2690 MHz MDS/ITFS band into a new 2495-2690 MHz BRS/EBS band, which includes a guard band from 2495-2496 MHz.[195]

4. Technical Feasibility of Sharing S-Band Spectrum

72. From a technical perspective, we find that CDMA MSS operators should be able to share spectrum at 2495-2500 MHz with fixed and mobile terrestrial operators, specifically, BRS. CDMA MSS operators can share this spectrum with BRS operators since BRS operations are likely to be in urban, suburban, and somewhat developed rural areas while the greatest demand for CDMA MSS operations is likely to be in very rural and undeveloped areas with little or no existing communications infrastructure. An MSS user in an urban setting may still be able to access the CDMA MSS system through ATC operations even if the top 4 megahertz of the CDMA MSS downlink were to be unavailable. As discussed further below, ATC operations will be moved down 5 megahertz in frequency in the S-band so that ATC base stations do not overlap the new fixed and mobile allocation.[196] In the *ATC Order*, the Commission separated ATC base stations, by 2 megahertz, from the edge of the fixed and mobile terrestrial allocation at 2500 MHz. The fixed and mobile terrestrial allocation will now start at 2495 MHz instead of 2500 MHz. By moving the ATC band, we have even greater frequency separation (*i.e.*, 2 megahertz plus 1 megahertz guard band from 2495-2496 MHz) to protect BRS and we ensure that CDMA MSS operators can provide service in urban areas. Additionally, to further protect the CDMA MSS downlink operations in rural areas at the 2495-2500 MHz band, we restrict the use of mobile services by making the allocation for "mobile except aeronautical," thereby eliminating the possible use of airborne mobile transmitters in this band. Further, the BRS will be restricted to using low power operations in the 2496-2500 MHz band.[197] With these allocation changes the CDMA MSS downlink in the 2495-2500 MHz band should remain viable.

73. BRS will be protected from MSS interference because CDMA MSS systems currently are restricted in the level of power they can transmit by existing PFD limits.[198] In general, PFD limits are put in place to allow terrestrial services, such as fixed and mobile, to share co-frequency with space services. Thus, current and future CDMA MSS operators must accept any interference from the terrestrial services within this band.

74. In addition to the 1 megahertz guard band from 2495 to 2496 MHz, strict OOB limits on the BRS operations at 2496 MHz and above, and power limits on BRS stations operating in the 2496-2500 MHz band will be implemented to protect CDMA MSS downlink operations just below the new band edge at 2495 MHz. The guard band, OOB and power limits should allow MSS providers to operate

(Continued from previous page)
No. 00-258, Second Report and Order, FCC 02-304, 17 FCC Rcd 23193 (2002) (*Second Report and Order*). Reallocation of the 2155-2162 MHz band is subject to a pending rulemaking. *See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, ET Docket No. 00-258, Third Report and Order, Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order, FCC 03-16, 18 FCC Rcd 2223, 2253-2257, ¶¶ 62-73 (2003).

[195] *See generally MDS/ITFS Order.*

[196] *See infra* ¶¶ 75-77.

[197] *See generally MDS/ITFS Order.*

[198] *See* ITU Radio Regulations, Resolution 46, Annex 2.1.2.3.1.

without unnecessary restrictions or significant interference in the 2483.5-2495 MHz band. CDMA MSS operators will still have access to the guard band. They will not be protected, however, from interference in this spectrum. We expect future CDMA MSS entrants to be aware of any OOB emissions from equipment operating in the 2496-2500 MHz band that may fall into the guard band. Accordingly, we adopt United States footnote, US391, to read as follows:

> In the band 2495-2500 MHz, the mobile-satellite service (space-to-Earth) shall not receive protection from non-Federal Government stations in the fixed and mobile except aeronautical mobile services operating in that band.

5. Ancillary Terrestrial Component Operations in the S-Band

75. We note that placing fixed and mobile except aeronautical mobile services in the upper portion of the S-band conflicts with ATC operations previously designated for use in the 2492.5-2498 MHz band.[199] Because of this allocation change, we will move ATC operations down five megahertz to the 2487.5-2493 MHz band, which continues to allow at least two megahertz of MSS-only use between ATC operations and non-MSS services. Additionally, we find that moving ATC operations down five megahertz will not change our analysis in the *ATC Order* with regard to interference to unlicensed services and BAS. For example, ATC base station transmissions will be separated from BAS channel A8 (2450-2467 MHz) by at least 20.5 megahertz, from BAS channel A9 (2467-2483.5 MHz) by at least 4 megahertz, and from unlicensed devices operating in the 2400-2483.5 MHz band (such as WI-FI) by at least 4 megahertz.[200] In the *ATC Order*, the Commission adopted an out-of-channel emissions limit of -44.1 dBW/30 kHz at the edge of the MSS licensee's authorized frequency assignment, which protects adjacent channel operations that are separated in frequency by at least 2 megahertz, and thus, operations below 2483.5 MHz are fully protected. Furthermore, with regard to the grandfathered fixed terrestrial services in the 2483.5-2500 MHz band, the coordination needed by the CDMA MSS operator to prevent interference will not change.[201] Lastly, section 25.255 of the Commission's rules allows other services to file a complaint with the Commission if the ATC operator fails to resolve the interference caused by its operations.[202]

76. We also disagree with WCA's claim that the Commission stated that ATC may not operate below 2490 MHz. In the *ATC Order*, the Commission stated that: "[t]o prevent the actions we take today from prejudicing the outcome of the [*Big LEO Spectrum Sharing NPRM*], . . . we will permit CDMA licensees to deploy ATC in the 1610-1615.5 MHz portion of the 1.6 GHz band and the 2492.5-2498 MHz portion of the 2.4 GHz band."[203] Thus, the Commission did not base its conclusion on any technical limitations, but, rather, deferred a decision on ATC operations below 2492.5 MHz as part of a notice and

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[199] 47 C.F.R. § 25.149(a)(2)(iii). In the Big LEO bands, ATC operations are limited to the 1610-1615.5 MHz, 1621.35-1626.5 MHz and 2492.5-2498 MHz bands. *Id.*

[200] *See ATC Order*, 18 FCC Rcd at 2209, App. C3, § 4.2.2. In that Order, the Commission stated that interference with unlicensed devices is a non-issue because ATC base stations are greater than 25 megahertz from these users. *Id.* at 2062-2063, ¶ 205.

[201] *See id.* at 2206-2207, App. C3, § 4.2.1; *see also* 47 C.F.R. § 25.254(a)(3).

[202] 47 C.F.R. § 25.255.

[203] *ATC Order*, 18 FCC Rcd at 2057, ¶ 192.

comment proceeding. In addition, as discussed above, we believe that moving ATC operations below 2490 MHz will not impact other in-band and OOB users such as BAS much differently than in its original 2492.5-2498 MHz band frequency assignment, since in either situation, ATC operators must protect incumbent operations that would be subject to harmful interference.[204] Thus, we find no basis for WCA's claim.

77. In moving this ATC band, we note that we have not received an application for development and deployment of ATC equipment in this band at this time. As such, we should not be causing any operator to incur redesign or redeployment costs as a result of moving the ATC band.

D. Government Space Stations in the Big LEO Bands

78. In response to the *Big LEO Spectrum Sharing NPRM*, the National Telecommunications and Information Administration (NTIA) filed comments on behalf of the DOD and the Department of Homeland Security (DHS) in support of expanding Federal Government access to the Big LEO bands.[205] The bands 1610-1626.5 and 2483.5-2500 MHz already are available for U.S. Government earth stations to operate with non-government space stations. Accordingly, NTIA argues that making these bands available for use by U.S. Government MSS satellite systems merely would extend what the national allocation table currently allows.[206] According to Lockheed, Federal Government use of CDMA technology in the Big LEO CDMA spectrum bands would both minimize disruptions to currently operating systems and allow the government to take advantage of the significant development work that has already occurred in producing CDMA-based equipment to operate in these bands.[207] Iridium opposes NTIA's proposal, arguing that the DOD already uses the Iridium system, which satisfies the DOD's requirements for globally secure MSS communications.[208] Globalstar also opposes NTIA's proposal, contending that the U.S. Government pays less for MSS services on Big LEO systems as compared to the costs incurred if the U.S. Government built and launched its own redundant system.[209] Globalstar also claims that encryption technology enables commercial satellite systems to provide the U.S. Government with as much security as a U.S. Government-owned satellite system.[210]

79. Discussions of Government and non-Government sharing spectrum generally have been ongoing for some time, and continue to progress. Rather than view Government/non-Government sharing in a piecemeal fashion, *i.e.*, in a rulemaking proceeding dedicated to specific bands and technologies, we intend to continue our work with NTIA and others in the Federal Government to address spectrum sharing issues in general. As a result, we do not expand Federal Government access to the Big LEO bands.

