

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Motient Services, Inc.)
)
and)
)
Mobile Satellite Ventures Subsidiary LLC)
)
Application for Assignment of Licenses and)
For Authority to Launch and Operate a)
Next-Generation Mobile Satellite Service)
System)

File No. SAT-ASG-20010302-00017

Received

APR 23 2001

Satellite Policy Branch
International Bureau

PARTIAL PETITION TO DENY OF INMARSAT VENTURES PLC

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April 18, 2001

Summary

The Commission must reject that portion of the application filed by Motient Services, Inc., and Mobile Satellite Ventures Subsidiary LLC that seeks effectively to convert the existing Mobile Satellite Service L-Band allocation to another terrestrial mobile service.

First, technology and spectrum already exist that would allow Motient to provide dual band/satellite and terrestrial service, if Motient believes that such a combined service is crucial to its business. Motient has offered no reason why it cannot take advantage of the existing regulatory scheme, but instead must provide both terrestrial and satellite services in the same band.

Second, Motient claims that its proposed dual service is “consistent with” the Commission’s current L-Band regulations and policy. This is patently wrong. Nothing in the L-Band allocation or service rules proceedings, much less in any of Motient’s existing licenses, supports the notion that the L-Band may now be used for any service other than MSS.

Third, sensing the weakness of its legal claim, Motient seeks a waiver of the Commission’s rules to allow it to provide terrestrial L-Band service. This request must be rejected outright. As Motient itself has stated repeatedly, the L-Band already is extremely crowded by satellite service providers. Among the services provided in the band are aeronautical and maritime safety services. The Commission must not grant any new service proposal that could jeopardize these services. As demonstrated herein, and contrary to Motient’s limited technical evidence, the proposed terrestrial L-Band service

will indeed interfere with other L-Band satellite services unless the terrestrial service is so limited in scope as to make it economically useless to Motient.

Inmarsat supports efforts to improve the efficiency of MSS services. However, despite Motient's claim to the contrary, the introduction of a new terrestrial allocation to the L-Band will have no such effect. Instead, Motient's proposed service will block spectrum reuse and cause unacceptable interference into co-channel and adjacent channel satellite operations. For these reasons, Motient's application must be denied.

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ATTACHMENT 1

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PARTIAL PETITION TO DENY OF INMARSAT VENTURES PLC

Inmarsat Ventures plc (“Inmarsat”), by counsel and pursuant to Section 25.154 of the Commission’s rules, hereby submits its partial petition to deny the above-captioned applications¹ of Motient Services, Inc. (“Motient”) and Mobile Satellite Ventures Subsidiary LLC (“MSV Sub”)(hereafter collectively referred to as “Motient”).² The Commission must reject Motient’s request effectively to convert the existing MSS L-Band allocation to another terrestrial mobile service.

In the captioned applications, Motient and MSV Sub propose to (i) assign Motient’s licenses and pending applications to MSV Sub;³ (ii) modify Motient’s license to permit MSV Sub to operate using certain Canadian-licensed facilities; and

¹ See “International Bureau Sets Deadlines Concerning Motient/TMI Assignment and Transfer of Control Applications, and Motient’s Request for Second Generation Satellite/Terrestrial Base Satation System,” Public Notice Report No. SAT-00066, released March 19, 2001.

² According to Motient, MSV Sub will be 32.8% owned by Motient. TMI Communications and Company LP (“TMI”) will hold another 27.2% interest. The remaining 40% of the company will be held by three separate investment funds.

³ By separate applications, TMI also proposes to assign its facilities licenses to MSV Sub. See File Nos. SES-ASG-20010116-00099; SES-MOD-20010116-00097; SES-MOD-20010116-00098; Report No. SES-000357 (January 31, 2001).

