

Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554

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

**REPLY COMMENTS OF GLOBALSTAR LLC**

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## SUMMARY

In these Reply Comments, Globalstar LLC reviews the comments filed by Iridium Satellite LLC on the Commission's proposal to require Globalstar and Iridium to share the 1616-1618.25 MHz band segment, in addition to the 1618.25-1621.35 MHz band segment. The facts in the record, even as amplified by Iridium's most recent comments, demonstrate that Iridium does not need access to additional spectrum to serve its U.S. and global subscribers beyond its exclusive access band segment of 1621.35-1626.5 MHz. Moreover, as Globalstar has demonstrated repeatedly, increasing Iridium's available spectrum does not improve its capacity or system efficiency. To meet greater demand, Iridium can improve its system efficiency by modifying certain design features in its network, but Iridium has taken no steps to optimize its use of spectrum other than to ask for access to MSS spectrum used by Globalstar. Based on the current record, it would be arbitrary and capricious for the Commission to find that Iridium should be granted shared access to the 1616-1618.25 MHz band segment.

If additional L-band sharing is required, then the Commission must also require sharing in the 1621.35-1626.5 MHz band segment. Authorizing sharing in this L-band segment would increase the number of MSS licensees using the 1621.35-1626.5 MHz band segment, consistent with the policy justification the Commission used to authorize sharing in the 1618.25-1621.35 MHz band segment. Granting Globalstar access to the 1621.35-1626.5 MHz band would also improve the ability of Globalstar to coordinate spectrum sharing with Iridium because both

systems would have access to more frequencies to locate users. And, Iridium claims that sharing with Globalstar does not harm Iridium's ability to operate in the spectrum or cause interference to Iridium users. Therefore, sharing the 1621.35-1626.5 MHz band would not pose a burden to Iridium. It would be arbitrary and capricious for the Commission to require sharing in the 1616-1621.35 MHz band segment, but not the 1621.35-1626.5 MHz band segment.

In its initial comments, Globalstar explained why it needs unshared access to CDMA Channels 6 and 7 above 1616 MHz to provide its aviation products and an ancillary terrestrial component ("ATC") in the United States. Iridium's claims to the contrary are refuted in the record. The requirements of the Federal Aviation Administration and standards adopted by RTCA, Inc., are applicable to Globalstar's aviation services and restrict operation of these services to above 1616 MHz. Moreover, if Globalstar offers ATC in frequencies below 1616 MHz, it needs unshared access to Channels 6 and 7 for MSS.

Iridium justified access to the 1616-1618.25 MHz band segment by claiming that Globalstar and Iridium can share spectrum without causing harm to either system. But, Iridium's technical showing is seriously flawed, and does not challenge Globalstar's demonstration in its initial comments that as both systems experience subscriber growth and increased loading, there will be harmful interference resulting from co-frequency operation. For this reason, the Commission should allow each system access to some unencumbered and unshared spectrum, for Globalstar, at the least, the 1616-1618.725 MHz band segment.

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**REPLY COMMENTS OF GLOBALSTAR LLC**

Pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. § 1.415), Globalstar LLC ("GLLC") submits the following reply to the comments of Iridium Satellite, LLC on the Further Notice of Proposed Rulemaking ("Further NPRM") in this docket.<sup>1</sup> GLLC owns and operates the international Mobile-Satellite Service ("MSS") business offered through the Globalstar™ non-geostationary satellite system in the 1.6/2.4 GHz bands.

In the L-Band Order, the Commission required that the operational Big LEO MSS systems, Globalstar using CDMA and Iridium using TDMA access technology, share use of the 1618.25-1621.35 MHz portion of the L-band for both systems' uplinks and Iridium's secondary downlinks. The Commission concluded that such

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<sup>1</sup> See Report and Order, Fourth Report and Order and Further Notice of Proposed Rulemaking, FCC 04-134 (released July 16, 2004) ("L-Band Order"). Iridium Satellite, LLC, Globalstar LLC and Sagem Avionics, Inc. were the only parties filing comments.

spectrum sharing would promote “spectral efficiency by increasing the number of MSS licensees that will use this spectrum, particularly at a time when the demand for spectrum has increased.”<sup>2</sup> (L-Band Order, ¶ 45.) In the Further NPRM, the Commission requested comment on the advantages and disadvantages of requiring Globalstar and Iridium to share the 1616-1618.25 MHz band segment as well.

In its initial comments, GLLC demonstrated that sharing the 1616-1618.25 MHz band segment would adversely affect the Globalstar system and preclude the delivery to the U.S. public of planned and currently available services. The filings of Sagem Avionics, Inc. and Qualcomm Incorporated confirm these points with respect to Globalstar’s aviation products. GLLC also explained why granting Iridium shared access to the 1616-1618.25 MHz band segment flatly contradicts the policy considerations on which the Commission relied to modify the Big LEO L-band plan and is utterly unjustifiable based on the record in this proceeding.

In response to the Further NPRM, Iridium claims that sharing the 1616-1618.25 MHz segment will promote spectrum efficiency and help satisfy its alleged need for additional spectrum. Iridium has provided no demonstration of need or any legal or technical reason why additional sharing should be required in L-band. Indeed, Iridium’s arguments lead inexorably to the conclusion that if additional

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<sup>2</sup> When the initial Big LEO band plan was adopted, Globalstar was required to share 11.35 MHz of L-band and 16.5 MHz of S-band spectrum with three other CDMA MSS systems. 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 (1994), modified on recon., 11 FCC Rcd 12861 (1996).