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[204] *See id.* at 2058-2063, ¶¶ 196-206.

[205] NTIA Comments at 3, 4.

[206] *Id.* at 6.

[207] Lockheed Comments at 4.

[208] Iridium Reply Comments at 13.

[209] Globalstar Reply Comments at 32.

[210] *Id.* at 32.

E. Miscellaneous Issues

1. Sections 316 and 312 of the Communications Act of 1934, as Amended

80. Globalstar claims that the Commission is modifying its license and that such modification to Globalstar's "existing rights to operate in [its] assigned spectrum" violates the hearing requirement under section 316 of the Act.[211] According to Globalstar, section 316 mandates the Commission to provide notice of any proposed license changes in writing to the licensee and to allow the licensee to object to those proposed changes.[212] In addition, Globalstar states that, under section 316, the Commission has the burden of introducing evidence and the burden of proof at a hearing.[213] Globalstar further contends that these procedures have not been initiated.[214] Globalstar claims, instead, that the Commission has unjustifiably concluded, on a tentative basis in the *Big LEO Spectrum Sharing NPRM*, that modifying the Big LEO band plan will serve the public interest.[215] Globalstar concludes that the Commission never indicated that it would take spectrum away based on a vague "traffic" or "consumer demand" standard and that the Commission may only do so on a prospective basis so that adequate notice of the standard is provided.[216]

81. Additionally, Globalstar claims that taking away some of its spectrum may be considered a revocation, implicating section 312 of the Act.[217] Globalstar argues that section 312 also mandates that the Commission provide notice and a hearing to the affected licensee.[218]

82. ICO supports Globalstar, arguing initially that the reallocation of Globalstar's spectrum to Iridium or other providers would essentially be a partial revocation of Globalstar's license.[219] Alternatively, ICO argues that the reallocation would constitute a license modification.[220] Either way, ICO argues, the Commission must adhere to the hearing requirements under sections 312 and 316 because the Commission is not adopting rules of general applicability and because factual questions regarding Iridium's and Globalstar's spectrum use are critical to the Commission's decision.[221] In addition, ICO contends that the evidence provided in the record fails to satisfy the burden of proof

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[211] 47 U.S.C. § 316.

[212] Joint Comments at 31.

[213] *Id.*

[214] *Id.*

[215] *Id.*

[216] *Id.* at 31-33 (citing the *Big LEO Spectrum Sharing NPRM*, 18 FCC Rcd at 2087, ¶ 261).

[217] *Id.* at 32 n.62 (citing 47 U.S.C. § 312).

[218] *Id.* at 32 n.62.

[219] ICO Reply Comments at 14.

[220] *Id.*

[221] *Id.* at 15.

requirement imposed on the Commission under sections 312 and 316 to justify the reallocation of spectrum.[222]

83. Iridium claims that section 316 does not apply to this proceeding.[223] Iridium argues that the *Big LEO Order* clearly stated that a reduction in spectrum may occur if one CDMA system remained.[224] Iridium contends that the license itself states that the spectrum assignment could be changed.[225] Iridium concludes, therefore, that Globalstar has no unconditional right to use the spectrum and that any change in Globalstar's spectrum assignment would not constitute a "modification" under section 316.[226]

84. Iridium further contends that a spectrum reallocation plan of general applicability that is adopted in a rulemaking proceeding does not constitute a license "modification" under section 316.[227] Iridium explains that, in this proceeding, the proposed band plan change affects all Big LEO operators, not just Globalstar, and that the proposed change stems from policy considerations regarding efficient spectrum use.[228] As a result, Iridium reiterates that section 316 does not apply. Nevertheless, Iridium claims that Globalstar had notice that the spectrum could be redistributed if only one CDMA operator remained as well as an opportunity to protest, thereby satisfying the procedural due process mandated by section 316.[229] In addition, Iridium argues that section 312 does not apply to this proceeding. According to Iridium, section 312 involves the revocation of a license due to a violation by a licensee of the Act or the Commission's rules.[230] Iridium concludes that no evidence in this proceeding suggests that the Commission plans to sanction Globalstar for any such violation.[231]

85. *Section 316.* We disagree with Globalstar and ICO that the hearing requirement of section 316 applies to this proceeding. Rather, Iridium is correct that this spectrum sharing plan does not fall under section 316 because the spectrum sharing plan has been adopted pursuant to a rulemaking proceeding that generally affects all MSS providers operating in that band.[232] Our actions in this Order simply modify the U.S. Table of Frequency Allocations to promote greater spectrum efficiency by

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[222] *Id.* at 16. With regard to section 312, ICO claims that the Commission has no authority to revoke the license in this case because Globalstar has complied with its license terms. *Id.* at 16.

[223] Iridium Reply Comments at 26.

[224] *Id.* at 27.

[225] *Id.*

[226] *Id.*

[227] *Id.* at 28.

[228] *Id.*

[229] *Id.* at 28-29.

[230] *Id.* at 26 n.66.

[231] *Id.* at 26-27 n.66.

[232] *See, e.g., California Citizens Band Association v. FCC*, 375 F.2d 43, 51-52 (9th Cir. 1967) (holding that rulemaking proceedings that are general in nature are not restricted by the hearing requirements of section 316, but rather are governed by only the procedural protections of the Administrative Procedure Act).

allowing other operators to use the spectrum when the prior CDMA MSS applicants failed to implement their operations.

86. Assuming *arguendo* that our actions today are determined to be "in substance and effect[,] individual in impact and condemnatory in purpose,"[233] we are not modifying Globalstar's license through implementation of the spectrum sharing plan. A license modification under section 316 occurs only if an "unconditional right conferred by the license is substantially affected."[234] Globalstar's license is not changing as result of today's decision - CDMA MSS operators still have access to the Big LEO spectrum previously assigned to them. Moreover, the Globalstar license never conferred an unconditional right to operate in the entire spectrum originally assigned for shared use by multiple CDMA systems. Globalstar's license to operate in Big LEO spectrum stems from the spectrum sharing plan adopted in the *Big LEO Order*, in which Globalstar expressed its support for sharing the Big LEO spectrum with three other CDMA MSS providers.[235] As a result of this band sharing plan and agreement, Globalstar should have had no reason to believe it had the sole right to the spectrum if other operators failed to implement their systems and, in fact, proceeded as if it expected to share the spectrum. For example, to enable sharing with the other CDMA MSS operators, Globalstar modified its system so it could serve more customers simultaneously.[236] Similarly, under the spectrum sharing plan adopted today, Globalstar will be sharing a portion of that spectrum with other operators: TDMA operators and terrestrial wireless operators. Moreover, Globalstar may need to change parameters of operation in shared parts of the band, but not the physical equipment requiring a license modification.

