Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of Commission Staff Invites Technical Comment on the Certain Proposals to Permit Flexibility in the Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band	)))))))	 IB Docket No. 01-185 ET Docket No. 95-18

COMMENTS OF MOBILE SATELLITE VENTURES SUBSIDIARY LLC

Mobile Satellite Ventures Subsidiary LLC ("MSV") hereby files these Comments on the Commission's above-captioned Public Notice asking interested parties to assess whether it is technically feasible for one operator to provide terrestrial services and another operator to provide mobile satellite service ("MSS") in the same MSS spectrum. As discussed below, MSV's proposed terrestrial component is highly integrated into and subordinate to the satellite system. If co-channel terrestrial operations were independent or "severed," they would cause harmful interference to MSV's satellite operations and potentially those of other satellite systems operating in the region. Independent terrestrial operations would also be inconsistent with the international frequency coordination process for MSV's spectrum and with the legal obligation to provide priority and preemptive access to satellite-based aeronautical and maritime safety communications.

Background

MSV is the successor to Motient Services Inc. ("Motient"), the entity authorized by the Commission in 1989 to construct, launch, and operate a U.S. MSS system in the L-band.[1] The first Motient satellite was launched in 1995, and Motient began offering service in 1996. Today, MSV offers a wide range of land, maritime, and aeronautical mobile satellite services, including voice and data, throughout the contiguous United States as well as Alaska, Hawaii, the U.S. Virgin Islands, and coastal areas up to 200 miles offshore.

As Figure 1 demonstrates, MSV's current system uses large beams and requires significant power to close the loop between the mobile terminals and the satellite. The consumer equipment is expensive (roughly $1000) and is the size of a laptop computer. Most importantly, MSV's first-generation system is burdened with the fundamental technical limitation that has plagued all MSS systems to date – the inability to overcome signal blockage in urban and indoor environments. While MSV is proud of what it has accomplished with its first-generation system, particularly its service to public safety and rural customers, it has struggled to break even.

Both of MSV's existing satellites will reach the end of their useful lives shortly. While MSV is committed to deploying a next-generation replacement system, MSV believes its satellite system will only be sustainable if it is able to offer a service that uses a small, handheld terminal that works everywhere, including urban environments, and has the critical mass of consumers needed to motivate equipment manufacturers to produce affordable consumer handsets. To reach this goal, MSV filed an application in January 2001 to deploy a next-generation, replacement MSS system that includes integrated, ancillary, in-band terrestrial facilities ("ATC") to supplement signals from the planned next-generation high-power, multiple spot-beam satellites.[2] With such a system, MSV will be able to provide service using small, handheld terminals (comparable in size to the smallest cellular and PCS phones) that operate reliably not only in rural and remote areas, but in urban and indoor environments as well. Figure 2 graphically depicts MSV's vision for its next-generation system. MSV is committed to providing an affordable, high-quality digital service to all of America, with ATC in urban areas and with its satellites in those areas where terrestrial systems do not provide digital coverage, which Figure 2 demonstrates are substantial.

In March 2001, the Commission placed MSV's application on Public Notice and specifically requested comment on MSV's proposal to deploy ancillary terrestrial facilities.[3] MSV's application to launch and operate its next-generation system is still pending. In response to MSV's ATC proposal and a similar proposal filed by New ICO Global Communications (Holdings) Ltd. for the 2 GHz band,[4] the Commission issued a Notice of Proposed Rulemaking

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1 Memorandum Opinion, Order and Authorization, 4 FCC Rcd 6041 (1989); Final Decision on Remand, 7 FCC Rcd 266 (1992); *aff'd sub nom.* Aeronautical Radio, Inc. v. FCC, 983 F.2d 275 (D.C. Cir. 1993) ("*Licensing Order*").

2 MSV originally filed its application on January 16, 2001. *See* File No. SAT-ASG-20010116-00010 (Jan.16, 2001). At the request of Commission staff, MSV withdrew this application and refiled an identical application on March 2, 2001. *See* Application of Motient Services Inc. and Mobile Satellite Ventures Subsidiary LLC, File No. SAT-ASG-20010302-00017 et al. (March 2, 2001).

3 *See* "International Bureau Sets Deadlines Concerning Motient/TMI Assignment and Transfer of Control Applications, and Motient's Request for Second Generation Satellite/Terrestrial Base Station System," *Public Notice*, Report No. SAT-00066 (March 19, 2001).