L-band sharing is required, then Globalstar must be granted access to the 1621.35-1626.5 MHz segment, currently Iridium's exclusive spectrum. Moreover, Iridium's so-called "technical" showing demonstrates exactly what the record reflects:

Iridium does not currently have sufficient U.S. traffic to justify grant to Iridium of access to the 1618.25-1621.35 MHz segment, much less to additional spectrum, shared or unshared. Based on the current record and the L-Band Order, a rule requiring additional sharing in the CDMA L-band spectrum would be arbitrary and capricious and a clear abuse of the Commission's discretion.

**I. THE RECORD DEMONSTRATES THAT THERE IS NO JUSTIFIABLE BASIS FOR L-BAND SPECTRUM SHARING IN THE 1616-1618.25 MHZ BAND SEGMENT.**

Iridium's comments on the Further NPRM have not amplified or modified the record in this docket in any way except one: While Iridium previously rejected Globalstar's efforts to forge a compromise based on spectrum sharing, Iridium now embraces spectrum sharing as the game-winning-bases-loaded-home-run of spectrum efficiency. However, just as its prior filings failed to demonstrate any factual support for granting Iridium access to additional spectrum, so its initial comments on the Further NPRM strike out on all relevant details.

**A. Iridium Has Not Demonstrated a Need for Additional Spectrum to Serve Subscriber Demand.**

In its Comments (at 2, 7-8), Iridium continues to claim that it needs additional L-band spectrum to meet increased demand for its services. In support, it cites only to its previous filings in this docket and the obviously temporary need

for service in Florida following Hurricanes Charley and Frances.<sup>3</sup> As if it added weight, Iridium also claims that it needs spectrum to provide “expanded” services in remote and underserved areas such as Alaska, Africa and Southeast Asia. Iridium Comments, at 9-10. Unlike Globalstar, Iridium continues its steadfast refusal to provide any data on current subscribers, future subscribers, minutes of use, or other evidence of actual demand on its network to support its claims.<sup>4</sup>

Thus, the record in this docket has not changed. There is not one iota of evidence in Iridium’s Comments, or in any prior filing, that can change the Commission’s observation that Iridium’s petition for assignment of additional spectrum was based on “what appears to be a sporadic and geographically-based need.” (L-Band Order, ¶ 47.) The latest claims made by Iridium are simply more generalized and anecdotal descriptions, reflecting geographically isolated and sporadic service—exactly the pattern of Iridium service demands that Globalstar has already documented in the record,<sup>5</sup> and that the Commission has concluded is factually accurate. With respect to expanding services in non-U.S. areas, if there were demand, any such need is not relevant to Iridium’s U.S. services. In any

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<sup>3</sup> Usage of Globalstar also spiked during and after the hurricanes.

<sup>4</sup> A good example of Iridium’s hyperbolic complaining comes at page 10 of its Comments. Iridium claims that service to underserved areas places “significant demands on Iridium’s system capacity.” But, Globalstar has demonstrated that Iridium is not currently using its capacity. Where there is no use, there can be no constraints on Iridium’s capacity.

<sup>5</sup> See, e.g., Globalstar, L.P., Ex Parte Presentation, Analysis, § 3 (Mar. 19, 2004).

event, since it has been proved that Iridium is not using its spectrum significantly outside the Middle East region, Iridium has access to more than enough spectrum to serve *and* expand services in all these areas.<sup>6</sup>

Nor can the Commission accede to Iridium's request for spectrum to meet its "peak" needs. Iridium Comments, at 4, 7-8. Iridium has never demonstrated on the record what its peak needs are. Even with such a demonstration, no wireless or wireline system can ever guarantee that it will have sufficient lines of communications available to connect every caller at every minute of every day. The Commission would run out of spectrum to award after just one application if it based its spectrum assignment policies on fulfilling a carrier's alleged peak requirements.

Similarly, Iridium's complaints (Comments, at 3, 8-9) about limitations on its quality of voice and data services are tired rehashes of earlier undocumented assertions. Iridium has always claimed that it needs access to 10.5 MHz of spectrum to provide full-rate voice and data services at 4.8 kbps and 19.2 kbps, rather than its current offerings of "half-rate" services, that is, 2.4 kbps for voice and 9.6 kbps for data.

However, as Globalstar pointed out over a year ago, Iridium always planned to offer half-rate services.<sup>7</sup> And, Iridium's filings with the Commission indicate that

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<sup>6</sup> See id., § 5.

<sup>7</sup> See Joint Reply Comments of L/Q Licensee, Inc., Globalstar, L.P., and Globalstar USA LLC, at 6, Tech. App. § 3 (July 25, 2003).

the system has the capability now to provide full-rate voice and data services.<sup>8</sup> Iridium's true complaint is that while it can offer these voice and data rates today, the number of subscribers it can serve at such rates is limited by the available satellite power or other network resources.<sup>9</sup> Indeed, Globalstar has explained why Iridium is voluntarily not offering these services as a business decision because Iridium has discovered other restrictions on capacity that make it unable to serve as many subscribers as it had originally estimated during the planning and design of the system.<sup>10</sup> Granting Iridium access to more spectrum simply to modify its business plan is not justifiable regulatory intervention. The Commission correctly assessed the facts regarding Iridium's usage in the L-Band Order based, in part, on Iridium's failure to document its demand. Brazenly, Iridium dares to question that conclusion, again *without documenting any need*.