87. Nor do we find that implementation of the new spectrum sharing plan constitutes an indirect modification of Globalstar's license. In *Western Broadcasting*, the D.C. Circuit Court of Appeals adopted, as the controlling legal principle, the following meaning of "modification" for purposes of section 316: "Indirect modifications include factual circumstances where it is alleged that a new grant may create objectionable electrical interference to an existing licensee and the existing licensee is protected by Commission policy or regulation from such interference."[237] No new grants resulting from our sharing band plan adopted today will create "objectionable interference." With regard to CDMA MSS systems sharing with TDMA MSS systems, Globalstar and Iridium already have demonstrated that they can share a portion of the 1.6 GHz band without undue interference. With regard to the upper portion of the S-band, sharing with BRS handsets and BRS base stations also will not cause "objectionable interference" particularly because CDMA MSS operators could switch their users to other frequencies in the S-band. In a concurrent order, we are also limiting the power of BRS base stations in the upper portion of the S-band to minimize the interference potential.[238] Similarly, we find that

[233] *Id.*

[234] *P & R Temmer v. FCC*, 743 F.2d 918, 927-28 (D.C. Cir. 1984).

[235] *See Big LEO Order*, 9 FCC Rcd at 5955-5956, ¶¶ 44-48.

[236] *See Loral/Qualcomm, L.P., For Authority to Construct, Launch, and Operate Globalstar, a Low Earth Orbit Satellite System to Provide Mobile Satellite Services in the 1610-1626.5 MHz/2483.5-2500 MHz Bands*, Order and Authorization, DA 95-128, 10 FCC Rcd 2333, 2335 (Int'l Bur. 1995).

[237] *Western Broadcasting Company v. FCC*, 674 F.2d 44, 49 (D.C. Cir. 1982) (*Western Broadcasting*); *see also AMSC Subsidiary Corporation*, 216 F.3d 1154, 1160 (2000) (finding that section 316 does not apply when the increased likelihood of interference is too speculative).

[238] *See generally MDS/ITFS Order.*

Globalstar is not protected from such interference by Commission policy or regulation, given how the Big LEO band plan was originally established, *i.e.*, requiring Globalstar to share its CDMA MSS spectrum with other operators. For all of these reasons, we conclude that section 316 does not apply to the instant proceeding and, therefore, a hearing is not required.

88. As a result of today's decision, only Iridium's license needs to be modified so that it can access the additional 3.1 megahertz in the 1618.25-1621.35 MHz band.[239] We delegate authority to the International Bureau to modify Iridium's license as outlined in this Order, having concluded, as required by section 316, that such action would serve the public interest.[240] The TDMA and CDMA MSS providers will share the 3.1 megahertz, thereby making better use of that spectrum. Oppositions to the modification must be filed with the Commission within thirty days from the International Bureau's release of its order modifying Iridium's license.

89. *Section 312.* We disagree with Globalstar's and ICO's contention that changing the band plan constitutes a "revocation" under section 312 of the Act. In particular, we disagree with ICO's claim that "redistribution of Globalstar spectrum would be no different from the Commission's action in *P & R Temmer v. FCC* where the court found that the Commission had revoked, rather than modified, a license when it reassigned 15 of 20 channels authorized under an SMR license for failure to meet a condition of the license."[241] Not only does the court in that case fail to cite to or discuss section 312, it states that the Commission revoked *channels*, not licenses. Significantly, the court proceeded to analyze the facts under section 316 to determine whether the license had been modified, which the court found it had not.[242] We find that the facts in the instant case do not support a determination that a license has been revoked. In fact, no channels are being reassigned. Thus, we find no basis for applying section 312 to this proceeding.

2. Other ATC Issues

90. In the *ATC Order*, the Commission adopted rules allowing MSS operators to implement ATC in the 1610-1615.5 MHz band and the 2492.5-2498 MHz band.[243] We then sought comment on whether to allow MSS operators to implement ATC in the remaining portions of the Big LEO bands.[244] Only the Globalstar Committee directly addressed this issue, arguing that the Commission should allow CDMA operators to implement ATC in all CDMA-licensed spectrum. According to the Globalstar Committee,

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[239] Section 316 of the Act and section 1.87(a) of the Commission's rules authorize the Commission to modify a license on its own motion. 47 U.S.C § 316; 47 C.F.R. § 1.87(a).

[240] 47 U.S.C. § 316; *see also California Metro Mobile Communications, Inc. v. Federal Communications Commission*, 365 F.3d 38 (C.A.D.C. 2004) (stating that the proposed modification must promote the public interest, convenience and necessity).

[241] *See* ICO Reply Comments at 14 n.45.

[242] *P & R Temmer v. FCC* at 926-928.

[243] *ATC Order*, 18 FCC Rcd at 2057, ¶ 192.

[244] *Id.* at 2057, ¶¶ 192, 193, at 2091, ¶ 273. For the L-band, the Commission specifically stated that "the disposition of the spectrum from 1615.5-1621.35 MHz will be determined by the Commission's ruling on the Notice of Proposed Rulemaking." *Id.* at 2057, ¶ 192. For the S-band, the Commission noted that the remainder of the spectrum from 2483.5-2492 MHz and 2480-2500 MHz would not be considered in the *ATC Order*. *Id.* at 2057, ¶ 193.

the restriction of Globalstar's ATC deployment forces it to operate at a competitive disadvantage with respect to other MSS operators allowed to implement ATC operations in all of their assigned spectrum.[245] Based on our review of the record, no MSS provider has demonstrated that it needs more spectrum for ATC. Thus, we find no reason to believe that CDMA operators need more spectrum to implement ATC operations and decline to change the amount of Big LEO spectrum that is currently available for ATC.

91. With regard to allowing ATC operations generally in the Big LEO bands, Lockheed suggests that the Commission consider the ramifications of ATC operations in the portions of the Big LEO bands under review in this proceeding.[246] According to Lockheed, allowing ATC in the CDMA MSS Big LEO spectrum could hinder the sharing of spectrum among CDMA MSS licensees.[247] Lockheed argues that allowing ATC in this spectrum also may result in band segmentation among operators, thereby losing the flexibility that exists within the current CDMA allocation.[248]

92. To the extent that Lockheed attempts to argue that we should reconsider allowing ATC operations in the CDMA MSS portions of the Big LEO bands, we find that Lockheed should have filed such a request on reconsideration of the *ATC Order* in IB Docket No. 01-185, not as comments filed in IB Docket No. 02-364. We decline to address Lockheed's concerns about allowing ATC operations in the non-ATC portion of CDMA Big LEO spectrum because we declined to expand ATC beyond the spectrum originally designated for the CDMA MSS Big LEO bands.

93. Finally, the Globalstar Committee argues that the Commission should reconfirm that Iridium must operate its ATC system so that its terrestrial system is fully integrated with the MSS system.[249] We do not find it necessary to reiterate compliance requirements for MSS operators utilizing ATC operations in the Big LEO spectrum. MSS operators should be well aware of those requirements.

3. International Law

94. Globalstar claims that modifying the existing band plan would violate international laws. According to Globalstar, Iridium concedes that its system is unable to direct frequency use below 1621.35 MHz in the United States without activating those frequencies in countries where the foreign administration might not have licensed Iridium to use frequencies below 1621.35 MHz.[250] For example, Globalstar argues that its local service provider in Australia has experienced interference from Iridium in the 1619.9550-1621.1850 MHz band, a band in which Iridium is not licensed.[251] Globalstar contends that Iridium's limitation poses a problem for the United States because, as a member of the ITU, it must recognize the right of other countries to control radio frequencies within their borders.[252] Thus,

[245] Globalstar Committee Comments at 10.

[246] Lockheed Comments at 5.

[247] *Id.* at 6.

[248] *Id.*

[249] Globalstar Committee Comments at 8-9.

[250] Joint Reply Comments at 25.

[251] *Id.* at 27 and Attach. B (Letter from Robert Sakker, Executive Director, Localstar Holdings Pty Limited, to Regional Manager, Australian Communications Authority (dated July 14, 2003)).

