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In the Matter of	)	Received
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Mobile Satellite Ventures Subsidiary LLC	)	APR 30 2004
	)	
Application for Modification of Space Station License (AMSC-1)	)	File No. SAT-MOD-20031118-00333
	)	Policy Branch International Bureau
	)	
Amendment to Pending Application to Launch and Operate a Next-Generation Replacement MSS Satellite System	)	File No. SAT-AMD-20031118-00332
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Application for a Modification of Blanket License to Operate Mobile Earth Terminals with MSAT-1	)	File No. SES-MOD-20031118-01879
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REPLY OF INMARSAT VENTURES LTD

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REPLY OF INMARSAT VENTURES LTD

Inmarsat Ventures Limited ("Inmarsat") hereby replies to the Response of Mobile Satellite Ventures Subsidiary LLC ("MSV") in the above-cited proceedings.[1]

INTRODUCTION AND SUMMARY

Under the guise of "technical advancements," MSV seeks to undermine the very underpinnings of the ancillary terrestrial component ("ATC") service rules,[2] though a series of twelve waiver requests. Like the Wizard in the movie *Wizard of Oz*, MSV hides behind a curtain, pulling levers, setting off explosions, and creating smoke. When Inmarsat pulls back the curtain and exposes the ruse, MSV pleas with the Commission to ignore what it said and to look

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1 *See* Response of Mobile Satellite Ventures Subsidiaries LLC to Opposition of Inmarsat Ventures Ltd., Application of MSV, File Nos. SAT-MOD-20031118-00333, SAT-AMD-20031118-00332, SES-MOD-20031118-01879 (April 14, 2004) ("*MSV Response*").

2 *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Report and Order*, 18 FCC Rcd 1962 (2003) (the "*ATC Order*"), *amended by Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Errata*, IB Docket Nos. 01-185 and 02-364 (March 7, 2003).

at new technology that MSV claims it has spent lots of money developing. As a further distraction, MSV has resorted to the timeworn yarn that Inmarsat (a fully privatized company no longer under control of its former signatories) used to be an intergovernmental organization that is not playing fair. The claims of allegedly problem-solving "innovations" and MSV's unfounded sniping about the current state of competition are, with apologies to William Shakespeare, merely a tale full of sound and fury, signifying nothing.

The Commission should take no comfort in MSV's assurances that "everything will be all right" if the Commission simply moves quickly and allows MSV to deploy yet another competitive offering in the ever-consolidating terrestrial wireless marketplace. There are very real technical problems with MSV's proposal to increase the size of its proposed terrestrial network *by a factor of 17* by, among other things, requiring Inmarsat to accept a significant increase in uplink interference to a total of 6% $\Delta T/T$, and by lowering the level of protection currently provided to Inmarsat mobile users, including U.S. military, other U.S. Government users, aeronautical, maritime and land mobile commercial users. There should be policy concerns as well.

The reality is that MSV's applied-for ATC system is little more than an attempt to convert the fundamental nature of the L-band at the expense of the MSS services provided by other entities. The Commission attempted to slam the door on such a scam, by limiting MSV to 1725 ATC base station spectrum reuses, and clearly warning ATC licensees that it would not countenance "gaming" the system.[3] For all of its talk of "researching and developing ways to increase efficient use of L-band spectrum," MSV is far more focused on terrestrial usage of the L-band than advancing the state of *satellite services* at L-band. Indeed, MSV's recent

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3 *See ATC Order* at ¶ 3, n.5.

investments appear primarily to have been in ways to employ almost 30,000 ATC base station spectrum reuses to support its increased terrestrial plans, *at the expense of increased interference into Inmarsat's satellite network on both the uplink and downlink side.*

In contrast to Inmarsat's $1.5 billion investment in the new, spectrally efficient Inmarsat-4 program, that will achieve new levels of frequency reuse in the L-band, and be able to share more L-band spectrum with other operators than ever before, there is no indication that MSV's proposed replacement satellite is actually moving forward. And MSV has no incentive to ever really do so, because it is free to keep its "wounded" MSS spacecraft in orbit as long as possible to provide "cover" for the deployment of a much more substantial terrestrial network in the L-band.

MSV argues that its attempt to rewrite ATC rules through waivers should be "ok" because MSV believes that it will be the only entity that will ever deploy ATC in the L-band. That assertion is dubious, at best, given that there are three other Administrations that share the L-band over North America. But if MSV continues to be allowed to warehouse L-band spectrum in violation of the Commission's clear policy against warehousing, MSV may be correct that no other operator will have the opportunity to offer additional MSS or ATC services in the L-band. Between its FCC-licensed spectrum, and the Industry Canada-licensed spectrum of its affiliate, MSV has access to a total of 26 MHz of L-band spectrum (13 MHz in each direction). Based on Inmarsat's measurements of usage on the MSV spacecraft, MSV is using only a very small portion of this spectrum. MSV has refused for over three years to recoordinate L-band spectrum under the Mexico City MOU and instead has hoarded valuable spectrum that it is not using. The fact that MSV does not use (or need) all of the spectrum it previously was licensed has been

confirmed by the Commission's decision in 2002 to modify MSV's license by reducing its licensed spectrum from 28 MHz to 20 MHz (10 MHz in each direction).[4]

So why is it that MSV is allowed to continue to retain spectrum that it is not using, when the Commission has rigorously enforced its anti-warehousing policies against every other MSS licensee in the Big LEO and 2 GHz bands? And why is it that MSV seeks to rebalance the careful tradeoffs reflected in the *ATC Order* and convert its unused spectrum to terrestrial usage at the expense of other current and potential MSS competitors? Perhaps it is because the vestiges of the anachronistic policy that originally gave MSV monopoly rights to the U.S. market, and constrained Inmarsat's ability to fully serve the U.S., has precluded potential MSS competitors from entering, and focusing on, the L-band. This has left only Inmarsat to cry "foul" while MSV attempts to fundamentally change the nature of the L-band by increasing permissible terrestrial usage by a factor of 17.

Putting aside these policy concerns, there are very real technical problems raised by the MSV ATC applications. MSV is the only ATC proponent that seeks to reopen virtually every rule established in the multi-year ATC rulemaking proceeding. The problem is not just the waste of Commission time and resources in relitigating matters that have been fully vetted. More fundamentally, MSV's piecemeal picking apart of the Commission's rules and analyses

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[4] *See In the Matter of Establishing Rules and Policies for the Use of Spectrum for Mobile Satellite Services in the Upper and Lower L-band*, Report and Order, IB Docket No.96-132, FCC 02-24 at ¶ 19 (rel. Feb. 7, 2002) ("Although the system Motient has been authorized to construct and operate is designed to use 28 megahertz, the record indicates that the system is capable of providing an economically viable MSS service with as little as 20 megahertz of spectrum. In light of this fact, we find that reserving the first 20 megahertz of internationally coordinated L-band spectrum for Motient's use in providing MSS service satisfies any reasonable expectations that Motient might have. . . . Further, if sufficient spectrum in the L-band should become available once the Commission has coordinated the 20 megahertz for which Motient is authorized, or should Motient acquire access to at least 20 megahertz of L-band spectrum through other means, *i.e.* its proposed merger with TMI, we find that the public interest benefit derived from reserving the additional spectrum to enable the creation of competitive MSS providers outweighs any benefits that might stem from assigning additional L-band spectrum to Motient.").

reopens the longstanding gap between MSV's and Inmarsat's technical analyses that the Commission closed by developing carefully-crafted ATC service rules for the L-band.

Throughout the multi-year ATC rulemaking, there was a gap of about 100x (approximately 20 dB), between the uplink interference analyses of MSV and Inmarsat. This gap existed because of certain assumptions each party made about how ATC would be deployed. The Commission closed this gap by enshrining certain technical limitations in its ATC service rules, which, if actually enforced, promise to resolve Inmarsat's technical concerns. Among other things, the Commission adopted a requirement that ATC mobile terminals reduce their maximum power by 18 dB when operating outside. Enforcing that requirement alone closes the gap between MSV's and Inmarsat's prior analyses to 2 dB. *The key to this and other interference protections adopted by the Commission*, as Inmarsat has emphasized before, is that (i) those protections must be based on accurate and reliable assumptions, (ii) those protections must be applied in the ATC licensing process and actually enforced, and (iii) ATC systems that vary from the baseline, or reference, ATC system analyzed by the Commission must be appropriately designed to provide a level of interference protection equivalent to that of the baseline system.

MSV's waiver requests and the deficiencies in its *ATC Application*[5] demonstrate that the Commission's assumptions are not being realized by MSV, and that MSV is not designing an ATC system that is consistent with the reference ATC system. These waiver requests and deficiencies must be considered, in the aggregate, to fully appreciate their collective impact:

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5 Applications of MSV, File Nos. SAT-MOD-20031118-00333, SAT-AMD-20031118-00332, and SES-MOD-20031118-01879 (filed November 18, 2003) (collectively, the "*ATC Application*").

MSV WAIVER REQUEST OR DEFICIENCY	INCREASE IN UPLINK INTERFERENCE
Failure to demonstrate compliance with 18 dB structural attenuation requirement	Up to 63x (18dB)
Request to allow ATC to generate 6% ΔT/T into Inmarsat uplinks	~4.3x (6.3dB)
Request to base uplink analysis on "average" vs. peak mobile terminal gain	2.5x (4dB)
Failure to adjust for CDMA architecture	Up to 2.2x (3.5dB)*
Failure to adjust for use of half-rate vocoders	1.6 to 2.5x (1.5 to 1.8dB)*
Request to increase density of ATC base stations in the US	1.6x (1.4dB)
RESULTING POTENTIAL INCREASE IN INTERFERENCE	Up to 2433x (33.9dB)

* These two factors are related, so that the maximum increase in interference due to both is limited to 3.5 dB.

Each of these issues is addressed in greater detail below and also is summarized in Appendix A hereto.

The uplink protections embodied in the ATC service rules are based on the assumption that, by constraining the ATC interference permitted into MSV's own satellite, Inmarsat's satellites should be sufficiently protected from ATC interference as well. Thus, the Commission limited the number of ATC base station frequency reuses to 1725 – a level that constrained MSV self-interference to a degree that also is intended to protect Inmarsat's satellites from unacceptable levels of interference.

By seeking to substantially increase the number of permitted base station frequency reuses and claiming that it will manage the resulting self-interference through an

interference cancellation technique within the MSV system, MSV is seeking permission to increase ATC interference and then "cancel" the effects on its own satellite. This proposed scheme, however, does absolutely nothing to protect Inmarsat or any other L-band MSS network from the additional ATC interference that MSV seeks to generate. Basing any changes in the ATC limits on a self-interference scheme at the MSV satellites therefore would undermine a fundamental underpinning of the ATC service rules. The Commission cannot make such a change, unless its also develops, *through a notice and comment rulemaking proceeding*, a new set of rules based on a new standard to constrain the uplink interference potential from ATC into Inmarsat's satellites.

Moreover, MSV's plan to negate the effects of ATC *self-interference* unquestionably comes at the expense of MSV's consuming substantially more of the very limited FSS feeder link spectrum. Inmarsat has shown that MSV's interference cancellation scheme is not feasible, and would never be implemented in reality. Furthermore, there is no question that MSV's proposed scheme simply does nothing to protect Inmarsat from the up to 2433x uplink interference onslaught described above from the aggregate effect of MSV's proposed ATC changes.

MSV's request for unlimited reuse of L-band spectrum that is shared with other MSS systems around the world would place the Commission right back into the morass it sought to avoid in the *ATC Order* when it previously rejected this MSV proposal, explaining: "In a dynamic environment, such as L-band MSS, we are concerned that determining the co-channel interference that arises from fluctuating and geographically discrete operations might require our continued oversight over many years with no foreseeable end."[6] The Commission was right – a

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6 *ATC Order* at ¶ 146.

different rule is appropriate in the L-band than the Big LEO band or the 2 GHz band, because the spectrum sharing environment is different. MSV has done nothing to assuage the Commission's concerns that gave rise to the current limits on reuse of L-band spectrum.

All parties recognize that MSV's proposed ATC base stations will cause some level of downlink interference into Inmarsat's mobile terminals. The only question is how much interference is tolerable.

The downlink interference problem is created by the simple fact that the ATC base stations will be located much closer to the Inmarsat mobile terminals than the Inmarsat satellite. The dynamics of the downlink interference are complex, no doubt. But one thing is very clear: MSV continues to ignore the intermodulation products within the Inmarsat receivers caused by an ATC base station transmitting multiple carriers. Inmarsat's test data demonstrates the impact of this problem, which is a different interference issue than the also-significant problem caused by high-power ATC base station signals overdriving Inmarsat mobile terminals to a point where they no longer perform correctly.

The real-world impact of the downlink interference dynamics affects virtually all of the calculations of downlink interference, which are addressed by the existing Commission rules. And the real-world impact also demonstrates that there is no basis for MSV's proposed relaxation of several rules that the Commission adopted to protect Inmarsat's mobile terminals from ATC base station interference.

DISCUSSION

MSV artfully downplays how the myriad of waivers that it seeks would individually and collectively result in a substantial increase in the interference caused by its proposed ATC service. MSV's claim that its *ATC Application* "largely conforms to the rules the

Commission adopted for the operation of terrestrial components"[7] is belied by the number, range, and impact of the waivers and variances it seeks.

In total, MSV requests twelve (12) waivers and variances that would fundamentally change the nature of MSS services in the L-band. Described in more detail in Inmarsat's Opposition,[8] the following list of the waivers and variances sought by MSV demonstrates that there is virtually no aspect of the ATC service rules that MSV did not try to modify in its *ATC Application*.