**B. Iridium's Access to Additional L-Band Spectrum in the Middle East Did Not Improve Its System Capacity.**

Iridium reasserts its claim that the additional 2.5 MHz of spectrum made available to it under Special Temporary Authority improved its ability to serve

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<sup>8</sup> See id., Tech. App. § 3.

<sup>9</sup> Perhaps, Iridium does not realize this fact because it states: "By operating full-rate data services, Iridium could support a greater number of data users. . . ." Iridium Comments, at 9. Obviously, offering full-rate data decreases by half the number of users that the system can serve for half-rate voice and data services.

<sup>10</sup> See Globalstar Joint Reply Comments, Tech. App. § 3.

increased call volume in the Middle East.<sup>11</sup> Iridium Comments, at 8. Yet, as Globalstar has pointed out previously, Iridium's data do not show any increase in call capacity on the satellites as a result of increased spectrum.<sup>12</sup> Thus, Iridium's capacity must be limited, if at all, by some factor other than the spectrum available to it. Granting Iridium access to more spectrum will not alleviate any problem that Iridium may be experiencing in meeting demand. For convenience, Globalstar explains once again in the attached Technical Appendix (§ 2) that Iridium's access to additional L-band spectrum pursuant to Special Temporary Authority did not result in an increase in its capacity in the Middle East region.

Iridium also claims that even with access to an additional 3.1 MHz of L-band, it will experience spectrum-related performance degradation "such as undue call drop rates and user acquisition failures." Iridium Comments, at 5. However, Iridium has never explained, as the Commission requested,<sup>13</sup> what the current and future demand on its system is. Therefore, it is impossible for the Commission to place any credence in these complaints. Moreover, Globalstar has already demonstrated, in the context of Iridium's alleged performance difficulties in the Middle East, that Iridium's service deficiencies were unlikely to be the result of lack

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<sup>11</sup> See, e.g., Iridium Satellite LLC, Request for Special Temporary Authority, File No. SAT-STA-20040319-00056.

<sup>12</sup> See Globalstar, L.P., Ex Parte Presentation, Analysis, § 4 (Mar. 19, 2004).

<sup>13</sup> Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, Notice of Proposed Rulemaking, 18 FCC Rcd 1962, 2087, ¶ 267 (2003).

of spectrum. Rather, there are numerous other variables in the operation of an MSS system, and it is much more likely that Iridium's performance failures arose from one of these other network variables.<sup>14</sup> Iridium has not refuted Globalstar's claim that some variable other than available spectrum bandwidth caused heightened call acquisition failures in the Middle East. Therefore, again, the Commission cannot rely on Iridium's undocumented claims to justify grant of access to additional spectrum for the Iridium system.

**C. The Commission Cannot Endorse Iridium's Technical Inefficiency By Granting It Access to Additional Spectrum.**

The Commission justified granting Iridium access to 3.1 MHz of additional L-band spectrum on promoting spectrum efficiency because two, rather than one, MSS systems will be able to use the frequencies. (L-Band Order, ¶ 45.) However, the Commission also indicated in the L-Band Order (¶ 45) that it expects spectrum licensees to use more efficient technology when demand for spectrum increases, consistent with the Spectrum Policy Task Force finding that technology choices can improve spectrum efficiency.<sup>15</sup> Indeed, the United States would soon run out of

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<sup>14</sup> See Globalstar Joint Reply Comments, at 15; Globalstar, L.P., Ex Parte Presentation, Analysis, §§ 2, 4 (Mar. 19, 2004).

<sup>15</sup> See Spectrum Policy Task Force, Report, at 13-14 (Nov. 2002).

available spectrum if the only solution for every carrier to achieve greater consumer use was getting access to more spectrum.<sup>16</sup>

The record in this docket contains undisputed analyses demonstrating that, despite Iridium's claims (Iridium Comments, at 8), the Iridium system does not make efficient use of its spectrum, *and* that there are specific technology choices that Iridium could make *now* to accommodate increased demand on its spectrum resources without access to additional spectrum.<sup>17</sup> The Commission cannot be complicit in addressing Iridium's alleged problems meeting subscriber demand by granting access to additional spectrum when Iridium itself refuses to take the steps necessary to improve system efficiency. Such action is contrary to long-established Commission policy and to all the recommendations of the Spectrum Policy Task Force which the Commission desires to implement "wherever possible." (L-Band Order, ¶ 45.)

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<sup>16</sup> The Commission has repeatedly promoted frequency reuse techniques as a means of maximizing consumer demand for spectrum-based services. See, e.g., Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, 18 FCC Rcd 25162, 25167-68 (2003) (granting flexible use to AWS licensees to promote efficient use of spectrum to meet consumer demand); Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz, the L-Band, and the 1.6/2.4 GHz Bands, 18 FCC Rcd 1962, 1974 (2003) (use of Ancillary Terrestrial Component achieves greater spectrum efficiency through greater frequency reuse of MSS spectrum); Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, 12 FCC Rcd 22310, 22321-22 (1997) (requiring Ka-Band FSS licensees to use state-of-the-art full frequency reuse techniques).

<sup>17</sup> See Globalstar, L.P., Ex Parte Presentation, Analysis, § 2 (Mar. 19, 2004).

