (See Figure 1 below.) The United States even went to great lengths at the 1992 World Administrative Radio Conference to obtain an allocation for MSS downlinks in the 1.6 GHz L-band—just for Iridium's bidirectional TDMA system design. (See Globalstar Joint Comments, at 22-25.)

Figure 1: The Big LEO Band Plan



Second, Iridium was offered but refused a spectrum assignment at S-band for its downlinks, refused to use a spectrum sharing technology, and insisted on a band plan that accommodated its highly unique technology. *Had Iridium not refused to construct a spectrum sharing MSS system, Globalstar and Iridium would today be sharing 16.5 MHz on both the uplink and downlink.*

Third, the Commission did not anticipate that it would be "necessary" to reassign Big LEO spectrum if only one CDMA system was constructed, as Iridium claims (Iridium Comments, at 6). The Commission considered that it might reassign 3.1 MHz, and only 3.1 MHz, in the L-band, depending upon the circumstances that pertained when the Big LEO systems became operational.[2] The Commission specifically declined to adopt as "necessary" the automatic

---

[2] See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 9 FCC Rcd 5934, 5959-61 (1994) ("Big LEO Rules Order"), modified on recon., 11 FCC Rcd 12861 (1996).

redistribution of 3.1 MHz if only one CDMA system became operational and stated that it would consider several factors in deciding whether any reassignment of the 3.1 MHz would be in the public interest.[3]

It is preposterous now for Iridium to assert that the current Big LEO band plan (Figure 1) is "inherently inequitable, anticompetitive, and contrary to the public interest." (Iridium Comments, at 7.) The current Big LEO band plan represented the Commission's best effort, based on an extensive factual record, a lengthy and sometimes fractious negotiated rulemaking process and dozens of expert opinions, to achieve the overarching goal of multiple entry (five systems total) while allowing Iridium to construct and launch its unique, sharing-resistant system using its proprietary bidirectional narrowband technology. In a very real sense, the design of the Big LEO band plan in 1994 was an accommodation to Iridium that the Commission was in no sense compelled to make.[4]

Iridium now complains (Iridium Comments, at 7-9) that it had to build its system to operate on less spectrum than the 10.5 MHz in L-band that it initially applied for. Well, so did Globalstar. Obtaining a license for less spectrum than requested in the initial application is a fact of life, not only in MSS processing rounds, but in virtually every spectrum allocation proceeding, because demand for spectrum invariably exceeds supply.

---

[3] Id.

[4] See Lockheed Martin Corp. Comments, at 4 (Big LEO band plan "was a valid compromise and should not be overturned at this time").

We have searched, without success, for any public statement or suggestion by Iridium at any time following the 1994 Big LEO Report and Order until it filed its Petition for Rulemaking that its exclusive access to 5.15 MHz of spectrum would in any way prevent it from meeting its revenue and subscribership forecasts and, consequently, becoming a successful enterprise. For example, we reviewed the Preliminary Prospectus of Iridium World Communications Ltd., dated May 9, 1997. This Prospectus was the vehicle for Iridium's first public offering of common stock. It is not only customary, it is mandatory, that the offeror describe all material circumstances that might cause the business to falter.[5] For a company built on spectrum as its natural resource, a shortage or potential shortage must be identified for investors. Under a Risk Factor entitled "Limited Satellite Capacity," Iridium refers to "usage pattern and spectrum allocation" as having a significant impact on the capacity of its system should it experience "unexpected usage patterns which could exceed the capacity of the IRIDIUM System through one or several gateways." (Prospectus at 32.) While the design capacity of Iridium's (and Globalstar's) system has been kept confidential, all MSS operators were predicting addressable markets in the multimillions. Later in the Prospectus under "Regulation of Iridium," Iridium states the following: "Each country in which Iridium intends to operate must authorize the use of the frequencies linking the phone to the satellites, allowing communications between end users and the satellite network. At a

---

[5] These carefully-worded reservations by the offeror are typically in a section of the Prospectus entitled "Risk Factors."

minimum, the IRIDIUM System needs exclusive use of the frequencies 1621.35-1626.5 MHz for this purpose, with authority to operate bi-directionally within that band."[6] (Prospectus at 70.) Iridium did receive exclusive access to enough spectrum to support potentially hundreds of thousands of subscribers in 1997; it now has a fraction of that number of subscribers,[7] and yet claims that its spectrum is insufficient; in other words, the "minimum" is no longer acceptable even though traffic is far below 1997 estimates.

Iridium complains further that the band plan results in inequities: Globalstar can offer greater bit rates than Iridium, Globalstar can offer ATC while Iridium cannot, and Iridium cannot meet its projected demand in 5.15 MHz. In truth:

- Iridium can offer higher voice and data rates; it has decided not to do so apparently for business reasons; but additional spectrum would not facilitate higher bit rates (see Tech. App. § 3);[8]

---

[6] There are no risks related to the amount of spectrum identified in Iridium LLC's Offer to Exchange senior notes, dated July 21, 1997, or in Iridium World Communications Ltd.'s Prospectus dated January 21, 1999.

[7] Unlike Globalstar, Iridium has refused to provide its number of subscribers for the record. We estimate that the number is in the range of 40,000 to 60,000, including the up to 20,000 Department of Defense ("DOD") subscribers that are captive customers under Iridium's exclusive contract with DOD. See Contract No. DCA100-01-C-4007, December 7, 2000, under which DOD pays $3 million per month for unlimited usage on up to 20,000 phones. The contract is next up for extension at the end of 2003.

[8] The original Iridium system was designed to use 4.8 kbps vocoders. See Report of Motorola on Band Segmentation Sharing, at 47, Att. 2 to Annex 1, NRM Report (April 6, 1993). It appears that the Iridium system was built to take advantage of "improved vocoders" that were an anticipated improvement to MSS systems. Id., at 91; see also Motorola Satellite Communications, Inc., Iridium System Application, at 36 (dated Dec. 3, 1990) (noting use of 2400 bps data service).

(continued...)

- Iridium's bidirectional system design precludes it from offering ATC in 5.15 MHz of L-band, or 10.5 MHz of L-band; accordingly, as shown below, ATC is irrelevant to this proceeding (see Tech. App., § 4);

- Iridium has failed, despite the Commission's invitation, to provide even one hard fact demonstrating that its available spectrum cannot meet its current and projected need (see infra § II).

The Commission can fairly interpret Iridium's complaints as nothing more than a lament about the limitations of its own system design.[9] It was asked by the Commission to demonstrate an actual need for more spectrum, and it has not done so. As Globalstar explains in its initial comments and below, there is simply no justification on this record to modify the existing Big LEO band plan.[10]

(...continued)

Again, the fact that the Iridium system was built to take risks with technology supports retention of the current band plan, rather than modifying the band plan to transfer the risk to Globalstar.

[9] See Comments of the Official Creditors' Committee of Globalstar, L.P., at 4 ("While Iridium has consistently argued that the Big LEO spectrum-sharing plan should be reconfigured as a matter of 'fairness,' the fact remains that Iridium has simply failed to demonstrate that it faces capacity constraints which justify such a reconfiguration, especially in light of Globalstar's full and efficient use of its spectrum allocation").

[10] See Motor Vehicles Mfrs. Ass'n v. State Farm Auto. Ins. Co., 463 U.S. 29, 43 (1983) (agency decision must be rationally related to the record developed in proceeding); Illinois Public Telecommunications Ass'n v. FCC, 117 F.3d 555, 564 (D.C. Cir. 1997) (FCC's decisionmaking found arbitrary and capricious because decision failed to respond to facts in the record).

II. THE RECORD DOES NOT SUPPORT MODIFICATION OF THE BIG LEO BAND PLAN AT THIS TIME.

As explained herein, the record does not support changes to the Big LEO band plan. The technical justifications for, and the public interest rationales that supported, the adoption of the Big LEO band plan in 1994 remain intact based on the information submitted to this record.

A. Iridium's Rationales for Re-Examining the Big LEO Band Plan Do Not Demonstrate Changed Circumstances.

In its Petition for Rulemaking (Iridium Comments, Ex. A, at 5-7) and Comments, Iridium suggests that the circumstances underlying the adoption of the existing Big LEO band plan have changed because, on the one hand, burdensome sharing issues for the licensed U.S. systems have not arisen with respect to the Global Navigation Satellite System ("GNSS"), Radio Astronomy Service ("RAS") or foreign Big LEO systems, and, on the other hand, substantial additional spectrum for MSS has been made available at 2 GHz.

Iridium is incorrect on both points.

First, as detailed in Globalstar's Joint Comments (at 10-12), the protection requirements imposed upon CDMA systems, in particular, with respect to GNSS and RAS make it difficult to use the lower portion of the CDMA L-band (*i.e.*, 1610-1616 MHz) relative to the higher portion (*i.e.*, 1616-1621.35 MHz). This situation is unlikely to improve. As the Commission is aware, the National Telecommunications and Information Administration ("NTIA") has drafted a proposal that would make more stringent the GNSS protection requirements

applicable to ATC stations.[11] And the RAS community remains acutely concerned with out-of-band emissions from MSS systems operating in the Big LEO L-band.[12] Perhaps RAS sharing has not proven overly burdensome for Iridium, but then Iridium operates at a farther remove from the RAS co-primary allocation at 1610.6-1613.8 MHz, whereas Globalstar operates right in it.[13] Therefore, as the Commission recognized in 1994, the burdensome requirements for protection of GNSS and RAS detailed by the Big LEO Negotiated Rulemaking remain in place today, and support retention rather than modification of the existing Big LEO band plan.

Second, the Commission has taken 30 MHz of the 70 MHz originally available for growth and expansion of MSS at 2 GHz.[14] Furthermore, the Commission has cancelled GLP's 2 GHz MSS license, but not Iridium's.[15]

---

[11] See NTIA Letter, IB Dkt. No. 01-185 (dated Nov. 12, 2002) (filed Feb. 10, 2003).

[12] See Cornell University Comments, at 6-8.

[13] See Big LEO Rules Order, 9 FCC Rcd at 5960 ("If RAS sharing proves burdensome . . . , an assignment of 8.25 MHz for each of the two LEO system architectures may not prove equivalent").

[14] See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, 18 FCC Rcd 2223, 2241 (2003) ("AWS Third Report").

[15] Globalstar, L.P., 18 FCC Rcd 1249 (Int'l Bur. 2003) (cancelling GLP's 2 GHz MSS licenses); Iridium 2 GHz LLC, DA 03-2075 (released June 24, 2003) (awarding Iridium 10 MHz of 2 GHz MSS spectrum). GLP has filed an Emergency Application for Review and Request for Stay of the decision cancelling its licenses, which remain pending.

Therefore, to the extent that the 2 GHz MSS spectrum is relevant to this proceeding, Iridium has obtained a competitive advantage over Globalstar as a result the Commission's action regarding 2 GHz MSS, and the 2 GHz allocation does not in any way justify reassigning Big LEO spectrum to Iridium.

B. Iridium Failed to Demonstrate Capacity Constraints That Would Justify a Change in the Big LEO Band Plan.

The Commission initiated this proceeding at the behest of Iridium Satellite LLC, based on the "anecdotal evidence" of its need for more spectrum to support its allegedly capacity constrained system. In the NPRM (¶¶ 267-268), the Commission made a straightforward request to Iridium to provide concrete evidence that the Iridium system is spectrum constrained.[16]

Iridium failed to provide that evidence. In fact, there are several other equally plausible explanations for the system congestion that Iridium alleges it is experiencing.[17]

Therefore, the record contains nothing more than Iridium's conclusory statements unsupported by data, and the Commission found such conclusory

---

[16] See NPRM, ¶¶ 267-268 ("we seek detailed comment regarding [Iridium's] actual current spectrum use and substantiated projections of its future spectrum requirements. . . . We seek comment on how efficiently Iridium is using its current spectrum and, if we were to make more Big LEO spectrum available, exactly how much additional spectrum would be appropriate").

[17] See Tech. App., § 2; Letter from William D. Wallace to Thomas S. Tycz, at 2 (dated June 11, 2003) (noting that Globalstar's analysis of Iridium's call traffic data indicated that "factors other than increased call traffic may be causing Iridium's radio link failures in the Middle East") (reproduced as Attachment A).

statements insufficient six months ago. Iridium did provide 120 pages of smoke and mirrors. Here's what its pleading did and did not demonstrate:

1. Iridium has customers in various parts of the globe that use its spectrum resources, but it has not shown that its service coverage has a bearing on whether it needs more spectrum.

Iridium's Petition for Rulemaking (Iridium Comments, Ex. A, at 8-12) and its pleading (Comments, at 10) make much of the global MSS services that Iridium is attempting to provide in rural United States, Africa, Latin America and the Middle East as a basis for its need for more spectrum. Yet, non-geostationary MSS systems are inherently global systems. Iridium is simply providing service in areas that the system was originally designed to serve, and the Commission's rules require it to cover.[18] Where Iridium is providing service is irrelevant to whether it actually needs more spectrum.[19] Providing service to isolated subscribers in rural parts of the globe does not add up to a spectrum constraint.

2. Iridium claims that its subscribership has increased since Iridium commenced operations in April 2001, but has not demonstrated how this claim is relevant.

Iridium claims that its subscriber growth is a factor in its need for additional spectrum. (See Iridium Comments, at 11; and Ex. B, at 1 "Spectrum Report.") It then provides some percentages (rather than any hard numbers, which are entirely

---

[18] See 47 C.F.R. § 25.143(b).

[19] Indeed, as discussed in Section III below, Iridium may be violating the laws of other administrations if it operates in an expanded frequency band.

absent from its pleading) of subscriber growth from May 2001 to May 2002 (*e.g.*, 350% global growth; 380% in Western U.S./Alaska; 650% in Department of Defense subscribers).

The new Iridium, of course, only commenced commercial service in *April 2001*.[20] Therefore, these percentages could very well represent an increase from 1 to 35 in global subscribers (350%), or from 1 to 38 subscribers in Alaska (380%). Its DOD subscribers are also unclear. Iridium claimed in the January 2003 Spectrum Report (at 1, § 3.0) that its DOD subscribers were "approaching the 20,000 base subscriber level" under the DOD contract. Yet, three months later, in March 2003, Government Computer News reported that Iridium's DOD subscribers number "about 15,000."[21]

Once again, Iridium has failed to document system capacity constraints, directly correlated with its amount of spectrum, even under the most exaggerated levels of subscribership. In response to the Commission's request for information on its subscribership, Iridium provided nothing except meaningless percentages. The simple inference is that if the raw numbers were favorable, Iridium would have provided them. It did not.

---

[20] "Iridium Satellite LLC Launches Global Satellite Communications Services," Iridium Press Release (Mar. 28, 2001).

[21] See Government Computer News, "DOD re-ups satellite communications contract," (Mar. 31, 2003) (available at www.gcn.com/vol1_no1/dod/21528-1.html).

3. Iridium has experienced periods of up to 30 minutes on a few days in some regions of the world where its peak loading reaches 80%.