1) A waiver to increase by 17 times the number of ATC base stations permitted based on:
   a. Requiring Inmarsat to accept 6% ΔT/T uplink interference from ATC;
   b. MSV deploying 80 percent of its ATC base stations in the U.S.;
   c. MSV's MTs allegedly have an average antenna gain calculated to be –4 dBi or less when operating in the "ATC mode"; and
   d. MSV's proposed use of a new self-interference cancellation technique;
2) A waiver of the requirement to use quarter-rate vocoders;
3) A waiver to permit the unlimited use of non-co-channel frequencies not currently used by any other MSS operator whose satellite is visible from the U.S.;
4) A waiver to loosen the emission limit protections on L-band ATC base stations and revise the aggregate EIRP permitted per sector;
5) A waiver to loosen the emission limit protections toward the physical horizon on L-band ATC base stations;
6) A waiver to loosen the rule protecting aeronautical MSS services;
7) A waiver to loosen the rule protecting maritime MSS services;
8) A waiver to loosen the overhead gain suppression restrictions;
9) A waiver of the 90,000 mobile terminal peak traffic limit;
10) A variance to permit use of a CDMA architecture;
11) A waiver of the ground spare requirement; and
12) A variance from the use of a "safe harbor" dual mode handset necessary to demonstrate an integrated MSS/ATC system.

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7 *See MSV Opposition* at 4.

8 *See* Opposition of Inmarsat Ventures Ltd., Application of MSV, File Nos. SAT-MOD-20031118-00333, SAT-AMD-20031118-00332, SES-MOD-20031118-01879 at 5-7 (March 25, 2004) ("*Inmarsat Opposition*").

While MSV characterizes certain of the waivers listed above as variances,[9] this is inappropriate because, as Inmarsat has demonstrated,[10] the requests, if granted, would result in greater interference into Inmarsat's MSS operations. The Commission has indicated it would entertain "variances" from the ATC service rules with respect to the use of a non-GSM architecture[11] and, on a case-by-case basis, with respect to a request to deploy more than 1725 base station carriers per channel,[12] *but* in each case only if such a variance *would not increase interference* into Inmarsat (and, in the case of increasing the number of base stations, would result in no greater interference into MSV as well).[13]

A fundamental tenet of MSV's proposal is that Inmarsat should have to suffer a greater "ΔT/T" measure of uplink interference than the Commission deemed suitable in the *ATC Order.* Because these MSV requests would increase interference into Inmarsat's MSS system, they cannot be characterized as variances. In total, the waivers requested by MSV seriously undermine both the uplink and downlink interference protections developed by the Commission and also impact the gating criteria established in the *ATC Order.*

MSV advocates its *ATC Application* as the culmination of innovations that Inmarsat opposes for anticompetitive purposes. Nothing can be farther from the truth. In Section I, Inmarsat discuses its support for innovation that results in greater efficiency, but will not stand by while MSV uses the cloak of "new technology" to undermine the protections

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9 *See MSV Response* at 4 (use of a CDMA protocol; use of half-rate vocoders; increased co-channel reuse based on the use of MT with average gain antenna of –4dBi or less; and unlimited reuse of non-co-channel frequencies).

10 *See Inmarsat Opposition* at 18, 39, 26 and 41.

11 *See* 47 C.F.R. § 25.253 at Note.

12 *See ATC Order* at ¶147.

13 Regardless, use of a half-rate vocoder does not fall into either of these categories and as such should not be considered under the variance framework.

established by the Commission to ensure that ATC does not disrupt the continued provision of MSS service. Although Inmarsat is compelled to respond to MSV's unjust allegations of "monopoly," that sideshow should not divert attention from the failings of MSV's *ATC Application*. In Section II, Inmarsat explains that the fundamental changes in the ATC service rules sought by MSV are not properly addressed in a "minor modification" application, but instead need to be resolved in a rulemaking proceeding or in the reconsideration stage of the ATC proceeding. In Section III, Inmarsat addresses how MSV's *ATC Application* remains deficient and should be dismissed by the Commission. And finally, in Section IV, Inmarsat discusses the severity of the interference that would be caused, if the waivers sought by MSV were granted.

I. MSV CLOUDS THE DEBATE BY UNJUSTLY CLAIMING INMARSAT TO BE AGAINST INNOVATION AND ANTICOMPETITIVE

A. Inmarsat Supports True Innovation – Not Half-formed Schemes Used To Justify Increases In Interference To A Competitor

MSV is wrong when it states that Inmarsat is opposing MSV's "innovations" in order to block MSV and "take over MSV's spectrum."[14] Inmarsat is a strong proponent of innovation and has made its own MSS system more efficient in many tangible ways. The Inmarsat-4 satellites to be launched this year and next, at a network cost of over $1.5 billion, will have over 200 narrow spot beams and provide 10 times the communications capacity of the current Inmarsat-3 satellites. Inmarsat is leading the advancement in MSS services and plans to use the Inmarsat-4 satellites to offer its B-GAN service, which will enable land-based users to access broadband speed MSS services at rates of up to 432 kbit/s, and thereby will advance the Commission's policies of improving service to rural areas and increasing the deployment of

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[14] *See MSV Response* at 13.

broadband technologies. In contrast, MSV claims to be spending millions of dollars to develop a secondary terrestrial service,[15] while remaining conspicuously silent about what tangible efforts it has been making to improve its current or next generation *satellite service* offerings.

MSV's allegation that Inmarsat's objections in this proceeding are designed to "take over MSV's spectrum" is ludicrous. Besides being incorrect as a factual matter, the Commission has stated that the deployment of ATC should have no impact on the coordination of L-band spectrum.[16] Whether or not MSV is permitted to deploy an ATC system in the manner it seeks should not affect how much spectrum MSV is able to coordinate under the Mexico City MOU – only the demonstrated need of its MSS operations should matter.

Inmarsat does object when a claim of "innovation" is used as a blind for MSV to hide behind in MSV's attempt to harm the services of its main competitor. Throughout the ATC proceeding and now with the *ATC Application*, when a difficult technical issue has been raised by Inmarsat, MSV dodges the issue by providing platitudes to the Commission about "patented technology" or a new "technique."[17] As soon as Inmarsat points out the flaws of the technique, MSV moves on to another new "innovation" and starts its game of "hide and seek" all over again. And when Inmarsat tries to hold MSV to its commitments to the Commission, MSV

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15 *See MSV Opposition* at 12-13.

16 *See ATC Order* at ¶ 215.

17 *See, e.g.*, Petition for Partial Reconsideration and Clarification of Mobile Satellite Ventures Subsidiary LLC, IB Docket No. 01-185 at 11 (July 7, 2003) ("*MSV Petition*")(introducing a self-interference cancellation scheme never raised again after technical critique by Inmarsat); *cf. MSV Application* at 16 and App. F (introducing new self-interference cancellation scheme).

blames the Commission for having adopted a new polarization requirement that allegedly "negates" the improved performance of MSV's promised innovation.[18]

Inmarsat and the Commission must have a clear understanding of what the architecture of MSV's ATC systems will be in order to evaluate the potential interference into Inmarsat's system. By offering a constantly moving target, MSV undermines the full and open discussion of its proposed ATC system and raises serious doubts as to whether MSV will follow through on the commitments it makes.

B. Inmarsat's Objections Are Motivated Solely By Interference Concerns

MSV characterizes Inmarsat as the "only entity who is potentially impacted by MSV's requests" for waiver of the ATC service rules.[19] Therefore, it should not be a surprise that Inmarsat is keenly interested in MSV's *ATC Application* and has filed an opposition to those aspects of the application that would cause unacceptable interference to Inmarsat's MSS system. It is baseless, as MSV implies, to suggest that Inmarsat is opposing MSV's *ATC Application* for any other reason.[20]

In an attempt to divert the discussion over its *ATC Application* from the interference issues, MSV once again raises allegations meant to paint Inmarsat's behavior as anticompetitive.[21] Specifically, MSV claims that Inmarsat, based on its "historical status as a

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18 *See MSV Response* at Appendix A at 8 (blaming failure to achieve promised level of overhead gain suppression mandated by the Commission on the Commission's required usage of left-hand circular polarization).

19 *See MSV Response* at 11.

20 *See MSV Response* at 5.

21 *See MSV Response* at 5. MSV has raised these same issues over the past three years, and the Commission has consistently dismissed its claims. *See, e.g., In the Matter of Comsat Corporation d/b/a Comsat Mobile Communications, et al.*, 16 FCC Rcd. 21,661 at ¶¶ 65-73, 76 (2001) ("*Market Access Order*"); FCC Report to Congress as Requested by ORBIT Act, Report No. SPB-183 at 16 (June 11, 2003).

monopoly and its ties to foreign governments," has a dominant share of the MSS market.[22] Moreover, MSV asserts that Inmarsat retains its market share by stifling its competitors' access to spectrum, refusing to license intellectual properly [sic] on fair terms despite a legal obligation to do so, and steadfastly opposing such efforts to offer a more valuable and ubiquitous service as MSV's ATC initiative."[23] MSV's assertions are scurrilous, false, and irrelevant to this proceeding.

As discussed throughout the ATC proceeding, the issue for Inmarsat has always been to what extent an ATC system would cause interference into Inmarsat's MSS operations. After two years of industry input, the Commission recognized the potential for ATC to cause significant interference into Inmarsat's system and established the ATC service rules to ensure that MSS operations in the L-band were not adversely impacted. If MSV had adopted the clear approach set forth in the *ATC Order*, as modified by Inmarsat's petition for reconsideration and clarification, Inmarsat would not have objected to the deployment of ATC on those terms.[24] Instead, MSV has continued to push the envelope and proposed a system that diverges greatly from the baseline system envisioned by the Commission.

Although MSV's competition complaints are irrelevant to this proceeding---because all of Inmarsat's objections are based on substantiated interference concerns---Inmarsat nonetheless takes this opportunity to clarify the record. As an initial matter, Inmarsat was never a "monopoly." Inmarsat was created as an intergovernmental organization in 1979 by the United

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22 *MSV Response* at 5.

23 *MSV Response* at 6.

24 Inmarsat sought clarification and reconsideration of a limited number of issues in the *ATC Order*, and continues to advocate for those adjustments to the ATC service rules. *See* Petition for Reconsideration and Clarification of Inmarsat Ventures plc, IB Docket 01-185 (July 7, 2003) ("*Inmarsat Petition*").

States and other governments because there was a need to improve maritime distress and safety communications. The risks associated with establishing a satellite system for that purpose were deemed to be so high that no private company would undertake them, but no member was obliged to give Inmarsat the exclusive right to provide service in its jurisdiction. In any event, Inmarsat privatized four years ago, in 1999. And in 2003, new investors acquired control of Inmarsat from the former owners, thereby substantially reducing foreign government ownership. Inmarsat is subject to public scrutiny due to the securities regulation of the European Union, and Inmarsat soon will be subject to U.S. securities regulation as well. Inmarsat therefore now competes with other MSS operators as does any other public or private company.

Many MSS competitors have developed and successfully compete with Inmarsat around the world.[25] In the U.S., MSV is Inmarsat's primary competitor and, prior to 2000, it was Motient, MSV's predecessor, who had a *regulatory monopoly* in the provision of land mobile services in the U.S., and Inmarsat was entirely blocked from providing competitive land mobile services in the U.S. This was the case even though Inmarsat gave MSV's predecessor, AMSC, a "jump start" on its MSS business by leasing it capacity on Inmarsat spacecraft. AMSC, MSV and Motient nonetheless fought against the opening of the U.S. market for years. After TMI gained access to the U.S. market, Motient entered in to a joint venture to form MSV and thereby regained *de facto* monopoly status in the U.S. It was only in October 2001 that Inmarsat was able to gain full market access to the U.S. – access that MSV seeks to terminate by its objections

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25 In fact, Inmarsat faces substantial competition from global MSS operators (Iridium and Globalstar are able to aggressively price voice and low speed data services because they do not have to cover debt service after going through Chapter 11 bankruptcy), regional MSS operators (MSV in North America; Thuraya in the Middle East, Europe, Northern Africa, and the Indian Subcontinent; and ACeS in Central and Southeast Asia; Optus in Australia; INSAT 3C in India; N-Star in Japan), and VSAT services (a Fixed Satellite Service that uses very small aperture terminals that can be transported and set up at remote locations to provide broadband data services).

in another proceeding. To this day, MSV retains monopoly protection from potential *U.S. competitors*, because the Commission will not license another U.S. MSS operator in the L-band unless the U.S. coordinates more than 20 MHz of spectrum under the Mexico City MOU.[26]

The specific allegations leveled by MSV have been dispensed with by the Commission multiple times,[27] and all of MSV's spectrum-related issues are appropriately addressed in the context of international coordination.[28] As the Commission is aware, spectrum usage in the L-band is supposed to be recoordinated annually under the terms of a multi-national agreement (the "Mexico City MOU") to which the U.S. is a party. Under the agreement, spectrum is to be assigned and reassigned among operators based on a demonstration of need. Because MSV uses far less spectrum than it was last assigned, MSV has repeatedly refused to participate in coordination negotiations under the Mexico City MOU since 1999.[29] Instead, it prefers to ignore the international agreement entered into by the U.S. and use proceedings such as these to baselessly complain that it cannot have access to even more spectrum.

MSV claims that Inmarsat denies MSV access to proprietary information that Inmarsat has an obligation to provide pursuant to the Inmarsat Convention. MSV fails to explain that once Inmarsat privatized in 1999, the convention to which MSV refers no longer binds Inmarsat – the ORBIT Act ensured that result. Inmarsat therefore has no obligation to reveal its

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26 *In the Matter of Establishing Rules and Policies for the use of Spectrum for Mobile Satellite Services in the Upper and Lower L-band*, IB Docket No. 96-132, Report and Order, FCC 02-24 at ¶ 19 (rel. Feb. 7, 2002).

27 *See, e.g., Market Access Order* at ¶¶ 69-76; FCC Report to Congress as Requested by ORBIT Act, Report No. SPB-183 at 16 (June 11, 2003).