Iridium itself (Comments, at 6) notes approvingly the Spectrum Policy Task Force's definition of "spectrum efficiency" as "when the maximum amount of information is transmitted within the least amount of spectrum." Yet, it cannot adhere to this principle. For example, even though Iridium concedes in its interference calculations that traffic on its system is currently very low (see Tech. App. § 1), it claims to need more spectrum to meet *current* demand. Iridium Comments, at 7. In other words, Iridium claims it needs more spectrum to meet the same low demand as it meets with its current spectrum. That certainly does not represent the Spectrum Policy Task Force's idea of spectrum efficiency.

Iridium now even attempts to make one of its principal design flaws into a virtue. Iridium claims that its ability to provide "continuous coverage of the entire globe" has the adverse effect of making regional capacity peaks tantamount to system capacity peaks. Iridium Comments, at 4. A regional peak "will not be met unless sufficient capacity is available in that region and therefore throughout the entire Iridium network." In other words, Iridium seeks access to spectrum that it may never use simply on the chance that it may experience a peak somewhere in the world.

Typically, Iridium has again attempted to bootstrap unrelated and irrelevant "data" to justify access to additional spectrum. The pan-network capacity issue is not inherently the result of the geographic coverage issue. Iridium claims "intra- and inter-satellite frequency reuse capabilities" as one of its technological advantages. Iridium Comments, at 8. Therefore, its system *can* reuse frequencies

geographically. However, the current network configuration results in congestion in call transmissions at various network points outside the region of congested call traffic, making congestion anywhere a problem for the system globally.<sup>18</sup>

That result does not justify granting Iridium access to more L-band spectrum. Iridium has never documented its average or peak usage. Therefore, the Commission has no way to measure whether granting Iridium more spectrum is an incrementally efficient use of spectrum, or would be needed for a so-called capacity peak. Iridium states that it cannot predict when or where capacity peaks may occur, but forgets to note that the Commission cannot predict *whether* a specific demand peak will occur. There is no justification for granting Iridium access to more spectrum in the United States when, by Iridium's own admission, the spectrum would simply lie fallow waiting for the Iridium system to experience an undefined "peak" in another part of the world--that may never occur.<sup>19</sup>

Also, Iridium could improve capability of the network to avoid congestion, and thereby improve the spectrum efficiencies without more spectrum.<sup>20</sup> Given the importance that the Commission ascribes to system efficiency, the Commission must encourage Iridium to improve its system before granting access to more

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<sup>18</sup> See Globalstar, L.P., Ex Parte Presentation, Analysis § 2 (Mar. 19, 2004).

<sup>19</sup> See Iridium Comments, at 4, (unpredictable nature of capacity peaks means "that the full Iridium system must have access to sufficient spectrum throughout the system to meet such rolling peaks throughout the network").

<sup>20</sup> See Globalstar Joint Reply Comments, at 18-19.

spectrum, particularly access to spectrum for which there is no evidence of a need to meet demand.

**D. The Commission Cannot Grant Iridium Access to More Spectrum on This Record.**

As outlined above, the facts in the record are straightforward and uncontroverted:

- Iridium does not need access to spectrum beyond 1621.35-1626.5 MHz to serve its U.S. and global subscribers;
- Increasing Iridium’s spectrum does not improve its capacity or system efficiency;
- Even if there were increased demand on the Iridium system, Iridium could improve its system efficiency by modifying certain design features in its network; and,
- Iridium has taken no steps to optimize its use of spectrum other than to petition for access to more MSS spectrum.

While the Commission historically has insisted upon improving spectrum efficiency through technology, in the L-Band Order, the Commission condoned and encouraged Iridium’s inefficiencies by granting it access to additional, but unneeded, spectrum. And, to compound its errors, the Commission ignored the record and its own assessment of the facts, invented a “spectral efficiency” rationale that is internally inconsistent and inaccurate,<sup>21</sup> and then proposed to consider granting Iridium access to even more spectrum without demanding of Iridium that it improve its use of the spectrum it has now.

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<sup>21</sup> See Globalstar LLC, Petition for Reconsideration, § I(A) (Sept. 8, 2004).

The Commission's analysis must be clearly grounded in and supported by evidence in the record. An agency must set forth a factual basis for new rules that is consistent with the rulemaking record,<sup>22</sup> including "examin[ing] the relevant data and articulat[ing] a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'"<sup>23</sup>

The Commission's action and proposed action in this rulemaking fall far short of these requirements. Rather than the facts supporting the Commission's decision in the L-Band Order, the record shows no support for any modification to the Big LEO L-band plan. Nor does merely claiming the justification "spectrum efficiency" indicate that additional changes should be made. The mere existence of a policy does not, *ipso facto*, provide the justification for applying it in particular circumstances.<sup>24</sup> The record and result must support that rationale, and here they do not. The Further NPRM compounds the error by building on the erroneous justification for granting Iridium access to the 3.1 MHz.

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<sup>22</sup> Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 416 (1970).

<sup>23</sup> Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) (quoting Burlington Truck Lines, Inc. v. United States, 371 U.S. 156, 168 (1962)).

<sup>24</sup> See Bechtel v. FCC, 10 F.3d 875, 878 (D.C. Cir. 1993) (FCC must review application of policy in light of facts presented); Flagstaff Broadcasting Found. v. FCC, 979 F.2d 1566, 1570 (D.C. Cir. 1992).

It is well-settled that where the record belies the agency's findings, the agency's action is arbitrary and capricious.<sup>25</sup> Accordingly, the Commission must ignore Iridium's undocumented demands and take no further action arbitrarily to "rebalance" the Big LEO L-band.