The centerpiece of Iridium's claim for spectrum-related capacity constraints is the information on "regional congestion trends" with "satellite loading approaching 80% for a number of days." (Comments, at 11; Spectrum Report, at 5-6.) Stripped of Iridium's rhetoric, what these tables show is limited usage of the Iridium system in the United States and Africa and moderate usage of the system in the Middle East (where the U.S. military has deployed Iridium phones).

The following discrepancies in Iridium's information vitiate the credibility of its asserted capacity constraints:

- Iridium counts a "day" of peak loading as any day in which "satellite loading" reaches 80% for 15-30 minutes. (Telecommunications providers do not generally consider such a brief period in such a small geographic area indicative of a "peaking" problem sufficient to warrant investment in more capacity.)
- Iridium has multiple satellites serving the same regions of the world, but it does not explain how many satellites serving any specific region actually reached 80% loading.
- Iridium provides absolutely no basis for its extrapolations that peak loading days will reach over 300 days during 2003 in various regions.
- Iridium claims that call establishment rates are negatively affected when satellite traffic loading reaches 80%, but it does not explain whether the "negative effect" is 0.5%, 1%, or 10% of attempted calls that are not established when 80% loading is reached. Given that a peak loading day on the Iridium System may comprise only 15-30 minutes of 80% loading, it is difficult to understand how call establishment could be seriously impaired.

In short, Iridium's conclusory claims of constrained capacity attributable to peak loading are unsubstantiated and distorted statements designed to create an

impression that usage of the system is greater than it actually is and that the problem can only be met with the assignment of additional spectrum.

4. Recent U.S. military operations in the Middle East region have allegedly taxed Iridium's system capabilities.

Iridium makes much of the fact that the U.S. military is using Iridium phones for communications in the Middle East during the recent operations in Afghanistan and Iraq. (Iridium Comments, at 12-15.) War is, of course, inherently unpredictable and, hopefully, temporary. The fact that U.S. military operations employ Iridium phones in foreign countries where there is no telephone infrastructure available is certainly no basis permanently to impair the ability of Globalstar subscribers globally from obtaining telephone service. Once the U.S. military can use more permanent telecommunications systems, or departs Iraq, Iridium's spectrum usage will return to the limited usage indicated for pre-2003 levels.[22]

In any event, Iridium claims that lack of spectrum has degraded Iridium service to the U.S. military. (Iridium Comments, at 12-15.) However, the Marine Corps Systems Command Liaison Team field report, dated April 2003, attached to

---

[22] Iridium's Exhibit E states that during November 2002, peak load of the Iridium system for military use globally was only 16% on any given day. S. Ellen, "Users Flock to Satellite Phone System," Military Information Tech. Magazine, at 4 (May 21, 2003). The Coalition Provisional Administration of Iraq recently announced that it would initiate the process of awarding terrestrial wireless licenses at a Tender Conference in Jordan on July 31, 2003.

Iridium's Comments (Ex. D, at 2), states that Iridium phones "provided reliable communications at all times."

> There was a lot of positive feedback on the Iridium phone. Due to its ability to be used when not in Line of Site [sic], these phones were often used for communication. It was a highly reliable means for the forces to continually be in contact with one another. (Exhibit D, at 8.)

One cannot square Iridium's claim that it needs more spectrum to improve quality of service in the Middle East when actual users rated the phone as "highly reliable."

5. Iridium alleges, but has not demonstrated, that its call drop rate in the Middle East improved *because of* temporary access to additional spectrum.

Iridium claims in its Comments (at 14) that "the call drop rate increase within the [Middle East] region was directly attributable to the lack of spectrum resources." However, it offers absolutely no analysis of how it reached that conclusion. Without information from Iridium on how it eliminated other potential causes of an increased call drop rate, Globalstar cannot test, and the Commission may not accept, its conclusion as credible.[23] (See Tech. App., § 2)

6. Iridium claims to have difficulty competing with other MSS systems with only 5.15 MHz.

Iridium claims (Comments, at 15-25) that 5.15 MHz for its forward and return links does not give it sufficient bandwidth to compete with other U.S. and

---

[23] Iridium claims a systemwide call drop rate of about 1%. Iridium Comments, at 23. Yet, in other documents it has stated that its call drop rate is 10%, which is much closer to Globalstar's estimate of the Iridium call drop rate at 18%. See Tech. App., § 6.

foreign systems. Iridium claims that it anticipates increases in subscribers for voice services in the rural United States and to data services, and expects increases in the number of peak loading days. It also claims that handset-to-handset calls are burdening the system. Further, even though it cannot provide ATC in 10.5 MHz of L-band spectrum, Iridium claims that ATC will further constrict its spectrum resources.

Globalstar also anticipates increases in subscribers and in demand for its various niche services. That is certainly the overall trend in wireless services. But again, Iridium has provided no facts that would allow the Commission to relate subscriber growth to its spectrum assignment or to ignore Globalstar's anticipated growth and usage, which, we are confident, will exceed Iridium's and will require 11.35 MHz at L-band,[24] or to conclude as a matter of rational decisionmaking that Iridium's predicted increases in usage merit a modification of the Big LEO band plan. Iridium has proved no connection between its business projections and its need for more spectrum.

Iridium's other assertions are equally unpersuasive or downright irrelevant. Handset-to-handset calls use no more spectrum than two separate calls, and such calls are unlikely to be prevalent except in areas, such as Iraq, where there is no operational telecommunications infrastructure.[25] Even this circumstance is only

---

[24] See Globalstar Joint Comments, at 5-12.

[25] Handset-to-handset calls use exactly the resources that they should – twice that of one call because in fact two calls are being made. A typical cellular system (continued...)

temporary. And, finally, as noted below, Iridium cannot provide ATC in L-band alone. Accordingly, it would not have to meet a demand for ATC even with expanded L-band spectrum. Projections based on temporary increases in types of calls and non-existent services do not demonstrate a spectrum-limited system.

7. Iridium cannot provide ATC in 5.15 MHz.

Iridium attempts to justify its request for additional spectrum by asserting that it will be unable to implement ATC in its current spectrum assignment. (Iridium Comments, at 33-34; Spectrum Report, at 7-9.) Unfortunately, the Commission appeared to accept this justification in the NPRM.[26] Yet, Iridium is tellingly silent on its *actual ability* to provide ATC in a total of 10.5 MHz of L-band spectrum.[27] There is no evidence on the record to suggest that reassignment of L-band spectrum would allow Iridium to implement ATC.

(...continued)

would charge both the originator and the person being called. Currently, Iridium offers a discount to users for handset-to-handset calls. Once such calls become numerous and use too much of the spectrum, it is standard practice to remove the discount.

[26] See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, 18 FCC Rcd 1962, 2011 & 2056-57 (2003) ("ATC Report and Order") (limiting CDMA spectrum available for ATC to 5.5 MHz in each direction at 1610-1615.5/2492.5-2498 MHz); NPRM, ¶ 266 and n.720.

[27] See Iridium's Spectrum Report, at 8. Iridium says that it "would be in a position to offer terrestrial connectivity while continuing to provide mobile satellite services with sufficient additional spectrum at either the 1.6 GHz or 2.4 GHz band." It does not say that it can provide ATC in 10.5 MHz of L-band. In Globalstar's view, Iridium is positioning its inability to provide ATC solely as a ruse to take spectrum away from Globalstar, which can provide ATC in the Big LEO bands.

As Globalstar demonstrated in its Joint Comments (at 15-16), Iridium cannot provide ATC in just L-band with 5.15 MHz or 10.5 MHz of spectrum. (See Tech. App., § 4.) Indeed, Iridium has implied a preference for gaining access to 2.4 GHz spectrum to implement ATC over the Iridium system, which would provide hundreds of megahertz of discrimination between the forward and return links for ATC transmitters.[28] This is not surprising, because as Globalstar has explained 10.5 MHz is simply insufficient for current filtering technology to preclude ATC transmitters from overloading ATC receivers.[29] No matter how Iridium tries to spin it, ATC is irrelevant to Iridium's purported need for additional spectrum and cannot be a decisional factor for the Commission.

8. Iridium's information does not show a need for additional spectrum.

In the NPRM, the Commission, for reasons not apparent in the document itself, indicated that it was predisposed to Iridium's claim to need more spectrum. Iridium was simply directed to document its need. Despite this invitation, Iridium has provided no concrete facts from which the Commission, or any reasonable decisionmaker, could find that the Iridium system is spectrum constrained.

As discussed in the attached Technical Appendix (§ 2), there is another reason why Iridium cannot show that it is suffering from capacity constraints.

---

[28] See, e.g., Letter from Richard E. Wiley to Marlene H. Dortch, at 10 ("New Band Plan A"), filed in ET Dkt. No. 01-185 (Dec. 3, 2002).

[29] See Globalstar Joint Comments, Tech. App., § 6; Reply Comments, Tech. App., § 4.

There are many factors that affect the capacity of an MSS system, available spectrum being one. Iridium claims (Comments, at 14-15, 25) that the additional 2.5 MHz of spectrum made available to it under Special Temporary Authority improved its ability to serve increased call volume in the Middle East. Yet, its analysis does not show any increase in call capacity on the satellites as a result of increased spectrum and thus supports the view that Iridium's capacity is limited, if at all, by some factor other than the spectrum available to it. Therefore, granting Iridium more spectrum would not improve the alleged constraint on capacity, and would simply make more Big LEO spectrum available for Iridium's inefficient system. (See Tech. App., § 1.) Accordingly, on this record, the Commission must reject Iridium's claim of need for more spectrum.[30]

C. Iridium Failed to Demonstrate That It Can Protect Radio Astronomy Sites If the Band Plan Were Changed.

Protection of Radio Astronomy Service ("RAS") sites was a critical issue during the Big LEO NRM, and it is a critical issue underlying any proposed modification of the Big LEO band because "[t]he emissions that radio astronomers

---

[30] See Comments of GLP Creditors' Committee, at 7 ("To grant Iridium's request to reallocate 3.1 MHz of Big LEO spectrum to Iridium, let alone the 5.85 MHz that Iridium has requested, would in essence be rewarding Iridium for its choice to deploy inefficient MSS technology").

review are extremely weak—a typical radio telescope receives less than one-trillionth of a watt from even the strongest cosmic source."[31]

CDMA systems can generally protect RAS sites during times of observations by not transmitting earth-to-space signals at L-band in certain geographic zones.[32] Iridium's space-to-earth transmissions, however, can only protect RAS sites during observations by meeting the ITU's standard for maximum acceptable level of interference into the RAS band at a spectral PFD ("SPFD") of –238 $dBW/m^{-2}/Hz^{-1}$ (ITU-R RA 769-1). Cornell University filed comments indicating that, with respect to the Arecibo Observatory in Puerto Rico, Cornell strongly believes that the closer Iridium transmissions are to the 1610.6-1613.8 MHz part of the band, the more difficult it will be for Iridium to comply with its obligation to avoid creating harmful interference into RAS.[33] Moreover, Cornell points out that the potential for harmful interference from Iridium downlinks will *increase* as the number of channels used by Iridium increases.[34]

Cornell has good cause for concern. In its comments, Iridium essentially concedes that it cannot protect RAS sites from transmissions below 1621.35 MHz. It states: "[W]hen necessary, the space-to-ground beams impinging on radio

---

[31] Cornell University Comments, at 3 ("[O]bservations of the hydroxyl (OH) molecule . . . . are of great importance to scientists studying stellar expansion velocities").

[32] See 47 C.F.R. § 25.213(a).

[33] Cornell University Comments, at 7.

[34] Id. at 4.

astronomy sites can be operated at the upper end of the MSS Big LEO allocation, thereby providing significantly reduced out-of-band emission." (Iridium Comments, at 38.) However, it also concedes that the non-RAS-impinging beams can only be used in limited geographic areas, "beams outside of the RAS field-of-view." (Id.)

The problem lies in Iridium's confessed inability to control its frequency assignments on a regional basis.[35] Because Iridium's channel usage cannot be controlled, the "field-of-view" for RAS sites has to be considered the entire earth because *any* one of the Iridium NGSO satellites will be illuminating each RAS site, wherever it is located at any time. (See Tech. App., § 5.) Indeed, Cornell stated that it has seen a change in low intensity emissions at the Arecibo Observatory coincident with Iridium's obtaining access to CDMA Channels 8 and 9, and that the worst of this harmful interference only abated after Iridium stopped using CDMA Channel 8.[36]

Iridium's method of protecting RAS sites is to make "quiet time" available during specified 24-hour periods beginning January 1, 2006. Based on what the Commission now knows about Iridium's inability to control channel assignments regionally or locally (which Globalstar can and does do), there can be little doubt that Iridium cannot fulfill its commitment to the radioastronomers with downlinks below its existing operating band. As Cornell University requests, the Commission

---

[35] See Iridium's Spectrum Report, at 6, § 7.

[36] See Cornell University Comments, at 5.

should not place the RAS community in the position of having to accept a *fait accompli* from Iridium which endangers the RAS scientific program.[37]

D. The Public Interest Does Not Support Iridium's Proposed Big LEO Band Plan.

As the future Big LEO band plan, Iridium recommends that the Commission assign to Iridium the 1615.35-1626.5 MHz band, assign to Globalstar the 1610-1615.35 MHz and 2483.5-2490 MHz bands, and reallocate for other services the 2490-2500 MHz band. Adoption of this band plan would eviscerate Globalstar's business plan for the United States, and would make it virtually impossible for Globalstar to provide the existing and future services described in its Joint Comments.

Adoption of Iridium's proposed band plan would have the following effects on Globalstar:

- The Globalstar system would be limited to four return link channels in L-band and five forward link channels at S-band, but would be forward-link constrained because the system is designed for a band plan with an asymmetric forward (16.5 MHz) and return (11.35 MHz) link. (See Tech. App., § 7.)
- Globalstar's actual available capacity would be diminished even further because Iridium's band plan restricts Globalstar's return link to spectrum that is shared with RAS and is impaired by protection requirements for GNSS. (See Globalstar's Joint Comments, at 5-12.) These interservice protection requirements impose both geographic and power limitations on L-band transmissions, which would make it difficult for Globalstar to offer substantial service.
- Globalstar's planned aviation services would be eliminated because it would not have access to channels above 1616 MHz, which are

[37] See id., at 7.

necessary to meet FAA and RTCA standards. (See Globalstar Joint Comments, at 7.)

- Globalstar's planned remote telemetry service may be severely curtailed. As Globalstar explained in its Joint Comments (at 8), the remote telemetry service requires a separate assignment of two channels in order to meet the necessary quality of service standard. With only four return link channels available in the United States for both voice and other services, Globalstar may have to curtail the availability of the remote telemetry service.