28 *See Market Access Order* at ¶¶ 65-73.

29 Inmarsat, in contrast, needs every of megahertz of spectrum that it has coordinated to satisfy the demand of its services. This is true even though Inmarsat continues to seek more and more efficient uses of the limited spectrum resource, by, among other things, deploying next-generation spacecraft with increased frequency reuse.

proprietary information to a competitor, such as MSV. Even under the defunct convention, Inmarsat had a right to be compensated for the use of its intellectual property, but MSV's predecessor refused to pay royalties when the issue of compensation was negotiated about ten years ago. The Commission has reviewed MSV's claim in the past and appropriately dismissed it as just another commercial dispute.[30]

In sum, MSV's allegations of anti-competitive conduct continue to be groundless. Instead of scurrilous name calling, the focus of this proceeding should be on (i) the inappropriateness of addressing in this proceeding the effective rule changes sought by MSV, (ii) the deficiencies in MSV's *ATC Application* that warrant its dismissal, and (iii) the substantial increased interference that would result from grant of MSV's waiver requests.

II. THE FUNDAMENTAL CHANGES IN THE ATC SERVICE RULES SOUGHT BY MSV SHOULD NOT BE DECIDED IN A "MINOR MODIFICATION" APPLICATION PROCEEDING

A. MSV Uses Its ATC Application to Relitigate the *ATC Order*

MSV asserts the waivers it requests are justified because (i) the proposed alternations to the Commission baseline ATC system will "not result[] in any more potential interference to other L-band operators or to MSV's own system than that established in the *ATC Order*" and (ii) in granting a waiver to MSV, the Commission should not be concerned that other operators will seek similar waivers.[31] Inmarsat, however, has demonstrated that the waivers and variances sought by MSV would in fact increase interference into Inmarsat's MSS system and in some instances into MSV's system as well.[32]

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30 *See Market Access Order* at ¶ 76.

31 *MSV Response* at 10-11.

32 *See generally, Inmarsat Opposition.*

As MSV notes, most of the waivers and variances to the Commission's baseline ATC system proposed by MSV in its *ATC Application* are also before the Commission as requests to reconsider the ATC services rules pursuant to MSV's Petition for Partial Reconsideration and Clarification.[33] The modifications sought by MSV are not minor variances in the Commission's rules but instead constitute fundamental rule changes that alter the ATC framework authorized by the Commission. Regardless of whether they legally can be made in this context, these proposed fundamental policy changes are best handled in the context of a rulemaking proceeding.

While MSV is the only party who currently has filed ATC applications in the L-band, granting MSV's waiver and variance requests would set a lasting precedent and impact proceedings in other bands as well. This is the first ATC application before the Commission. How the Commission addresses MSV's attempt to rewrite the ATC services rules will influence how other ATC applicants will treat the ATC service rules in the future.

MSV claims that "it is unlikely that any entity other than MSV will apply for ATC in the L-band."[34] While this reflects the current situation, it is neither a reasonable predictor of the future nor grounds for the Commission to eviscerate its ATC service rules. As MSV has made clear in the past, MSV Canada is a separate company from MSV with separate management.[35] There is no guaranty that the current joint venture with MSV will be in MSV Canada's best interest and that it will not file its own ATC application in the future. Moreover,

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33 *See MSV Response* at 11.

34 *MSV Response* at 11.

35 *See, e.g., Petition for Clarification and Partial Reconsideration of Mobile Satellite Ventures LLC*, IB Docket No. 96-132 at 12 (filed Sept. 6, 2002) ("MSV and MSV Canada are owned, controlled and operated by two separate corporate entities each of which has its own controlling shareholders. . . . MSV Canada is licensed by Canada to serve Canadian users and needs access to spectrum to serve these users.").

while Inmarsat has stated that it has no current plans to deploy ATC, the option to deploy ATC is now a reality and changes in the marketplace may dictate a change in Inmarsat's plans in the future. Finally, any of the five parties to the Mexico City MOU may seek to offer MSS services and ATC in North America. The possibility that more operators than MSV will seek to deploy ATC in the U.S. and/or other parts of North America is real and must be considered by the Commission when it considers the implications of granting waivers in the context of MSV's ATC applications.

B. Requiring Inmarsat to Accept Uplink Interference To A Total Of 6% ΔT/T From A Secondary Service Has Policy Ramifications That Extend Far Beyond the L-band

MSV's request that the Commission require Inmarsat to accept a significant increase in uplink interference to a total of 6% ΔT/T has major implications for the entire satellite industry. MSV attempts to justify a four-fold increase in the level of uplink interference from ATC operations by stating that a ΔT/T criterion of 6% is "internationally accepted" and it asserts that "there is no technically defensible reason to protect Inmarsat-4 satellites to a 1.4% ΔT/T or less."[36] MSV grossly misconstrues the relevant international standard, and it hopes the Commission simply ignores what Inmarsat has explained many times before.

That MSV's *ATC application* raises important policy issues that are appropriately resolved in a rulemaking proceeding, not an adjudicatory proceeding, is highlighted by the fact that the relevance of the ITU ΔT/T criterion for interference from terrestrial services into satellite networks is currently being examined in the pending NOI and NPRM in the interference temperature proceeding, ET Docket No. 03-237.

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36 *MSV Response* at Appendix A, p. 2.

In that case, Inmarsat has explained, as it previously has done in the ATC rulemaking proceeding, that any analysis of the level of interference that a satellite system may be expected to tolerate must account for interference from terrestrial systems not only in the United States, but also in almost all visible countries.[37] Hence, the aggregate interference from terrestrial uses, such as ATC, in the United States should be a fraction of the total interference which can be accommodated by the Inmarsat satellite system.

It is true that the traditional criterion for *coordination between satellite systems* is a $\Delta T/T$ criterion of 6%. This value is compared to the increase in system noise temperature due to the contribution from another satellite network. Where the other network causes interference in both the uplink and downlink, the aggregate interference is determined and compared to the 6% criterion. *This is a fundamentally different situation from the one addressed here*, which involves interference from *terrestrial* services into satellite systems, and for which interference there is no international coordination process.

The interference from ATC into MSS spacecraft is from an aggregation of a large number of terrestrial transmitters. Thus, this total interference will be effectively constant, or "long term." Inmarsat link budgets include a long-term interference margin of 1 dB and this value is commonly used in other MSS networks, as well as in FSS networks. An additional "short term" margin is generally included to account for short-term propagation impairments. To conserve mobile terminal power and satellite power, and to reduce intermodulation effects, power control is used to set the MSS mobile terminal uplink carrier power at the minimum level that will ensure that the availability and performance requirements are just met. Hence, long-

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37 *See* Comments of Inmarsat, ET Docket No. 03-237, at 5-10 (April 5, 2004); *Inmarsat Opposition* at 25; Inmarsat Opposition to Petition for Partial Reconsideration and Clarification of MSV, IB Docket No. 01-185 at 7-8.

term interference which led to a loss of margin of more than 1 dB would quickly lead to significant degradation of the link performance and availability of the MSS service.

In this regard, Inmarsat emphasizes that satellite systems are not designed with large margins in their link budgets. Satellites are generally limited in their total e.i.r.p. largely due to the available power. Therefore, an increase in link margin may often have to be at the expense of the satellite network's overall traffic capacity. Thus, link margin is a very expensive commodity in a satellite system. Due to the limited spectrum available for MSS services, satellite system operators have every incentive to migrate to more technologically innovative and efficient uses of spectrum, for example through the use of high order modulation schemes and through adaptive coding techniques. Such methods lead to a requirement to increase the carrier-to-noise ratio to meet the more demanding receiver requirements and thus further restrict the power that can be made available to accommodate increased interference. Satellite operators have every incentive to achieve the greatest possible level of performance from their equipment, because, among other things, excess weight has a direct impact on the cost of launching a spacecraft, and all electrical power consumed on a spacecraft needs to be generated on board from solar panels.

The 1 dB interference margin in Inmarsat's return link budget (from the L-band user terminal to the C-band gateway) is intended to accommodate interference from the following types of external sources:

1. Other MSS systems which contribute uplink interference in the band 1626.5-1660.5 MHz;
2. Other FSS systems which produce interference in the feeder downlink band;
3. Other services (i.e. not FSS) in the feeder downlink band, in particular fixed services;
4. Other services (i.e. not MSS) internationally allocated on a primary or secondary basis in the service uplink band,
5. Other services in nearby frequency bands which may contribute to the aggregate interference through their out-of-band emissions.

Thus, there are many possible sources of external interference into the Inmarsat system. Some sources of interference can be predicted and controlled, for example through inter-satellite network coordination procedures, but it is often necessary to accept more interference than would be desired to obtain the necessary coordination agreements.[38] Other sources cannot be predicted or controlled, such as interference from terrestrial services. In short, there is no basis to conclude that Inmarsat has "excess" interference margin available to accommodate new, terrestrial interference sources, such as ATC.

ITU-R Recommendations support Inmarsat's position, as well as the Commission's conclusion, that ATC interference should consume, at most, only a very small part of the interference margin of an MSS system. ITU-R Recommendation S.1432[39] provides guidelines on the apportionment of the available interference margin. Recommends 3 states:

> 3 that, when sharing frequencies below 15 GHz, the maximum allowable interference from all sources (aggregate) should be limited to 32% or 27% for systems not practising and for systems practising frequency re-use, of the clear-sky satellite system noise.

Because all Inmarsat spacecraft employ frequency re-use, the 27% figure is appropriate. An I/N value of 27% is equivalent to a loss of margin of approximately 1 dB. This aggregate criterion is consistent with the interference margins used in Inmarsat link budgets, as described above.

In the same ITU-R recommendation, Recommends 4 states:

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38 Higher interference levels may be accepted in cases where the benefit of additional reuse outweighs the interference concerns and are always considered in the context of the overall 1 dB interference allowance. Examples of cases where additional interference can be accepted include if the interference is related to specific carrier combinations that are unlikely to occur in practice or if it is known that there are no other significant interference sources.

39 Recommendation ITU-R S.1432; "Apportionment Of The Allowable Error Performance Degradations To Fixed Satellite Service (FSS) Hypothetical Reference Digital Path Arising From Time Invariant Interference For Systems Operating Below 15 GHz," 2000.

4 that error performance degradation due to interference at frequencies below 15 GHz should be allotted portions of the aggregate interference budget of 32% or 27% of the clear-sky satellite system noise in the following way:

- 25% for other FSS systems for victim systems not practising frequency re-use;
- 20% for other FSS systems for victim systems practising frequency re-use;
- 6% for other systems having co-primary status;
- 1% for all other sources of interference.

Taking this Recommendation into account, the following interference apportionment is appropriate:

Source	I/N (%)	I/N (dB)	loss of margin (dB)
Other FSS/MSS networks	20	-7.0	0.79
Other co-primary services	6	-12.2	0.25
All other sources (including ATC)	1	-20	0.04
Total	**27**	**-5.7**	**1.04**

ATC, as a secondary service, falls into the category of "all other sources." Thus, an *I/N criterion of 1%* is appropriate for all such secondary services, of which ATC is but a subset.

Against this background, it should be clear that MSV's proposal that Inmarsat suffer a 6% ΔT/T criterion from ATC operations has no technical or regulatory basis, whatsoever. Nor is MSV's position consistent with the views of the rest of the MSS and FSS satellite industry, who recognize that satellite systems have simply no available margin to accommodate a 5% ΔT/T from new terrestrial services, and that such an increase in their satellite system noise floor would "constrain the deployment of more advanced satellite technologies in the future."[40]

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40 Comments of Globalstar, L.P., ICO Global Communications, Inmarsat Ventures Ltd., Intelsat Global Services Corp., Lockheed Martin Corp., Loral Space & Communications Ltd., New Skies Satellites, Northrop Grumman Space Technology, PanAmSat Corporation, and SES Americom, Inc., ET Docket No. 03-237, at 27-28 (April 5, 2004); *see also* Comments of The DIRECTV Group, Inc., ET Docket No. 03-237, at 3 (April 5, 2004) (noting in the context of the Interference Temperature proceeding that "under the ΔT/T proposal a new class of unlicensed devices would add at least *five times as much* new interference into satellite uplinks as ITU Recommendation ITU-R S.1432 . . . specifies for interference from *all* non-co-primary sources" (emphasis in original)).

III. MSV'S ATC APPLICATION SHOULD BE DISMISSED AS INCOMPLETE

The Commission's requirement that applications be complete at the time they are filed is not limited to "first come, first-served" cases, as MSV asserts in its Response.[41] The Commission's Part 25 rules set forth information requirements that applicants must provide or else their satellite applications will be dismissed.[42] The purpose of giving satellite applications a "hard look" is not simply to deter speculative claims but to enhance the efficiency of the satellite review process and to ensure that important issues are addressed at the outset of the proceeding. To allow a defective application to be accepted for filing "serves to create uncertainty and inefficiencies in the licensing process."[43] Dismissing incomplete applications "will enable the Commission to establish satellite licensees' operating rights clearly and quickly."[44]

For the purposes of an ATC application in the L-band, Section 25.253 sets forth the information requirements that must be supplied by an applicant in order for an application to be considered complete. Because ATC is authorized as a secondary service that must remain ancillary to the primary MSS services of both the applicant and other MSS operators, including Inmarsat, the Commission established clear demonstrations that an applicant must make.

As this is the first ATC application filed with the Commission, requiring a complete application that addresses all the demonstrations enumerated in the Commission's

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41 *See MSV Response* at 7, n.15; *cf.* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004).

42 *See* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004).

43 Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Koichiro Matsufuji, Space Communications Corp., File Nos. SAT-PPL-20040120-00006, SAT-AMD-20040331-00071 and SAT-AMD-20040331-00072 at 2 (Apr. 22, 2004) ("*Tycz Letter*") (dismissing petition for declaratory ruling to add satellite to the Commission's permitted space station list).