4 *Ex parte* letter from Lawrence H. Williams and Suzanne Hutchings, New ICO Global Communications (Holdings) Ltd., to Chairman Michael K. Powell, FCC, IB Docket No. 99-81 (March 8, 2001) ("ICO Letter").

("NPRM") in August 2001 seeking comment on the need for ancillary terrestrial operations, ways to ensure that terrestrial operations remain ancillary to satellite service, the technical rules that should be adopted to protect co-channel and adjacent band licensees from interference, and licensing procedures.[5] In addition, the Commission asked interested parties to consider an alternative approach to terrestrial operations in MSS bands whereby non-MSS operators would be allowed to provide terrestrial services either in conjunction with MSS operators or as an alternative mobile service. *Id.* at ¶ 3; *see also id.* at ¶¶ 37-40. In its Comments and Reply Comments in this proceeding, MSV presented extensive analysis as to why terrestrial operations in the L-band can occur only if the satellite and terrestrial operations are integrated under the control of one entity.[6] This analysis was not rebutted by any entity nor did any entity provide evidence that independent terrestrial operations in MSS spectrum are technically feasible.

On March 5, 2002, MSV met with Commission staff to discuss the technical difficulties of severing MSS operations from terrestrial operations in the L-band.[7] On March 6, 2002, the Commission released the above-captioned Public Notice seeking comment on whether, from a purely technical point of view, MSS operations in the 2 GHz band, L-band, and Big LEO bands can be severed from terrestrial operations.[8]

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5 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 Band, *Notice of Proposed Rulemaking*, IB Docket 01-185 (August 17, 2001) ("NPRM").

6 Comments of MSV, IB Docket No. 01-185, at 33-35 and Technical Appendix at 2-4 (Oct. 22, 2001); Reply Comments of MSV, IB Docket No. 01-185, at 13-15 (Nov. 13, 2001).

7 *See* Letter from Bruce D. Jacobs, Counsel for MSV, to Mr. William F. Caton, FCC, IB Docket No. 01-185 (March 7, 2002).

8 "Commission Staff Invites Technical Comments on the Certain Proposals to Permit Flexibility in the Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band," IB Docket No. 01-185, ET Docket No. 95-18, *Public Notice* (rel. Mar. 6, 2002) ("Public Notice"). The date for

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Discussion

While the above-captioned Public Notice requests only technical comments, MSV is compelled to briefly address a few policy issues. First, the questions raised in the Public Notice are not new. They were raised implicitly in the March 2001 Public Notice regarding MSV's application and explicitly in the August 2001 NPRM.[9] Despite this, not one party to date has provided technical evidence that independent terrestrial operations in MSS spectrum are technically feasible. Second, MSV notes that the key to its next generation system is the ability to create a more valuable service with the combination of satellite and terrestrial facilities. MSV believes that this can be accomplished with its next generation system, integrated with ATC. Severing ATC from MSS, however, will fundamentally alter the economics of the next generation system. The key to the next generation system is to create a more valuable service that, with the combination of satellite and terrestrial service, can generate sufficient value to create a critical mass of customers. By severing the ATC from the satellite operations, the economics are much more difficult, if not impossible.

I. SEVERING MSS FROM TERRESTRIAL OPERATIONS IS NOT TECHNICALLY FEASIBLE

In the Public Notice, the Commission asks whether MSS operations can be "severed" from terrestrial operations. By "severed," MSV understands that the Commission means that

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filing comments in response to the Public Notice was extended to March 22, 2002. *See* Order Extending Comment Period, IB Docket No. 01-185, ET Docket No. 95-18 (rel. March 13, 2002).

9 *MSS Flexibility NPRM* at ¶ 3; *see also id.* at ¶¶ 37-40.

terrestrial operators will act independently from MSS operators.[10] As discussed below, for three key reasons, such severed terrestrial operations in L-band MSS spectrum are not feasible. First, independent, severed terrestrial operators in the L-band will cause debilitating interference to current and future satellite operations in the band. Second, coordination of L-band spectrum is a dynamic process with frequencies potentially changing from year to year. Third, priority and preemptive access requirements in the L-band for aeronautical and maritime safety services further complicate independent terrestrial operations.