Globalstar maintains that the Commission should not modify the Big LEO band plan in the United States unless and until Iridium can prove that it can comply with the technical international restrictions placed on its L-band use.[253]

95. We disagree. We find that the spectrum sharing plan outlined above will not violate international laws. First, international allocations exist on a secondary basis for TDMA MSS downlink systems in the 1613.8-1626.5 MHz band.[254] Thus, TDMA MSS operators may provide MSS services in frequencies below 1621.35 MHz as long as they have coordinated the use of the spectrum for downlink operations with each affected Administration. Therefore, as long as Iridium coordinates its use of its spectrum with affected Administrations, including license modifications where necessary, we are not aware of any ITU restrictions that would prevent Iridium, or any TDMA MSS system, from complying with international law by operating in the shared spectrum. In addition, apart from Globalstar's unconfirmed allegation of interference from Iridium in Australia, the Commission has not received any complaints of harmful interference from Administrations arising from Iridium's use of CDMA MSS spectrum under the STA. Should we, as the space station licensing Administration, receive complaints of harmful interference from other Administrations, we will expect the system operators to coordinate their shared use of the spectrum as set forth above.

IV. FURTHER NOTICE OF PROPOSED RULEMAKING

96. In the attached *Report and Order*, we adopt provisions that permit TDMA and CDMA MSS operators to share 3.1 megahertz of spectrum at 1618.25-1621.35 MHz, based on the record before us. In adopting these provisions, we have approved a sharing plan that provides the opportunity for Iridium to have greater capacity to serve its customers' needs, while at the same time not causing significant harm to Globalstar's ability to serve its current and future customers. We recognize, however, that Iridium's current TDMA MSS satellite system is capable of operating on frequencies as low as 1616 MHz, and thus an opportunity for further sharing between Globalstar and Iridium could exist at 1616-1618.25 MHz. We issue this *Further Notice* in IB Docket No. 02-364, to explore whether and how such additional sharing may be possible.

97. In adopting this *Further Notice*, we also recognize that a portion of the remaining CDMA MSS unshared spectrum in this band (1610-1618.25 MHz) is constrained by other uses in this and adjacent bands, and that these constraints limit CDMA MSS operators' ability to provide certain services on frequencies below 1616 MHz. In particular, CDMA MSS operations must protect radio astronomy operations at 1610.6-1613.8 MHz pursuant to footnote 5.372 of the ITU radio regulations and section 2.106 of our rules. In addition, CDMA MSS operations must protect aeronautical radionavigation operations, including GPS operations below 1610 MHz. Globalstar has indicated in its filings that these constraints preclude its ability to provide aviation services below 1616 MHz.[255] For instance, Globalstar argues that the restrictions on aircraft earth stations (AES) as outlined in RTCA/DO262 and RTCA/DO228[256] limit the center frequency of their uplink transmissions to above 1616 MHz in order to

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[252] Joint Reply Comments at 25.

[253] *Id.* at 27-28.

[254] *See* 47 C.F.R. § 2.106.

[255] *See* Letter from Thomas Gutierrez, Counsel for Globalstar, to Richard Engelman, International Bureau, FCC at 1 (dated June 1, 2004) (*Globalstar June 1 Ex Parte*); *see also Globalstar June 3 Ex Parte* at 1-2.

[256] The RTCA, Inc (formerly known as Radio Technical Commission on Aeronautics) is an industry advisory group (continued....)

meet OOB limitations below 1613.8 MHz.[257] Iridium counters that "Globalstar could prevent its out of band emissions from interfering in spectrum below 1614 MHz if it employed better filter technology"[258] Globalstar claims that it was making use of state-of-the-art filter techniques to meet the out-of-band requirements.[259] Globalstar also indicates that a spectrum sharing scenario that limited Globalstar's exclusive spectrum to 1616 MHz and below would make its ability to deploy ATC dependent on the effectiveness and outcome of the coordination process.[260] Iridium, on the other hand, alleges that these constraints would not render Globalstar unable to provide these services.[261]

98. It appears that, based upon a CDMA transmit spectrum and a carrier frequency of 1616 MHz, a significant amount of filtering would have to be used to meet the OOB requirements set forth in RTCA/DO262 and RTCA/DO228 at 1613.8 MHz. If so, Globalstar likely would be required to maintain a center frequency above 1616 MHz to avoid violating the OOB limitation of RTCA/DO262. However, we do not have sufficient information to decide whether restrictions on Globalstar's operations would deter the sharing of additional spectrum in the L-band. Thus, by seeking comment in this *Further Notice*, we intend to develop a record to determine whether an additional 2.25 megahertz of spectrum could be shared at 1616-1618.25 MHz.

99. Specifically, in this *Further Notice*, we invite comment on whether and how additional sharing may be possible in the future, with specific attention paid to the following issues. First, parties should discuss how to ensure that shared use of this band does not adversely impact the ability of both CDMA and TDMA MSS operators to provide a wide-range of services, including aviation services. Second, we seek comment on whether and how sharing of this spectrum by TDMA and CDMA MSS operators would impact CDMA MSS operators' ability to provide viable ATC services. Further, we seek comment on how any additional sharing requirements might impact the ability of Globalstar to provide

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that acts as a Federal Advisory Group to develop consensus-based recommendations on aviation issues. The RTCA publishes documents that contain minimum operational standards for transmitters aboard aircraft. Document RTCA/DO262 entitled "Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)" contains both in-band and out-of-band emission limitations for satellite transmitters operating in, among others, the Big LEO bands. RTCA/DO228 entitled "Minimal Operational Performance Standards for Global Navigation Satellite Systems (GNSS) Airborne Antenna Equipment" contains interference criteria for airborne GNSS receivers-antenna systems.

[257] *Globalstar June 1 Ex Parte* at 1.

[258] Letter from Peter D. Shields, Counsel for Iridium, to Marlene H. Dortch, FCC at 1 (dated June 2, 2004) (*Iridium June 2 Ex Parte*).

[259] *Globalstar June 3 Ex Parte* at 1. In addition, Globalstar claims that the restrictions on aircraft earth stations, as outlined in RTCA/DO262, limit the center frequency of their uplink transmissions to above 1614 MHz due to peak-power limitations. *Globalstar June 1 Ex Parte* at 1. Iridium states that RTCA/DO262 specifically relaxed in-band and OOB requirements within the Big LEO L-band. *See Iridium June 2 Ex Parte* at 1. Globalstar responded with additional detailed information on how the in-band power limits were met at 1614 MHz, and explained that it was unable to satisfy the in-band restrictions below 1614 MHz. *See Globalstar June 3 Ex Parte* at 1-2. Iridium subsequently argued that Globalstar could choose to operate with a transmit power level lower than one watt if it chose to do so and, therefore, could operate below 1614 MHz. *See Iridium June 7 Ex Parte.*

[260] Letter from William D. Wallace, Counsel for Globalstar, to Marlene H. Dortch, Secretary, FCC at 1-2 (dated May 28, 2004).

[261] *See Iridium June 7 Ex Parte.*

global communications. For example, Globalstar's French license starts at 1615 MHz, and Globalstar's Italian and Russian licenses are limited to frequencies above 1616 MHz.[262]

100. We also seek comment on what benefits might be gained by permitting additional sharing and how any technical limitations should be weighed in comparison against these benefits. We are particularly interested in any alternative sharing approaches that take into account any technical limitations and that would permit us to make the most efficient use of this spectrum.

V. CONCLUSION

101. In the attached *Report and Order*, we adopt a spectrum sharing plan that should promote more efficient use of spectrum in the Big LEO bands while avoiding harmful interference to the operators in those bands. In the L-band, TDMA and CDMA MSS operators will maximize spectrum use through coordination of the 3.1 megahertz previously used by only one MSS operator. In the S-band, CDMA MSS operators will share the spectrum with fixed and mobile except aeronautical services in the top 5 megahertz, both of which are expected to provide services in separate geographic regions – terrestrial services in more urban-based areas and CDMA MSS operators in more rural-based areas. In addition, opening up the 5 megahertz at 2495-2500 MHz to a fixed and mobile allocation will complement the restructuring of the adjacent BRS/EBS band at 2500-2690 MHz, and assist in accommodating the relocation of MDS from the 2150-2160/62 MHz band.