44 *Id.* at 1.

services rules is vital to ensuring a full review of the proposed ATC system. To allow MSV to proceed on an incomplete application that promises fixes in the future merely defers the consideration of difficult issues and may force the Commission to attempt to unwind or restrict MSV's ATC deployment after commercial service has begun. At that point, however, the Commission might simply be closing the proverbial barn door after the horses have left.

Inmarsat enumerated three ways in which the *ATC Application* is incomplete because MSV failed to comply with clear requirements of the Commission's rules.[45] MSV did not cure any of these deficiencies in its response. And the fact that the Commission has reviewed the MSV applications and placed them on public notice does not mean that the Commission has approved these deficiencies.[46]

A. MSV Does Not Demonstrate How It Would Use 18 dB of Link Margin Solely to Overcome Structural Attenuation

Inmarsat showed in its Opposition why MSV's ATC applications are deficient in several respects pertaining to the Section 25.253(a)(8) requirement that MSV include a demonstration that the cellular structure of the ATC network design includes 18 dB of link margin allocated *solely* to structural attenuation. MSV asserts it has met this requirement because MSV "has certified" that it will comply with this requirement in the future, and

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45 *See Inmarsat Opposition* at 12-13.

46 MSV asserts that the International Bureau has requested all of the clarifications that it deem necessary to complete the *ATC Application*. *See MSV Response* at 8, n.15. While Inmarsat recognizes the diligence with which the Bureau has handled the application, one of the purposes of inviting public comment is to assist the Bureau in identifying problems. Having become aware of the deficiencies in MSV's applications, the Commission can dismiss those applications with leave for MSV to refile once the failings have been addressed. Indeed, the Commission did just that with the satellite modification application that is an integral part of MSV's ATC proposal. *See* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004).

Appendix E of its applications explains how MSV will comply. MSV has done nothing in its Response to rectify the deficiencies in its applications.

The 18 dB attenuation requirement in Section 25.253(a)(8) of the Commission's rules embodies a critical uplink interference-controlling mechanism that underlies the Commission's decision to allow ATC in the L-band. The rule mandates that an L-band ATC system must be designed with at least an 18 dB link margin *allocated solely to overcoming structural attenuation.*[47] This margin may not be used to enhance edge-of-cell coverage,[48] nor may it be used to close a link when an ATC user is outside. Compliance with this condition is necessary to ensure that an ATC system does not exceed the interference level assumed in the Commission's analysis of a reference ATC system. Indeed, failure to comply with this one condition *alone* could raise the potential uplink interference from an ATC base station by a factor of 63.[49]

MSV again refers to its Appendix E, where MSV provides merely a description of one *possible* measure that MSV *might* be able to employ to ensure compliance with this rule. [50] MSV still makes no commitment to implement this measure or any of the other "variety of ways" that MSV refers to but does not explain or even describe. And MSV does not deny that in

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47 "Our analyses is based on the expectations that MSV will implement the full 18 dB of margin for structural attenuation that they state is 'per standard PCS design practices' and that they will implement the maximum dynamic range of power control contained in the GSM system specification." *ATC Order*, Appendix C2 at 1.3.5. MSV had represented that standard PCS design practices provide for 18 dB of building penetration margin at edge-of-cell coverage, with this maximum level of power increase being used only in the case of users "deep inside buildings." MSV Reply Comments, Technical Appendix at 6-7 (filed November 13, 2001),

48 *See ATC Order* at ¶ 142.

49 18dB = 63 times.

50 S*ee MSV's* Consolidated Opposition to and Comments on Petitions for Reconsideration, August 20, 2003.

some cases it *will not* comply with the clear requirement of Section 25.253(a)(8). In MSV's own words: "If less structural attenuation is used, the maximum number of base stations permitted under Section 25.253(a)(9) will be reduced or a showing will be made that there would be no increase in interference to other MSS operators . . . ."[51]

Moreover, the one method MSV describes does not even remotely begin to address the requirement of ensuring that all terminals operating outdoors will reduce their EIRP by at least 18 dB, even when they are within the ATC coverage area.[52] Such a showing is mandated because (i) 18 dB of link budget must be allocated solely for structural attenuation, and (ii) structural attenuation is defined as "signal attenuation caused by transmitting to and from mobile terminals which are located in buildings or other man-made structures that attenuate the transmission of radiofrequency radiation."[53] The fact that this link margin may not be used to overcome outdoor signal blockage is highlighted by the Commission's emphasis that the definition of structural attenuation is distinct from the concept of "outdoor blockage" – "radiofrequency attenuation that occurs when an obstacle interrupts the link-of-site path between a transmitter and the satellite receiver."[54] Without a clearly articulated means of ensuring 18 dB is used *only for overcoming structural attenuation*, there is no way of ensuring that the level of the interfering signal from an ATC mobile terminal will be the same, regardless whether the terminal is operated inside a building or outdoors.

Because the rules require a "*demonstration* that the cellular structure of the ATC network design *includes* 18 dB of link margin allocated to structural attenuation, " it is not

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51 *ATC Application* at 15-16.

52 *See Inmarsat Opposition* at 36-39.

53 47 CFR § 25.201.

54 *ATC Order* at n.375.

sufficient for MSV to provide a theoretical textbook recitation of the ways that MSV "*can design* its ATC base stations" at a later date. And while Section 25.253(a)(8) contemplates less attenuation being used in certain cases, *with an appropriate showing*, and with a commensurate reduction in the maximum number of permitted base station reuses, that provision makes it incumbent on the ATC applicant to make that showing *in its application*, not at some time in the future, after it is licensed and its network has been deployed.

MSV asserts that its deficiencies are consistent with Section 25.149(d). That rule, however, as well as Section 25.149(a), contemplates that an explanatory technical exhibit, not a certification, is appropriate in circumstances such as these. Specifically, a mere certification is not an appropriate means of making the demonstration called for in the Note to Section 25.253(g) regarding certain permitted variances from the reference ATC system. If it were, an ATC application could be one page long, consisting of a single certification that an applicant has or will meet all applicable rules. That clearly would not be a sufficient "demonstration" under Section 25.253(g) where an applicant seeks to use a different ATC system architecture. Nor should that be appropriate or sufficient where, as here, MSV admits there are cases where it will not comply with the 18 dB structural attenuation requirement, but MSV chooses not to tell us where or how that will be the case, how often it will occur, exactly what reduction in base station reuses will be necessitated, or how that reduction will be calculated or implemented.

Significantly, MSV does not dispute Inmarsat's demonstration that certification is not appropriate where the economic interests of the licensee and the practice in the industry are contrary to the dictates of the rule,[55] nor does MSV dispute Inmarsat's explanation why it would

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[55] *See Inmarsat Opposition* at 17.

be rational and consistent with the practice in the mobile telecommunications industry to use this 18 dB of margin to serve as much area as possible, with the fewest possible base stations.[56]

At bottom, compliance with the 18 dB structural attenuation requirement is as fundamental to managing unacceptable interference from ATC as the Commission's two-degree spacing policies are to ensuring the successful, non-interference operations of FSS spacecraft. Last December, the Commission reiterated the importance of making a complete and detailed showing of two-degree spacing compatibility, and reaffirmed its intention to dismiss as deficient applications that do not contain a suitable interference analysis.[57] MSV should now know this – its recent modification to its replacement satellite application was dismissed for this very reason.[58] Failure to comply with the 18 dB structural attenuation requirement could result in unacceptable interference into another L-band satellite system, just as failure to design a satellite network appropriately poses a threat of unacceptable interference into an adjacent, two-degree-spaced adjacent satellite network. In both cases, compliance with the rule can ensure that uplink interference is managed. And in both cases, a complete and detailed technical explanation is warranted.

In sum, the critical nature of this 18 dB requirement in constraining ATC uplink interference, as well as the novel and untested nature of ATC systems, warrant that the Commission require a clear and convincing showing *in MSV's ATC Application* how an applied-for ATC system will comply with Section 25.253(a)(8). Since MSV has been given the chance to amend its filing to make such a showing, and has chosen not to do so, MSV's *ATC Application*

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56 *See Inmarsat Opposition* at 37-38.

57 *See* Clarification of 47 C.F.R. § 25.140(b)(2), Space Station Application Interference Analysis, *Public Notice*, No. SPB-195, DA 03-3863 (rel. Dec. 3, 2003).

58 *See* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004).

must be dismissed due to MSV's decision to ignore the clearly stated requirements of Section 25.253(a)(8).

B. MSV Fails To Demonstrate The Peak EIRP Of Its ATC MTs

Section 25.253(g)(1) requires that MSV "demonstrate that ATC mobile terminals shall: (1) be limited to a peak EIRP level of 0 dB." Recognizing that this limit is important to ensuring the protection of MSS operations, the Commission made the demonstration of compliance with this restriction an integral part of the ATC application. MSV admits that it has failed to satisfy this requirement stating that it "is fully prepared to provide a prototype ATC terminal to the Commission as soon as one is available."[59] MSV's inability to demonstrate, or even clearly state, the peak EIRP level of its proposed MTs, further shows the precipitous nature of its ATC application.

In a rush to deploy ATC, MSV has sought authority from the Commission before it has a full understanding of what its network architecture will entail. Inmarsat cannot adequately comment, and the Commission cannot fully evaluate, a system that MSV itself cannot itself adequately describe. Inmarsat therefore urges the Commission to dismiss the application, as deficient with respect to yet another critical element in controlling ATC uplink interference.

C. MSV Fails To Demonstrate That Its Proposed CDMA Architecture Produces No Greater Potential Interference Than A GSM System

Compliance with Sections 25.253(a)(2) and (3) of the ATC service rules would achieve an interference reduction of 3.5 dB for an ATC system using GSM technology. While the ATC service rules contemplate that an ATC applicant may use a non-GSM architecture, they also require that the applicant "demonstrate that the use of a different system architecture would

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[59] *See MSV Response* at 10, n.18.

produce no greater potential interference than that produced as a result of implementing the rules of this section."[60]

In its Opposition, Inmarsat showed that the interference reduction that results from compliance with Sections 25.253(a)(2) and (3) in a GSM system will not automatically be present if CDMA technology is used, because there are no time slots in CDMA. Therefore, MSV is required to demonstrate that a comparable interference reduction is provided in some other way if it wants to use a CDMA architecture.[61] MSV has made no attempt to provide such a demonstration in its application.

In responding to Inmarsat's Opposition, MSV states that "the key factor from an uplink interference perspective is that the mobile terminal will use a half-rate vocoder when operating within 3.5 dB of maximum power, regardless of whether transmissions are based on GSM or CDMA protocols. This will produce the same benefit in interference reduction of at least 3.5 dB."

There are two flaws in MSV's statement. First, as explained in Inmarsat's Opposition, MSV's proposed use of only half-rate vocoder (instead of the required quarter-rate vocoder) does not achieve the overall 3.5 dB interference reduction that is required based on the traffic characteristics assumed in the Commission's *ATC Order*.[62] Second, it is not necessarily correct that the use of lower-rate vocoders produce the same interference reduction in CDMA as in GSM. In GSM, the reduction in transmitted data rate as a result of the implementation of a lower voice coding rate by the vocoder allows the use of a reduced number of time slots, thereby achieving a reduction in the average transmit power over several frames of the TDMA

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60 47 C.F.R. § 25.253 at Note (emphasis added).

61 *See id.*

62 *See Inmarsat Opposition* at 39-40

waveform. Thus, a lower vocoder rate automatically reduces the average output power, assuming that ATC terminals are precluded from using the open time slots in accordance with 25.253(3). In CDMA, however, there are no time slots, and it is not clear from MSV's ATC Applications that the CDMA MT transmit power is actually reduced when the vocoder is switched to a lower rate, or whether the same power is transmitted, regardless of the coding rate. If the latter is the case, then there would be no resulting reduction in interference by the use of the vocoder.

MSV therefore fails to demonstrate a comparable 3.5 dB interference reduction for its proposed CDMA architecture as would occur in a GSM system that complies with Sections 25.253(a)(2) and (3). If the CDMA MT transmit power is held constant, then MSV's proposed CDMA system would produce more interference than the baseline GSM system in the ATC service rules. Therefore, MSV's *ATC Application* should either be dismissed as incomplete, or MSV's request for authorization to deploy a CDMA based ATC system should be denied.

IV. MSV'S PROPOSED ATC SYSTEM WILL CAUSE INCREASED INTERFERENCE TO INMARSAT

A. MSV Mischaracterizes the Technical Debate Regarding the Interference Impact of MSV's Proposed ATC System

As MSV notes, most of the waivers it seeks in its *ATC Application* are also modifications of the Commission's rules sought by MSV in the reconsideration stage of the ATC proceeding.[63] MSV does not address Inmarsat's arguments directly, but instead references a chart that purportedly describes both MSV's and Inmarsat's positions on the issues.[64] Inmarsat takes issue with MSV's characterizations and has revised the chart to more accurately reflect

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63 *See MSV Response* at 11.

64 *See MSV Response* at Appendix A.

Inmarsat's positions.[65] But even the revised chart is a gross oversimplification of the detailed technical analyses that Inmarsat has submitted to the Commission regarding the very real and substantial interference that would result from MSV's ATC proposal. Inmarsat urges the Commission to closely examine each of the issues raised in this proceeding, based on the fulsome explanations set forth in the pleadings, rather than relying on MSV's attempted distillation. In any case, a close analysis mandates denial of MSV's *ATC Application* because of the increased interference the proposed ATC system would cause Inmarsat's MSS system.

B. Waivers Resulting In Increased Uplink Interference To Inmarsat

1. Non-Compliance With 18 dB Structural Attenuation Requirement

The 18 dB structural attenuation requirement is absolutely crucial to making ATC compatible with MSS, and this has been clearly recognized by the Commission in its *ATC Order*. As explained in Section III.A above, MSV has not provided sufficient explanation concerning how it will achieve the purpose of this rule. If MSV implements its ATC system without fully complying with this rule, then Inmarsat could receive up to 18 dB higher levels of interference from some ATC MTs, causing significant interference to the Inmarsat uplinks.