(iii) construct and operate a next-generation Mobile Satellite Service (“MSS”) system. As part of its next generation service, Motient proposes to employ fill-in base stations to provide co-channel terrestrial mobile service in areas where the satellite signal is attenuated by terrain or morphological features, and to provide in-building coverage.⁴ Motient claims that the proposed operation of terrestrial base stations in the MSS L-Band is consistent with existing rules.⁵ To the extent the Commission determines that this is not the case, however, Motient seeks a waiver of those rules “in light of the public interest benefits that would be provided by the addition of base stations and the absence of any interference to other users from their operation.”⁶

Inmarsat supports Motient’s applications for assignment of its earth and space station licenses and Section 214 authority to MSV Sub LLC, as well as its application to launch and operate a next generation Mobile Satellite Service system. However, Inmarsat strongly opposes Motient’s effort to introduce terrestrial L-Band service. Consistent with the FCC’s rules, Motient can use existing technology to provide terrestrial/satellite service on a dual-band basis, using terrestrial and satellite bands. Motient’s proposal to provide both services within the L-Band would violate current FCC rules,⁷ and would fly directly in the face of the Commission’s long-standing efforts to accommodate international L-Band MSS. Furthermore, a waiver of the Commission’s rules would not serve the public interest. Motient’s proposed terrestrial service would severely burden other L-Band satellite operators and their customers, including those who provide critical safety-related services, by placing intolerable demands on the available spectrum as well as causing harmful co-channel

⁴ Application at 8.

⁵ *Id.* at 9, 15.

⁶ *Id.* at 15. Motient does not identify the specific rules it seeks to have waived.

⁷ These rules include, at the least, Sections 2.106 (Table of Allocations), 25.201 (definition of mobile satellite service) and 25.202(a)&(b)(satellite service frequencies). Of course, Motient is most familiar

and adjacent channel interference. At best, the requested action would cause substantial hardship to Inmarsat and other MSS operators. At worst, it could make the provision of MSS – particularly critically important safety services – impossible.

Thus, for the reasons set forth below, Inmarsat urges the Commission to deny that portion of Motient’s application relating to its proposed L-Band terrestrial service.⁸

I. Motient’s Dual-Service L-Band Proposal Is Unnecessary.

As is evident throughout Motient’s application, the terrestrial component of its proposed service is far from a simple “ancillary” fill-in similar to an AM Subcarrier or VBI transmission application as Motient claims.⁹ Rather, it is a major component of a new hybrid service specifically designed for widespread use.¹⁰ Indeed, the scope of terrestrial service Motient describes would far exceed its currently-licensed MSS service. The Commission must bear this in mind when considering Motient’s application.

As an initial matter, the Commission should reject Motient’s apparent assumption that it can only provide the terrestrial fill-in service that it now regards as essential to its business plan in L-Band MSS spectrum. It is simply untrue that Motient (or any service provider) must use the same spectrum allocation in order to provide the type of complementary services Motient proposes. Indeed, as its own application notes, Motient already provides a dual terrestrial/satellite service

with the characteristics of the service it wishes to offer and, therefore, Motient must identify the rules the Commission would need to waive.

⁸ Inmarsat understands that the Commission has not yet formally accepted for filing Motient’s waiver request and L-Band terrestrial service proposal. In the event the Commission does so in the future, Inmarsat reserves the right to submit supplemental comments at that time.

⁹ Application at footnote 10.

¹⁰ *Id.* at 6 (provide improved coverage in urban areas); *Id.* at 13 (plan for marketing to millions of consumers in both rural and urban areas). The application of TMI for transfer of its licenses to MSV Sub, attached to Motient’s Application as Appendix D, is equally explicit.

employing multiple spectrum bands.¹¹ In fact, terrestrial mobile service providers offer a range of handsets that operate in multiple frequency bands and on multiple analog and digital standards in order to overcome incompatibilities among spectrum allocations and technical specifications. Further, several MSS providers have already developed precisely the type of hybrid terrestrial-satellite service Motient seeks to offer, including Globalstar, ACeS, and Thuraya. These services use terrestrial allocations for terrestrial services and satellite allocations for satellite services. Moreover, the Commission is currently considering rules for software-defined radios, which could make such hybrid services even easier to provide.¹²

Of course, Motient is free to provide terrestrial service pursuant to the rules that govern such services. Given the technologies and wireless allocations already available, however, Motient fails to offer any reason why it cannot take advantage of these resources, but instead must provide terrestrial service within the L-Band.