VI. PROCEDURAL MATTERS

102. *Comment Dates.* Pursuant to Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments on the *Further Notice of Proposed Rulemaking* in IB Docket No. 02-364 on or before 30 days after Federal Register publication and reply comments on or before 45 days after Federal Register publication. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies.[263] All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

103. Comments filed through the ECFS can be sent as an electronic file via the Internet to http://www.fcc.gov/e-file/ecfs.html. Generally, only one copy of an electronic submission must be filed. In completing the transmittal screen, commenters should include their full names, Postal Service mailing addresses, and the applicable docket number, IB Docket No. 02-364. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to ecfs@fcc.gov, and should include the following words in the body of the message: "get form <your e-mail address>". A sample form and directions will be sent in reply.

104. Parties who choose to file by paper must file an original and four copies of each filing. If parties want each Commissioner to receive a personal copy of their filing, they must file an original plus nine copies. Paper filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in

[262] *See Globalstar June 3 Ex Parte.*

[263] *See Electronic Filing of Documents in Rulemaking Proceedings*, GC Docket No. 97-113, Memorandum Opinion and Order on Reconsideration, FCC 98-254, 13 FCC Rcd 21517 (1998); Report and Order, 13 FCC Rcd 11322 (1998).

receiving U.S. Postal Service mail). The Commission's contractor, NATEK, Inc., will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capital Heights, MD 20743. U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, S.W., Washington, D.C. 20054.

105. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center, 445 12th Street, S.W., Washington, D.C. Comments are also available on the ECFS, at http://gullfoss2.fcc.gov/cgi-bin/websql/prod//ecfs/comsrch_v2.hts.

106. *Final Regulatory Flexibility Certification for the Report and Order.* A Final Regulatory Flexibility Analysis Certification for this Report and Order, pursuant to the Regulatory Flexibility Act, 5 U.S.C. § 604, is contained in Appendix D.

107. *Final Regulatory Flexibility Analysis for the Fourth Report and Order.* The Final Regulatory Flexibility Analysis for the Fourth Report and Order, pursuant to the Regulatory Flexibility Act, 5 U.S.C. § 604, is contained in Appendix E.

108. *Initial Regulatory Flexibility Certification.* As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the proposals suggested in this document. The IRFA is set forth in Appendix F. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments filed in this *Further Notice of Proposed Rulemaking*. Comments must have a separate and distinct heading designating them as responses to the IRFA.

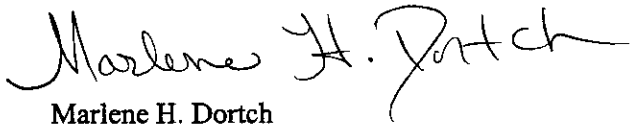
109. *Paperwork Reduction Act.* This *Report and Order and Fourth Report and Order* does not contain either a proposed or modified information collection, and therefore, there is no need to seek comments from the general public and the Office of Management and Budget.

VII. ORDERING CLAUSES

110. IT IS ORDERED that, pursuant to sections 4(i), 7, 302(a), 303(c), 303(e), 303(f) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. sections 154(i), 157, 302(a), 303(c), 303(e), 303(f) and 303(r), the Report and Order, Fourth Report and Order, and Further Notice of Proposed Rulemaking ARE ADOPTED and that Parts 2, 25, 74, 90 and 101 of the Commission's Rules ARE AMENDED, as specified in Appendix B, effective 30 days after publication in the Federal Register.

111. IT IS FURTHER ORDERED that the Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order, Fourth Report and Order, and Further Notice of Proposed Rulemaking*, including the Final Regulatory Flexibility Analysis, Final Regulatory Flexibility Certification, and the Initial Regulatory Flexibility Certification to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION



Marlene H. Dortch
Secretary

APPENDIX A

LIST OF COMMENTERS

Comments

American Petroleum Institute and
the United Telecom Council
Blue Sky Information Services
Globalstar Canada Co.
Iridium Satellite, LLC
L/Q Licensee, Inc., Globalstar, L.P.
and Globalstar USA, L.L.C.
License-Exempt Alliance
Lockheed Martin Corporation
National Telecommunications and
Information Administration
Official Creditors' Committee of Globalstar, L.P.
Verizon Wireless

Reply Comments

ICO Global Communications (Holdings) Limited
IEEE Local and Metropolitan Area Networks
Standards Committee
Iridium Constellation LLC
Iridium Satellite, LLC
L/Q Licensee, Inc., Globalstar, L.P.
and Globalstar USA, L.L.C.
Official Creditors' Committee of Globalstar, L.P.
Wireless Communications Association International, Inc.

Ex Partes

Cornell University
Globalstar, LLC
Globalstar, L.P.
Iridium Satellite, LLC
Sioux Valley Wireless
Sprint Corporation
Wi-Fi Alliance
Wireless Communications Association International, Inc.

Congressional Letters

Honorable Anna G. Eshoo
Honorable Michael M. Honda

APPENDIX B

FINAL RULES

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 C.F.R. parts 2, 25, 74, 90, and 101 as follows:

PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. Revise page 52.

b. In the list of United States footnotes, add footnote US391.

c. In the list of non-Federal Government footnotes, revise footnote NG147.

§ 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

* * * * *

2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A Radiolocation 5.150 5.371 5.397 5.398 5.399 5.400 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402	2483.5-2500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) 5.351A RADIOLOCATION Radiodetermination-satellite (space-to-Earth) 5.398 5.150 5.400 5.402	2483.5-2500 MOBILE-SATELLITE (space-to-Earth) US319 US380 US391 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41	2483.5-2495 MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41 NG147 2495-2500 FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) US319 US380 RADIODETERMINATION-SATELLITE (space-to-Earth) 5.398 5.150 5.402 US41 US391 NG147	ISM Equipment (18) Satellite Communications (25) Private Land Mobile (90) Fixed Microwave (101)
2500-2520 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space-to-Earth) 5.403 5.351A 5.405 5.407 5.412 5.414	2500-2520 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (space-to-Earth) 5.403 5.351A 5.404 5.407 5.414 5.415A		2500-2655	2500-2655 FIXED US205 MOBILE except aeronautical mobile	Domestic Public Fixed (21) Instructional TV Fixed (74)
2520-2655 FIXED 5.409 5.410 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.403 5.405 5.412 5.418 5.418B 5.418C	2520-2655 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.403 5.418B 5.418C	2520-2535 FIXED 5.409 5.411 FIXED-SATELLITE (space-to-Earth) 5.415 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.403 5.415A 2535-2655 FIXED 5.409 5.411 MOBILE except aeronautical mobile 5.384A BROADCASTING-SATELLITE 5.413 5.416 5.339 5.418 5.418A 5.418B 5.418C	5.339 US205	5.339	

* * * * *

UNITED STATES (US) FOOTNOTES

* * * * *

US391 In the band 2495-2500 MHz, the mobile-satellite service (space-to-Earth) shall not receive protection from non-Federal Government stations in the fixed and mobile except aeronautical mobile services operating in that band.

* * * * *

NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

* * * * *

NG147 In the band 2483.5-2500 MHz, stations in the fixed and mobile services that are licensed under Part 74 (Television Broadcast Auxiliary Stations), Part 90 (Private Land Mobile Radio Services), or Part 101 (Fixed Microwave Services) of the Commission's Rules, which were licensed as of July 25, 1985, and those whose initial applications were filed on or before July 25, 1985, may continue to operate on a primary basis with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, these grandfathered stations may also continue to operate on a primary basis with stations in the fixed and mobile except aeronautical mobile services that are licensed under Part 27 (Miscellaneous Wireless Communication Services) of the Commission's Rules.

* * * * *

PART 25 – SATELLITE COMMUNICATIONS

3. Amend section 25.149 by revising paragraph (a)(2)(iii) to read as follows:

§ 25.149 Application requirements for ancillary terrestrial components in the mobile-satellite service networks operating in the 1.5/1.6 GHz, 1.6/2.4 GHz and 2 GHz mobile-satellite service.