2. Increase in ΔT/T To Inmarsat Uplinks

The MSV proposed increase in the ΔT/T allowance from 1.4% to 6% undeniably would increase the uplink interference to Inmarsat by approximately 4.3 times. This issue is also addressed in Section II.B above.

3. MSV's Refusal to Provide Peak Antenna Gain for the MTs, and MSV's Proposal to Consider Only the Average MT Antenna Gain

Section 25.253(g)(1) requires that the ATC mobile terminal be limited to a peak EIRP level of 0 dBW. Nowhere in the *ATC Application* does MSV specify the peak EIRP level

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[65] *See* Appendix A.

for its ATC mobile terminals. MSV carefully limits its disclosure to specifications about antenna gain of its mobile terminals, focusing on the "average" antenna gain of those terminals. MSV never clearly represents the level of power into the mobile terminal antennas, the peak gain of the antenna or the resulting peak EIRP of the terminal. Based on other information in the ATC application, it would appear that the peak EIRP is +2 dBW, and therefore exceeds the limits of § 25.253(g)(1).[66] It is completely inappropriate, as MSV urges, to drastically modify a fundamental principle in the Commission's ATC interference analysis, and the ATC rules themselves, in this licensing proceeding.

In any event, MSV has not provided a sufficient basis for changing the rules. MSV itself describes the MT antenna gain characteristics for the "external stubby" antenna, contained in MSV's ATC applications, as theoretical for two out of the three planes.[67] Thus, the results of its analysis cannot be relied upon. It is meaningless for MSV to offer to provide measured data after it has started implementation of its ATC system. Finally, head blockage effects could significantly alter the MT antenna characteristics (and hence the average gain).

4. Use of a Half-Rate Vocoder Instead of the Required Quarter-Rate Vocoder

As demonstrated in Inmarsat's Opposition to the MSV ATC Applications, the use of only a half-rate vocoder (instead of the required quarter-rate vocoder) would increase the uplink interference to Inmarsat by between 1.6 and 2.5 dB, depending on the assumed ATC user traffic profile.

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66 *Inmarsat Opposition to MSV ATC App.* at 14-15

67 *See ATC Application* at Appendix H, p. 5, n.1.

5. Use of CDMA With No Equivalent Constraint to Maintaining Vacant Time Slots in a TDMA System and No Clear Commitment to Reduce Power When Vocoder Operates at Reduced Coding Rates

Without an equivalent adjustment to implement the interference-constraining purpose of Section 25.253(a)(3), there is a risk that there will be no interference reduction from the use of a lower-rate vocoder in a CDMA system. MSV needs to commit to reduced MT transmit power for the CDMA situation when the vocoder switches to lower coding rates, as no such commitment has been provided in its ATC Applications. This matter is also addressed in Section III.C above.

6. Increased US Deployment (vs. Canadian Deployment)

MSV proposes to increase the number of base station re-uses by 60% based (erroneously) on its proposal to deploy 80% of its system in the USA and only 20% in Canada. The uplink interference to Inmarsat could increase by up to 60% depending on the geographic distribution of the ATC MTs.

7. MSV's Self-Interference Cancellation

In establishing the ATC service rules, the Commission recognized the difficulty of measuring the interference caused by MSV's proposed ATC service into Inmarsat's and other MSS systems, and thus decided that the best way to protect Inmarsat was to limit the amount of ATC interference MSV generated into its own satellite.[68] Based on the principle that MSV's own satellites would be affected as much or more by the interference caused by ATC than Inmarsat's satellites would be affected, the Commission established limits on the number of base stations permitted to operate simultaneously per channel.

In its *ATC Application*, MSV requests a waiver to increase the number of base stations permitted to operate per channel, relying on a new self-interference cancellation

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[68] *See ATC Order* at ¶¶ 136-145

technique that does nothing to reduce interference toward Inmarsat. As discussed in its Opposition, the Commission should deny this waiver request for two reasons.[69] First, a technique that reduces the self-interference into MSV's satellite without correspondingly decreasing the interference into the satellites of other MSS operators does not change the calculation upon which the Commission's uplink interference protections are based. Second, MSV's proposed self-interference technique is flawed in that it would both reduce the capacity of the MSV satellites and dramatically increase MSV's feeder link spectrum requirements in a manner that renders the technique impractical.

In its Response, MSV blithely notes that it is "odd" that Inmarsat complains that MSV's self-interference cancellation technique does not reduce interference into Inmarsat's satellites.[70] MSV simply ignores that the Commission uses self-interference into MSV as the fundamental basis for protecting Inmarsat's system from ATC-generated uplink interference. The Commission expressly decided to protect Inmarsat by limiting the amount of self-interference MSV was permitted to cause from its ATC operations. The Commission concluded that because MSV's satellites would be affected to a greater degree by the ATC interference than Inmarsat's satellites, this would serve as an appropriate proxy.

MSV now seeks to substantially increase the number of permitted base station frequency reuses by claiming that it will manage the resulting self-interference through an interference cancellation technique within the MSV system.[71] Such a proposal does not address

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69 *See Inmarsat Opposition* at 32-35.

70 *See MSV Response* at 18.

71 Moreover, there is an outstanding issue in the reconsideration stage of the ATC proceeding about whether the limit on the number of base stations calculated by the Commission is correct based on the satellites antenna gain stated by MSV during the proceeding. *See Inmarsat Petition* at 11-12.

one of the underlying purposes of the rule in the first place – the protection of Inmarsat's satellites from interference. If the Commission permits MSV to increase uplink interference levels based on interference cancellation techniques, the Commission must devise another method of protecting other MSS satellites in the L-band from ATC uplink interference. This can only be done *through a notice and comment rulemaking proceeding* that will devise a new set of rules based on a standard yet to be formulated.

Furthermore, there is no basis for the Commission to rely on this proposed self-interference cancellation technique as a means to increase the level of interference generated into MSV. It is as impractical as the MSV "interference monitoring" scheme that the Commission previously rejected as unworkable.[72] In its Opposition, Inmarsat explained at length how the MSV interference cancellation proposal would dramatically increase the complexity of the MSV system and reduce the capacity of the MSV satellites and increase the feeder link spectrum requirements.[73] MSV does not dispute that its proposed self-interference cancellation technique would increase the number of channels in its next generation satellite by a factor of seven and require a far greater number of interference cancellers than implied in MSV's *ATC Application*. In response, MSV simply states that it "will be able to deploy its interference cancellation technology without any reduction in its capacity to provide satellite service or any significant added cost."[74] Such platitudes mean nothing without a discussion of how the issues raised by Inmarsat would be addressed. As MSV failed to address those issues, the Commission can only conclude that MSV cannot do so.

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72 *See ATC Order* at ¶ 167.

73 *See Inmarsat Opposition* at 33-34 and Appendix A.

74 *MSV Response* at 17.

MSV does respond to Inmarsat's calculation that the proposed self-interference cancellation technique would require the use of seven times as much feeder link spectrum. MSV states that "the only impact is to require MSV to employ greater frequency reuse of its feeder link frequencies than it would otherwise" and makes the curious assertion that this will be accomplished by deploying additional gateway earth stations. This response is nonsensical. Frequency reuse in a satellite network can only be achieved if there are multiple satellite beams. MSV's replacement satellite application depicts only a single Ku band beam.[75] With a single beam for the feederlink, no frequency reuse is possible. MSV's vague "trust me I'll make it work" response is consistent with its past *modus operandi*. When MSV does not have an answer to a hard question, it simply attempts to push the issue off to another day.[76] The Commission should not be fooled by MSV's hand waving. The Commission must deny any waiver request to increase in number of base stations permitted per channel based on MSV's proposed self-interference cancellation technique.

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75 *See* Application of Mobile Satellite Ventures Subsidiary LLC for Authority to Launch and Operate a Replacement Mobile Satellite Service Space Station at 101 ° W.L., Call Sign S2358, File No. SAT-AMD-20040209-00014, Appendix A, at 8, Figure 1-8 (*"February 2004 MSV Amendment"*). That amendment since has been dismissed as incomplete. *See* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004).

76 To the extent that MSV desires to employ Ku-band feeder link spot beams to achieve spatial frequency reuse, *see February 2004 MSV Amendment,* Appendix A at 5, it is incumbent on MSV to depict representative beams, provide antenna gain patterns and link budgets, and generally submit all of the other information required by Part 25. *See* Letter from Thomas S. Tycz, Chief, Satellite Division, FCC, to Lon C. Levin, Vice President, MSV, File No. SAT-AMD-20040209-00014 (Apr. 23, 2004). This data is not included in MSV's November 18, 2003 amendment. *See* SAT-AMD-20031118-00335, Appendix A, at 4-8.

Finally, MSV makes clear in its Response that the self-interference cancellation technique does not apply to its current generation satellite.[77] Therefore, regardless of the resolution of any issue addressed above, with no change proposed with respect to MSV's current generation satellite, there is no basis for the Commission to alter the number of base stations permitted per channel for any ATC system deployed using MSV's current generation satellite.

C. Waivers Resulting In Increased Downlink Interference To Inmarsat

1. MSV Refuses to Address the Overload Interference to Inmarsat Receivers Caused by Intermodulation Products of MSV Transmissions Falling Into the Inmarsat Receive Band

Once again, MSV refuses to address the relevant interference mechanisms that would exist in the downlink interference scenario where ATC MTs transmits in frequency bands adjacent to those in which Inmarsat receivers are operating. MSV continues to ignore the interference caused by adjacent band transmissions causing intermodulation products *within the Inmarsat receivers*, and instead focuses only on the 1 dB compression point measure of receiver nonlinearity. MSV has further attempted to confound the issue by introducing mention of the differences in the spectrum roll-off within the Inmarsat band of the interfering signals used in the measurements (GMSK versus linear QPSK as referred to by MSV), which have nothing to do with the intermodulation interference mechanism that Inmarsat is referring to. This intermodulation interference mechanism is caused by the high level MSV signals *outside of the Inmarsat receive band*, which produce intermodulation products, due to nonlinearity within the Inmarsat receivers, that fall inside the Inmarsat receive band. This interference problem manifests itself at much lower signal levels than the 1 dB compression point, which is the only characteristic that MSV has made any reference to.

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77 *See MSV Response* at 17, n.26.

MSV's measurements used only a single ATC interfering carrier and therefore do not represent a real-life scenario of a base station transmitting on several carriers which would produce intermodulation products due to nonlinearity in the Inmarsat receiver. The MSV "objective" tests only measured desensitization due to a single interfering carrier as a result of small signal suppression, and MSV related this only to the 1 dB compression point. Whether by design or misunderstanding, MSV has completely avoided addressing the crucial interference effect due to nonlinearity in the Inmarsat receivers.

Irrefutable data provided by the Inmarsat receiver manufacturers has been presented by Inmarsat in this proceeding, which shows that significant intermodulation interference occurs at input levels of –75 dBm.

In addition, even for a single interfering carrier causing small signal suppression in the Inmarsat receiver, MSV's results do not agree with those performed by the Inmarsat receiver manufacturers. For interfering carriers with only a few hundred kHz separation from the Inmarsat receive channel, the Inmarsat receiver manufacturers have measured significant receiver performance degradation for interfering carrier levels of only –75 dBm. For unknown reasons MSV's claimed measurement produces results more than 30 dB higher.

As a result of the above, there is approximately a 30 dB discrepancy between the threshold levels proposed by MSV and by Inmarsat (MSV proposes –45 dBm and Inmarsat proposes –75 dBm). This affects all the calculations of downlink interference, which are addressed by the following Commission rules all of which MSV seeks to relax to allow greater ATC deployment:

a. *Aggregate EIRP Limit for ATC Base Stations*

Section 25.253(d)(1) restricts ATC base station peak EIRP per carrier to 19.1 dBW. The limit proposed by MSV is 38.9 dBW per base station sector. In order to protect

Inmarsat to the level assumed in the *ATC Order*, this must be reduced to 8.9 dBW per base station sector.[78]

b. *Aggregate EIRP Limit for All ATC Base Stations Within a 50-Mile Radius*

Section 25.253(d)(1) also restricts the number of carriers per section. An alternative limit proposed by MSV is an aggregate limit of 58.3 dBW from all ATC base stations with a 50-mile radius in its *ATC Application*. In order to protect Inmarsat to the level assumed in the *ATC Order*, this must be reduced to 38.9 dBW.[79]

c. *ATC Base Station EIRP Limit Towards the Horizon*

Section 25.253(d)(2) restricts ATC base station EIRP toward the physical horizon (not to include man-made structures) to 14.1 dBW per carrier in 100 kHz. The limit proposed by MSV in its *ATC Application* is 33.9 dBW. In order to protect Inmarsat to the level assumed in the *ATC Order*, this must be reduced to 3.9 dBW.[80]

d. *ATC Base Station Limits Near Airports*

Sections 25.253(d)(3) and (4) require compliance with a minimum distance limit and a maximum PFD limit. The distance limit in the current rule is 470 meters based on the Commission's assumed interference threshold value of –60 dBm. This limit should be correspondingly increased to 2,643 meters for the actual interference threshold level of –75 dBm for the Inmarsat receivers. The current (corrected) rule PFD value of –64.6 dBW/m^2/200 kHz should be correspondingly reduced to –79.6 dBW/m^2/200 kHz to accurately take account of the actual interference threshold level of –75 dBm for the Inmarsat receivers. For reasons previously

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78 *See Inmarsat Opposition* at 49-51.

79 *See Inmarsat Opposition* at 51-52.