A. Severed Terrestrial Operations in the L-band Will Cause Debilitating Interference to Satellite Operations

MSV has spent significant resources planning how it can operate terrestrial facilities without causing interference to its satellites, while at the same time being able to operate with a critical mass of ATC customers. Figure 3 demonstrates the architecture that will allow MSV to realize this vision. MSV will deploy a new satellite with over 200 spot beams, capable of closing the link to a much smaller handset (like a standard cellular or PCS unit). Figure 4 describes the relevant system parameters for MSV's next-generation system. Terrestrial base stations will be deployed in urban areas to provide service when the satellite signal is blocked. This entire network will be controlled by a single brain--the Network Operations Center

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10 MSV understands that the Commission is not interested in parties addressing the issues raised by separately-licensed terrestrial systems being integrated into an MSS system. Needless to say, such an approach to licensing would require extraordinarily problematic cooperation between the satellite system operator and (potentially multiple) terrestrial system licensees, with respect to a huge variety of fundamental and continually changing technical issues, including end-user equipment design and functionality; satellite air interface; and ATC air interface. As a practical matter, for such an approach to have any chance of success, the satellite system operator would have to be in a position to dictate the design and operation of the terrestrial systems.

("NOC")--to insure that MSV's ATC does not cause interference to its own satellite or to other satellites.

Figure 5 describes how MSV will avoid interference to its own satellite from ATC. There are three critical ways to accomplish this. First, MSV will deploy dynamic automatic frequency planning and retuning ("DAFPR") to manage frequency allocations between the satellite spot beams and the ATC. DAFPR will optimize frequency assignments based on interference criteria and traffic demand. Second, MSV will limit base station deployment to places where it is unlikely that a user will have clear line-of-sight to a satellite. As such, MSV will rely on ATC users being inside buildings or otherwise shielded from line of sight to the satellite. If terrestrial operations were "severed" from MSS operations, the terrestrial operator would have no similar incentive to judiciously place base stations so as to avoid interfering with co-channel satellites. The third and more complicated means of avoiding interference to the satellite involves the use of variable rate vocoders to dynamically reduce the power output of handsets operating on the ATC component as needed to reduce the potential for interference. This is done in real-time through the NOC. MSV will also rely on its satellite antenna discrimination to minimize interference.

Controlling the interference environment is critical not only to protecting MSV's own satellite system from interference, but to protecting other co-channel L-band satellite systems from interference. Figure 6 describes MSV's analysis of the potential interference from ATC to Inmarsat's co-channel operations in the Atlantic, the Pacific, and in South America. This figure demonstrates that MSV can serve millions of ATC users without causing interference to Inmarsat, but only by controlling every user's handset.

With severed terrestrial operations, however, there is no way for the MSS operator to control the interference environment. The potential for interference would increase by as much as 25 dB, causing debilitating interference to both MSV's own satellite and other L-band satellites.

B. L-Band Spectrum Coordination Negotiations Further Complicate Severed Terrestrial Operations

As described in Figure 7, MSV's access to spectrum in the L-band is subject to international frequency coordination. The L-band is shared in North America by six systems licensed by the United States, Canada, United Kingdom (Inmarsat), Mexico, Russia, and Japan (to be launched in 2003). The Mexico City Memorandum of Understanding (MoU) of 1996 provides for annual coordination to divide the spectrum on the basis of, among other things, each satellite system's actual usage and realistic projections of future usage. Thus, from year to year, an MSS operator in the L-band has no concrete assurance of how much spectrum it will have. In addition, only satellite operations are taken into account at the L-band coordination negotiations. A severed terrestrial operator would have no right to participate in these negotiations nor would its usage demands be taken into account.

Currently, there is in fact no annual agreement, meaning the systems are operating on only a non-interference basis. Thus, under the present arrangement, to the extent a severed terrestrial operator were to interfere with an L-band MSS operator, it would be required to immediately cease service.[11]

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[11] *See* Satcom Systems, Inc. and TMI Communications and Co., 14 FCC Rcd 20798, ¶ 34 (1999).

C. Priority and Preemptive Access Further Complicates Severed Terrestrial Operations in the L-Band

MSV's access to spectrum in the L-band is subject to the requirement of the ITU radio regulations to provide real-time intra-system priority and preemptive access in the upper L-band to aviation safety service and in the lower L-band to maritime safety communications. 47 C.F.R. § 2.106 footnotes US308, US315. Providing such priority and preemptive access is highly problematic if the satellite and terrestrial networks operate separately.