(a) ***

(2) ***

(iii) In the 1610-1626.5 MHz/2483.5-2500 MHz bands (Big LEO bands), ATC operations are limited to the 1610-1615.5 MHz, 1621.35-1626.5 MHz, and 2487.5-2493.0 MHz bands and to the specific frequencies authorized for use by the MSS licensee that seeks ATC authority.

* * * * *

PART 74 – EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

4. Amend section 74.602 by revising paragraph (a)(2) to read as follows:

§ 74.602 Frequency assignment.

(a) ***

(2) In the band 2483.5-2500 MHz, no applications for new stations or modification to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, and licensees whose initial applications were filed on or before July 25, 1985, are grandfathered and their operations are on a co-primary basis with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, their operations are also on a co-primary basis with Part 27 fixed and mobile except aeronautical mobile service operations.

* * * * *

PART 90 – PRIVATE LAND MOBILE RADIO SERVICES

5. Amend section 90.20 by revising paragraph (d)(73) to read as follows:

§ 90.20 Public Safety Pool.

* * * * *

(d) ***

(73) Available only on a shared basis with stations in other services, and subject to no protection from interference due to the operation of industrial, scientific, or medical (ISM) devices. In the band 2483.5-2500 MHz, no applications for new stations or modification to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, and licensees whose initial applications were filed on or before July 25, 1985, are grandfathered and their operations are on a co-primary basis with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, their operations are also on a co-primary basis with Part 27 fixed and mobile except aeronautical mobile service operations.

* * * * *

6. Amend section 90.35 by revising paragraph (c)(74) to read as follows:

§ 90.35 Industrial/Business Pool.

* * * * *

(c) ***

(74) Available only on a shared basis with stations in other services, and subject to no protection from interference due to the operation of industrial, scientific, or medical (ISM) devices. In the band 2483.5-2500 MHz, no applications for new stations or modification to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, and licensees whose initial applications were filed on or before July 25, 1985, are grandfathered and their operations are on a co-primary basis with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, their operations are also on a co-primary basis with Part 27 fixed and mobile except aeronautical mobile service operations.

* * * * *

PART 101 – FIXED MICROWAVE SERVICES

7. Amend section 101.147 by revising paragraph (f)(2) to read as follows:

§ 101.147 Frequency assignments.

* * * * *

(f) ***

(2) Stations licensed in this band under this part prior to March 1, 1996, are grandfathered and may continue their authorized operations. Stations licensed in the 2483.5-2500 MHz portion of the band as of July 25, 1985, and licensees whose initial applications were filed on or before July 25, 1985, are grandfathered, and may continue operations, subject only to license renewal, on a co-primary basis with with the mobile-satellite and radiodetermination-satellite services, and in the segment 2495-2500 MHz, their operations are also on a co-primary basis with Part 27 fixed and mobile except aeronautical mobile service operations.

* * * * *

APPENDIX C

TECHNICAL ANALYSIS FOR RATIO OF CDMA MSS BIG LEO L-BAND CAPACITY TO S-BAND CAPACITY

Globalstar claims that the capacity of a mobile-satellite system (MSS) L-Band uplink channel is approximately 1.4 times greater than the capacity of an equivalent MSS S-Band downlink channel.[264] The uplink capacity is limited by, among other things, the total system noise which, for a CDMA system, includes the additional noise caused by all other CDMA users in the same channel. The downlink capacity, however, is constrained by the power flux density (PFD) limits placed on satellite systems to avoid interference with terrestrial systems operating in the same band. These PFD limits constrain the power output of the satellite and, therefore, the number of users served from a single satellite because each CDMA user consumes a certain amount of the satellite downlink power to create the link.

The following link budget tables, Table C.1, "CDMA Uplink Link Budget," and Table C.2, "CDMA Downlink Link Budget," provide calculations for the number of users that can occupy Big LEO CDMA uplink and downlink channels under two different conditions. Tables C.1 and C.2 show two different budgets: The link budgets contained in Column A were developed under the assumption that the system link margin is zero because the system has the maximum possible number of users. Column B contains the link budget developed under the assumptions that all users have a 7 dB link margin. This link margin is commonly used in developing commercial mobile-satellite systems. The ratio for the number of uplink users to downlink users in Column A is (148/98) = 1.51. The ratio for the number of uplink users to downlink users in Column B is (28/20) = 1.40. The average of both of these ratios is 1.46 which is approximately equal to Globalstar's stated ratio of 1.4.

Table C.1 - CDMA Uplink Link Budget[265]

	Column A	Column B	Unit
Number of Users	148	28	
Frequency	**1615**	**1615**	MHz
Range	**1740**	**1740**	Km
Receive Noise Temperature	**500**	**500**	K
Receiver Noise Density	**-201.6**	**-201.6**	dBW/Hz
Receiver Bandwidth	**1.23**	**1.23**	MHz
Date Rate	**4.8**	**4.8**	Kbps
Channel Activity Factor	**0.5**	**0.5**	#
Nominal Max User EIRP	0.0	0.0	dBW
Spreading Loss	**-161.4**	**-161.4**	dB
Received Wanted Signal Level	**-161.4**	**-161.4**	dBW
Receive Antenna Gain	**15.7**	**15.7**	dB

[264] Letter from William Wallace, Counsel for Globalstar, to Marlene H. Dortch, Secretary, FCC, Attach., Big LEO Band Plan at 12 (dated Sept. 15, 2003) ("Ratio of users per L-band to S-band channel is about 1.4 to 1 to achieve equivalent capacity.").

[265] Note that the items in bold were taken from the Amendment to Globalstar System Application, file no. 19-DSS-P-91(48) and CSS-91-014 dated Nov. 15, 1994 .

User Signal @ Satellite Receiver	-145.7	-145.7	dBW
Average Data Rate	2.4	2.4	Kbps
Energy per Bit (Eb)	-179.5	-179.5	dBW/Hz
Interference Power	-124.6	-131.9	dBW
Spreading BW	1.23	1.23	MHz
Spreading BW	60.9	60.9	dBHz
Interference Power Density (Io)	-184.8	-192.3	dBW/Hz
Resulting Eb/(No+Io)	5.3	12.3	dB
Coherent Combining Gain	1.0	1.0	dB
Required Eb/(No+Io)	6.3	6.3	dB
Margin	0.0	7.0	dB

Table C.2 - CDMA Downlink Link Budget

	Column A	Column B	Units
Number of Users	98	20	
Frequency	2495.5	2495.5	MHz
Receive Noise Temperature	293.7	293.7	K
Receiver Noise Density (No)	-203.9	-203.9	dBW/Hz
Receiver Bandwidth	1.23	1.23	MHz
Date Rate	2.4	2.4	Kbps
Maximum PFD	-144.0	-144.0	dBW/m^2 4 kHz
Wanted Signal PFD	-163.9	-157.0	dBW/m^2 4 kHz
Bandwidth Conversion	24.9	24.9	dB
User gain	2.6	2.6	dB
Antenna Isotropic Area	-29.4	-29.4	dBm^2
Wanted Signal Power @ Receiver	-165.8	-158.9	dBW
Date Rate	33.8	33.8	dBHz
Energy-per-Bit (Eb)	-199.6	-192.7	dBW/Hz
Unwanted Signal Power	-144.0	-144.2	dBW/m^2 4 kHz
User gain	2.6	2.6	dBi
Antenna Isotropic Area	-29.4	-29.4	dBm^2
Bandwidth Conversion	24.9	24.9	dB/4kHz
Unwanted Signal Power	-146.0	-146.1	dBW
Spreading Bandwidth	60.9	60.9	dBHz
Interference Density (Io)	-206.9	-207.0	dBW/Hz
Resulting Eb/(No+Io)	2.5	9.5	dB
Coherent Combining Gain	2.5	2.5	dB
Resulting Eb/(No+Io)	5.0	12.0	dB
Required Eb/(No+Io)	5.0	5.0	dB
Margin	0.0	7.0	dB

APPENDIX D

FINAL REGULATORY FLEXIBILITY CERTIFICATION

Report and Order

1. The Regulatory Flexibility Act of 1980, as amended (RFA),[266] requires that a regulatory flexibility analysis be prepared for notice-and-comment rulemaking proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[267] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[268] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[269] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the U.S. Small Business Administration (SBA).[270] The SBA has developed a small business size standard for Satellite Telecommunications, which consists of all such companies having $12.5 million or less in annual revenue.[271]

2. Pursuant to the RFA, the Commission incorporated an Initial Regulatory Flexibility Analysis (IRFA) into the *Big LEO Spectrum Sharing NPRM*.[272] We received no comments in response to the IRFA. For the reasons described below, we now certify that the policies and rules adopted in the present Report and Order will not have a significant economic impact on a substantial number of small entities.