- Given the diminished capacity and services, Globalstar would have difficulty competing with MSV and Iridium in the United States. Both those systems would have access to relatively more spectrum channels and would, therefore, have substantially more robust market positions.[38]

- The impairments to the Globalstar service attributable to the channel constraints and spectrum location noted above may make MSS less attractive as a communications solution for many of Globalstar's primary markets, including public safety organizations, security functions, and homeland defense. Globalstar may not be able to commit to the quality of service that would be expected for as many of these organizations as need the services Globalstar provides.[39]

- Iridium's proposed band plan would also have the effect of reducing the overall available capacity for MSS in the United States because of the substantial reduction in capacity available over the Globalstar system that would not be replaced with capacity on the less spectrally efficient Iridium system. As Globalstar detailed in its Joint Comments (at 14-15), Iridium appears to be operating at about 10% efficiency. (See Tech. App., § 1.)

---

[38] Under its band plan proposal, Iridium would have access to 10.5 MHz for each of its forward and return links. Iridium Comments, at 32. MSV has access to up to 20 MHz in the L-band. See Establishing Rules and Policies for Use of Spectrum for Mobile Satellite Services in the Upper and Lower L-Band, 17 FCC Rcd 2703 (2002).

[39] For example, Globalstar Canada expresses concern that Iridium's use of additional channels would interfere with Globalstar's commitment to Industry Canada's Emergency Telecommunications programs. Globalstar Canada Comments, at 3.

Iridium's proposed band plan would *not* necessarily increase the capacity or efficiency of the Iridium system. As explained in the Technical Appendix (§ 1), the Iridium system appears to operate very inefficiently, and increasing the available bandwidth would not improve its efficiency. Moreover, Globalstar has also explained (Tech. App., § 2) how Iridium's data show that a recent, temporary increase in available bandwidth did *not* increase the call capacity on the Iridium satellites. Iridium has ways other than spectrum reassignments to improve its efficiency and capacity. (See Tech. App., §§ 1-2.) The Commission should require Iridium to explore those improvements before awarding it additional spectrum for which, in any event, it has demonstrated no need.

During its development and operation, Globalstar has devoted substantial resources, in reliance on the existing Big LEO band plan, to developing a variety of MSS services to serve underserved and unserved wireless telecommunications markets. Although the development of MSS markets is taking more time than anticipated 12 years ago, Globalstar's experience over the last three years indicates that the markets will develop sufficiently to fulfill the expectations for MSS outlined in the Commission's Big LEO Report and Order.[40] It would not serve the public interest or the interests of the Globalstar system for the Commission to adopt a band plan, such as the one proposed by Iridium, that curtails this promise. Accordingly, the Commission must reject Iridium's proposed band plan.

---

[40] See Big LEO Rules Order, 9 FCC Rcd 5939-40.

III. MODIFICATION OF THE EXISTING BAND PLAN WOULD VIOLATE INTERNATIONAL LAWS.

Iridium has conceded that its system does not have the capability to make geographic discrimination in frequency usage.[41] Thus, if Iridium directs the satellites and mobile earth terminals ("METs") to utilize frequencies below 1621.35 MHz in the United States, then it cannot preclude the satellites and METs from activating those frequencies in other countries where the foreign administration might not have licensed Iridium to use frequencies below 1621.35 MHz.

Iridium's inability to adhere to various band plans in various countries portends a serious international problem for the United States. As a member of the International Telecommunication Union ("ITU"), the United States recognizes the sovereignty of other administrations over the use of radiofrequencies within their borders. In the context of the Big LEO MSS rulemaking, the Commission explicitly recognized this principle of international comity, stating that "[t]he Commission's Rules do not . . . purport to have any extraterritorial application. . . . any decision on the issue of what, if any, method of inter-system sharing best serves its national

---

[41] See Iridium's Spectrum Report, at 6, § 7. On April 14, 2003, counsel for Iridium submitted a letter regarding its request for an STA for additional spectrum in the Middle East region stating "the Iridium system is not currently able to assign frequencies based on geographic location." Letter from Jennifer D. Hindin to Thomas S. Tycz (filed April 14, 2003). In contrast, Globalstar can assign frequencies based on geographic location and is fully capable of augmenting capacity on short notice in areas of temporary shortage.

interests rests with the particular [foreign] administration."[42] MSS systems, such as Globalstar and Iridium, must obtain specific authorization ("landing rights") from each country in which they desire to provide service for transmissions within and from such countries.

More recently, the International Bureau reiterated this principle in the context of a request to authorize frequency usage outside the territories under the jurisdiction of the United States:

> Nothing in the jurisdiction provisions of the Communications Act explicitly gives the Commission authority to issue licenses for radio operations on foreign territory and on foreign ships, regardless of whether the operators of those radio stations voluntarily request a license from the Commission. The Supreme Court has recognized that there is a presumption against extraterritorial application of statutes in the canons of legislative interpretation. . . . .[43]

Thus, as the Commission recognizes, the Communications Act does not permit authorization for Iridium operations in non-U.S. territories.

Iridium has made no showing that any change to the Big LEO MSS band plan would be consistent with its authorizations in all other countries where the

---

[42] See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 11 FCC Rcd 12861, 12879, ¶ 53 (1996).

[43] Maritime Telecommunications Network, Inc., 16 FCC Rcd 11615, 11622, ¶ 18 (Int'l Bur. 2001) (footnotes omitted) (citing EEOC v. Arabian American Oil Co., 499 U.S. 244, 248 (1991) and Foley Brothers v. Filardo, 336 U.S. 281, 285 (1949)).

operations of Globalstar and Iridium would be affected.[44] Indeed, Iridium appears to be urging the Commission to flout international law and ignore ITU principles of comity and reciprocity.[45]

The Commission cannot ignore U.S. obligations under these international law principles. Globalstar Canada has pointed out that Iridium traffic on channels that might be authorized in the United States, but not elsewhere, "would be unauthorized by Industry Canada and in violation of Canadian law."[46]

> The Commission may have no desire to give extra-territorial effect to its regulatory decisions, but in view of the technical limitations of the Iridium system, a decision to grant Iridium additional spectrum in channels 9 and below will definitely have such effect. It will permit unlicensed and unlawful operations in Canada and constrain the ability of Industry Canada to effectively plan the use of MSS L-band spectrum in Canada.[47]

Interference from Iridium's operation in Channels 8 and 9 has also been experienced by Globalstar's local service provider in Australia, and it has filed a complaint with the Australian Communications Authority. (Attachment B.) Accordingly, the Commission cannot change the Big LEO band plan in the United States, which is the extent of the Commission's jurisdiction, unless and until

---

[44] For example, the European Big LEO band plan for the L-band is identical to the U.S. band plan. See European Radiocommunications Office, Decision ERO/DEC (97)(03), adopted June 30, 1997. Iridium cannot lawfully use spectrum below 1621.35 MHz in Europe without first securing a modification of the band plan.

[45] Iridium's Spectrum Report, at 6, § 7.

[46] Globalstar Canada Comments, at 3.

[47] Id.

Iridium demonstrates that it can comply technically with the international restrictions on its use of L-band spectrum elsewhere.

IV. THE RECORD DOES NOT SUPPORT REALLOCATION OF BIG LEO SPECTRUM TO OTHER SERVICES.

Globalstar does agree with Iridium on one essential point: The operational Big LEO systems are providing important and critical MSS services that are not being provided by any other system or service to commercial subscribers, public safety and critical infrastructure organizations, and the U.S. military. Globalstar itself provided 500 of its hand-held phones for use by federal, state and local security personnel for back-up communications around the northern Utah area during the February 2002 Winter Olympics.[48] The QUALCOMM Globalstar GSP-1600 phone has been accepted for standard use by Russia's Ministry of Civil Defense, Extraordinary Situations and Natural Disasters, known by its Russian initials "MChS." During the recent Iraq War, Globalstar's Saudi service provider served over 450 British Special Forces, generating about 200,000 minutes of use per week, in addition to several dozen other users roaming into Iraq, including Saudi Board Security Guards, Saudi Naval Support and Saudi Red Crescent. Globalstar's Turkish service provider also supplied phones to the Turkish Special Forces and the Turkish Ground Army for use during the Iraq War.

---

[48] Descriptions of these and other uses of Globalstar phones, as well as detailed information on the types of services available, can be found at Globalstar's Internet site: www.globalstar.com.

New uses for MSS systems are being found each day. Globalstar was recently award a contract by the National Aeronautics and Space Administration ("NASA") "to develop an Internet protocol that would make a network easy to transport and would allow users to stay connected from multiple platforms on land, at sea or in the air."[49]

Taking spectrum away from Big LEO MSS will harm these services and make less MSS services available for public, commercial and governmental use. Therefore, there is absolutely no reason at this time to reallocate Big LEO spectrum to any other service.[50]

A. The Advocates of Unlicensed Services Have Not Justified Obtaining Access to Big LEO Spectrum.

Several parties with an interest in use of spectrum for unlicensed devices filed comments suggesting that the Commission designate some of the Big LEO

---

[49] E. Book, "Globalstar Sharpens Government Marketing Strategy," National Defense Magazine (June 2003).

[50] Verizon Wireless filed comments suggesting that the Commission should use some of the Big LEO MSS spectrum as replacement spectrum for the MDS systems' frequencies at 2150-2162 MHz. This request is absurd. Not even the Wireless Communications Association International bothered to make such a request. MDS and ITFS systems enjoy 190 MHz of unencumbered spectrum at 2500-2690 MHz *which is mostly unused.* The Commission's most recent report on competition in the video services market indicated that wireless cable systems have a nationwide total of only about 490,000 subscribers, a decline of almost 50% over the prior year. See Annual Assessment of the Status of Competition in Markets for Delivery of Video Programming, Ninth Annual Report, 17 FCC Rcd 26901, 26938 (2002). The Commission also indicated that MMDS licensees are generally holding onto the spectrum in hopes of developing data services. Id. Clearly, MDS does not even need replacement spectrum, and, even if it did, there is no justification to take such spectrum from the limited MSS allocation.

MSS spectrum, particularly the 2483.5-2500 MHz band, for unlicensed use. The American Petroleum Institute ("API") and United Telecommunications Council ("UTC") advocated "robbing Peter to pay Paul." API and UTC are attempting to obtain spectrum for the very same critical infrastructure services that Globalstar provides. Indeed, public safety organizations form a large group of Globalstar subscribers, as detailed in Globalstar's Joint Comments (at Attachment B), and Globalstar's new remote telemetry service can provide monitoring services for many of API's and UTC's members.

The License-Exempt Alliance ("LEA") focuses on spectrum for unlicensed devices providing last-mile, wireless broadband access to rural areas. Again, these are services provided by Globalstar and other satellite systems, and the infrastructure is already built and available.[51] (See Attachment C.) Unlicensed, wireless broadband is actually a less secure system because the uncertain interference environment for unlicensed devices makes it difficult to provide voice and data services with the same reliability as wireline services, an issue not present with satellite services. Also, systems based on unlicensed devices may not provide the same level of accountability to consumers as subscription services. The public

---

[51] LEA (Comments, at 2) claims that the Commission's Spectrum Policy Task Force supports designation of more spectrum for unlicensed uses. But, the Task Force did not support the "wholesale conversion" of available spectrum to unlicensed use, and noted that in bands shared with licensed services, unlicensed devices must be power restricted below the "interference temperature." Spectrum Policy Task Force, Report, ET Dkt. No. 02-135, at 40 (Nov. 2002).

interest clearly favors allowing MSS to develop this market, in competition with unlicensed devices operating in other bands.

IEEE 802 advocates extending the current unlicensed band at 2400-2483.5 MHz up to 2492.5 MHz, and adopting a less restrictive emissions standard for unlicensed equipment operating at the band edge. There is already five times as much spectrum available for unlicensed devices at 2.4 GHz compared to MSS. IEEE 802 has not demonstrated any constraint on availability of spectrum for unlicensed use. It has also offered no justification for relaxing the emissions limits at the band edge. The Commission needs more than mere desire on the part of IEEE 802 to justify changing a rule designed to protect licensed systems.

All the unlicensed service advocates ignore that the Commission has just proposed an additional allocation of 225 MHz for unlicensed devices in the 5 GHz band, nearly *doubling* the size of the unlicensed spectrum block at 5 GHz.[52] And, earlier this year, the Commission reallocated the 1910-1920 MHz band away from unlicensed services because it was not being used.[53] There is no demonstrated need for taking Big LEO spectrum for unlicensed devices, and, based on this record, the Commission must preserve all Big LEO MSS spectrum for Big LEO MSS.[54]

---

[52] See Revisions of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, ET Docket No. 03-122, FCC 03-110 (released June 4, 2003).

[53] See AWS Third Report, 18 FCC Rcd at 2247.

[54] See Lockheed Martin Corp. Comments, at 5 (making Big LEO spectrum available to unlicensed uses "would likely decrease the utility of this spectrum").

B. The U.S. Government Does Not Need Access to Big LEO Spectrum for New MSS Systems.

NTIA, with an echo by Lockheed Martin Corporation, suggested that the Commission allocate spectrum in the Big LEO band for U.S. government MSS systems. Lockheed Martin, bizarrely, in Globalstar's view, proposes that CDMA-based government systems be authorized to share the non-government allocation of Big LEO spectrum. Such conversion of non-governmental spectrum to governmental use is patently unjustified and clearly contrary to longstanding and prevailing U.S. policy.

First, according to the NTIA comments, the U.S. Government already has access to 219.5 MHz below 3 GHz for MSS systems, and 3469.5 MHz total. The spectrum available to commercial Big LEO systems (33 MHz) is significantly smaller by comparison. Second, the U.S. Government can purchase MSS services on Big LEO systems for far less cost than constructing and launching a redundant MSS system. Encryption technology is available to provide the government with as much security on a commercial system as on a government-owned system. The Department of Defense ("DOD") today uses the Iridium System for classified communications routed through DOD's proprietary Iridium gateway in Hawaii. Globalstar has three products capable of meeting the U.S. Government's Type 1 encryption requirements and more are in development. Under the circumstances, NTIA's and Lockheed Martin's suggestions should not be given further consideration.

C. The Commission Should Reject All Suggestions to Reallocate Big LEO Spectrum to Other Services.

In the past ten years, the Commission has repeatedly taken the position that MSS systems serve the public interest by offering advanced telecommunications services to all persons in the United States and, in particular, by connecting persons in rural and other areas unserved by terrestrial wireline and wireless companies with other places in the United States and around the world.[55] The benefits of and need for MSS do not change based on the number of licensed systems that are implemented, or the total number of MSS subscribers at any point in time. But, if there is less total spectrum available for MSS, services may change; operational systems may be restricted to offering narrowband voice and data services despite the fact that the services in demand for the future via satellite are the same broadband services that terrestrial carriers intend to offer.

Moreover, reallocating MSS spectrum to terrestrial services would impair the capability of MSS to serve rural and unserved areas which already lag behind urban areas in obtaining access to advanced telecommunications services. The Commission has required every MSS system to extend service to all parts of the United States.[56] Thus, for example, the Globalstar system currently provides the

---

[55] See, e.g., Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, 12 FCC Rcd 7388, ¶ 13 (1997), aff'd on recon., 13 FCC Rcd 23949 (1998); Big LEO Rules Order, 9 FCC Rcd 5939-40.