Conclusion

For the reasons stated above, severed terrestrial operations are not technically possible in L-band MSS spectrum.

Respectfully submitted,

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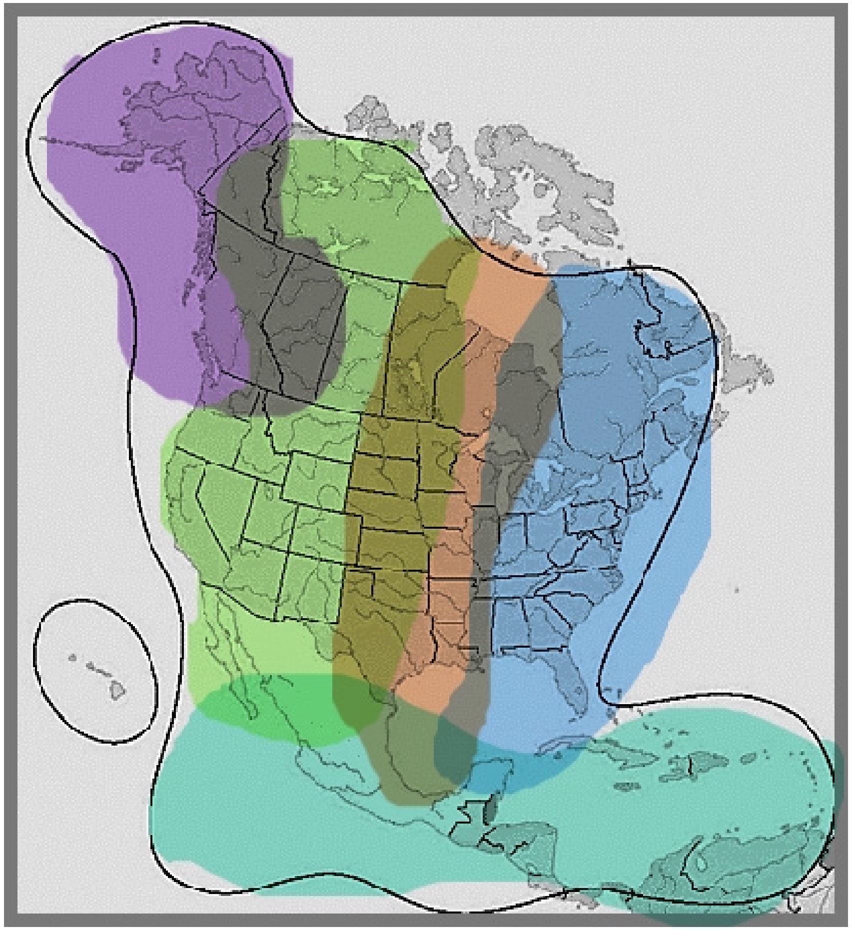
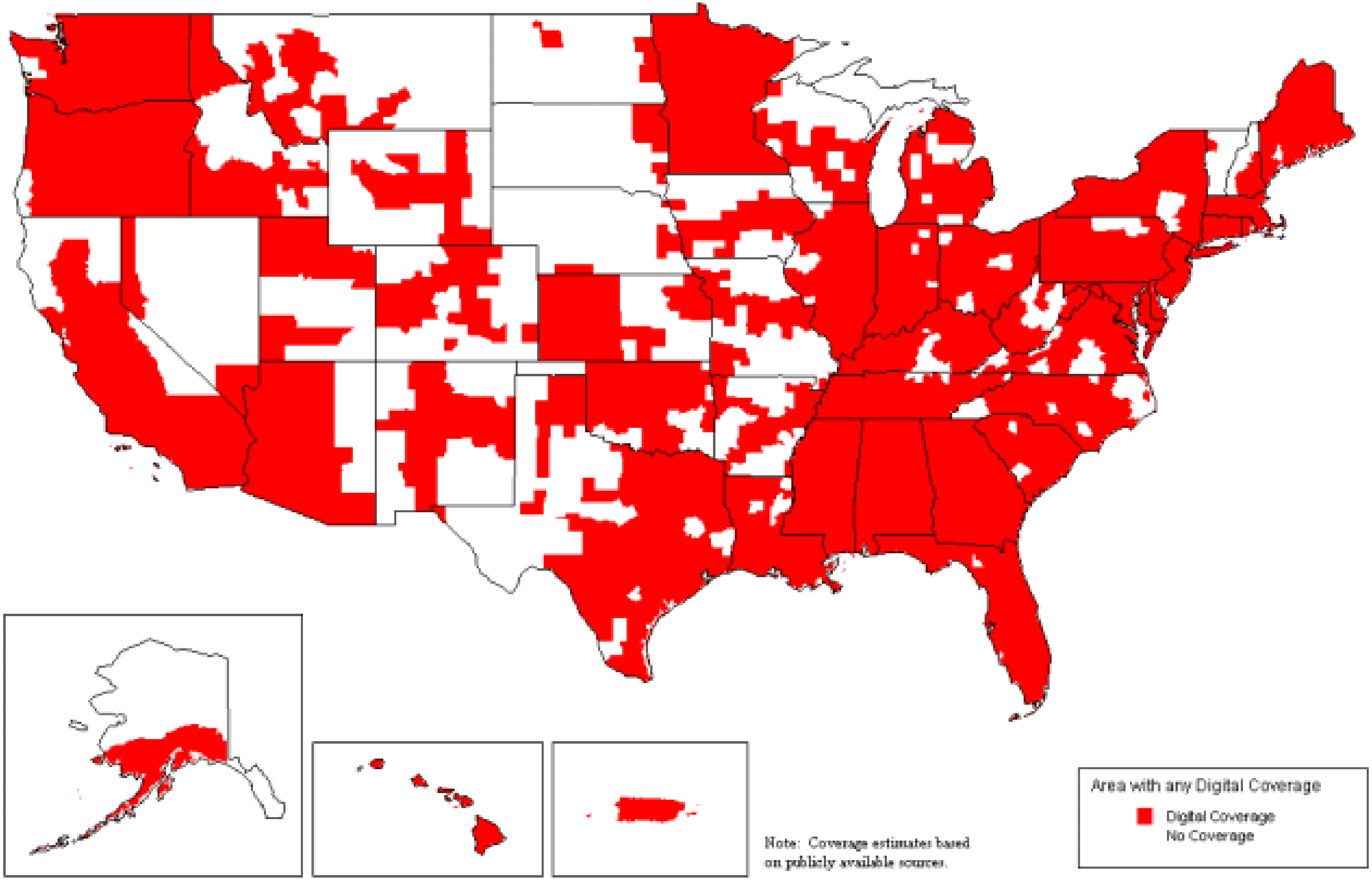
March 22, 2002