3. In this *Report and Order* the Commission adopts a spectrum sharing plan that allows TDMA mobile-satellite service (MSS) operators to share the L-band at 1618.25-1621.35 MHz with CDMA MSS operators. The Commission also allocates spectrum in the S-band at 2495-2500 MHz for fixed and mobile except aeronautical mobile services on a primary basis, which will share this band with CDMA MSS operators providing MSS services. We believe that the spectrum sharing plan in the Big LEO bands will improve spectral efficiency by increasing the number of providers and consumer users without harming current MSS operations.

4. We find that our action will not affect a substantial number of small entities because only MSS operators in the Big LEO L- and S-bands will be affected. In particular, two Big LEO MSS

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[266] The RFA, *see* 5 U.S.C. §§ 601-612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[267] 5 U.S.C. § 605(b).

[268] 5 U.S.C. § 601(6).

[269] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[270] 15 U.S.C. § 632.

[271] 13 C.F.R. § 121.201, NAICS code 517410.

[272] *Big LEO Spectrum Sharing NPRM*, 18 FCC Rcd at 2214-2215, App. E.

licensees currently are authorized to provide MSS in the United States. We find that neither of these licensees are small businesses. Small businesses often do not have the financial ability to become MSS system operators due to high implementation costs associated with launching and operating satellite systems and services. Therefore, we certify that the requirements of this Report and Order will not have a significant economic impact on a substantial number of small entities. The Commission will send a copy of the *Report and Order* including a copy of this Final Regulatory Flexibility Certification, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, *see* 5 U.S.C. § 801(a)(1)(A). In addition, this *Report and Order* and this Final Regulatory Flexibility Certification will be sent to the Chief Counsel for Advocacy of the Small Business Administration, and will be published in the Federal Register. *See* 5 U.S.C. § 605(b).

APPENDIX E

FINAL REGULATORY FLEXIBILITY ANALYSIS

Fourth Report and Order

1. As required by the Regulatory Flexibility Act (RFA)[273] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Third Notice*.[274] The Commission sought written public comments on the proposals in the *Third Notice*, including comment on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.[275]

A. Need for, and Objectives of, the Fourth Report and Order

2. This *Fourth Report and Order* continues our efforts to promote the provision of advanced wireless services (AWS) to the public, which in turn supports our obligations under section 706 of the Communications Act of 1934, as amended[276] and, more generally, serves the public interest by promoting rapid and efficient radio communication facilities. Adding a fixed and mobile except aeronautical mobile allocation to the 2495-2500 MHz band potentially provides suitable spectrum for relocation of Multipoint Distribution Service (MDS) licensees in the 2150-2160/62 MHz band. Also, adopting this allocation has the potential to help free up the entire 2150-2160/62 MHz band for the provision of AWS, the 2150-2155 MHz portion of which has already been reallocated for AWS,[277] and the 2155-2160/62 MHz portion of which has been tentatively identified as suitable for AWS.[278] In addition, an MDS relocation to the 2495-2500 MHz band could provide an opportunity to integrate the spectrum at 2495-2500 MHz into a larger 2495-2690 MHz band plan and establish a new Broadband Radio Service (BRS).

B. Summary of the Significant Issues Raised by Public Comments in Response to the IRFA

3. There were no comments filed that specifically addressed the rules and policies proposed in the IRFA.

C. Description and Estimate of the Number of Small Entities to Which the Rules Will Apply

4. The RFA directs agencies to provide a description of, and, where feasible, an estimate of, the

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[273] *See* 5 U.S.C. § 603. The RFA (codified at 5 U.S.C. § 601-612) has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[274] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems*, ET Docket No. 00-258, Third Report and Order, Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order, 18 FCC Rcd 2223 (2003) (*Third Notice*).

[275] *See* 5 U.S.C. § 604.

[276] Section 706 of the Communications Act of 1934, as amended, codified at 47 U.S.C. § 157.

[277] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems*, ET Docket No. 00-258, Second Report and Order, 17 FCC Rcd 23193, 23212 (2002).

[278] *See Third Notice*, 18 FCC Rcd at 2255.

number of small entities that may be affected by the rules adopted herein.[279] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[280] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[281] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[282]

5. Fixed Microwave Services. Fixed microwave services include common carrier,[283] private operational-fixed,[284] and broadcast auxiliary radio services.[285] At present, there are approximately 22,015 common carrier fixed licensees and 61,670 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services. The Commission has not created a size standard for a small business specifically with respect to fixed microwave services. For purposes of this analysis, the Commission uses the SBA small business size standard for the category "Cellular and Other Telecommunications," which is 1,500 or fewer employees.[286] The Commission does not have data specifying the number of these licensees that have more than 1,500 employees, and thus are unable at this time to estimate with greater precision the number of fixed microwave service licensees that would qualify as small business concerns under the SBA's small business size standard. Consequently, the Commission estimates that there are up to 22,015 common carrier fixed licensees and up to 61,670 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services that may be small and may be affected by the rules and policies proposed herein. We note, however, that the common carrier microwave fixed licensee category includes some large entities.

6. Broadcast Auxiliary Service (BAS). BAS involves a variety of transmitters, generally used to relay broadcast programming to the public (through translator and booster stations) or within the program distribution chain (from a remote news gathering unit back to the stations). The Commission has not

[279] 5 U.S.C. § 604(a)(3).

[280] 5 U.S.C. § 601(6).

[281] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[282] 15 U.S.C. § 632.

[283] *See* 47 C.F.R. §§ 101 et seq. (formerly, Part 21 of the Commission's Rules) for common carrier fixed microwave services (except MDS).

[284] Persons eligible under parts 80 and 90 of the Commission's Rules can use Private Operational-Fixed Microwave services. *See* 47 C.F.R. Parts 80 and 90. Stations in this service are called operational-fixed to distinguish them from common carrier and public fixed stations. Only the licensee may use the operational-fixed station, and only for communications related to the licensee's commercial, industrial, or safety operations.

[285] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 C.F.R. Part 74. This service is available to licensees of broadcast stations and to broadcast and cable network entities. Broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile television pickups, which relay signals from a remote location back to the studio.

[286] 13 CFR § 121.201, NAICS code 513322 (changed to 517212 in October 2002).

developed a definition of small entities specific to broadcast auxiliary licensees. The SBA has developed small business size standards, as follows: 1) For TV BAS, we will use the small business size standard for Television Broadcasting, which consists of all such companies having annual receipts of no more than $12.0 million;[287] 2) For Aural BAS, we will use the small business size standard for Radio Stations, which consists of all such companies having annual receipts of no more than $6 million;[288] 3) For Remote Pickup BAS, we will use the small business size standard for Television Broadcasting when used by a TV station and the small business size standard for Radio Stations when used by a radio station.

7. According to Commission staff review of BIA Publications, Inc. Master Access Television Analyzer Database, as of May 16, 2003, about 814 of the 1,220 commercial television stations in the United States had revenues of $12 million or less. We note, however, that, in assessing whether a business concern qualifies as small under the above definition, business (control) affiliations[289] must be included.[290] Our estimate, therefore, likely overstates the number of small entities that might be affected by our action, because the revenue figure on which it is based does not include or aggregate revenues from affiliated companies. There are also 2,127 low power television stations (LPTV).[291] Given the nature of this service, we will presume that all LPTV licensees qualify as small entities under the SBA size standard. According to Commission staff review of BIA Publications, Inc., Master Access Radio Analyzer Database, as of May 16, 2003, about 10,427 of the 10,945 commercial radio stations in the United States had revenue of $6 million or less. We note, however, that many radio stations are affiliated with much larger corporations with much higher revenue, and, that in assessing whether a business concern qualifies as small under the above definition, such business (control) affiliations are included. Our estimate, therefore, likely overstates the number of small businesses that might be affected by our action.