**II. IF ADDITIONAL SHARING IS REQUIRED, THE COMMISSION'S POLICY DICTATES THAT IRIDIUM SHOULD SHARE THE 1621.35-1626.5 MHZ BAND SEGMENT WITH GLOBALSTAR.**

The Commission decided to grant Iridium shared access to an additional 3.1 MHz at 1618.25-1621.35 MHz based on its conclusion that "sharing this spectrum should promote spectral efficiency by increasing the number of MSS licensees that will use this spectrum, particularly at a time when demand for spectrum has increased." (L-Band Order, ¶ 45.) In the Further NPRM, the Commission asked whether sharing additional L-band spectrum at 1616-1618.25 MHz would also promote spectrum efficiency (¶¶ 96-99), and whether there are "alternative sharing approaches" that promote efficient use of the spectrum (¶ 100).

GLLC explained in its initial comments why the Commission should not extend the shared L-band segment down to 1616 MHz. Specifically, requiring Globalstar and Iridium to share the 1616-1621.35 MHz band segment *eliminates* all unencumbered spectrum to which Globalstar had access under the original Big LEO band plan but *maintains* all unencumbered spectrum to which Iridium had access.

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<sup>25</sup> Petroleum Communications, Inc. v. FCC, 22 F.3d 1164, 1172 (D.C. Cir. 1994); AT&T v. FCC, 974 F.2d 1351, 1354 (D.C. Cir. 1992).

That result would be unlawful as blatantly and inherently prejudiced against Globalstar,<sup>26</sup> made even more capricious because the Commission stated that the new sharing plan was designed to be “technology neutral.” (L-Band Order, ¶ 46).

If the Commission does require additional sharing, then its only internally (i.e., within the L-band) consistent action would be to authorize sharing in the 1621.35-1626.5 MHz band segment as well.<sup>27</sup> As discussed above, Iridium is making little or no use of its exclusive spectrum in the United States.<sup>28</sup> Therefore, authorizing sharing throughout the L-band would not only increase the number of MSS licensees using the 1621.35-1626.5 MHz band segment (L-band Channels 10-13), it would also result in *actual use* of the 1621.35-1626.5 MHz band segment for MSS by Globalstar.

There are several other reasons why granting Globalstar access to additional L-band frequencies would serve the public interest. Granting Globalstar access to Channels 10-13 would make it easier for Globalstar to coordinate sharing of L-band with Iridium because there would be more opportunities to locate users by

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<sup>26</sup> See Melody Music, Inc. v. FCC, 345 F.2d 730, 733 (D.C. Cir. 1965) (requiring FCC to treat similarly-situated parties in a similar manner).

<sup>27</sup> See, e.g., MCI Telecommunications Corp. v. FCC, 10 F.3d 842, 846 (D.C. Cir. 1993) (FCC’s action found arbitrary and capricious where its explanation does not accord with procedures actually used).

<sup>28</sup> Iridium’s technical discussion (Comments, at 17-20) assumes that the Iridium system has very low traffic. See Tech. App., § 1.

frequency, and that would ease the burden on Globalstar that will result from loss of exclusive access to the 1616-1621.35 MHz band segment.

Globalstar could also use Channels 10-13 for its aviation services and have more flexibility in placing aviation users in channels above 1616 MHz, helping to resolve some of the difficulties from sharing that Globalstar has identified for its aviation products.

Finally, Iridium claims in its Comments (at 17-20) that sharing with Globalstar does not harm Iridium's ability to operate in the spectrum or cause interference to Iridium users. Moreover, Iridium responded to the Further NPRM by claiming that requiring Globalstar and Iridium to share additional L-band spectrum "will further promote the Commission's spectral efficiency objectives and, in turn, serve the public interest." Iridium Comments, at 6. Therefore, based on Iridium's calculations, sharing the 1621.35-1626.5 MHz band would not pose a burden to Iridium and would serve the public interest.

Given the Commission's stated interest in maximizing use of Big LEO L-band, the Commission cannot decline to grant Globalstar access to the underused 1621.35-1626.5 MHz band segment. If the Commission were to fail to do so, its actions would be deemed arbitrary and capricious.<sup>29</sup> Accordingly, if the Commission

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<sup>29</sup> See Hispanic Info. & Telecomm. Network v. FCC, 865 F.2d 1289, 1297-98 (D.C. Cir. 1989) (FCC's failure to consider factors relevant to purpose of rule applied in awarding spectrum license is arbitrary and capricious).

decides to grant Iridium access to the entire 1616-1621.35 MHz band segment, then Globalstar should have access to the 1621.35-1626.5 MHz band segment.

### **III. GLOBALSTAR REQUIRES UNSHARED ACCESS TO CDMA CHANNELS 6 AND 7, UP TO 1618.725 MHZ.**

In its initial comments, Globalstar explained why it was necessary for Globalstar aeronautical MSS (“AMSS”) terminals to operate above 1616 MHz to meet the requirements of the Federal Aviation Administration (“FAA”) and the applicable Minimum Operational Performance Standards (“MOPS”) developed for the FAA by RTCA, Inc. Iridium claims (Comments, at 14-15) that the standards are not applicable because Globalstar aviation terminals are not providing a safety service (AMS(R)S) and that the technical standards do not preclude the operation of Globalstar AMSS terminals below 1616 MHz.<sup>30</sup>

As discussed more fully in the comments of Sagem Avionics, Inc. and Qualcomm Incorporated filed in this docket,<sup>31</sup> Iridium is wrong on both points. Qualcomm and Sagem developed aviation products that are in use today with the

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<sup>30</sup> Iridium also claims (Comments, at 16-17) that sharing the 1616-1618.25 MHz band segment will not adversely affect Globalstar’s ability to establish an Ancillary Terrestrial Component (“ATC”) because CDMA ATC must operate below 1616 MHz. Iridium has completely missed the point. Globalstar explained in its initial comments that, if it implements ATC, then it needs access to unshared Channels 6 and 7 for its MSS traffic.