Figure 1
MSV's Current System Coverage



- Continental U.S.
- Canada
- Gulf of Mexico
- Caribbean
- Alaska and Hawaii
- Up to 200 miles off-shore
- Central America
- Northernmost South America

Figure 2
Counties With Any Digital Coverage



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Source: FCC, *Sixth Annual CMRS Competition Report*, June 20, 2001

Figure 3
MSV's Integrated Satellite-Ancillary Network
(Standard GSM Architecture)

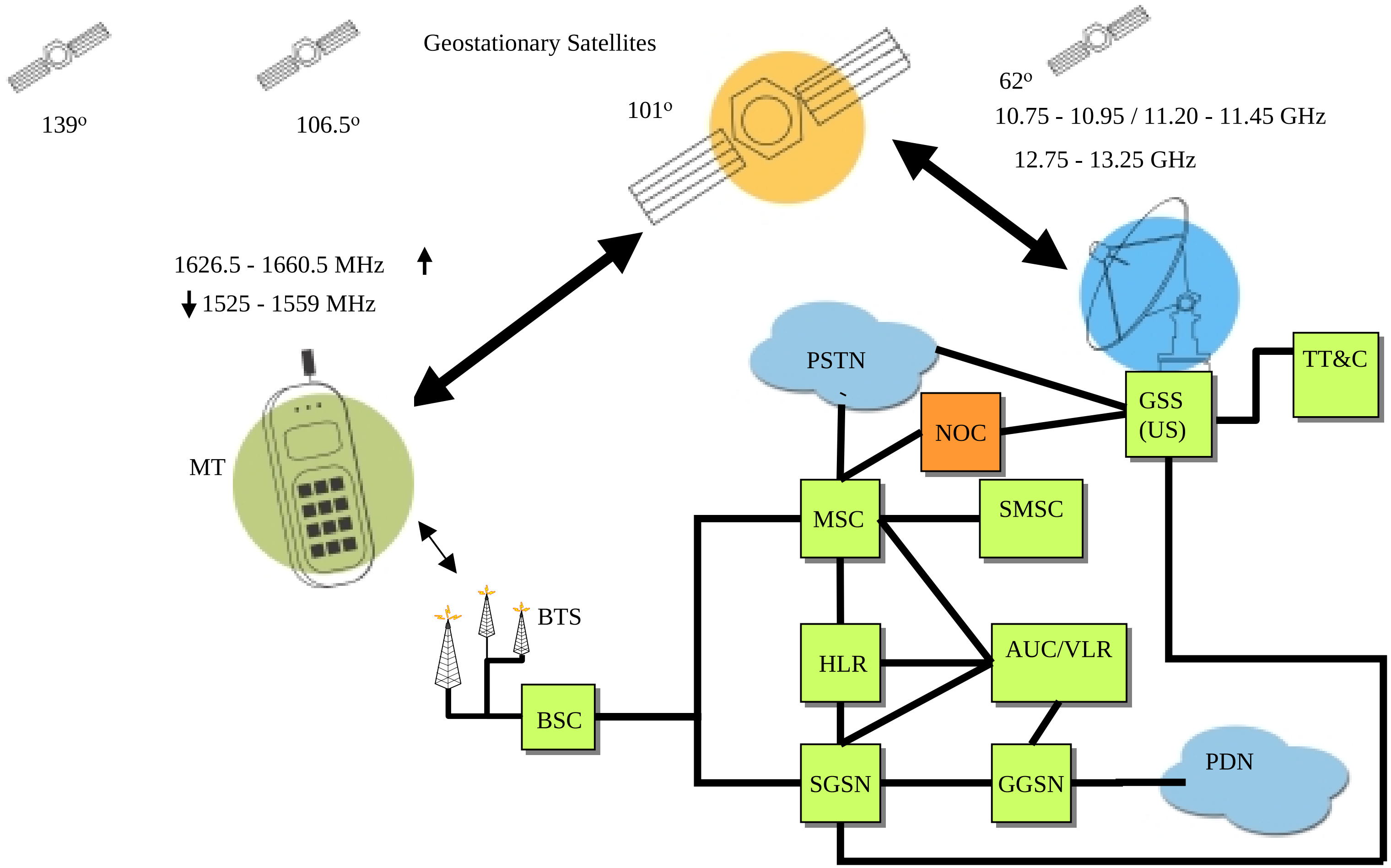

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Figure 4
Relevant MSV System Parameters
(For Current & Next Generation System)

	CURRENT GENERATION	NEXT GENERATION	
SATELLITE CHARACTERISTICS			
PARAMETER			
Satellite Longitudes	101 W and 106.5 W	101 W and 106.5W	
Satellite Transmit Band	1530 –1559 MHz	1525 –1559 MHz	
Mobile Terminal Transit Band	1631.5 – 1660.5 MHz	1626.5 – 1660.5 MHz	
Polarization	RHCP	RHCP	
Peak Antenna Gain	29 dBi	42.5 dBi	
System Temperature	600 K	450 K	
Peak G/T	3.7 dB/K	16 dB/K	
Total EIRP	56.6 dBW	80 dBW	
Carrier Bandwidth	6 kHz	200 kHz Satellite Transmit 50 KHz Satellite Receive	
MOBILE TERMINAL CHARACTERISTICS			
		Satellite	**Terrestial**
Access Mode	SCPC	TDMA	TDMA
Mobile Terminal Maximum EIRP	12.5 – 16.0 dBW	5 dBW	0 dBW
Polarization	RHCP	RHCP	Linear
Carrier Bandwidth-Transmit	6 KHz	50 KHz	200 KHz
Carrier Bandwidth-Receive	6 KHz	200 KHz	200 KHz
Channels per carrier (Rx/Tx)	1	32/8	8/8
BASE STATION CHARACTERISTICS			
			Terrestial
Access Mode			TDMA
BTS Maximum EIRP			19.1 dBW
Polarization			LHCP
Carrier Bandwidth-Transmit			200 kHz
Carrier Bandwidth-Receive			200 kHz
Channels per carrier			8

Figure 5
Potential Intra-System Interference from MSV's Terminals to MSV's Satellite
(from ATC operations)