8. MDS, Multichannel Multipoint Distribution Service. Multichannel Multipoint Distribution Service (MMDS) systems, often referred to as "wireless cable," transmit video programming to subscribers using the microwave frequencies of MDS and Instructional Television Fixed Service (ITFS).[292] In connection with the 1996 MDS auction, the Commission defined "small business" as an entity that, together with its affiliates, has average gross annual revenues that are not more than $40 million for the preceding three calendar years.[293] The SBA has approved of this standard.[294] The MDS

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[287] 13 C.F.R. § 121.201, NAICS code 515120.

[288] *Id.*, NAICS code 515112.

[289] "Concerns are affiliates of each other when one concern controls or has the power to control the other or a third party or parties controls or has to power to control both." 13 C.F.R. § 121.103(a)(1).

[290] "SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic concern's size." 13 C.F.R. § 121.103(a)(4).

[291] FCC News Release, "Broadcast Station Totals as of September 30, 2002" (Nov. 6, 2002).

[292] *Amendment of Parts 21 and 74 of the Commission's Rules with Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service and Implementation of Section 309(j) of the Communications Act – Competitive Bidding*, Report and Order, 10 FCC Rcd 9589, 9593, ¶ 7 (1995) (*MDS Auction R&O*).

[293] 47 C.F.R. § 21.961(b)(1).

[294] *See* Letter to Margaret Wiener, Chief, Auctions and Industry Analysis Division, Wireless Telecommunications Bureau, FCC, from Gary Jackson, Assistant Administrator for Size Standards, Small Business Administration (dated Mar. 20, 2003) (noting approval of $40 million size standard for MDS auction).
(continued....)

auction resulted in 67 successful bidders obtaining licensing opportunities for 493 Basic Trading Areas (BTAs).[295] Of the 67 auction winners, 61 claimed status as a small business. At this time, we estimate that of the 61 small business MDS auction winners, 48 remain small business licensees. In addition to the 48 small businesses that hold BTA authorizations, there are approximately 392 incumbent MDS licensees that have gross revenues that are not more than $40 million and are thus considered small entities.[296]

9. In addition, the SBA has developed a small business size standard for Cable and Other Program Distribution,[297] which includes all such companies generating $12.5 million or less in annual receipts.[298] According to Census Bureau data for 1997, there were a total of 1,311 firms in this category that had operated for the entire year.[299] Of this total, 1,180 firms had annual receipts of under $10 million, and an additional 52 firms had receipts of $10 million or more but less than $25 million.[300] Consequently, we estimate that the majority of providers in this service category are small businesses that may be affected by the proposed rules and policies.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

10. Although the *Fourth Report and Order* imposes no compliance requirements, future Commission decisions may impose some requirements.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

11. The RFA requires an agency to describe any significant alternatives that it has considered in developing its approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities."[301]

(Continued from previous page)

295 Basic Trading Areas (BTAs) were designed by Rand McNally and are the geographic areas by which MDS was auctioned and authorized. *See MDS Auction R&O*, 10 FCC Rcd at 9608, ¶ 34.

[296] 47 U.S.C. § 309(j). Hundreds of stations were licensed to incumbent MDS licensees prior to implementation of section 309(j) of the Communications Act of 1934, 47 U.S.C. § 309(j). For these pre-auction licenses, the applicable standard is SBA's small business size standard for "other telecommunications" (annual receipts of $12.5 million or less). *See* 13 C.F.R. § 121.201, NAICS code 517910.

[297] 13 C.F.R. § 121.201, NAICS code 517510.

[298] *Id.*

[299] U.S. Census Bureau, 1997 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4 (issued October 2000).

[300] *Id.*

[301] 5 U.S.C. § 603(c)(1)-(c)(4).

12. The *Fourth Report and Order* recognizes that there are grandfathered stations in the BAS and private radio services that may need to be relocated to accommodate the addition of a fixed and mobile except aeronautical mobile allocation in the 2495-2500 MHz band, and the potential use of this band by the BRS. But because the BAS and private radio services have been sharing use of the 2495-2500 MHz band on an interference-free basis for some time, the addition of a fixed and mobile except aeronautical mobile allocation to this band may not cause interference to these operations. A specific relocation plan for the remaining grandfathered incumbents in the 2495-2500 MHz band, including BAS and private radio service operators, will be provided, if necessary, when the remaining issues concerning AWS relocation are addressed.

13. Finally, no significant alternatives were suggested by commenters and nor do we think there are any other alternatives that would have a lesser impact on small businesses.

Report to Congress: The Commission will send a copy of the *Fourth Report and Order*, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.[302] In addition, the Commission will send a copy of the *Fourth Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Fourth Report and Order* and FRFA (or summaries thereof) will also be published in the Federal Register.[303]

[302] *See* 5 U.S.C. § 801(a)(1)(A).

[303] *See* 5 U.S.C. § 604(b).

APPENDIX F

INITIAL REGULATORY FLEXIBILITY CERTIFICATION

Further Notice of Proposed Rulemaking

1. The Regulatory Flexibility Act (RFA)[304] requires that an agency prepare a regulatory flexibility analysis for notice-and-comment rulemaking proceedings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[305] The RFA generally defines "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[306] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[307] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[308] The SBA has developed a small business size standard for Satellite Telecommunications, which consists of all such companies having $12.5 million or less in annual revenue.[309]

2. The Commission established the original Big LEO band plan in 1994[310] and has modified that plan in the attached *Report and Order*. In that *Report and Order*, the Commission allows the TDMA and CDMA mobile-satellite service (MSS) operators to share 3.1 megahertz in the L-band at 1618.25-1621.35 MHz. The spectrum sharing plan in the L-band should promote the efficient use of spectrum by increasing the number of licensees that use the spectrum. We recognize, however, that Iridium, the current TDMA MSS operator, is capable of operating in spectrum as far down as 1616 MHz. Thus, the purpose of the attached *Further Notice* is to initiate and conduct a review of whether it would be feasible for the TDMA and CDMA MSS operators to share an additional 2.25 megahertz of spectrum at 1616-1618.25 MHz. This proposed band plan change is designed to further improve spectral efficiency within the L-band.

3. The proposal in the *Further Notice* impacts only Big LEO MSS licensees and currently, only

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[304] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[305] *See* 5 U.S.C. § 605(b).

[306] 5 U.S.C. § 601(6).

[307] 5 U.S.C § 601(3) (incorporating by reference the definition of "small business concern" in Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[308] 15 U.S.C. § 632.

[309] 13 C.F.R. § 121.201, NAICS code 517410.

[310] *See generally 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*, CC Docket No. 92-166, Report and Order, FCC 94-261, 9 FCC Rcd 5936 (1994), modified on recon., FCC 96-54, 11 FCC Rcd 12861 (1996)..

two MSS licensees are operating in the Big LEO bands. We do not consider these entities to be small businesses because small businesses would not likely be able to satisfy the capital requirements for launching and operating these satellite systems. Thus, the change we propose will not have a substantial economic impact on small entities.

4. The Commission therefore certifies, pursuant to the RFA, that the proposal in this *Further Notice*, if adopted, will not have a significant economic impact on a substantial number of small entities. If commenters believe that the proposals discussed in the *Further Notice* require additional RFA analysis, they should include a discussion of these issues in their comments and additionally label them as RFA comments. The Commission will send a copy of the *Further Notice*, including a copy of this Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the SBA. In addition, a copy of the *Further Notice* and this initial certification will be published in the Federal Register.[311]

[311] *See* 5 U.S.C. § 605(b).