II. Motient's Dual-Service L-Band Proposal Is Inconsistent With Current FCC Rules and Policies.

Contrary to Motient's claim, there is nothing in the history of the domestic L-Band MSS allocation process, the development of the MSS service rules or in Motient's various operating licenses to support the position that an in-band terrestrial mobile service component to Motient's L-Band system is consistent with existing Commission rules and policies.¹³

First, the footnotes to the U.S. Table of Allocations cited by Motient are

¹¹*Id.* at 12. Motient already provides terrestrial services through ARDIS, which it acquired in 1998. Motient provides that service pursuant to all of the relevant technical rules that the FCC established through notice and comment rulemaking procedures. It is not apparent why Motient should not similarly follow the Commission's rules for MSS.

¹² See *In the Matter of Authorization and Use of Software Defined Radios*, Notice of Proposed Rulemaking, ET Docket No. 00-47 (December 7, 2000).

¹³ Application at 15.

specific to the Aeronautical Mobile Satellite (Route) Service. That service is reserved specifically for “communications relating to safety and regularity of flights.”¹⁴ The policy need for limited extension and supplement of satellite to aircraft communications for safety and navigational purposes is both obvious and markedly different from Motient’s purely commercial goal of attracting more subscribers.¹⁵ Furthermore, there are no parallel footnotes extending this supplemental authority to land mobile or maritime MSS.

Motient also argues that the Commission explored the notion of a dual terrestrial/satellite service when it proposed a generic MSS system in 1985, through a possible allocation of spectrum for the service adjacent to the cellular bands.¹⁶ While this is true, it does not support Motient’s current proposal. First, the suggested allocation would not have incorporated in-band dual service, but rather, adjacent band dual service. Second, the Commission ultimately decided against this suggestion. In fact, the 1985 MSS allocation proceeding is relevant to Motient’s proposal chiefly because the Commission made clear from the outset that it did not believe that MSS should compete with terrestrial mobile systems, as Motient now proposes to do.¹⁷

Finally, while Motient notes - correctly - that the Commission has expressed some interest in the idea of a same-band satellite-terrestrial dual-operating system, and more generally in promoting flexible spectrum use,¹⁸ the cases Motient cites are not relevant to Motient’s application. All of the dockets cited by Motient have either been statements of the Commission’s general policy or else rulemaking proceedings

¹⁴ See 47 CFR § 87.5.

¹⁵ See, e.g., Application at 12, 13.

¹⁶ Application at 15.

¹⁷ See Amendment of Parts 2, 22 and 25 of the Commission’s Rules to Allocate Spectrum for and Establish Rules Pertaining to the Use of Radio Frequencies in the Land Mobile Satellite Service, Notice of Proposed Rulemaking, Docket No. 84-1234, 50 Fed. Reg. 8149 (January 28, 1985) at footnote 19.

¹⁸ Application at 10, footnote 14.

establishing initial service and licensing requirements open to any party interested in supplying such service. By contrast, in this case Motient is attempting to introduce a new hybrid service by radically altering well established rules.

In short, Motient's proposed operation of a terrestrial mobile service in the L-Band is absolutely inconsistent with the existing rules. Motient has presented no evidence to the contrary.

III. No Good Cause Exists For Grant Of Motient's Waiver Request.

As an alternative to finding that its proposed terrestrial service is consistent with current rules, Motient also requests that the Commission waive those rules to the extent necessary to grant the proposal.¹⁹ The waivers of the L-Band service rules that Motient requests, however, would disserve the public and cause major disruption and hardship to the MSS industry. Motient has failed to provide sufficient justification to warrant such waiver.

A. Motient's Proposal Would Jeopardize Critical L-Band Safety Services.

At the outset, it is extremely important to reiterate the fact that the L-Band serves a special and important function in providing global maritime and aeronautical safety services. As the Commission is well aware, Inmarsat was created specifically to provide such services. Successive ITU World Radiocommunication Conferences allocated L-Band spectrum for MSS to be used where required for maritime and aeronautical safety-related services. Those obligations remain in effect regardless of whatever commercial plan an MSS operator may choose to pursue. As discussed below, Motient's proposal raises serious concerns with respect to the ability of Inmarsat and other operators to fulfill their safety-related service obligations. The

¹⁹ Id. at 15.

Commission should not now effectively reallocate this spectrum, for the benefit of one company, to terrestrial services and thereby jeopardize public safety both inside and outside of the United States.