[56] See 47 C.F.R. § 25.143(b)(2).

same level of service in the rural American plains and southwest as it does in the urban areas of the east and west coasts. The Commission is not proposing to modify the coverage requirements of Big LEO MSS systems to allow them to focus on only the most profitable markets. Therefore, it must ensure that the Big LEO systems have sufficient spectrum to provide a variety of services that appeal to the diverse markets that these systems must serve.

The fact that the Big LEO MSS systems have not achieved the market share that they predicted when first proposed is irrelevant to whether the same amount of spectrum should remain allocated for satellite-delivered services. Although the results of "market forces" may be useful for determining winners and losers within the same service, in which similar technologies and marketing strategies form a basis for comparison, a comparison of MSS and cellular/PCS, for example, makes little sense because they are such disparate technologies with such disparate subscriber and market bases.

The Commission has recognized that it and the public must tolerate a longer ramp-up period for certain services in order to achieve the public interest benefits provided by the services. For example, Direct Broadcast Satellite ("DBS") required a long time to gain acceptance in the market. In 1982, the Commission first allocated spectrum at 12 GHz for DBS to provide improved video services to rural areas, a greater variety of video programming and technically innovative services.[57]

---

[57] See Inquiry into the Development of Regulatory Policy in Regard to Direct Broadcast Satellites, 90 FCC 2d 676 (1982).

Just a few years later, as DBS was still developing, other services sought to dismantle the DBS allocation.[58] The FCC rejected these requests, noting that its allocation decision was not based on the time needed for the service to develop and that the passage of time had not somehow changed its findings as to the benefits of the service.[59] Only years later did DBS develop a substantial market share.[60] In light of the Commission's policy of allowing new services time to develop and gain acceptance in the marketplace, the Commission must preserve the opportunity for Big LEO systems to provide the recognized public interest benefits and must maintain the Big LEO spectrum for Big LEO systems.

V. THE COMMISSION SHOULD GRANT TIME FOR GLOBALSTAR AND IRIDIUM TO DISCUSS A COMMON BAND PLAN PROPOSAL.

Based on the available information, the Commission does not need to modify the existing Big LEO spectrum assignments at this time. Iridium should be able to meet its existing needs with its current spectrum assignment (see Tech. App. § 2). Moreover, given the documented inefficiencies in Iridium operations (see Tech. App., § 1), assignment of additional spectrum does not serve the public interest in efficient use of the spectrum resource. There is also no reason to reallocate Big LEO spectrum to another service at this time. Both Globalstar and Iridium need all available spectrum *now* for areas and times of high demand.

---

[58] See United States Satellite Broadcasting Co., 1 FCC Rcd 977, ¶ 5 (1986).

[59] See id., ¶¶ 6-7.

[60] See Ninth Annual MVPD Report, 17 FCC Rcd at 26929-31.

Indeed, if the Commission were to decide that the record thus far supports reconsideration of the Big LEO band plan, then it should generally adhere to the principles developed in the Big LEO NRM and rulemaking which are as valid today as they were in 1994. Nothing proposed by Iridium in this proceeding warrants a different result.

If an alternative to the current band plan were justified, Globalstar believes that there are approaches that would meet the needs of both Big LEO systems for the foreseeable future and would serve the public interest substantially better than the destructive band split proposed by Iridium.[61] For example, Globalstar, Iridium and the Commission have learned more about the operational capabilities of the two Big LEO systems as a result of the Technical Appendices submitted for the record here and the submissions to the International Bureau in connection with Iridium's Special Temporary Authority to operate on the CDMA Channels 8 and 9 at L-band in the Middle East Region and globally.[62] As a result of the Bureau's orders, Globalstar and Iridium have been required to share Channels 8 and 9 on a co-

---

[61] Globalstar believes the only way for Iridium to offer ATC with its current system is to use a band other than the Big LEO L-band for the base-to-mobile links. That may not be an issue that can be resolved in this proceeding, and should not be an issue that drives restrictions on Globalstar's capability to offer ATC in the Big LEO spectrum irrespective of the outcome of this proceeding. See Comments of GLP Creditors' Committee, at 10 (requesting Commission to authorize ATC in full range of CDMA Big LEO spectrum).

[62] See, e.g., Iridium Constellation, LLC and Iridium, US LP, Order, DA 03-1917 (Int'l Bur. June 11, 2003); Iridium Constellation, LLC and Iridium, US LP, Order to Show Cause, DA 03-2298 (Int'l Bur. July 17, 2003).

primary basis, and, consequently, have learned more about how the systems operate.

Iridium's first STA request was filed and granted in mid-April 2003, months after the NPRM was adopted and after Globalstar and Iridium first discussed the Commission's recommendation (NPRM, ¶ 266) that they develop a common proposal for a band plan for future operations. Before the Commission determines that a change to the current CDMA-TDMA band assignments is warranted, the Commission should allow time for Globalstar and Iridium to explore further a common proposal, using previously known information and information obtained since April 2003. Globalstar is ready to work on a common proposal, and has communicated to Iridium its willingness to discuss a proposal.

VI. CONCLUSION

For the reasons set forth above, the existing Big LEO band plan does not need to be modified, and all the spectrum at 1.6/2.4 GHz should be retained for Big LEO MSS. Before the Commission determines that a change to the current CDMA-TDMA band assignments is warranted, the Commission should allow time for Globalstar and Iridium to explore further a common Big LEO band plan proposal.

Respectfully submitted,

L/Q LICENSEE, INC.
GLOBALSTAR, L.P.
GLOBALSTAR USA, L.L.C.

William D. Wallace

CROWELL & MORING LLP
1001 Pennsylvania Avenue, N.W.
Washington D.C. 20004
(202) 624-2500

Their Attorneys

Of Counsel:

William F. Adler
Vice President, Legal and
Regulatory Affairs
Globalstar, L.P.
3200 Zanker Road
San Jose, CA 95134
(408) 933-4401

July 25, 2003

Technical Appendix

July 25, 2003

GLOBALSTAR REPLY COMMENTS
TECHNICAL APPENDIX
IB Docket No. 02-364

1. The Iridium System Does Not Use Spectrum Efficiently.

On page 15 of its July 11 Comments, Iridium states that its system is unable to handle more than 180 to 200 users with single beam loading in its current 5.15 MHz assignment. Since there are four time slots per carrier, this means that Iridium has approximately 8.7 carriers per MHz, with the carrier separation at 114.5 kHz, rather than the 41.67 kHz that was stated in the Iridium system 1992 Minor Amendment.[1] This factor alone accounts for a reduction of capacity to about 1/3 of the value Motorola Satellite Communications claimed during the Big LEO Negotiated Rulemaking ("NRM").

During the Big LEO NRM, Motorola Satellite Communications stated that the efficiency of the Iridium system would be 467 channels per MHz, whereas the peak capacity per beam is now being stated as 180 users per beam in 5.15 MHz, or 35 channels per MHz. (As explained in the Technical Appendix (§ 4.2) of Globalstar's July 11 Joint Comments, the actual Iridium capacity appears to be about 10% of the stated NRM value.)

One possible explanation for Iridium's larger carrier spacing is that the extra spacing is needed because of imperfect Doppler correction to account for the relative velocity of the user and the Iridium satellite with which it is communicating. This hypothesis is consistent with observations of Iridium signals made by Globalstar in recent months following the International Bureau's April 14, 2003 grant of Special Temporary Authority ("STA") authorizing Iridium to use Globalstar's Channels 8 and 9 in the Middle East and elsewhere (Application File No. SAT-STA-20030414-00066). If Iridium were to implement its original carrier spacing of 41.67 kHz, it would immediately be able to increase its spectral efficiency by a factor of almost 3 in its existing 5.15 MHz without the need for additional spectrum.

In its July 11, 2003, "Technical Appendix" (at 11) (Exhibit F to Iridium's Comments), Iridium claims that "additional spectrum very significantly improves the spectral efficiency of the Iridium system," but provides no explanation for why this is the case. When an MSS system obtains an additional allocation of frequency, the total number of users supported *may* increase, if the system is not limited by other factors such as satellite power. But, there is no reason for the spectral *efficiency* to increase. In fact, if other factors such as power or network connections

---

[1] See Motorola Satellite Communications, Inc., Minor Amendment (dated Aug. 8, 1992) (referred to in the Technical Appendix filed with the July 11, 2003 Globalstar Joint Comments as "1993 Amendment").

become the limiting factor, it is likely that spectral efficiency will actually *decrease*. Since Iridium's current assignment of 5.15 MHz already allows Iridium to have multiple carriers (at least 8.7 per MHz, even with the 114.5 kHz carrier spacing discussed above), there is no reason why greater frequency reuse is not possible with the current 5.15 MHz, but would become possible with additional spectrum.

Iridium's Technical Appendix gives only a very general description of how the system works, without providing any technical details of how efficiency can be improved with additional spectrum. In fact, much of the Technical Appendix is an attempt to portray the Iridium design as technologically advanced and therefore spectrum efficient. In reality, all the claimed advantages of the Iridium system are achieved equally well or better by the Globalstar system. Specifically, onboard processing, demodulation and crosslinks do not affect the spectral efficiency of the service links, which are at issue in this NPRM. The "up to four-way reuse in time" mentioned on page 1 of the Technical Appendix is just a regular feature of TDMA, which should be compared to the 128 times reuse of a single CDMA carrier by means of 128 orthogonal codes in each FDM channel. Also, Iridium makes much of the fact that the on-board switching "allowed the Iridium system to respond, instantaneously, to the STA grant of temporary spectrum," but the same is true of the Globalstar system, which has no onboard switching. On-board switching has nothing to do with service-link spectrum efficiency. And, the use of on-board switching and crosslinks adds two more factors that will limit satellite capacity. In other words, much of the information in Iridium's Technical Appendix is irrelevant to the question of whether Iridium is using its spectrum efficiently. The analysis provided by Globalstar in its July 11 Joint Comments shows that the Iridium system is being operated at about 10% of its stated capacity, and that allowing it access to more spectrum at the expense of Globalstar's spectrum does not cure its inherent inefficiency.

2. Iridium Did Not Increase Capacity With Additional Spectrum under the STA.

Iridium's claim that it needs more spectrum to support increased capacity is belied by Iridium's Figure 2 (Comments, at 14) which shows that increasing service link spectrum by almost 50% did not increase Iridium's satellite capacity and by Globalstar's observations of Iridium's operations in the Middle East. The capacity of a mobile satellite system is potentially limited by many factors, and the main ones are discussed below. The complex interplay of a large number of factors in the design of a mobile satellite system means that increasing only one factor such as spectrum may or may not increase capacity or "efficiency" of the system.

a. Satellite power on the forward link is often the main factor that limits the total number of calls that a single satellite can handle (and hence impacts the total system capacity). Satellite power is extremely expensive and a system would usually be designed with a power subsystem that is just sufficient to meet the projected per-satellite peak demand, based on traffic projections, link budgets and simulations.

b. In a satellite system that relies on gateways to interconnect satellite calls to the Public Switched Telephone Network ("PSTN"), the trunk capacity of the gateway(s) has to be sufficient to meet the projected traffic demand for traffic served by the gateway(s).

c. In a satellite system that uses inter-satellite links ("ISL") to connect some portion of its traffic to the PSTN, the capacity of the ISL subsystem has to be sufficient to accommodate all the projected traffic. The capacity could be limited because of satellite power allocated to the crosslink subsystem (which again is expensive, as was discussed in (a) above), crosslink spectrum, or crosslink switching subsystem size.

d. Onboard processing ("OBP") power or size can be a limiting factor in an OBP satellite system, because the size and power of any subsystem on a satellite adds to the cost of the satellite, and OBP is typically very power-hungry.

e. Resource allocation algorithms, which decide how to assign limited resources like power and frequencies to incoming calls, will determine how efficiently the system is using its resources, and hence dictate capacity. Poor resource allocation can lead to low capacity.

f. User terminal EIRP and filtering restrictions, which are typically determined by applicable out-of-band emissions restrictions and limits on human exposure to RF radiation, will limit the data rate which can be supported by a good link in the reverse direction. Insufficient terminal EIRP due to high interference conditions, low battery or design limits on the EIRP can limit the number of return link calls, and hence the capacity of a system that offers full-duplex services such as voice.

g. Service link spectrum can be one of the factors that could limit the satellite system capacity.

Figure 2 of Iridium's July 11, 2003 Comments (at 14) is consistent with the inference that its capacity is limited not by the amount of available spectrum, but by power or network switching constraints or some other factor. Of course, it is possible to allocate additional frequencies so that all available spectrum is used; however, that is not necessarily an efficient use of spectrum. Nevertheless, this is what Iridium appears to have done with the additional spectrum available under the STA in the last few months.

Iridium states on page 15 of its Comments that the peak capacity of a beam is 180 to 200 simultaneous users. Since each satellite has 48 beams and Iridium now uses a frequency reuse pattern based on an 8-beam cellular-like arrangement, then there should be 180 times 48/8 or 1080 users per satellite at one time. However, the upper curve in Figure 2 is limited at about 350 simultaneous users per satellite. This again points to some factor other than spectrum as the limiting factor. Iridium states (Comments, at 15) that "Iridium is unable to handle satisfactorily geographically dense loads" of more than 180 to 200 users per beam, and implies that this is caused by spectrum limitations. This statement is misleading. The inability of a system to handle geographically concentrated loads is actually *inherent in any satellite system* because of the large surface area covered by any one of the satellite's beams.

Iridium also argues (Comments, at 25) that Figure 2 shows that its acquisition failures dropped after the Commission granted Iridium 2.5 MHz of additional spectrum on an STA basis. In reality, Figure 2 shows no such thing. Figure 2 does not actually show any increase in calls per satellite following the addition of the CDMA L-band Channels 8 and 9. In fact, the upper curve in Figure 2, which is labeled "Peak Satellite Connections," does not show any increase after the

addition of Channel 8 on April 26, 2003, or even after the addition of Channel 9 on April 11, 2003. Thus, Figure 2 supports the view that Iridium's capacity is actually limited by power or cross-link capacity or other network resources and not actually by the amount of available spectrum. Iridium's satellite capacity did not increase *at all* after an almost 50% increase in service link spectrum.

Based on the other curve presented in Figure 2, Iridium asserts (Comments, at 14) that there was a "dramatic reduction in blocked calls with the addition of spectrum." In reality, the fact that the number of daily blocked calls decreased dramatically after the addition of spectrum *does not provide evidence that capacity or quality improved.* The reduction in blocked calls could very well be attributed to a reduced number of total calls. In other words, without knowing the total number of calls attempted as a function of time -- information that Iridium did not provide -- the decrease in number of blocked calls is not very useful as a measure of system capacity or quality.

Iridium's method of calculating its system capacity is highly suspect. On page 24 of its Comments, Iridium states that "call drop rates can reach and even exceed 25% when satellite traffic exceeds 80% of system utilization capacity." This implies that the true system capacity is actually less than 80% of Iridium's claimed system capacity. System capacity has no useful meaning if it is not accompanied by acceptable quality of service, such as a call drop rate under 1% or 2%, which is a theoretically achievable objective of all systems.