<sup>31</sup> The comments of Sagem Avionics were filed in the Commission’s Electronic Comment Filing System on September 14, 2004. Qualcomm is filing Reply Comments responding to Iridium’s Comments.

Globalstar system, and they are fully conversant with the FAA and RTCA compliance procedures for Globalstar AMSS terminals.

The response to Iridium's argument is that the RTCA standards set forth in RTCA DO-262 are applied to non-safety as well as aviation safety services provided by Next Generation Satellite Systems ("NGSS") for the protection of GPS and GLONASS. Moreover, meeting the technical standards in RTCA DO-262 effectively restricts Globalstar aviation terminals to operations above 1616 MHz, that is, currently in CDMA Channels 6, 7, 8 and 9.

Iridium also claims (Comments, at 16) that Globalstar does not need two channels above 1616 MHz to provide aviation services because terrestrial air-to-ground services only have an allocation of 4 MHz. Globalstar has previously explained why the configuration of earth stations, loading demands, and the provision of AMSS to aircraft on international routes requires the availability of two CDMA channels for Globalstar's aviation services.<sup>32</sup> The comparison to terrestrial air-to-ground service is simply inapt.

Accordingly, for the reasons set forth in Globalstar's initial comments and in the comments of Sagem Avionics and Qualcomm, Globalstar requires unshared access at least to CDMA Channels 6 and 7.

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<sup>32</sup> See Joint Comments of L/Q Licensee, Inc., Globalstar, L.P., and Globalstar USA, LLC, at 7, Tech. App., § 1 (July 11, 2003).

**IV. GLOBALSTAR AND IRIDIUM CAN COORDINATE USAGE OF SHARED SPECTRUM, BUT THAT IS NOT A SUFFICIENT REASON TO REQUIRE SPECTRUM SHARING.**

Globalstar explained in its initial comments that it is possible for Iridium and Globalstar to coordinate access to the 1618.25-1621.35 MHz band segment through frequency segmentation and geographic division of the spectrum resources. For example, Iridium continues to make the claim (Comments, at 11) that Globalstar did not experience harmful interference after Iridium began to use CDMA Channels 8 and 9 in the Middle East pursuant to Special Temporary Authority. However, as Globalstar noted in its initial comments, it accommodated Iridium by discontinuing use of those channels in the Middle East region when the Commission found that Iridium needed the additional spectrum to provide service to U.S. military forces in the area. This unilateral coordination resulted in no interference to Globalstar on those channels.

Similarly, Iridium's current use of L-band in the United States is so limited that use of the same spectrum is not likely to result in interference to either system. Nevertheless, once there is increased use on both systems, operating co-frequency in the same geographic area will result in harmful interference, as Globalstar explained in its initial comments on the Further NPRM.

In its Comments (17-20), Iridium argues that Globalstar and Iridium can share spectrum without causing harm to either system, and provides link budgets to demonstrate that proposition. As discussed in the attached Technical Appendix (§ 1), Iridium's link budgets do not undercut Globalstar's analysis of spectrum

coordination and the potential for interference.<sup>33</sup> Iridium assumes that its own system is lightly used, and Iridium makes some egregiously incorrect assumptions about the operational parameters of MSS systems.

First, Iridium uses a 20 dB cross-polarization isolation factor to mitigate interference from Iridium mobile-earth terminals into Globalstar. The actual value of the cross-polarization isolation from typical user terminals varies from 0 dB to 6 db. Higher numbers, such as those used by Iridium, can be achieved only with highly directional antennas. This error results in increased interference values calculated by Iridium, bringing the 12.2 dB margin down to a deficit of -4.8 dB.

Second, Iridium uses a figure of 0.5 Iridium carriers per Globalstar spot beam, an assumption of essentially no traffic over the Iridium system. If Iridium were fully using its capacity, it would register approximately 18 carriers per Globalstar beam, which would, as Globalstar demonstrated in its initial comments, result in interference into Globalstar. Correcting this assumption increases the potential for interference by a factor of 15.6 dB.

Third, in calculating average EIRP, Iridium uses a time average over a frame factor of -10.4 dB. This does not account for a TDMA system's use of four users for each frequency. If all four slots are filled, then the -10.4 dB frame factor becomes

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<sup>33</sup> To the extent that there is a dispute in the record on the interference issue, it should be noted that only Globalstar has provided evidence supported by an engineering certification for this issue.

approximately -3 dB, resulting in an additional 7.4 dB deficit in the margin of the link budget.

Fourth, Globalstar assumed a 3% noise degradation as the allowable interference for coordination between the two satellite systems. Iridium allows 6% for its calculations, substantially increasing the amount of aggregate noise that Iridium claims Globalstar could tolerate, above the accepted minimum noise floor.

Using these assumptions, Iridium claims that the Globalstar and Iridium systems could share spectrum even when both systems are fully loaded, and that spectrum-sharing will continue to be non-problematic as it has been pursuant to Iridium's STA. Iridium Comments, at 11-12. This is a reckless misrepresentation of the facts. As Globalstar explained in its initial comments, the two Big LEO systems can coordinate use of shared spectrum, but, as both systems experience subscriber growth and increased loading of the systems, there will be harmful interference resulting from co-frequency operation. For this reason, the Commission should allow each system access to at least some unencumbered spectrum, for Globalstar, the 1616-1618.725 MHz band.<sup>34</sup>

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<sup>34</sup> See Globalstar LLC, Petition for Reconsideration, § II (Sept. 8, 2004).