80 *See Inmarsat Opposition* at 50-51.

explained, Inmarsat also believes that both the minimum distance limit and the maximum PFD limit should both apply for all ATC base stations.

e. *Overhead Gain Suppression*

In the Inmarsat Opposition to MSV's *ATC Application* the effects of the proposed relaxation in overhead gain suppression for the ATC base stations is analyzed, and shown to cause a severe interference risk to aircraft on approach and ascent paths near to airports.[81] MSV should be held to the performance levels that it insisted in the past were readily achievable. CSS Antenna Inc.'s letter, referenced in MSV's Response, stresses that the base station antenna that was measured and presented by MSV was not an expensive prototype but was a production type antenna based on a "...one-piece circuit board for the feed network and radiating elements combined..." and could be easily mass-produced in a way that "...eliminates any assembly variations..." and hence provide reliably high performance as shown in the measurement results. In addition, the Commission has provided other practical measurement data to support the ability of MSV to achieve the overhead gain suppression masks originally proposed by MSV.[82] MSV fails to substantiate its claim that the requirement to employ left-hand circular polarization somehow undercuts the ability to achieve this level of performance.

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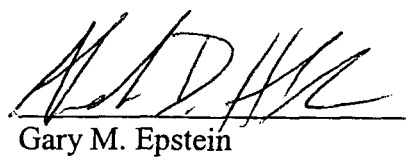
81 *See Inmarsat Opposition* at 57-60.

82 *See ATC Order*, Appendix C2, Sections 1.8 and 2.2.3.1.

CONCLUSION

For the reasons discusses above, the MSV's *ATC Application* is deficient and should be denied or dismissed.

Respectfully submitted,



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April 26th, 2004

Appendix A

Reply to MSV's Summary of Inmarsat's Arguments and MSV's Responses

In its Response to Inmarsat's Opposition, MSV prepared a chart with its version of certain issues raised by MSV's ATC applications. MSV "summarized" each of the issues, and then characterized Inmarsat's position (below left), and MSV's reply (below center). In this revised version of the MSV summary chart, Inmarsat corrects MSV's mischaracterization of the issue, and then adds a new column with its reply (below right). Inmarsat also has added issues 9 through 13, along with its own "summary" of those matters.

Even this revised chart is a gross oversimplification of the detailed technical analyses that Inmarsat has submitted to the Commission regarding the very real and substantial interference that would result from MSV's ATC proposal. Inmarsat urges the Commission to closely examine each of the issues raised in this proceeding, based on the fulsome explanations set forth in the pleadings, rather than relying on MSV's attempted distillation.

1. Increased co-channel reuse based on increased deployment in the United States

MSV requests permission to increase co-channel reuse in the United States proportionally on the basis of its desire to deploy 80% of its ATC facilities in the United States, asserting that "the Commission effectively authorized a system-wide reuse factor of 3,450," and asserting that the *ATC Order* assumed 50% U.S. deployment. *MSV Petition for Recon* at 5-*6; MV ATC Application* at 17.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) The FCC has no authority to enforce a limit outside of the U.S. *Inmarsat Opposition to MSV Recon Petition at 7-8; Inmarsat Opposition to MSV ATC App. at 24-25.*	(a) The FCC can condition MSV's license on not exceeding the system-wide interference allowance. MSV will be able to account for ATC operations on frequencies it uses both inside and outside the United States. *MSV Reply to Inmarsat Recon. Opposition at 6.*	(a) (i) MSV misses the main point of what Inmarsat said, and takes Inmarsat's comment out of context. The main point here is that nowhere in the *ATC Order* does the Commission conduct an analysis that establishes that, within the U.S., 3450 ATC base stations could operate simultaneously on a 200 kHz channel (ii) In context, Inmarsat said: 'The 1725 reuse limit imposed by the Commission also recognizes the need to

		anticipate and accommodate the potential actions of other administrations. The Commission has no authority to limit the deployment of ATC base stations that are authorized by the regulatory authorities in Canada, Central America, the Caribbean or South America." This remains true. Thus, even if MSV promises that it will not deploy ATC outside of the U.S., foreign administrations will still have the ability to authorize *other L-band operators* to deploy ATC in their jurisdictions. For example, as MSV has stated several times, MSV Canada is a separate entity with its own license from Industry Canada. *See Inmarsat Opposition to MSV Recon Petition at 7-8.*
(b) The FCC needs to allow margin for other administrations that may authorize ATC. *Inmarsat Opposition to MSV Recon Petition at 8; Inmarsat Opposition to MSV ATC App. at 25.*	(b) Imposing a condition on MSV's license will be sufficient. *MSV Reply to Inmarsat Recon. Opposition at 6.*	(b) Inmarsat spacecraft "see" large portions of the Americas, and multiple countries, and therefore are susceptible to the aggregate effects of ATC uplink interference. Even if MSV could be held to not deploy ATC outside of the U.S., the Commission cannot control whether foreign administrations authorize *other entities* to deploy ATC in their jurisdictions. For example, as MSV has stated several times, MSV Canada is a separate entity with its own license from Industry Canada.

		Inmarsat Opposition to MSV Recon Petition at 7-8.
(c) Disproportionate deployment of ATC in U.S. will result in higher densities of MTs than envisioned by the FCC, resulting in greater uplink interference to Inmarsat and MSV. *Inmarsat Opposition to MSV Recon Petition at 7; Inmarsat Opposition to MSV ATC App. at 25.*	(c) ATC operations will have the same impact on Inmarsat regardless of whether the frequency reuse is in the United States or elsewhere in North America. MSV will use interference cancellation techniques to maintain non-harmful intrasystem interference levels. *MSV Reply to Inmarsat Recon. Opposition at 6 & Technical Appendix.*	(c) MSV's statement simply is not true. High density ATC interference closer to an Inmarsat uplink beam will have greater impact than the same total ATC interference spread over a wider geographic area. So, an Inmarsat beam located off the U.S. East coast would be more affected by ATC levels concentrated in the eastern part of CONUS than if the same total ATC interference level were spread across Eastern Canada as well. MSV's proposed interference cancellation scheme has no impact whatsoever on interference into Inmarsat and will likely never be implemented in any event.

2. System-wide co-channel uplink interference allowance of 6% ΔT/T

MSV asserts that the appropriate threshold for potential co-channel uplink interference should be 6% ΔT/T, instead of the 1.4% ΔT/T set in the *ATC Order*. The lower intersystem interference allowance in the *ATC Order* is claimed by MSV to be unnecessary to protect MSV from intrasystem interference due to MSV's proposed self-interference mitigation techniques. *MSV Petition for Recon.* at 9-14 & Appendix *A; MSV Reply to Inmarsat Recon. Opposition* at 3-5 & Technical Appendix; *MSV Nov. 3 ex parte* at *3; MSV ATC Application* at Appendix F, 1.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) 1% ΔT/T is a reasonable accommodation for a non-conforming use. *Inmarsat Opposition to MSV Recon Petition* at 9; *Inmarsat Opposition to MSV ATC App.* at 29-30.	(a) There is no technically defensible reason to protect Inmarsat-4 satellites to a level of 1.4% ΔT/T or less. *MSV Reply to Inmarsat Recon. Opposition* at 5*; MSV Nov. 3 ex parte* at 3.	(a) 1.4% ΔT/T or less is perfectly consistent with ATC being a secondary service, with international standards, and the views of the satellite industry. Recommends 4 of ITU-R Recommendation S.1432 provides that error performance degradation due to interference at frequencies below 15 GHz should be allotted portions of an aggregate interference budget of clear-sky satellite system noise as follows (i) 20% for other FSS systems in the case of victim systems practicing frequency re-use; (ii) 6% for other systems having co-primary status; and (iii) 1% for all other sources of interference. ATC, as a secondary service, falls into the last, 1% category. In the recent FCC Interference Noise Temperature proceeding, the entire satellite industry opposed allowing a new

		co-primary terrestrial service to consume an allowance of 5% ΔT/T, noting that it would "constrain the deployment of more advanced satellite technologies," and such a problem would be exacerbated if each country in a receive beam allowed the same type of terrestrial interference. Comments of Globalstar, *et al.*, ET Docket 03-237 (April 5, 2004).
(b) If interference from ATC (a secondary service) approaches the level of interference from the satellite, ATC could not be ignored in satellite coordination. *Inmarsat Opposition to MSV Recon Petition* at *11; Inmarsat Opposition to MSV ATC App.* at 30.	(b) ATC operations will have much less, potential impact to Inmarsat than MSV's present satellite operations. MSV's next generation system will reduce in the aggregate the potential of interference to Inmarsat-4 satellites by approximately two orders of magnitude. *MSV Petition for Recon.* at 12-13 & Appendix *A; MSV Reply to Inmarsat Recon. Opposition* at *5; MSV ATC Application* at Appendix I.	(b) The simultaneous operation of Inmarsat-4 satellites and MSV's first generation satellite will not last long. As with every transition to a new generation of spacecraft, the situation will stabilize to a long-term compatible operating arrangement of Inmarsat-4 and MSV's next generation satellite. That is the situation that should be used as the baseline for an assessment of the interference impact of ATC.
(c) Allowing ATC MTs to impact Inmarsat to 6% ΔT/T would consume 25% of Inmarsat's total interference budget. *Inmarsat Opposition to MSV Recon Petition* at *10; Inmarsat Opposition to MSV ATC App.* at 31,	(c) ATC MTs impacting Inmarsat-4 satellite receivers at a level of 6% ΔT/T will contribute a negligible 0.17 dB of link margin loss to Inmarsat. Inmarsat has not refuted this. Inmarsat should be able to accommodate this impact in the 1 dB it claims to allocate for all intersystem interference sources. *MSV Reply to Inmarsat Recon. Opposition* at 5.	(c) The 1 dB interference margin in Inmarsat's return link budget (from L-band user terminal to C band gateway) is intended to accommodate interference from the following external sources: 1. Other MSS systems contributing uplink interference in the L-band; 2. Other FSS systems which produce interference in the feeder downlink; 3. Other services (*i.e.* not FSS) in the feeder downlink, in particular fixed

		services; 4. Other services (*i.e.* not MSS) internationally allocated on a primary or secondary basis in the service uplink band, and 5. Other services in nearby frequency bands which may contribute to the aggregate interference through their out-of-band emissions. Treating the secondary ATC service the same, from an interference allowance perspective, as another co-primary MSS satellite network has no basis in international standards or real-world link budgets, which provide 0.25 dB of margin for all non-satellite co-primary services, and only 0.04 dB of margin for all secondary services. Furthermore, Inmarsat does not agree that its links would be degraded by only 0.17 dB due to the proposed interference level from MSV corresponding to a 6% $\Delta T/T$ increase in the Inmarsat uplink. This level of $\Delta T/T$ gives a link budget degradation of 0.25 dB, and not 0.17 dB. For digital transmission systems, as used in the Inmarsat networks, the loss of an additional 0.25 dB could make the difference between a satellite link working correctly or failing. Inmarsat needs to use its link margin to accommodate other

		sources of interference as explained above.
(d) If Canada or Mexico were to allow a similar ATC regime, even more of Inmarsat's total interference budget would have to be designated for ATC coordination. *Inmarsat Opposition to MSV Recon Petition* at 10; *Inmarsat Opposition to MSV ATC App.* at 31.	(d) The same frequencies are not reused by any other North American MSS systems. *MSV Reply to Inmarsat Recon. Opposition* at 6.	(d) This is non-responsive. MSV Canada (or MSV itself) could operate an ATC-like system in neighboring countries, thereby increasing the total uplink interference to Inmarsat.

3. Unlimited reuse of non-co-channel frequencies

MSV requests that its ATC facilities be permitted unlimited reuse of frequencies that are not co-channel to frequencies used by Inmarsat satellites, arguing that such use cannot cause harmful interference to Inmarsat satellites. MSV notes that the FCC did not impose co-channel interference limits on 2 GHz or Big LEO ATC operators because there is not expected to be any co-channel sharing. *MSV Opposition to Inmarsat Recon Petition* at n.13; *MSV Reply to Inmarsat Recon. Opposition* at 4, *5; MSV Nov. 3 ex parte* at *3; MSV ATC Application* at 16-17 and Appendix G.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) Unlimited non-co-channel reuse would result in increased self-interference to MSV. *Inmarsat Opposition to MSV ATC App.* at 42.	(a) MSV will use interference cancellation techniques to maintain non-harmful intrasystem interference levels. *MSV Reply to Inmarsat Recon Opposition* at *6; MSV ATC Application at* 16-17 & Appendix F.	(a) As noted in Inmarsat's March 25 Opposition and April 26 Reply, MSV has not addressed a number of deficiencies with this theoretical interference cancellation scheme.
(b) L-band frequency assignments are not static. *Inmarsat Reply to MSV Recon. Opposition* at *8-9; Inmarsat Opposition to MSV ATC App.* at 42.	(b) To the extent the assignment of L-band frequencies remains dynamic, MSV is willing to assume the risk that a portion of its non-co-channel frequencies with Inmarsat may become co-channel in the future and thus become subject to co-channel restrictions. *MSV Opposition to Inmarsat Recon Petition* at n.13.	(b) MSV ignores the point that the existence of non-co-channel operations is not going to last much longer. With the launch of Inmarsat-4, co-channel interference *will be* an issue for most of the channels over which MSV intends to provide ATC service. *Inmarsat Reply to MSV Recon. Opposition* at *8.* Moreover, the FCC explained that it adopted this constraint because "determining co-channel interference that arises from fluctuating and geographically discrete operations might require our continued oversight for years to come." *Inmarsat Opposition to MSV ATC App.* at

		42-32. The Commission is right. MSV still has not demonstrated how it would be able to cope with changing spectrum availability in its ATC system. MSV's cellular-like ATC system will not be able to adapt flexibly to changing L-band spectrum availability, because of the other constraints on ATC frequency planning: (i) the need to coordinate the frequencies with the MSV MSS system itself, and (ii) the coordination of the terrestrial frequency re-use within the cellular-like ATC system. MSV is simply seeking to substantiate its intransigence in the international coordination of L-band MSS spectrum under the Mexico City MOU, and its refusal to release spectrum that it is warehousing.