Another measure of telecommunications system capacity is system blocking, as used in the wireline or wireless industry. Erlang B is the normal wireline and wireless industry standard for the blocking level of the network. Erlang B is a probability distribution to estimate the number of telephone trunks needed to carry a given amount of traffic within certain blocking objectives. A general guideline in wireless systems is to equip the network with enough trunk capacity to achieve a blocking probability of 2% during the peak busy hour. As an example, 100 trunks will carry 88 erlangs (B) of traffic with 2% blocking, 200 trunks will carry 186 erlangs (B) of traffic with 2% blocking, and 1000 trunks will carry 992 erlangs (B) of traffic with 2% blocking. For the first example, 100 trunks should reach 88% utilization before exceeding 2% blocking. Consistent with these practices, a 2% blocking Erlang B formula for busy hour traffic was used in the design of Globalstar. Using this industry standard, Iridium's statement about call blockage when using 80% of system *capability* may make sense. In fact, Iridium should state that capacity is 80% of system capability.

3. Iridium Does Not Need Additional Spectrum to Offer "Full-Rate" Voice and Data Services.

In several sections of its July 11, 2003 Comments (e.g., at 29), Iridium claims that access to only 5.15 MHz of spectrum has limited its voice and data offerings to "half-rate" services, that is, 2.4 kbps for voice and 9.6 kbps for data, rather than "full-rate" services at 4.8 kbps voice and 19.2 kbps data.

Historically, Iridium's claim is not accurate. Iridium's initial business plan called for 2.4 kbps data (see, for example, page 51 of Iridium's SEC filing of August 25, 1995; also see page 92 of Iridium's initial 1990 FCC Application, discussing "subscriber 2400 baud data").

In any case, if Iridium can offer 19.2 kbps data, then it should be able to accommodate 9.6 kbps digital voice. Once digitized, voice consists of binary digits exactly like data, and both voice and data have the same bandwidth occupancy characteristics. As an example, Globalstar's vocoder operates at rates of up to 9.6 kbps and the basic data rate offered is also 9.6 kbps.

Iridium's filings with the FCC indicate that the system has this capability. Iridium's 1994 Amendment describes in Table R-A-1 an occupied bandwidth of 31.5 kHz and carrier spacing of 41.67 kHz. These parameters are more than sufficient to accommodate data rates of 4.8 kbps or 9.6 kbps or even 19.2 kbps using modern digital modulation techniques, and easily permit raw spectrum efficiencies (before accounting for overhead and other resource allocation constraints) on the order of 0.5 to 2 bps/Hz. Indeed, if Iridium is genuinely unable to offer a higher vocoded rate than 2.4 kbps for its voice service, with an occupied bandwidth of 31.5 kHz per carrier, then it is using its available spectrum very inefficiently. This represents at most 2.4/31.5 or 0.076 bps/Hz of spectral efficiency, without even considering additional inefficiencies necessary for overhead and other resource allocation constraints.

It is more likely that Iridium can offer these voice and data rates today, but the number of subscribers it can serve at such rates is limited by the available satellite power or other network resources. Under the circumstances, one would expect Iridium to make a business decision not to offer the full-rate services. In general, as the bit rate of vocoded voice increases, the number of voice calls that can be handled simultaneously decreases in proportion. Therefore, it may be inferred that Iridium consciously decided not to offer 4.8 kbps voice when it discovered *other capacity restrictions* (that is, not service link bandwidth) that made it unable to serve as many subscribers as it had originally estimated during the planning and design of the system.

It is also not clear how additional spectrum would allow Iridium to increase its service data rates while still serving the same number of subscribers. As discussed in the previous section, Figure 2 of Iridium's Comments (at 14) is supposed to show that Iridium's call acquisition failures dropped after the Commission granted Iridium an additional 2.5 MHz pursuant to an STA. But Iridium's Figure 2 does not actually show any increase in calls per satellite after the additional spectrum became available. The upper curve in this figure, labeled "Peak Satellite Connections," shows that Iridium could not use the additional spectrum from the STA to increase the number of its per satellite peak connections, nor could it increase the total number of bps that the satellite can handle.

On the other hand, it is also possible that the higher rate service is not being offered because Iridium's user terminal EIRP needed to close the return link is so high that out-of-band emissions restrictions would be violated in the absence of a filter that would be too large to fit in a commercially acceptable handset. In any event, Globalstar's analysis of transmitted Iridium signals shows that the *initial Iridium phones* placed in the market were designed to implement only 2.4 kbps vocoded voice. Clearly, Iridium made this business decision, or technical design choice, or both, based on its conclusions that the voice quality with a 2.4 kbps vocoder was "good enough," or based on a determination to serve a certain number of users.

4. Iridium Cannot Offer ATC Service Even With Additional L-band Spectrum.

In its Technical Appendix (at 4), Iridium acknowledges its business decision to use L-band exclusively for return and forward links because "the decision to change to a TDD air-interface format was deemed to present a lower risk." Having made this decision in the initial design of the system, Iridium now complains that Globalstar has 27.85 MHz of spectrum (Iridium Comments, at 6) and claims (Spectrum Report, at 8) that "additional spectrum at 2.4 GHz would provide Iridium paired spectrum" and "timing remediation." These statements imply that some of the issues that limit Iridium's capacity, namely timing problems, cannot be cured without completely new satellites that use the 2.4 GHz band for the downlink.

As Globalstar explained in its July 11, 2003 Joint Comments, Iridium cannot provide ATC in the L-band, even if it had additional spectrum, because of the stringent filtering requirements that ATC imposes. Iridium provides no technical data or analysis showing how it can overcome these filtering restrictions. In other words, as explained in the Technical Appendix (§ 6) to Globalstar's Joint Comments, Iridium cannot offer ATC services at L-band, because of the extremely tight filtering that would be needed to prevent self-interference in a system that transmits and receives in frequencies that are only a few MHz apart.

5. Iridium Downlinks Operating Below 1621.35 MHz Would Likely Cause Harmful Interference into Radio Astronomy Service ("RAS") Sites.

In its July 11, 2003 Comments (at 38), Iridium argues that "when necessary, the space-to-ground beams impinging on radio astronomy sites can be operated at the upper end of the MSS Big LEO allocation" and further discusses how it has reduced "its OOB [out-of-band] emission levels in the 1610.6-1613.8 MHz band on a continuous 24 hours per day, 7 days per week basis." In the following paragraph on page 38, Iridium basically admits that it could only use the frequencies below 1621.35 MHz in very limited regions that are "outside of the RAS field-of-view."

The RAS "field of view" actually covers most of the Earth since it is the field of view of any RAS site from some Iridium satellite. Iridium has admitted that it cannot control its frequency allocations on a regional basis, which is why it needed to use, under its STA, Globalstar Channels 8 and 9 worldwide when it really wanted to use them only in the Middle East. Therefore, it is difficult to understand how Iridium could ever use any frequencies below 1621.35 MHz without causing interference to some RAS site somewhere. In fact, in its July 14 , 2003 Comments (at 5), Cornell University notes that it has seen a change in low intensity emission features at the Arecibo Observatory while Iridium has been using Globalstar Channels 8 and 9, and that the worst of these features disappeared when Iridium stopped using Channel 8.

Iridium states that it will "revisit these MOUs [with RAS] based upon any new band plan adopted" in this proceeding. In effect, Iridium cannot use frequencies from Globalstar's current L-band assignment without modifying the manner in which it purports to protect RAS.

6. Iridium's Call Quality Percentage Supports Globalstar's Analysis.

In its May 1, 2003 letter to the Commission objecting to extension of Iridium's STA (reproduced at Attachment C of Globalstar's Joint Comments), Globalstar provided independent measurements of Iridium's call drop rates of about 18.4 %, as opposed to the sub-1% numbers given on page 23 of Iridium's Comments. In its May 8 letter responding to Globalstar (Attachment D to Globalstar's Joint Comments), Iridium challenged Globalstar's assertion[2] that Globalstar measured a call drop rate of 18.4% in the summer of 2002. However, Iridium states on the next page[3] that its real-world call drop rate is 10% across four regions. Obviously, 10% is closer to Globalstar's measurements of Iridium's real-world call drop rates than the 1% which Iridium claims.[4]

7. Globalstar Would Be Forward Link Limited If Assigned Only 5 Channels at S-band and 4 Channels at L-band.

In its Comments (at 32), Iridium seeks reassignment of an additional 5.85 MHz of L-band spectrum. Not surprisingly, Iridium's proposal totally disregards Globalstar's current operating system design, both with respect to absolute amounts of spectrum and to the ratio of spectrum needed at L-band and S-band. As explained in Globalstar's Technical Appendix (§ 1) to its Joint Comments, the Globalstar system was designed to account for different constraints at L-band and S-band, one of which was the asymmetric nature of the spectrum with 13 channels at S-band for the service downlink and 9 channels at L-band for the service uplink. Each service uplink at L-band is designed to carry up to 13/9 times more, i.e., about 1.5 times more, simultaneous calls than each service downlink channel at S-band. Thus, if Globalstar were to be assigned 5 channels at S-band and 4 channels at L-band, then Globalstar's system would be severely forward link limited. In addition to the fact that any reduction in spectrum will cause Globalstar's capacity to decrease, Globalstar requires S- and L-band spectrum in the ratio of 6:4 as measured in 1.23 MHz channel units in order not to be further limited in capacity because of asymmetric spectrum assignment. Globalstar does not have the ability to redesign its system while the satellites are in the air and operating.

---

[2] Page 6 of Iridium's May 8 letter.

[3] Page 7 of Iridium's May 8 letter, and pp 23-24 of Iridium's July 11 comments

[4] Page 7 of Iridium's May 8 letter, and pp 23-24 of Iridium's July 11 comments.

Engineering Certification

I hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing "Technical Appendix"; that I am familiar with the relevant sections of the FCC's Rules, the proposals set forth in the "Notice of Proposed Rulemaking" in IB Docket No. 02-364, and the information contained in the foregoing Technical Appendix; and that information in the Technical Appendix is true and correct to the best of my knowledge and belief.

Signed this 25th day of July 2003.

Paul A. Monte

Director, Systems & Regulatory Engineering
Globalstar L. P.

ATTACHMENT A

1001 Pennsylvania Avenue, NW, Washington, DC 20004-2595 ▪ p202 624-2500 ▪ f202 628-5116

crowell moring

June 11, 2003

BY HAND DELIVERY

Thomas S. Tycz
International Bureau
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

RE: Iridium June 9, 2003, Request for Extension of STA
STA-MSC-20030515-00089 and SES-MSC-20030515-00666

Dear Mr. Tycz:

This letter is written on behalf of Globalstar, L.P., and Globalstar USA, L.L.C. (collectively, "Globalstar"), in response to the June 9, 2003, request by Iridium Constellation LLC for extension of its current Special Temporary Authority ("STA") to provide Mobile-Satellite Service in the 1620.10-1621.35 MHz frequency band (Channel 9) for an additional 30 days, until July 12, 2003. In this letter and the attachment, Globalstar explains why Iridium has not justified its request.

Globalstar has previously filed with the Commission information opposing Iridium's use of the channels in the 1610-1621.35 MHz band assigned to and used by the Globalstar system. Attached to this letter is additional information based on Globalstar's analyses of Iridium's call traffic in the Middle East. This attachment demonstrates the following:

First, the Globalstar system is experiencing harmful interference that appears to arise from Iridium's use of Channels 8 and 9 in the Middle East region. Specifically, Iridium uplink transmissions in these channels are received at Globalstar satellites, and, because of either the density of calls and/or the types of terminals in use, overload the L-to-C-band transponder's C-band solid state power amplifier ("SSPA"). Saturation reduces the ability of the SSPA to provide the desired end-to-end signal noise ratio for Globalstar users. The result in these

circumstances is increased radio link failure ("RLF") for Globalstar calls. Indeed, in the Middle East region, Globalstar is experiencing RLF in the 30-45% range.[1]

Second, Globalstar's analysis of the call traffic data submitted by Iridium in its May 8, 2003, filing demonstrates that factors other than increased call traffic may be causing Iridium's radio link failures in the Middle East. Such factors may include self-interference, satellite power limitations, and intersatellite link capacity limitations. Based on Globalstar's analysis, and the lack of additional information in Iridium's most recent request, Globalstar submits that Iridium has not justified its purported need for more spectrum in the Middle East region.

Third, as indicated in Figure 5 in our attachment, Globalstar's call traffic has dropped by about 50% in the last month in the Middle East region. Iridium indicates that its call traffic has also decreased in the Middle East region, and so, it needs less spectrum. If Iridium's call traffic has dropped by only 33%, then it should be able to stop using both Channels 8 *and* 9 (which represent one-third of its total modified spectrum access).

Iridium's most recent request simply recites a generalized need for expanded spectrum access (Channel 9) without providing additional facts and claims that it is not causing interference into Globalstar. Section 25.120 (47 C.F.R. § 25.120) requires an applicant for an STA to demonstrate "circumstances *requiring*" temporary use of facilities. Based on the attached engineering analysis, Iridium's generalized request is not sufficient to support an extension of Iridium's STA.

Moreover, as Globalstar explained in its May 23, 2003, protest in response to the Commission's *Order to Show Cause* (DA 03-1722, released May 16, 2003), "[t]he Commission's Rules do not . . . purport to have any extraterritorial application."[2] Iridium apparently concedes that the Communications Act does not authorize the Commission to grant Iridium "landing rights" for specific frequency usage globally

---

[1] Globalstar needs a period of at least 48 hours when Iridium is not transmitting in Globalstar channels in order to complete its analysis of the impact of Iridium transmissions in Channels 8 and 9. Data on the type and numerical distribution of each type of Iridium earth terminal operating in the Middle East would also be useful for Globalstar's analysis.

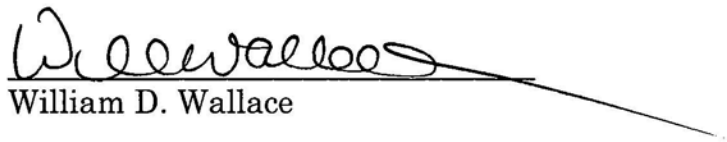
[2] Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 11 FCC Rcd 12861, ¶ 53 (1996).

because it offered no defense in response to Globalstar's protest.[3] The fact that the Communications Act does not provide extraterritorial authority for spectrum licensing matters is yet another reason for the Commission to reject Iridium's request.

For the reasons set forth in this and previous Globalstar filings, Iridium's June 9, 2003, filing has not provided sufficient justification for extension of its STA. Accordingly, Globalstar urges the Commission not to accept Iridium's request for an extension of its STA for use of frequencies below 1621.35 MHz in the Middle East region and elsewhere.

Respectfully submitted,

GLOBALSTAR, L.P.
GLOBALSTAR USA, L.L.C.