V. CONCLUSION

For the reasons set forth above, the Commission must make *no* further changes to the L-band sharing plan. If it does grant Iridium shared access to the 1616-1618.25 MHz band segment, then the only equitable step consistent with the policy outlined in the L-Band Order is to grant Globalstar shared access to the 1621.35-1626.5 MHz band segment.

Respectfully submitted,

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Date: September 23, 2004

GLOBALSTAR LLC TECHNICAL APPENDIX  
Reply Comments (IB Dkt. No. 02-364)

1. Iridium makes several errors in its link budget analysis that result in a significant understatement of potential interference.

In its September 8, 2004, Comments (the "Comments") at pages 17-20, Iridium offers support for its claim that the Globalstar and Iridium systems can share spectrum without causing harm to each other. Iridium provides link budgets that purport to show that Iridium can never cause harmful interference into Globalstar. There are several incorrect assumptions in these link budgets, as discussed below, that, when corrected, dramatically alter Iridium's conclusion.

- a. The cross-polarization isolation figure is incorrect.*

In its link budget Iridium repeatedly uses a 20 dB cross-polarization isolation that mitigates interference from Iridium terminals into Globalstar. However, the actual value of the cross-polarization isolation applicable to handsets and small antennas typical of mobile user terminals varies between 0 dB and 6 dB. Cross-polarization in the range of 18 dB to 20 dB can only be achieved for highly directional antennas like fixed antennas. Nothing in the literature for cross-polarization isolation in mobile satellite systems using omnidirectional, or nearly omnidirectional, antennas accepts more than 6 dB isolation. Using the generally accepted 6 dB isolation would increase the interference values shown in Iridium's table on page 19 by anywhere from 14 to 20 dB, or an average of 17 dB. This means the margin of 12.2 dB shown in the last column of that table now becomes a (deficit) margin of -4.8 dB.

- b. Iridium's current very light usage cannot provide the basis for a forecast of future interference.*

Iridium's calculation in the "Minimum" column of the table on page 19 of its Comments purporting to show that it does not cause interference to Globalstar is based on 0.5 Iridium carriers per Globalstar spot beam. As Globalstar has previously demonstrated, this observed level of Iridium usage in Globalstar's channels is much lower than the expected 18 carriers per beam that would be present if Iridium were fully using its available capacity. Iridium's low usage is the reason that Globalstar currently does not experience interference from Iridium, but it does not have any relevance if Iridium were to approach full capacity and load its beams more heavily. If the full capacity case were assumed, which it must be for the purposes of this exercise, Iridium's interference into Globalstar increases by a factor of  $18/0.5$  or 15.6 dB. Accordingly, to calculate a useful estimate for the purpose of determining whether sharing will cause degradation, we must add 15.6 dB to the figures in the "Minimum" column on page 18. Globalstar has conclusively shown in its September 8, 2004, Comments that under a full capacity scenario, each system will experience harmful interference from the other. The only noteworthy aspect of Iridium's numbers in the "Minimum" column in the Table on page 19 is Iridium's failure to rebut Globalstar's observation that only 0.5 Iridium carriers, on average, are present in one Globalstar beam per

1.23 MHz channel. That is, Iridium's tables assume that its system is not even close to fully loaded, contrary to Iridium's claims earlier in its Comments.

c. *Iridium incorrectly applies the average time for a single user rather than for a single carrier.*

In calculating the average EIRP transmitted in the first table on page 17 of its Comments, Iridium uses a time average over frame factor of -10.4 dB; however, since the system is TDMA, it is necessary to add in the effects of *four* such users for each frequency being used based on Iridium's own assertion that it uses eight time slots per carrier. Globalstar has always assumed that all four time slots are fully occupied in every observed frequency. If this is not true, then Iridium is operating with only one-fourth the number of users that Globalstar has been giving it credit for and is very far from achieving full use of its system capacity. On the other hand, if all four slots are occupied in each carrier, then the -10.4 dB must be replaced by something like -3 dB (since four slots are uplink and four downlink), so there is an additional 7.4 dB deficit in the margin shown in the first Table on page 17.

d. *Iridium incorrectly uses 6% degradation as a criterion.*

Iridium's analysis in its Comments uses a 6% increase in system noise temperature as the allowable interference before serious degradation while Globalstar's analysis uses a 3% increase in system noise temperature. See ITU-R S.1427.<sup>1</sup> While 6% might be the total aggregate of allowable noise into the system, allocating all 6% to one source (i.e., the Iridium system) is unacceptable, and would result in an overall increase in allowable interference above 6% when other noise sources are taken into account. By using 6%, Iridium substantially understates the harmful effect of interference from its system into Globalstar.

e. *Conclusion.*

Just to correct for three factors listed above (polarization, time average for four slots occupied, and 3% instead of 6% degradation), it is necessary to subtract [17 +7.4 + 3 dB] or 27.4 dB from Iridium's link margin of 12.2 dB, i.e., Iridium is underestimating the degradation due to sharing at capacity by 27.4 dB, resulting in a dramatically higher value for likely interference. This leaves Globalstar with a -15.2 dB link margin. Globalstar cannot operate with that level of interference from Iridium.