Parameter	Units	Values
Link Margin Degradation	dB	0.25
MSV Satellite Antenna Gain (average per beam)	dBi	41
MSV Satellite Receiver Noise Temperature	K	450
MSV Satellite Receiver Noise Spectral Density	dBW/Hz	-202.1
Maximum MSV Ancillary Terminal EIRP	dBW	0
MSV Terminal Carrier Bandwidth (ancillary mode)	kHz	200
MSV Terminal EIRP Spectral Density	dBW/Hz	-53.0
Free Space Loss	dB	188.8
Average Shielding	dB	10
MSV Satellite Receive Antenna Discrimination (Average)	dB	10
Average Power Reduction due to Closed-Loop Power Control	dB	6
Average Power Reduction due to Variable-Rate Vocoder	dB	7.4
Average Polarization Isolation (Linear to Circular)	dB	3
Voice Activity Factor	dB	1
Received Interfering Signal Spectral Density	dBW/Hz	-238.2
Max Number of Co-channel ATC Carriers per Co-channel Spot Beam Vicinity		244
Number of Users per Carrier		7
Maximum Number of ATC Users per Co-channel Spot Beam Vicinity		1,707
Number of Co-Channel Satellite Beam Vicinities over CONUS		~10
Total Number of Allowed Ancillary Co-Channel Carriers Over CONUS		2,438

Figure 6
Potential Co-Channel Interference from MSV's Terminals to Inmarsat 3 & 4 Satellites
(from ATC operations)

Parameter	Units	Inmarsat 3 Satellite	Inmarsat 4 Satellite		
Inmarsat Satellite G/T	dB/K	-1.45	13	13	13
Inmarsat Satellite Antenna Gain	dBi	27	41	41	41
Inmarsat Satellite Receiver Noise Temperature	K	700	650.0	650.0	650.0
Inmarsat Satellite Receiver Noise Spectral Density	dBW/Hz	-200.1	-200.5	-200.5	-200.5
Maximum MSV Terminal EIRP	dBW	0.0	0.0	0.0	0.0
MSV Terminal Carrier Bandwidth	kHz	200	200	200	200
MSV Terminal EIRP Spectral Density	dBW/Hz	-53.0	-53.0	-53.0	-53.0
Free Space Loss	dB	188.8	188.8	188.8	188.8
Average Shielding	dB	10	10	10	10
Inmarsat Satellite Receive Antenna Discrimination	dB	22	20	25	30
Average Power Reduction due to Closed-Loop Power Control	dB	6	6	6	6
Average Power Reduction due to Variable-Rate Vocoder	dB	7.4	7.4	7.4	7.4
Average Polarization Isolation (Linear to Circular)	dB	3	3	3	3
Voice Activity Factor	dB	1	1	1	1
Received Interfering Signal Spectral Density	dBW/Hz	-264.2	-248.2	-253.2	-258.2
Δ T/T Increase per MSV carrier	%	0.00004	0.0017	0.0005	0.0002
Maximum CONUS-wide Frequency Reuse		2,000	2,000	2,000	2,000
Total Δ T/T Increase based on maximum reuse across CONUS	%	0.08	3.37	1.06	0.34

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Figure 7
Spectrum Access

- MSV's access to spectrum is subject to international frequency coordination and the requirement of the ITU radio regulations to provide intra-system priority in the upper L-band to aviation safety service and in the lower L-band to maritime safety communications.

- The band is shared in North America by six systems (one of which is to be launched in 2003) licensed by the U.S., Canada, U.K. (Inmarsat), Mexico, Russia, and Japan.

- The Mexico City MoU of 1996 provides for annual coordination to divide the spectrum on the basis of, among other things, each system's actual usage and realistic projections.

- Most recent annual agreement was for 1999, giving the U.S. system access to a relatively small amount of the band.

- Currently, there is no annual agreement, so systems are operating on only a non-interference basis.

Technical Certification

I, Dr. Peter D. Karabinis, Chief Technical Officer of Mobile Satellite Ventures Subsidiary LLC, certify under penalty of perjury that:

I am the technically qualified person with overall responsibility for the preparation of the technical information contained in the above "Comments." The information contained in this document is true and correct to the best of my belief.

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Dated: March 22, 2002

CERTIFICATE OF SERVICE

I, Sylvia A. Davis, a secretary with the law firm of Shaw Pittman LLP, hereby certify that on this 22nd day of March 2002, served a true copy of the foregoing Comments by first-class United States Mail, postage prepaid, upon the following

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