4. Peak Traffic Limit

MSV argues that the limit of *90,000* MTs peak traffic can be lifted without affecting potential interference to Inmarsat. *MSV Opposition to Inmarsat Recon Petition* at *8-9; MSV ATC Application* at 24-25.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) The maximum peak traffic limit on MTs is integrally related to the 1725 reuse limitation. *Inmarsat Petition for Recon* at 12-13; *Inmarsat Opposition to MSV ATC App.* at 43.	(a) The *ATC Order* states that the peak traffic limit was adopted to protect Inmarsat from adjacent channel interference. But the aggregate adjacent channel emissions from 90,000 fully-loaded ATC carriers operating at the out-	(a) Section 1.14 of Appendix C2 to the *ATC Order* is clear that the Commission considered the 90,000 mobile terminal peak loading limit as one that is integrally related to the 1725 base station carrier limit that was adopted with a view toward

	of-channel emission limit adopted in the *ATC Order will* impact Inmarsat's current and next-generation satellites to a level of only 0.001% $\Delta T/T$. *MSV Opposition to Inmarsat Recon Petition* at *8-9; MSV ATC Application* at 24-25.	limiting MSV self-interference, thereby keeping ATC ancillary, as well as protecting other MSS systems. This limit has its genesis in the repeated representations that MSV made to the Commission. As that Appendix explains, MSV's various analyses assumed a maximum peak traffic limit of 90,000 terminals, based on a maximum of 2000 mobile terminals transmitting on a single channel. *Inmarsat Opposition to MSV ATC App.* at 43.

5. Half-Rate Vocoder

MSV argues that the FCC should attribute a 3.5 dB reduction in interference potential to the use of a half-rate vocoder. *MSV Petition for Recon.* at 14 & Appendix *B; MSV Reply to Inmarsat Recon. Opposition* at 5 & Technical Annex at § *3; MSV ATC Application* at 13-15 & Appendix C.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) MSV's analysis ignores the clear requirement for an effective EIRP limit of -7.4 dBW. *Inmarsat Opposition to MSV ATC App.* at 39.	(a) The rules do not contain any requirement for an effective EIRP limit of -7.4 dBW. The only requirement on interference reduction level due to the use of a lower (than full-rate) vocoder is 3.5 dB. MSV has shown that 3.5 dB reduction of co-channel interference potential is attained from the use of a half-rate 4.75 kbps vocoder. *MSV Petition for Recon.* at 14 &Appendix *B; MSV Reply to Inmarsat Recon. Opposition* at 5 & Technical	(a) MSV misrepresents the FCC's analysis on this point. *ATC Order, Appendix C2, Section 1.10.* Quarter rate vocoders are required to reduce any MT's EIRP by 7.4 dB. The use of such quarter rate vocoders, with the traffic distribution proposed by MSV and used in the FCC's analysis (*see Table 1.10.B of the ATC Order, Appendix C2*) will result in an average EIRP reduction of 3.5 dB. If only half-rate vocoders were used by MSV then the

	Annex at *§ 3; MSV ATC Application* at 13-15 & Appendix C.	average EIRP reduction for the reference traffic distribution, would be only between 0.97 and 1.87 dB (*Inmarsat Opposition to MSV ATC App.* at 40-41).
(b) If a half-rate vocoder is analyzed using the Vogel user distribution pattern, the average reduction in uplink interference will be less than the 3.5 dB assumed by the FCC. *Inmarsat Opposition to MSV ATC App.* at 40.	(b) The distribution of users (whether users are outdoors, in-buildings, in-vehicles, near the base station, at the edge of the base station service area, etc.) is irrelevant. Nowhere in the FCC's uplink interference analysis is the distribution of users a relevant consideration. The key parameter (among others) is the peak EIRP of the terminal. The half-rate vocoder in effect guarantees that no terminal can ever radiate more than -3.5 dBW (in equivalent full-rate peak EIRP) even though terminals are (per the FCC's analysis) capable of outputting 0 dBW peak EIRP. *MSV Petition for Recon.* at Appendix *B; MSV Reply to Inmarsat Recon. Opposition,* Technical Appendix at § 3.	(b) MSV is wrong. The FCC's analysis clearly factors in the traffic distribution of the ATC users. *ATC Order, Appendix C2, Table 1.10.B.* This is beyond question.

6. Increased Base Station EIRP and PFD Limits

MSV argues that the EIRP and PFD limits on MSV's base stations should be based on data showing that Inmarsat's maritime and land-based METs are not susceptible to overload at less than -45 dBm, even though Inmarsat has shown clear measured evidence of interference problems with Inmarsat receivers at levels below –75 dBm, based on testing by the receiver manufacturers. MSV asserts that its testing confirms that the overload threshold for Inmarsat land-based and maritime Inmarsat METs is -43 dBm, however, MSV's testing ignores the intermodulation product interference that will occur at signal levels significantly below the 1 dB compression point of the Inmarsat receivers. *MSV Petition for Recon* at 16-17 & Appendix *C; MSV ATC Application* at Appendix J. Based on its flawed analysis, MSV argues for increasing base station EIRP and PFD limits by 15 dB. *MSV Petition for Recon* at 16-17 & Appendix *C; MSV Opposition to Inmarsat Recon. Petition* at 9-11 & Appendix *B; MSV ATC Application* at 20 & Appendix J.[1]

In adopting EIRP and PFD limits for L-band base stations, MSV asserts that the FCC must consider that there are, according to MSV, relatively few Inmarsat receivers operating in the United States today and, according to MSV, only a fraction (if any) of these receivers can be expected to operate in areas where ATC base stations will be located. *MSV Nov. 3 ex parte* at 4-5. In this regard, MSV simply fails to take into account the imminent deployment of Inmarsat's BGAN land mobile service on Inmarsat 4, and the fact that the Commission already took into account the likelihood of Inmarsat receivers being located neat ATC base stations.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) Testing conducted by NERA and a letter supplied by Honeywell confirm an overload threshold of -75 dBm. *Inmarsat Petition for Recon.* at 15-17 & Exhibits A, *B; Inmarsat Reply to MSV Recon. Opposition* at 9-10 & Exhibits A, B; *Inmarsat Opposition to MSV ATC App.* at 47-48 & Appendices B, C. The EIRP and PFD limits for L-band base stations should	(a) The NERA testing is flawed and grossly misleading because much of the data relates to interference from adjacent channel emissions, which is irrelevant to the issue of overload interference. NERA used GMSK modulation which is known for its very gradual spectral roll-off. MSV will use (GSM compatible) linear QPSK modulation which has much sharper	(a) Again, MSV does not take account of the relevant interference mechanisms that would exist in the scenario of ATC MTs transmitting in frequency bands adjacent to those in which Inmarsat receivers are operating. MSV continues to ignore the interference caused by adjacent band transmissions causing intermodulation products within the Inmarsat receivers, and

[1] MSV also cites its prior argument that the Commission should "impose receiver standards on Inmarsat METs." This is absurd, for the reasons Inmarsat has explained in the receiver standards proceeding. *See* Reply Comments of Inmarsat Ventures plc, ET Docket No. 03-65 (August 18, 2003).

thus be reduced, not increased, by 15 dB. *Inmarsat Petition for Recon.* at 15-17; *Inmarsat Opposition to MSV ATC App.* at 51, 52, 55, 57.	spectral roll-off. The Honeywell letter is misleading and irrelevant because it refers to a section of an RTCA specification that applies only to continuous wave ("CW") interference; but MSV's ATC base stations will radiate modulated spread-spectrum (noise-like) carriers, not CW signals. If the distinction between CW and other signals was not relevant, the RTCA specification would not have made such a distinction. *MSV Opposition to Inmarsat Recon Petition* at 9-11 & Appendix B.	instead focuses only on the 1 dB compression point measure of receiver nonlinearity. Also, the interference effect that Inmarsat is concerned about has nothing to do with the spectrum roll-off of the MSV transmissions within the Inmarsat receive band (GMSK or linear QPSK as referred to by MSV). The problem of greatest concern is caused by the high level MSV signals outside of the Inmarsat receive band, which produce intermodulation products falling inside the Inmarsat receive band. This interference problem manifests itself at much lower signal levels than the 1 dB compression point, which is the only characteristic that MSV has made any reference to. MSV's supposition concerning the difference in overload characteristics (and hence RTCA specs) for CW versus modulated signals is highly speculative, and likely not to be valid. Overload, as it relates to the 1 dB compression point, should be primarily dependent on the total power of the interfering carrier, regardless of its modulation.
(b) MSV's testing is invalid because it only measures the 1 dB compression point of Inmarsat METs. It ignores inter-modulation interference. MSV has not tested the entire receiver chain. *Inmarsat Opposition to MSV Recon Petition* at 15-16 & Technical Annex; *Inmarsat Opposition*	(b) In November 2001, MSV submitted the results from testing the entire receiver chain of an Inmarsat MET. These tests entailed subjectively determining the onset of degradation in the received speech of an Inmarsat Mini-M MET as a function of interfering signal level. Both this	(b) MSV has simply not addressed one of Inmarsat's primary concerns. MSV's measurements, even of the entire Inmarsat receiver chain, used only a single ATC interfering carrier and therefore did not represent a real-life scenario of a base station transmitting on several carriers, and

to MSV ATC App. at 48-51.	subjective testing and the objective testing of the 1 dB compression point concluded that the worst-case overload threshold for an Inmarsat MET can be set conservatively at -45 dBm. *MSV Reply to Inmarsat Recon Opposition* at 7-8 & Technical Appendix, § 3.	hence cause intermodulation products due to nonlinearity in the Inmarsat receiver. The MSV tests only measured desensitization due to a single interfering carrier as a result of small signal suppression, and related this only to the 1 dB compression point. Whether by design or misunderstanding, MSV has completely avoided addressing the crucial interference effect due to nonlinearity in the Inmarsat receivers. Significant intermodulation interference occurs at input levels of –75 dBm. In addition, even for a single interfering carrier causing small signal suppression in the Inmarsat receiver, MSV's results do not agree with those performed by the Inmarsat receiver manufacturers. For interfering carriers with only a few hundred kHz separation from the Inmarsat receive channel, the Inmarsat receiver manufacturers have measured significant receiver performance degradation for interfering carrier levels of only –75 dBm. For unknown reasons MSV's claimed measurement produces results more than 30dB higher.

7. Dual PFD and Distance Restrictions for Base Stations Near Airport Runways/Aircraft Stand Areas

MSV asserts that it is not necessary to impose both a PFD limit and a separation distance restriction on base stations near airport runways/aircraft stand areas. MSV claims that allowing L-band base stations to meet either a PFD limit or a separation distance will not increase the potential for interference to Inmarsat METs located in airports. MSV asserts that the FCC used an "either/or" approach in adopting a similar rule requiring L-band base stations to protect Inmarsat METs located on ships in waterways. *MSV Petition for Recon* at *20-22; MSV ATC Application* at Appendix J.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) For base stations located greater than 470 meters from an airport runway, MSV must still calculate the PFD level because distance alone will not guarantee that the L-band base station will avoid interfering with Inmarsat METs. *Inmarsat Opposition to MSV Recon. Petition* at *19; Inmarsat Opposition to MSV ATC App.* at 54.	(a) To the extent a base station is located greater than 470 meters from an airport runways/aircraft stand areas, the FCC has calculated using a worst case, free space propagation model that 470 meters is the maximum separation distance needed between an ATC base station and an Inmarsat MET to avoid overload interference. The FCC has effectively established a safe harbor zone with a radius of 470 meters surrounding airport runways/aircraft stand areas beyond which an ATC operator should not be mandated to calculate the PFD level. Under these circumstances, no further showing should be required. *MSV Reply to Inmarsat Recon Opposition at 9.*	(a) Firstly, the 470 meter criterion is based on an erroneous assumption concerning the overload / intermodulation interference threshold and needs to be increased to 2,643 meters to take account of the actual –75 dBm interference threshold level. Secondly, if the PFD calculation is simply based on the free-space loss distance then it should not be burdensome for MSV to comply with it, and the additional reassurance for the public in knowing that safety-of-life services are well protected from harmful interference would be well worth the additional effort on MSV's part.
(b) Verifying PFD levels is complex, thereby necessitating a distance restriction. *Inmarsat Opposition to MSV Recon. Petition* at *18-19; Inmarsat Opposition to*	(b) MSV will perform all necessary calculations to ensure that its base stations operate without exceeding the PFD limit specified in the rules. MSV is willing to	(b) MSV's technical rationale that the PFD is in fact acceptable despite the distance being less than 470 meters (or in fact 2,643 meters based on the correct interference

MSV ATC App. at 53-54.	provide an appropriate showing in cases where it operates closer than 470 meters from an airport. *MSV Reply to Inmarsat Recon. Opposition* at *9.*	threshold for the Inmarsat receivers) has not yet been vetted by any party. To avoid possible errors in this regard, or MSV using a technical argument that might not be valid, the "safety net" of the minimum separation distance is essential to maintaining integrity of the Inmarsat services to aircraft.

8. Base Station Overhead Gain Suppression

MSV proposes that the FCC relax the required base station overhead gain suppression as proposed by MSV because it will make base station deployment substantially less expensive and cause no more than a 0.03 dB increase, according to MSV's calculations, in potential interference. However, it is quite an "about face" for MSV to now request such a relaxation when it made such bold claims in the past to the "special" base station antenna designs that it was planning to use. *MSV Petition for Recon* at 16-19 & Appendix *C; MSV Opposition to Inmarsat Recon. Petition* at 9-11 & Appendix *B; MSV ATC Application* at 21 & Appendices J & K.