2. The amount of L-band spectrum assigned to Iridium is not limiting Iridium's capacity

Globalstar has repeatedly shown in its technical analyses in this docket that 5.15 MHz of L-band spectrum is not the limiting factor of Iridium's system capacity. Iridium's own figure in its September 2, 2003, request for Special Temporary Authority, attached hereto, does not support its assertion that temporary additional L-band spectrum led to any increase in its capacity in the Middle East. Specifically, the figure does not show any increase in calls per satellite due to the addition of access to Globalstar's channels 8 and 9. In fact, the upper curve in this figure, which is labeled "Max. SV Conns," does not show any increase in

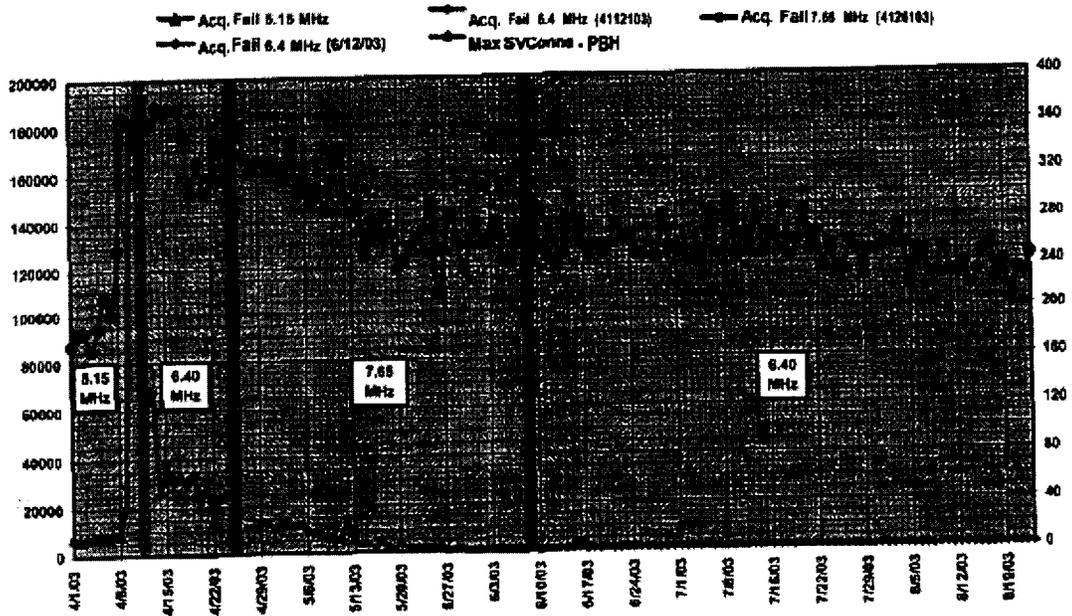
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<sup>1</sup> "Methodology and Criterion to Assess Interference from Radio Local Area Networks (RLAN) Transmitters to Non-GSO MSS Feeder Links in the Band 5150-5250 MHz."

number of satellite connections after the addition of channel 8 on 4/26/03 (labeled as the region with 7.65 MHz ), or even after the addition of channel 9 on 4/11/03 (labeled as the region with 6.40 MHz), for the simple reason that Iridium had already reached its peak of around 350 calls per channel by 4/9/03 when it had access to only 5.15 MHz of spectrum. This proves that Iridium's capacity is actually limited by power or cross-link capacity or other network resource and not by spectrum resources.

To restate Globalstar's proof: The reduction in system acquisition failures cannot mean that Iridium is able to complete more calls with more spectrum alone. If the system acquisition failures are now successes, and those successes lead to completed phone calls, there would have been, for example, about 140,000 more phone calls completed after the addition of channel 9 on 4/11/03 because the lower curve in the figure shows 180,000 system acquisition failures dropping to 40,000 after 4/11/03. However, if the consequence were more calls being made and completed, then there would need to be a larger value of "Max. SV Conns" (the upper curve), assuming that the same level of call blocking (typically 2%) was maintained. The number of simultaneous calls can only increase (for a given blocking percentage) if the number of circuits available increases as well. Because the "Max. SV Conns" did not increase and, in fact, decreased, the only possible inference is that these system acquisitions did not lead to more calls being made and completed. Therefore, those system acquisition failures are still caused by system features or limitations that Iridium is not disclosing. In any event, "system acquisition failure" is a misleading, if not fallacious, parameter in the context of this spectrum assignment proceeding.

System Acquisition Failures - No Channel Available: April 1 - Aug 23, 2003



Reproduction of figure from Iridium's 09.02.03 STA request

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 rules adopted and proposals set forth in the "Report and Order, Fourth Report and Order, and Further Notice of Proposed Rulemaking" (FCC 04-134) in IB Docket No. 02-364 and ET Docket No. 00-258, 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 22nd day of September 2004.



Paul A. Monte  
Director, Systems & Regulatory Engineering  
Globalstar LLC

## CERTIFICATE OF SERVICE

I, William D. Wallace, hereby certify that I have on this 23rd day of September, 2004, caused to be served true and correct copies of the foregoing "Reply Comments of Globalstar LLC" upon the following persons via hand delivery:

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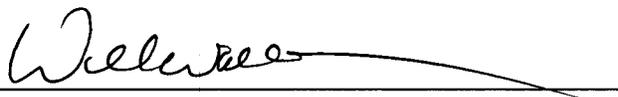
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