William D. Wallace

CROWELL & MORING LLP
1001 Pennsylvania Avenue, N.W.
Washington D.C. 20004
(202) 624-2500

Of Counsel:

William F. Adler
Vice President, Legal and
Regulatory Affairs
Globalstar, L.P.
3200 Zanker Road
San Jose, CA 95134
(408) 933-4401

Enclosure

---

[3] Iridium requested extension of its STA to provide "global Mobile-Satellite Service" in Channel 9. However, its STA is limited to use of Channel 9 on a co-primary basis with Globalstar in the Middle East Region and on secondary basis everywhere else in the world. See *Order to Show Cause*, DA 03-1722, ¶ 5 (released May 16, 2003).

cc: Marsha J. MacBride
Bryan Tramont
Scott Delacourt
Jennifer Gilsenan
Cassandra Thomas
Linda Haller
Karl Kensinger
Fern Jarmulnek
Peter D. Shields
Karl Nebbia
Jack Zinman
Stephen Lett
Paul J. Feldman

Attachment

GLOBALSTAR, L.P. AND GLOBALSTAR USA, L.L.C.
ENGINEERING ANALYSIS
(June 11, 2003)

Part I: Analysis of Interference into Globalstar

1. Summary of Globalstar Analysis of Its Radio Link Failures

Globalstar has been conducting an intensive series of experiments aimed at understanding our call performance in the Middle East, and in particular, trying to isolate the cause of the increased Radio Link Failure (RLF) rate in the region served by the Riyadh gateway. As stated in Globalstar's Letter of May 13, 2003, Globalstar has been experiencing unusually high rates of Radio Link Failure in the Middle East, and its engineers were interested to note that Iridium, in its May 8 Letter, also mentioned that Iridium has been experiencing interference "in a small group of carriers in the upper end of Iridium's operating band." Since then, Globalstar engineers have re-examined the initial hypothesis that these localized failures were caused by external interference. If the same external interference were affecting Globalstar and Iridium, one would expect it to cause failures at the upper end of the Globalstar band (and the lower end of the Iridium band). Instead, several channels at both ends of the Globalstar band are affected (and Iridium states that it had problems in the upper end of its band). One possibility is that there are several interferers operating in different parts of the 1610-1626.5 MHz band; in fact, Globalstar has observed some of these in its Channels 1 and 3. In addition, Globalstar's entire L-band performance is affected by "power-robbing" in the Globalstar L-to-C satellite transponder that is caused by the combined power of Globalstar traffic and external emitters (Iridium and other unknown sources) falling in the 1610-1626.5 MHz band. Further analysis of these issues is being undertaken, with more remote monitoring equipment being incorporated into several of Globalstar's Middle East and European gateways.

2. Mechanism By Which Iridium Is Causing Harmful Interference To Globalstar

Between April 8 and April 11, Globalstar noticed that the Radio Link Failure (RLF) rate in the region served by its Riyadh gateway increased from approximately 10 percent on average to approximately 30 percent on average, and it has stayed in the 30 to 45 percent range since. Initially, Globalstar engineers thought that the reason for this increased rate was some sort of localized interference in the Middle East, and not attributable to Iridium, inasmuch as any Iridium related effect should have started only after April 11 when Iridium received authority to operate in channel 9. At that time, Globalstar changed its frequency assignments in the Riyadh gateway area to free up channel 9 for Iridium use, expecting that the RLF would improve. However, this has not been the case. Globalstar engineers then initiated a detailed analysis of large amounts of data from several gateways in the Middle East (especially comparing performance at other gateways around the world), as well as an analysis of large amounts of satellite telemetry. We now suspect that the increased RLF is, in fact, caused by Iridium's use of

Channels 8 and 9. Analysis to confirm this finding is ongoing. The Iridium-induced degradation even after Globalstar reassigned frequencies in the Riyadh gateway to avoid Channels 8 and 9 is explained below.

The Globalstar return link signals go through the L-to-C transponder, with signals from each L-band beam passing through the beam's own L-to-C upconverter. The signal from eight of the sixteen L-band beams are translated into C-band feederlink frequencies on one polarization, and the remaining eight L-band beams are similarly mapped to the other C-band polarization. The signals from all eight L-band beams corresponding to one polarization at C-band pass through a common C-band solid state power amplifier (SSPA). Thus, all the Iridium signals in Channel 8 and Channel 9 in eight of these beams are passed through the same C-band SSPA, along with the desired Globalstar signals from those beams in channels 1 through 9. Globalstar has found that at peak hour in the Middle East (which coincides with Iridium's peak hours of 1600 Z to 1900 Z), the combined Globalstar and Iridium signals at L-band are driving the C-band SSPAs into saturation, thereby reducing their ability to amplify the signals and provide the desired end-to-end signal to noise ratio for Globalstar users. This manifests itself as a Radio Link Failure. Figures 1 and 2 show typical periods of time when a satellite which is serving Iraq (Basra and Baghdad in particular) experiences a peak C-band power level of 1.9 to 2 volts. The interpretation of the peak value of 2 volts in the telemetry is that telemetry values of 1.7 volts and above correspond to saturation of the SSPA. When Iridium is operating in its licensed L-band, Globalstar engineers have managed to alleviate the saturation problem by onboard filter settings that reject frequencies corresponding to Channels 10 through 13 (the Iridium band); however, these filter settings do not allow Channels 8 and 9 to be rejected because they are within Globalstar's authorized band. Again, these saturating peak loads in the Middle East have been occurring after Iridium started using Channels 8 and 9.

To compile evidence that Iridium is causing these C-band power amplifier peaks, Globalstar temporarily placed certain satellites in an even narrower band mode, designated "L3," which allows only Channels 1 through 6 to be passed through the satellite, but suppresses Channels 7 through 9. This is not the normal mode (which is designated "L2"), because normally, Channels 7 through 9 are also carrying Globalstar traffic. However, in order to adapt to Iridium's use of Channels 8 and 9, Globalstar assigned only Channel 7 to carry its traffic in the Middle East region. During this experiment, the traffic on Channel 7 was purposely reduced to a negligible level. Thus, the differences between the observed peak C-band power seen on a satellite when it is in the narrower-band "L3" mode versus the C-band power levels seen in normal "L2" mode are attributable to non-Globalstar sources of uplink power in Channels 7, 8 and 9.

As an example, Figure 3 shows the C-band power for a satellite in "L2" mode and one in "L3" mode as they pass over Basra, Iraq, during the peak traffic hours of 1600 Z to 1900 Z. Satellite 15, which is in the wider band mode "L2," and which is amplifying signals and interference in channels 1-9 clearly has much larger peaks as it passes over Basra than Satellite 1, which is in the narrower band mode "L3." Another example is given in Figure 4, which shows the C-band satellite power for a Satellite 59 in mode "L2" and Satellite 38 in mode "L3" as they pass over Basra during the peak traffic hours. Again, Satellite 59 in the wider band mode has much larger peaks than Satellite 38 in the narrower band mode.

These examples show that the effect of Iridium operations in Channels 8 and 9 is to drive the Globalstar satellites' C-band amplifiers into saturation, thereby reducing their capability to amplify signals in all the return link frequencies at peak hour. This has the direct effect of increasing Radio Link Failure rates during peak hours over the Middle East. The increased Radio Link Failure rates after Iridium was authorized to operate are depicted in Figure 5, which shows that the percentage of Radio Link Failures at the Riyadh gateway increased from before to after April 11. Also shown is the variation in weekly traffic in the Iraq region; this curve shows that even though traffic, after increasing in the first part of the graph, dropped in the second half of the graph, the RLF rate remains high. These curves indicate that the C band saturation effect started to occur as soon as Iridium began using Channel 9.

To get similar saturation effects with Globalstar-only signals would take a much higher level of Globalstar traffic than the rest of the Globalstar system was designed to handle. In other words, similar power robbing by Globalstar-only signals cannot occur.

Iridium user terminals are licensed to operate at burst EIRP levels of up to 11.95 dBW or 15.66 watts (Call Sign E960132). From the very strong Iridium signals that Globalstar engineers have observed in channels 8 and 9, the EIRP from Iridium user terminals has indeed been calculated in the range of 15.66 watts. In the case of Globalstar, power control is used to keep the power from each user down to the minimum need to close the link. As a result, each Globalstar user typically transmits only 100 to 200 milliwatts of EIRP on average. Since each Iridium user is on only 1/8th of the time, an Iridium user transmitting at 15.66 watts burst EIRP would effectively rob the power that would otherwise have served between 15.66/8/.2 and 15.66/8/.1, i.e., between 9 and 19 Globalstar users.

3. Globalstar's Proposal to Confirm Observations

Globalstar engineers are continuing to try to reduce the Radio Link Failure rate in the Middle East to acceptable levels. Because so many factors, including Globalstar traffic, frequency assignments, external interference, Iridium traffic in Channels 8 and 9 (which appears in-band to Globalstar's satellites and subtracts satellite power in the L-to-C transponder), are varying at the same time, it is challenging to test different hypotheses and to isolate the impact of alternative system configurations. It would be extremely useful to Globalstar to take measurements when Iridium is not using Channels 8 and 9. Globalstar's call performance results from this experiment will be reported to the Commission and Iridium.

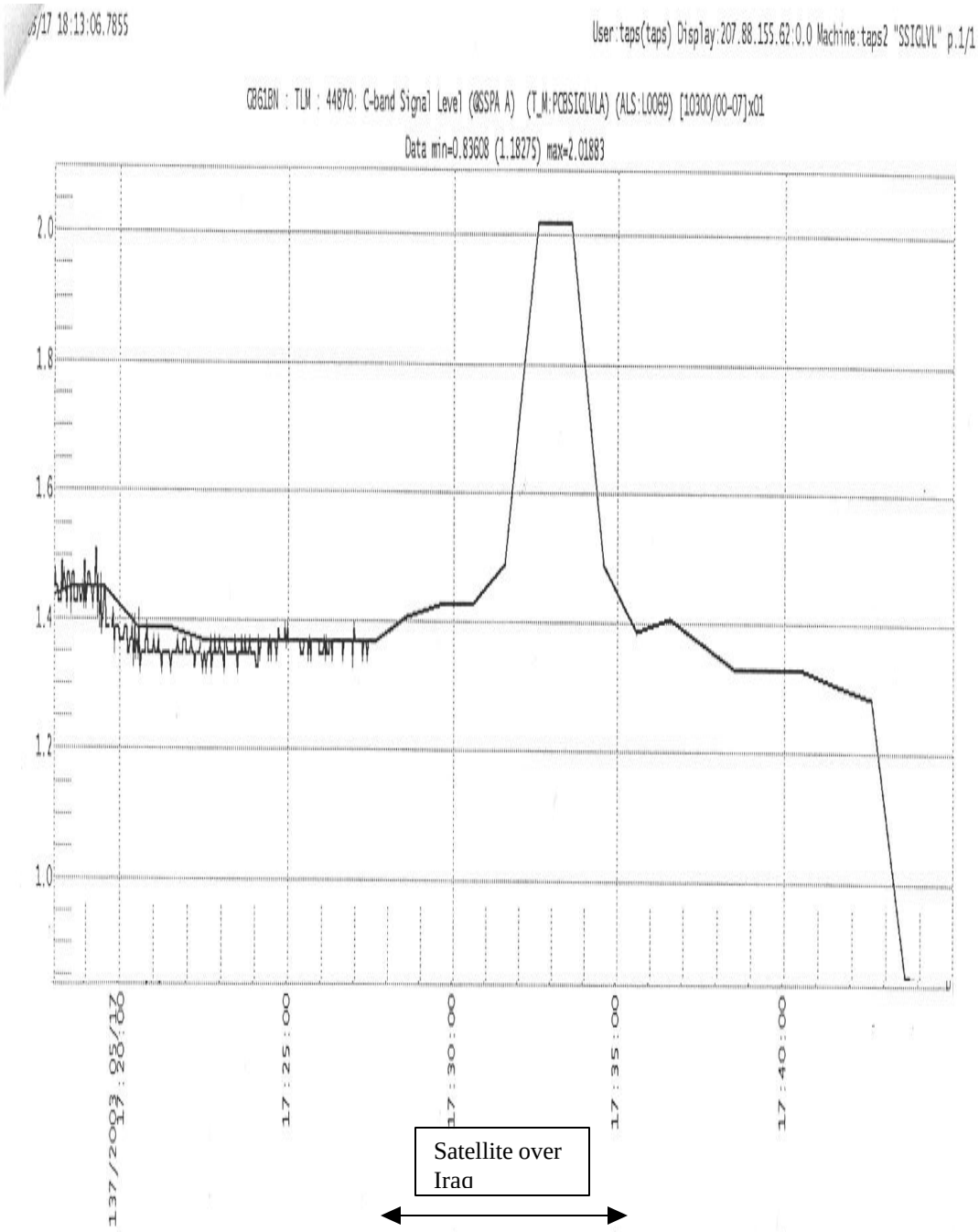


Figure 1: Satellite C-band SSPA telemetry data showing peak of 2 volts as satellite beams pass over Iraq.

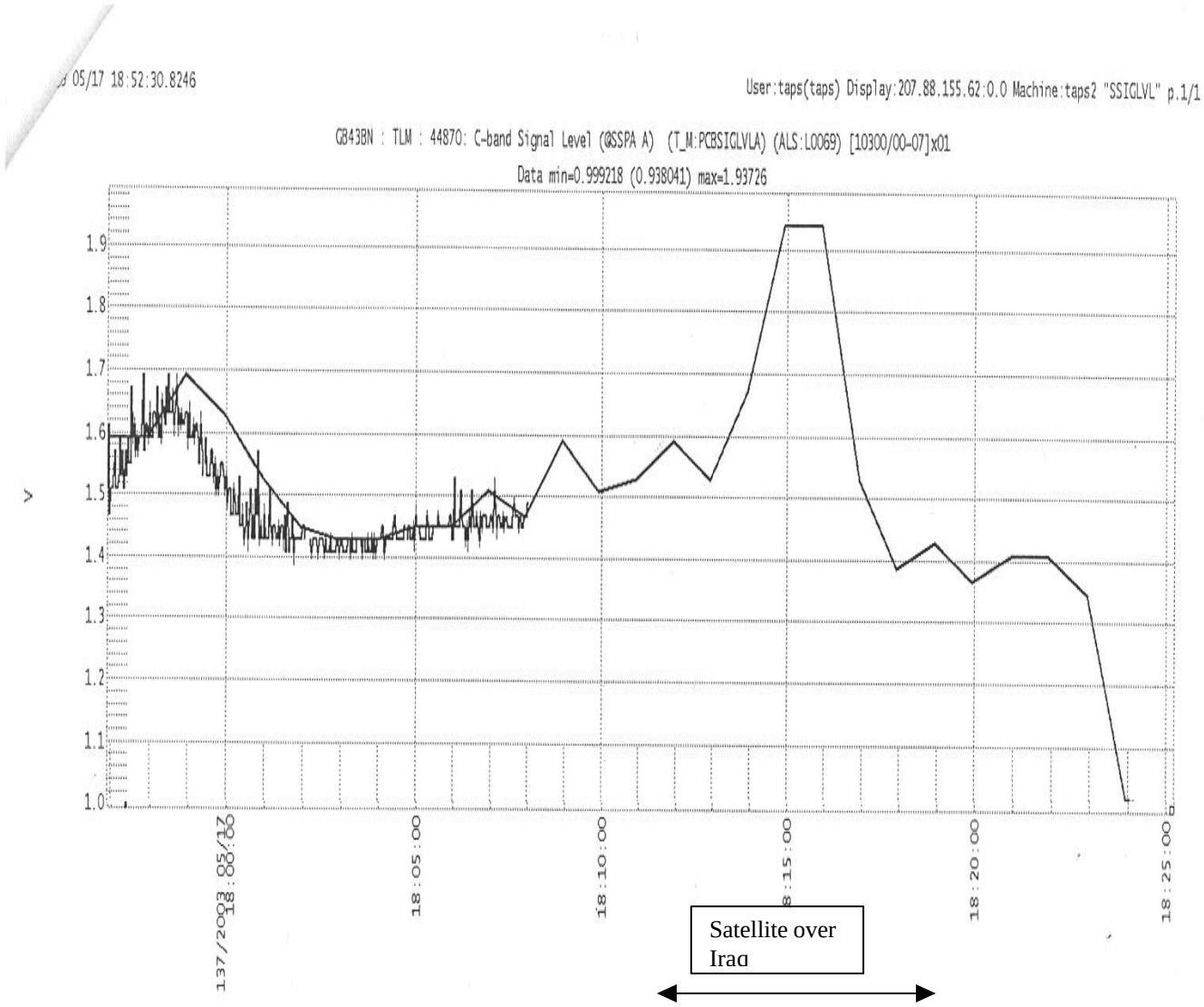


Figure 2: Satellite C-band SSPA telemetry data showing peak of 1.94 volts as satellite beams pass over Iraq.