Inmarsat's Position (as described by MSV)	MSV's Response (as described by MSV)	Inmarsat's Reply
(a) The level of suppression required by the FCC was originally proposed by MSV. *Inmarsat Opposition to MSV Recon. Petition* at 17-18; *Inmarsat Opposition to MSV ATC App.* at 57-59.	(a) MSV's initial proposal relied on statements by CSS Antenna, Inc. Those statements were made before the FCC required L-band ATC base stations to use left-hand circular polarization ("LHCP"). *MSV Reply to Inmarsat Recon Opposition* at 8.	(a) MSV's explanation makes no sense. Why does the use of LHCP invalidate MSV's prior claims on the achievable antenna performance? Also, CSS Antenna Inc.'s letter, which was included as part of MSV's Reply, stresses that the antenna that was measured was not an expensive prototype but was a production type antenna based on a "…one-piece circuit board for the feed network and radiating elements combined…" and could be easily mass-produced in a way that "…eliminates any assembly variations…" and hence

		provide reliably high performance as shown in the measurement results. In addition, the FCC has provided other practical measurement data to support the ability of MSV to achieve the overhead gain suppression masks originally proposed by MSV (*see ATC Order, Appendix C2, Sections 1.8 and 2.2.3.1.*) Furthermore, Inmarsat has demonstrated the practical interference problems that will occur with the reduced overhead gain suppression now proposed by MSV assuming the actual interference threshold of –75 dBm for the Inmarsat receivers *(see Inmarsat Opposition to MSV ATC App., Section IV.B.6).*

9. Requirement to demonstrate that MSV's proposed ATC design includes 18 dB of link margin allocated solely to overcoming structural attenuation that will not be used to extend the edge of cell coverage and will reduce MT power levels when operated outdoors even if the MSV satellite is blocked by a building or other structure.

The 18 dB attenuation requirement in Section 25.253(a)(8) of the Commission's rules embodies a critical uplink interference-controlling mechanism that underlies the Commission's decision to allow ATC in the L-band. The rule mandates that an L-band ATC system must be designed with at least an 18 dB link margin *allocated solely to overcoming structural attenuation*. This margin may not be used to enhance edge-of-cell coverage, nor may it be used to close a link when an ATC user is outside. Compliance with this condition is necessary to ensure that an ATC system does not exceed the interference level assumed in the Commission's analysis of a reference ATC system. Indeed, failure to comply with this one condition *alone* could raise the potential uplink interference from an ATC base station by a factor of 63.

Inmarsat's Position (as described by Inmarsat)	MSV's Response (as described by Inmarsat)	Inmarsat's Reply
(a) MSV has not committed to how it will implement this crucial requirement. Without this rule being effectively implemented the total number of base station frequency re-uses must be reduced from 1725 to 27 times, which is an indication how critical this rule is to the viability of ATC. *Inmarsat Opposition to MSV ATC App.* at 15-17; 35-39.	(a) MSV claims to have certified that it will comply with the requirement in the future pursuant to an explanation in a technical exhibit. *MSV Response to Inmarsat Opposition* at 8.	(a) A certification would be woefully inadequate and the referenced Appendix E of MSV's ATC applications is seriously lacking in two respects. Firstly, it provides no actual commitment to implement a particular technique to comply with the rule, and merely lists some possible ways that MSV claims the rule could be complied with. Secondly, it does not address the situation where MSV MTs are outdoors (with high probability of a clear line-of-sight to an Inmarsat satellite) and yet the MTs are still blocked from the base stations with which they are attempting to communicate, and therefore will be operating at EIRP levels above –18 dBW, even as high as 0 dBW.

10. MSV's claim that the average MT antenna gain is reduced to –4 dBi

Section 25.253(g)(1) requires that the ATC mobile terminal be limited to a peak EIRP level of 0 dBW. Nowhere in its ATC application does MSV specify the peak EIRP level for its ATC mobile terminals. MSV carefully limits its disclosure to specifications about antenna gain of its mobile terminals, focusing on the "average" antenna gain of those terminals. MSV never clearly represents the level of power into the mobile terminal antennas, the peak gain of the antenna or the resulting peak EIRP of the terminal. Based on other information in the ATC application, it would appear that the peak EIRP is +2 dBW, and therefore exceeds the limits of § 25.253(g)(1). *Inmarsat Opposition to MSV ATC App.* at 14-15.

Inmarsat's Position (as described by Inmarsat)	MSV's Response (as described by Inmarsat)	Inmarsat's Reply
(a) MSV has not responded to the FCC rule § 25.253(g)(1), which requires that the peak EIRP be no greater than 0 dBW, and in fact it would seem from the information provided by MSV that its peak MT EIRP may be as high as +2 dBW. Furthermore, the *average* antenna gain was not the basis of the FCC's analysis and rules, and the natural fluctuation in the actual interfering EIRP level towards the Inmarsat satellites was taken into account in the assessment of the overall acceptability of the proposed rules. The supposedly measured data provided by MSV concerning the MT antenna performance is not accurate, is not even *measured* in the case of two of the three planes for the "stubby" antenna (but is a simplistic theoretical prediction), and does not take account of the way that head blockage will further change the antenna radiation patterns in practice. Finally,	(a) MSV proposes that the Commission's interference analysis should now, for the first time, take account of the *average* MT antenna gain in place of the *peak* gain. MSV denies that any of the antenna patterns presented are theoretical and insists that they are all real measured patterns (although MSV admits that these measurements are for antennas operating in a different frequency band). MSV proposes that it will *eventually* provide measured patterns for the actual MT antennas and that this will demonstrate that the average antenna gain is –4 dBi. MSV also asserts that the head blockage effect is not relevant, and that it should further reduce the interfering EIRP level from the MT in practice. *MSV Response to Inmarsat Opposition* at 15-17.	(a) It is completely inappropriate to drastically modify a fundamental principle in the Commission's ATC interference analysis, and hence the ATC service rules, in this licensing proceeding. MSV itself describes the MT antenna gain characteristics for the "external stubby" antenna, contained in MSV's ATC applications, as theoretical for two out of the three planes. (*See footnote 1 on page 5 of Appendix H of the MSV's ATC Applications*). Thus, the results of the analysis cannot be relied upon. It is meaningless for MSV to offer to provide measured data after it has started implementation of its ATC system. Finally, the head blockage effects could significantly alter the MT antenna characteristics (and hence the average gain).

MSV's claim is belied by the fact that MSV has made no change whatsoever to its MT antenna design, and the relevant factor, under the ATC service rules, remains peak MT EIRP, which MSV fails to specify. *Inmarsat Opposition to MSV ATC App.* at 14-15, 26-28.		

11. MSV's proposed CDMA architecture does not ensure that it would cause no greater potential interference than a TDMA system permitted under the ATC service rules.

Compliance with Sections 25.253(a)(2) and (3) of the ATC service rules achieves an interference reduction of 3.5 dB for an ATC system using GSM technology. While the ATC service rules contemplate that an ATC applicant may use a non-GSM architecture, they also require that the applicant "demonstrate that the use of a different system architecture would *produce no greater potential interference than that produced as a result of implementing the rules of this section.*"[2]

Inmarsat's Position (as described by Inmarsat)	MSV's Response (as described by Inmarsat)	Inmarsat's Reply
(a) Inmarsat contends that MSV's ATC applications are deficient regarding the use of CDMA in that they do not state how MSV will achieve the corresponding interference reduction that is provided in FCC rule 25.253(a)(3) by the maintenance of vacant time slots (in a TDMA system). *Inmarsat Opposition to MSV ATC App.* at 18-19.	(a) MSV asserts that there is no need for an equivalent rule for CDMA, and that the vocoder related power reduction and the overall limit on the number of frequency re-uses will adequately control the interference. *MSV Response to Inmarsat Opposition* at 9-10.	(a) MSV has not clearly explained or committed to its CDMA MTs reducing their transmit power when the vocoder reduces the transmitted data rate. Without this commitment, which is specific to CDMA, there would be no overall interference reduction as a result of the use of a vocoder.

[2] 47 C.F.R. § 25.253 at Note (emphasis added).

12. MSV's proposed self-interference cancellation scheme does not protect Inmarsat and will likely never be able to be implemented in any event.

In establishing the ATC service rules, the Commission decided that the way to protect Inmarsat was to limit the amount of ATC interference MSV generated into its own satellite. Based on the principle that MSV's own satellites would be affected as much or more by the interference caused by ATC compared to Inmarsat's satellites, the Commission established limits on the number of base stations permitted to operate simultaneously per channel. In its ATC application, MSV requests a waiver to increase the number of base stations permitted to operate per channel based on a new self-interference cancellation technique that does nothing to reduce interference toward Inmarsat.

Inmarsat's Position (as described by Inmarsat)	MSV's Response (as described by Inmarsat)	Inmarsat's Reply
(a) (i) A technique that reduces the self-interference into MSV's satellite without correspondingly decreasing the interference into the satellites of other MSS operators does not change the calculation upon which the Commission's uplink interference protections are based. (ii) MSV's proposed self-interference technique is flawed in that it would both reduce the capacity of the MSV satellites and dramatically increase MSV's feeder link spectrum requirements in a manner that renders the technique impractical. *Inmarsat Opposition to MSV ATC App.* at 32-35.	(a) (i) It is "odd" that Inmarsat complains that MSV's self-interference cancellation technique does not reduce interference into Inmarsat's satellites, since MSV does not claim otherwise. (ii) MSV will be able to deploy this technology without any reduction in satellite capacity or significant added cost. All that is needed are more gateway earth stations. *MSV Response to Inmarsat Opposition* at 17-18.	(a) (i) If the Commission permits MSV to deploy self-interference cancellation techniques, the Commission must devise another method of protecting other MSS satellites in the L-band from ATC uplink interference. (ii) Frequency reuse in a satellite network can only be achieved if there are multiple satellite beams. MSV's replacement satellite application depicts only a single Ku band beam. MSV has not sought the needed authority to employ such a system, nor demonstrated how the high level of frequency re-use could be achieved in practice using the Ku-band feeder link spectrum with CONUS-based gateway earth stations.

13. MSV's request to immediately increase the number of authorized ATC base stations is fundamentally inconsistent with the 18 month phase in period

The ATC Order contains a separate requirement that MSV constrain its ATC deployment to 863 base stations operating on the same 200 kHz channel during its first 18 months of ATC operations. The reasons for phasing in the 1725 base station limit over an initial 18-month phase-in period are to: (i) provide an additional 3 dB of protection to Inmarsat during the initial deployment, (ii) protect safety-related services to ships and aircraft from interference, and (iii) allow Inmarsat time to study the interference impact of ATC in the real world, including the effects of seasonal variations. Moreover, this phase-in period provides Inmarsat the opportunity to object to the interference caused by MSV's untested secondary service, and for MSV to modify its ATC operations, before MSV fully deploys its ATC network.[3] The Commission indicated that it would consider a request to waive its rules "*based on negotiated agreements*"[4] among interested parties in the band. No such agreement exists. *Inmarsat Opposition to MSV ATC App.* at 24.

Inmarsat's Position (as described by Inmarsat)	MSV's Response (as described by Inmarsat)	Inmarsat's Reply
(a) MSV's attempt to increase the number of ATC base stations during the 18-month phase in period is groundless and would undermine the ATC service rules. *Inmarsat Opposition to MSV ATC App.* at 23-24.	(a) No response	(a) MSV does not dispute that its proposal would undermine an important aspect of the ATC service rules.

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3 *ATC Order* ¶ 104 (requiring an ATC operator to resolve harmful interference into an MSS network from ATC base stations or mobile terminals).

4 *Id.* (emphasis supplied).

Explanation of Abbreviations

MSV Petition for Recon	-	MSV, Petition for Partial Reconsideration and Clarification of *ATC Order,* IB Docket No. 01-185 (filed July 7, 2003)
Inmarsat Opposition to MSV Recon Petition	-	Inmarsat, Opposition to MSV's Petition Partial Reconsideration and Clarification of *ATC Order,* IB Docket No. 01-185 (filed August 20, 2003)
MSV Reply to Inmarsat Recon Opposition	-	*MSV,* Reply to Inmarsat's Opposition to MSV's Petition for Partial Reconsideration and Clarification of *ATC Order,* IB Docket No. 01-185 (filed September 2, 2003)
MSV Nov. 3 ex parte	-	Letter from Lon C. Levin, MSV, to Ms. Marlene H. Dortch, FCC, IB Docket No. 01-185 (November 3, 2003)
Inmarsat Petition for Recon	-	Inmarsat, Petition for Reconsideration and Clarification *of ATC Order,* IB Docket No. 01-185 (filed July 7, 2003)
MSV Opposition to Inmarsat Recon Petition	-	MSV, Opposition to Inmarsat's Petition for Reconsideration and Clarification of *ATC Order,* IB Docket No. 01-185 (filed August 20, 2003)
MSV ATC Application	-	MSV, Application for Minor Modification and Amendment, File No. SAT-MOD-20031118-00333; File No. SAT-AMD-20031118-00332; File No. SES-MOD-20031118-01879 (filed November 18, 2003)
Inmarsat Opposition to MSV ATC App.	-	Inmarsat, Opposition to MSV ATC Application, File No. SAT-MOD-20031118-00333; File No. SAT-AMD-20031118-00332; File No. SES-MOD-20031118-01879 (filed November 18, 2003)

ENGINEERING INFORMATION CERTIFICATION

I hereby certify that I am the technically qualified person responsible for reviewing the engineering information contained in the foregoing submission, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this pleading, and that it is complete and accurate to the best of my knowledge and belief.

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Dated: April 26, 2004

CERTIFICATE OF SERVICE

I, Alexander Hoehn-Saric, hereby certify that on this 26th day of April, 2004, the foregoing "Reply of Inmarsat Ventures Limited" was filed by hand at the Federal Communications Commission and a copy via first class mail, postage pre-paid, upon the following:

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