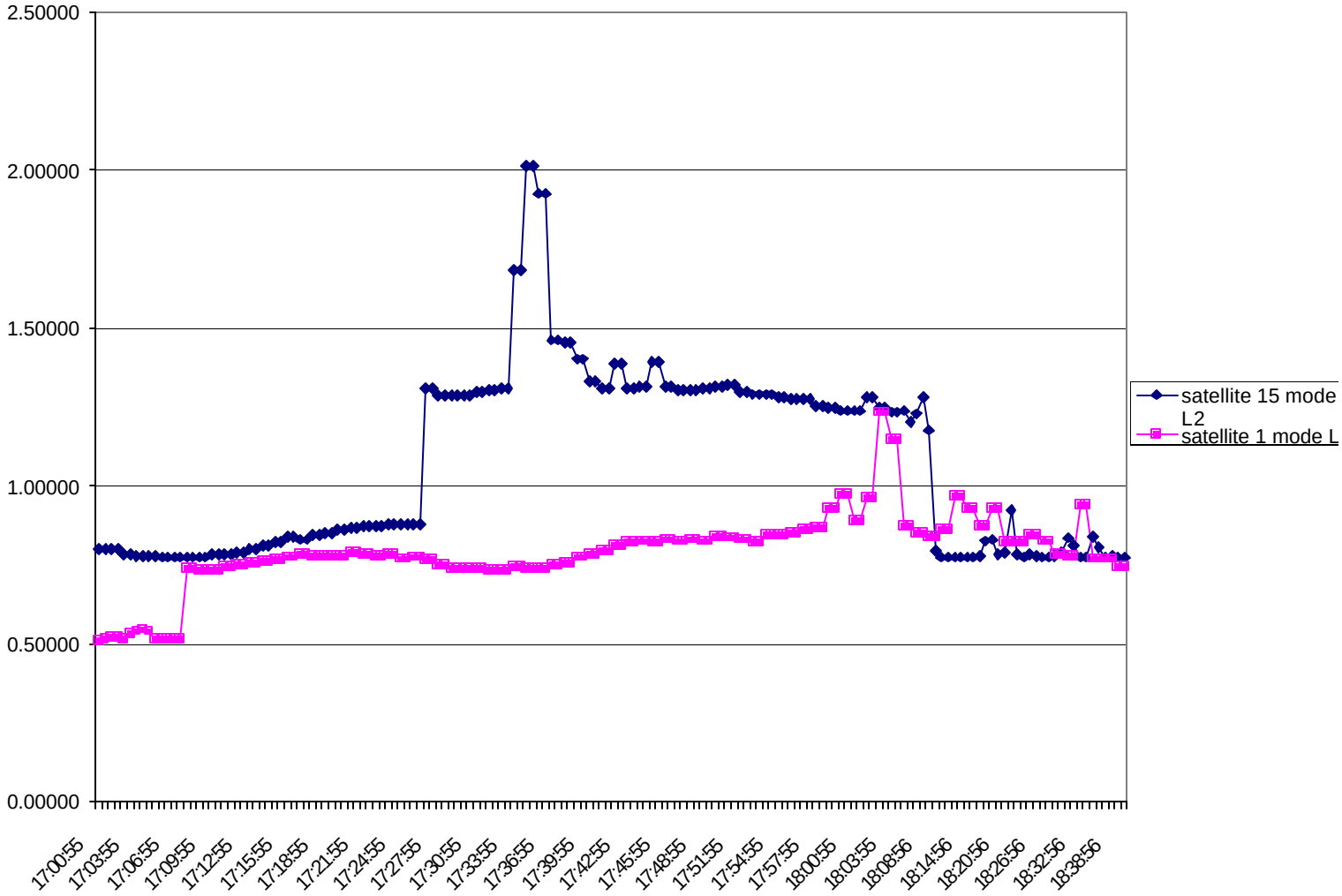


Figure 3: C-band SSPA output for two satellites; satellite 15 is in the wider band mode 'L2', and passes over Basra from 17:25:30 to 17:47:31 Z; satellite 1 is in the narrower-band mode 'L3' and passes over Basra from 18:20:00 to 18:39:24 Z.

Figure 4: C-band SSPA output for two satellites; satellite 59 is in the wider band mode 'L2', and passes over Basra from 18:45:05 to 19:07:41 Z; satellite 38 is in the narrower-band mode 'L3' and passes over Basra from 18:53:45 to 19:14:06 Z.

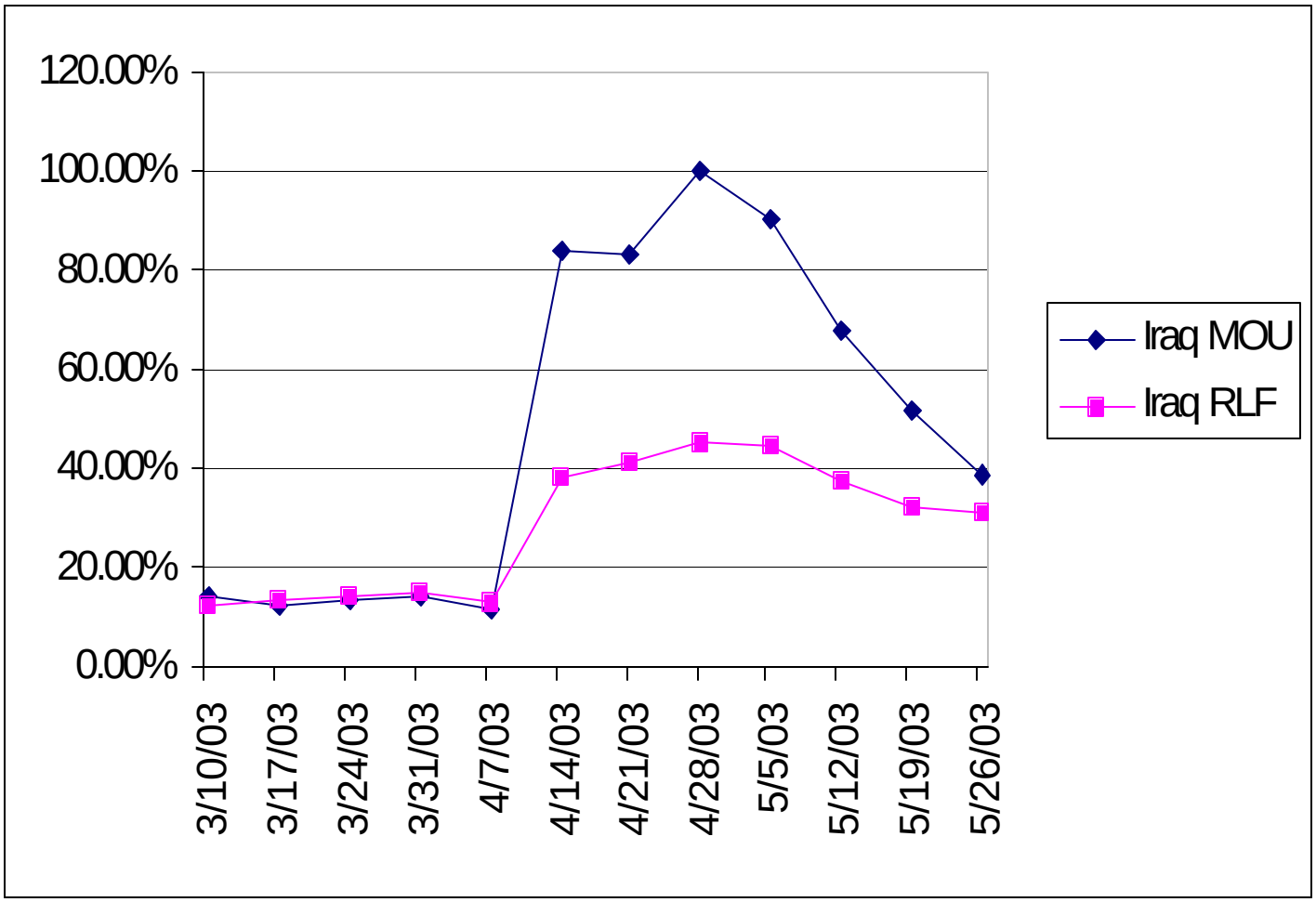


Figure 5: Weekly Minutes of Use (MOU) in Iraq as a percentage of the highest weekly traffic seen, and Radio Link Failure (RLF) rates for Globalstar system while serving Iraq.

Part II: Response to Specific Claims in Iridium's May 8 Letter

1. Overview Of Part II

In its May 8 Letter, Iridium offers data to show that it is handicapped by a lack of spectrum. In fact, all the points that Iridium makes are broad generalizations that do not prove that it needs additional spectrum to accommodate its subscribers at an acceptable level of service quality. This Part II shows that Iridium's alleged need for Channels 8 and 9 arises from an inefficient use of spectrum that should not be rewarded. Allocating its frequencies in an inefficient manner and then providing call success rate data, as Iridium has done in its May 8 Letter, simply demonstrates that its quality of service is better when its users are spread across more spectrum. Every wireless licensee in the World could make such a showing no matter how much spectrum it held.

Section 2, below, points out several discrepancies between Iridium's analysis and data to demonstrate that Iridium did not need access to Channel 8 or 9 in order to serve its Middle East traffic, and that some factors other than spectrum availability are limiting its ability to serve users in the Middle East.

2. Iridium's Data and Analysis Contain Several Discrepancies

Iridium, in its May 8 Letter, makes several statements that are either inconsistent or incompatible with the data presented in Attachments 1 through 4 of that Letter.

a. Attachment 1 to the May 8 Letter shows the total Middle East calls remaining almost unchanged (or even dropping slightly) around April 26, while Attachment 2 shows the traffic supported on Channels 8 and 9 going from about 35,000 call-minutes to 65,000 call-minutes just with the addition of Channel 8 on April 26. This large jump, which is not reflected in any increase in the total *number of calls* in Attachment 1, is more likely due to a change in the pattern of frequency allocations than due to increased traffic. Further the supposed traffic jump on April 26 is not reflected in the top curve in Attachment 4 to the May 8 Letter, which shows the "Max. connections on SV" staying relatively unchanged after the addition of Channel 8. We further note that the curve did not even increase on April 11 with the addition of Channel 9 because the traffic ramp-up had already occurred before April 11. Attachment 4 shows that the maximum number of calls per satellite did not increase as Iridium's spectrum increased by approximately fifty percent. Since most of Iraq is covered with only one Iridium satellite more than sixty percent of the time, if the maximum connections on a satellite did not increase with the inclusion of Channel 8, it is not clear how capacity went up as shown in Attachment 2. Attachments 1 and 4 together actually support the position that the addition of Channels 8 and 9 did not increase the total number of calls per satellite or SV, but merely allowed Iridium to spread its users out over a wider frequency band, just because it could. Other factors such as satellite power, or satellite-to-satellite cross-link capacity limitations or other network limitations, rather than the spectrum allocation, must be the true limiting factor(s) on Iridium's capacity.

Referring again to the topmost curve in Attachment 4 to the May 8 Letter, the maximum number of connections on an SV is around 360, even before and after the addition of channels 8

and 9. This number is only 9.4% of the maximum number of L-band uplink channels per satellite of 3,840 which was given in Table R-1 of Iridium's Minor Amendment filed with the FCC in the Big LEO Proceeding. This Minor Amendment formed the basis of Iridium's capacity estimates in the Negotiated Rulemaking (NRM) in CC Docket No. 92-166. Note that this 9.4% is quite close to Globalstar's May 1 estimates of Iridium's capacity utilization.

b. On page 3 of the May 8 Letter, Iridium asserts that Globalstar's estimate of Iridium's spectrum utilization contains numerous flaws. Iridium then makes sweeping statements about dense and distributed traffic, which actually seem to agree with Globalstar's observations. Iridium first states that "more widely distributed traffic optimizes the frequency reuse potential of the Iridium system," that "the Iridium traffic emanating out of the Middle East region has remained extremely 'dense' geographically," and that Globalstar's estimates fail to take into consideration this dense traffic. In these statements, Iridium tries to create the impression that the traffic density is much smaller than a satellite footprint so that optimal frequency reuse cannot be achieved. In a second statement, Iridium says that "at any given moment, channels 8 and 9 are actually being distributed throughout the satellite footprint covering the Middle East and surrounding regions." Here, Iridium says that the frequencies are being reused throughout the satellite footprint.

Both statements cannot be true. The first statements imply that the reason for Iridium's inability to reuse its assigned frequencies efficiently is the "dense" nature of the call traffic, and so it needs more spectrum for Middle East traffic. The second statement that "at any given moment, channels 8 and 9 are actually being distributed throughout the satellite footprint covering the Middle East and surrounding regions," is an admission that Iridium is not using Channels 8 and 9 efficiently to solve its *localized* traffic problems in the Middle East. Moreover, Iridium's apparent inability to handle *dense* traffic explains why Globalstar's studies are not recording as many Iridium carriers as would be expected based on Iridium's channel capacity suggested during the NRM.

c. On page 8 of the May 8 Letter, Iridium says that "it is these intra-system channel reuse degradations that have been dramatically improved (but not eliminated) by the additional STA spectrum." However, performance degradation can be caused by self-interference arising from intra-system channel reuse because the sidelobes of the nearby beams that are using the same frequency appear as self-interference. The effect is indistinguishable from external interference. The degradation can also be due to satellite power limitations, or an increase in traffic, both of which lead to a reduction in observed carrier-to-interference ratio or C/I. It is extremely difficult to separate the effects of all these factors. Iridium does not demonstrate how its engineers determined whether the interference contributing to the observed C/I is self-interference or external interference in a region which they acknowledge is rich in RF interference.

d. Finally, Iridium does not accept Globalstar's previous assertion on page 6 that an independent consultant measured Iridium's call drop rate to be 18.4 percent in the summer of 2002 (as opposed to its claimed 1%). Iridium states on the next page 7 that its real world call drop rate is 10% across four regions. <u>Note that 10% is closer to the consultant's measured real-world call drop rates than the 1 % which Iridium claims is its world-wide call drop rate</u>.

ATTACHMENT B

14 July 2003

Regional Manager
Australian Communications Authority
GPO Box 5295
Sydney NSW 2001

Dear Sir/Madam,

Localstar Holdings Pty Limited – Unauthorised Operation of Iridium in Localstar Holding's Licenced Spectrum

Localstar Holdings Pty Limited (Localstar) holds an Australia wide space receive Apparatus Licence, licence number 1137161. The Apparatus Licence is valid to 11 Nov 2003, and it is Localstar's intention to renew this licence on an ongoing basis.

The frequencies (GHz) assigned to Localstar under this Apparatus Licence are:

ASSIGNED	LOWER	UPPER
1.6155930	1.6100000	1.6211850

Localstar has discovered interfering signals in the upper part of its band, and in investigating these interfering signals sought the assistance of Globalstar LP (GLP), the operator of the Globalstar™ constellation of low earth orbit satellites.

The interfering signals are affecting Globalstar™ Channel 9, which has frequencies set at:

CENTRE	LOWER	UPPER
1.620570	1.6199550	1.6211850

The characteristics of the interfering signals are that they:

- are 30-40kHz in bandwidth;
- are 10 – 20dB above the noise floor;
- are centred on Globalstar™ Channel 9 frequency; and
- have been located at each of Localstar's gateway facilities at Dubbo, NSW, Mt Isa QLD, and Meekatharra WA.

Please see Attachment 1 for a plot of the interfering signals recently taken from Localstar's Dubbo Gateway facility.

Whilst Localstar has done everything it can rearrange its operations so as to limit any impact on its Australian customer base, the interfering signals are likely to cause increased radio link failures for customers on the Globalstar™ network in Australia if they are allowed to continue.

GLP has advised Localstar that the source of these interfering signals is Iridium operating in Localstar's assigned frequency band, in particular in Globalstar™ Channel 9.

We are aware that in Australia, Iridium Australia LLC has been granted an Australia wide space Apparatus Licence, licence number 1225833. This licence is valid until 18 March 2007.

The frequencies (GHz) assigned to Iridium Australia LLC are:

ASSIGNED	LOWER	UPPER
1.6239250	1.6213500	1.6265000

Consequently, Iridium Australia LLC is not licenced in Australia for transmissions in Globalstar™ Channel 9, and Iridium is interfering with Localstar's operations within its licenced spectrum. Would you please investigate this issue, and take action to stop Iridium operating in breach of the conditions of its Apparatus Licence.

Should you wish to discuss this matter further, I can be contacted on 0414 207 050 or by email to robert.sakker@globalstar.com.au.

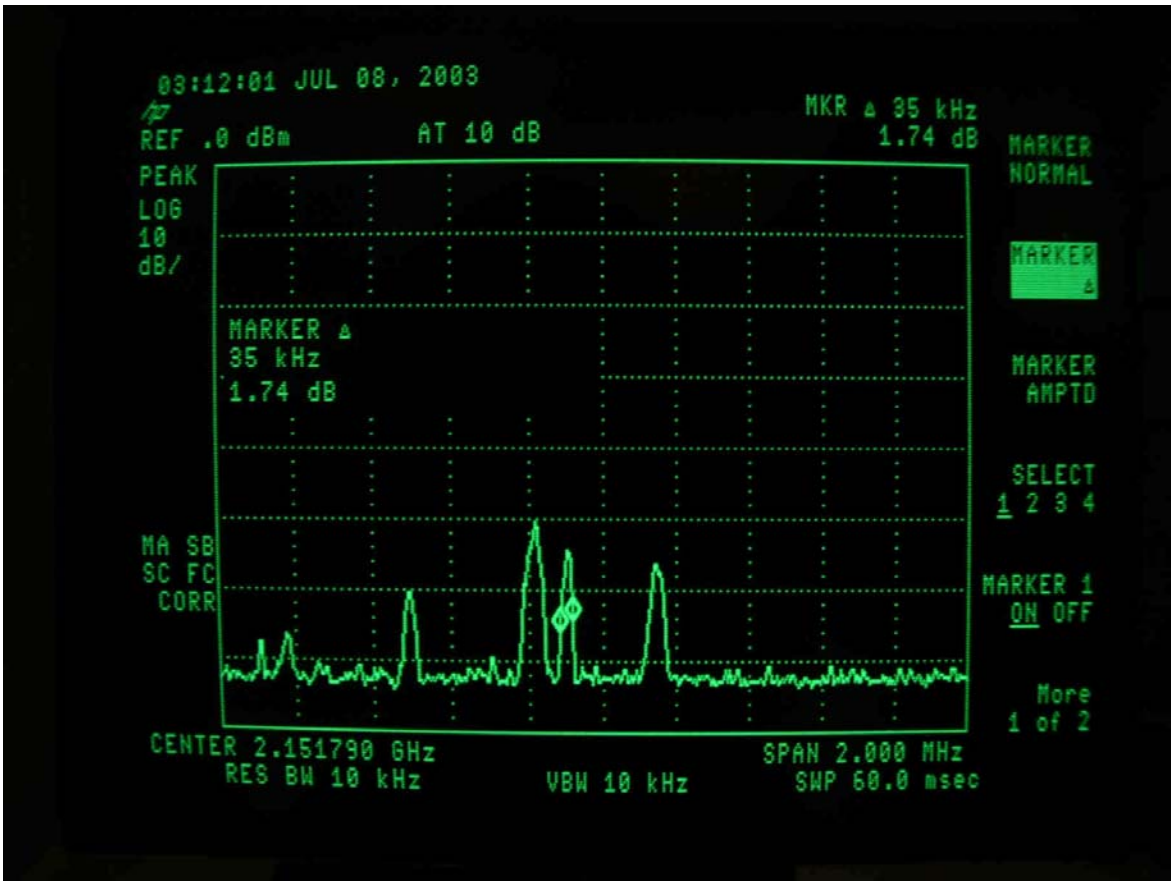
Yours sincerely
Localstar Holdings Pty Limited ABN 85 102 274 322

Robert Sakker
Executive Director

CC William F Adler
Vice President, Legal and Regulatory Affairs
Globalstar LP

Attach

Attachment 1



Test Setup Details:

- Tests were performed at Dubbo Gateway at 12:00 pm, Tuesday 8th July 2003 (Local Time).
- A spectrum analyzer was connected to the C-band downlink at centre frequency 2.151790 GHz which corresponds to Globalstar Channel 9 L-band uplink at centred at 1.620570 GHz.
  (NB: as Globalstar satellites act as repeaters, signals received on the L-band uplink will be re-transmitted on the C-band downlink regardless of modulation type).
- DUB2 antenna was used, as at the time it had the most satellite passes.
- The spectrum analyser was set to display max hold, over approx 10 min period.
- Beams 14 & 9 were displayed only - markers were placed on all detected carriers.
- Spec Analyser settings were: 60mS sweep rate, 10dB/Div Vertical, 2MHz Horizontal Span, 10dB Attn, Centre Freq = 2.151790GHz (corresponds to Globalstar Channel 9)

ATTACHMENT C

Stay connected to racin' news. . .

Front Page

The Mercury News

Published Tuesday, April 3, 2001, in the San Jose Mercury News

ADVERTISEMENT

Navajo girl finally gets phone line

- S.F. marketer mounts gimmick-filled effort urging Internet users to show their support online.

Email a friend
Save on Palm
Print this Page

I just got off the phone with Myra Jodie.

She called on her phone. From her house.

No, it wasn't ``Mr. Watson, come here," but as phone calls go, it was a very big deal.

Remember Myra? The Navajo teenager who won a computer in an online contest just over a year ago? She took it home to a northeastern Arizona trailer with no running water and no telephone service and in the process caught the attention of the president of the United States.

But none of that meant a phone and it was beginning to look like she'd never have one.

Well, she has phone service now and she thought she'd ring me up Monday to say so.

``I got my phone today," Myra, 14, said, first calmly and then with a little giggle.

Technicians from Globalstar, a San Jose-based company in the satellite phone business, installed about $1,000 worth of equipment Monday morning and instantly connected Myra with the rest of the world. The company agreed to cover the $1-a-minute charge for a year and then consider continuing the help.

Contact the Merc
Letters to the Editor

Myra said her family had heard from Globalstar last week.

``This morning they came by," she said, meaning came by Ganado High, which she attends on the Navajo reservation. ``They said they were going to install it."

Globalstar's entry brings another dramatic twist to a remarkable story. Talk about rags to riches -- or riches to rags. On the same day the company installed the phone, Globalstar told the Securities and Exchange Commission that it might shut down by the end of the year if it doesn't raise more cash.

Ed Hirshfield, a Globalstar vice president who coordinated the installation, said he was optimistic despite the company's gloomy forecast.

``I think that a company that is planning to survive for awhile, has to do business as though it will survive," he said late Monday. And providing phone service to remote regions is part of Globalstar's mission.

There is nothing easy about this story and Myra learned that long ago. She's lived her life on a rugged reservation, a West Virginia-sized chunk of Arizona, New Mexico and Utah where fewer than a quarter of the homes have phones. It's a place where running water and reliable heat are not a given. Unemployment is high and poverty is deep.

Still, Myra didn't have time Monday to worry about far-flung financials. She had to learn the new phone system. By Monday afternoon, she'd already checked her e-mail. Her mother, Marcella, had already called her sister, who lives near the Grand Canyon.

You might not give checking e-mail or calling your sister a second thought. I didn't until I met Myra just over a year ago. She was a face on the digital divide. A determined face with a bright pair of eyes on a teenager who made the honor roll, played in the band and was a star pitcher for her school softball team. She was the face of a young woman who plans to attend Notre Dame or Harvard and she spoke for many.

It seemed Myra might never get a phone, despite heartfelt efforts by many dozens of you who first read her story last March. The irony of her computer prize reached the White House, and President Clinton invited Myra to introduce him when he traveled to the reservation last April. Myra did beautifully. But it did not get her a phone.

Hirshfield said Globalstar executives were taken by Myra's story when they first read it a year ago. They thought about ways they might help, but they didn't yet have the ideal technology. Their talks with Navajo tribal leaders moved slowly.

Then Hirshfield saw my column last month, which recounted Myra's last year: Winning the computer. Meeting the president. Appearing on a game show. And still having no phone.

``It spurred us to move more rapidly," Hirshfield said.

Not only that, by March the company had improved the technology needed to bring satellite phone and Internet service to Myra's trailer on the reservation.

So, Globalstar is a hero here, but this story is packed with heroes. They give reason for hope that the so-called digital divide and even older divides might be bridged by those with good hearts.

Readers have written offering to donate money to the cause. And you would think money would have done it, but the problem takes lots of money. No phone wires run near Myra's home. Bringing them several miles to her would cost tens of thousands.

But in the past year, satellite systems became more practical. Frank Paniagua, CEO of AutoNetworks in San Ramon, and Sandy Colony, a vice president with StarBand, based in Virginia, said last month that together they would install a StarBand satellite system that would provide Myra with an Internet connection. They agreed to pay for a year or more of service.

But, they graciously backed off when they learned that Globalstar was preparing to offer both Internet and telephone service.

And there were heroes on the reservation. Heroes like Ella Earl, Myra's eighth-grade teacher, who let students surf the Web at school when they were finished with their school work. Myra was often finished early and she entered the Web-based computer giveaway at school. It took representatives of contest sponsor Awz.com, of San Jose, weeks to track her down because she had no phone. Awz has since gone out of business.

All along, Myra has said she's thrilled to have the machine. She's seemed a bit bemused that people made something out of the fact that she had the computer, but no Internet connection. So many of her neighbors had nothing more than she had.

So, of course, if you're looking for heroes, there is Myra, too. She

never complained. Never asked for help, really. But help has arrived.

I know, because Myra called to tell me.

Contact Mike Cassidy at mcassidy@sjmercury.com or (408) 920-5536.

Back to Top

The Mercury News Home | Site Index | Archives | Help/Feedback

Stay connected to racin' news. . .

© 2000 The Mercury News. The information you receive online from The Mercury News is protected by the copyright laws of the United States. The copyright laws prohibit any copying, redistributing, retransmitting, or repurposing of any copyright-protected material. Mercury News privacy policy

CERTIFICATE OF SERVICE

I, William D. Wallace, hereby certify that I have on this 25th day of July, 2003, caused to be served true and correct copies of the foregoing "Joint Reply Comments of L/Q Licensee, Inc., Globalstar, L.P. and Globalstar USA, L.L.C." upon the following persons via hand delivery (marked with an asterisk (*)) or first-class United States mail, postage prepaid:

The Honorable Michael K. Powell *
Chairman
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

The Honorable Kathleen Q. Abernathy *
Commissioner
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

The Honorable Michael Copps *
Commissioner
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

The Honorable Kevin Martin *
Commissioner
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

The Honorable Jonathan S. Adelstein *
Commissioner
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

John Rogovin *
Office of General Counsel
Federal Communications Commission
445 12th Street, S.W., Room 6-A665
Washington, D.C. 20554

Donald Abelson *
International Bureau
Federal Communications Commission
445 12th Street, S.W., Room 6-C750
Washington, D.C. 20554

Thomas S. Tycz *
International Bureau
Federal Communications Commission
445 12th Street, S.W., Room 6-A665
Washington, D.C. 20554

Karl A. Kensinger *
International Bureau
Federal Communications Commission
445 Twelfth Street, S.W., Room 6-A663
Washington, D.C. 20554

Howard Griboff *
International Bureau
Federal Communications Commission
445 12th Street, S.W., Room 6-C467
Washington, D.C. 20554

Fern J. Jarmulnek *
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Bryan Tramont *
Office of Chairman Michael Powell
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Paul Margie *
Office of Commissioner Michael Copps
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Sam Feder *
Office of Commissioner Kevin Martin
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

J. Breck Blalock *
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Christopher Murphy *
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Michael Senkowski
Peter D. Shields
Jennifer Hindin
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, D.C. 20006

Cassandra Thomas *
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Jennifer Manner *
Office of Commissioner Kathleen Abernathy
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Barry Ohlson *
Office of Commissioner Jonathan Adelstein
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

James Ball *
International Bureau
Federal Communications Commission
445 12th Street, S.W., Room 6-C467
Washington, D.C. 20554

Richard Engelman *
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Ed Thomas *
Office of Engineering & Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

William D. Wallace