B. Authorization Of Terrestrial Mobile Services Would Harm Existing And Future L-Band Satellite Operations.

The Commission is well aware of the chronic, long-standing shortage of available L-Band spectrum. Motient itself has repeatedly told the Commission that the L-Band is extremely congested and contends that it has insufficient spectrum for its current services.²⁰ Further, as Motient states several times, MSS operators must use the available capacity as efficiently as possible.²¹ Contrary to Motient's claim, however, its proposed L-Band terrestrial service would detract from the efficient use of the spectrum by other MSS operators.

1. Terrestrial Operations Would Significantly Damage Co-Channel Satellite Frequency Reuse Capacity.

One factor critical to determining the capacity available to MSS operators in the L-Band is the extent of frequency reuse. By introducing additional interference into the band, the Motient proposal has the potential to reduce the level of reuse and thereby the capacity available to MSS systems.

Motient states that since the terrestrial fill-in service would use spectrum coordinated for Motient's use, there would be no possibility of co-channel interference except with respect to Motient's own satellites.²² This assertion is

²⁰ See, e.g., Motient Services Inc.'s Petitions to Deny Applications of Comsat Corporation, File No. SAT-ITC-2000605-00103 (filed July 26, 2000); Comsat Corporation, File Nos. SES-LIC-20000609-00944, 00946-00949 (filed August 4, 2000); Marinesat Communications Network d/b/a/ Stratos Communications, File No. SES-LIC-2000426-00630 (filed July 7, 2000); Marinesat Communications Network, File No. SES-MS-2000426-00861 (filed July 7, 2000); Honeywell, Inc., File No. SES-LIC-2000403-00534 (filed July 7, 2000); SITA Information Networking Computing Canada, Inc., File No. SES-MS-2000209-010201 (filed July 28, 2000); and Deere & Company, File No. SES-LIC-20010112-00051 (filed March 9, 2001).

²¹ See, e.g., Application at 8.

²² Application at Appendix A, section 8.2.1.

incorrect because Motient ignores the fact that the L-Band MSS spectrum is not strictly segmented between operators. Where possible, spectrum is reused on a geographical basis. For example, some spectrum that is assigned to Motient and TMI for use in North America is re-used by Inmarsat in South America. The Inmarsat receiving satellite spot beams serving South America receive interference from Motient or TMI terminals in the side lobes of the satellite antenna. Reuse is feasible because the aggregate interference from mobile earth stations is at acceptable levels. The amount of additional interference that is acceptable depends on how close the existing interference level is to the acceptable limit, and the actual increase depends on the number of mobile terminals that are introduced, their power levels and the average shielding between the terminals and the Inmarsat satellite. Motient's terrestrial mobile terminals will cause additional interference, however, and Inmarsat believes that the total interference level will exceed acceptable levels.

Thus, the proposed terrestrial fill-in use will degrade frequency reuse through interference to MSS systems other than Motient's. But Motient's proposal would also seriously degrade reuse within Motient's own system. Motient states that it can prevent co-channel interference to its own satellites by satellite antenna discrimination in combination with low levels of terrestrial mobile station effective isotropic radiated power ("EIRP") toward the Motient satellites.²³ Even though the interference level from a single mobile terminal may be low, however, the aggregate interference from a large number of mobile stations could still degrade the reuse level of the Motient system. A simple calculation is attached to demonstrate the principle.²⁴ The example, which is not a worst case, calculates that no more than approximately thirty two

²³ *Id.* at footnote 1.

²⁴ *See* Attachment 1 hereto.

thousand terrestrial mobile stations could be introduced throughout the United States and Canada without degrading the reuse.

It may be technically possible that a limited number of mobile units could operate in the band without any effect on the MSS. However, since MSS systems operate at low radio link margins, the scale of any such use would necessarily be very small. As Inmarsat's calculation shows, a very limited number of mobile stations would degrade the frequency reuse in the band. The Motient application does not specify how many mobile stations Motient anticipates but simply states that there will be no interference to other systems and that no additional spectrum will be required. This claim does not appear consistent with Motient's reference elsewhere in its application to millions of potential customers for its proposed service. The interference from millions of mobile terminals would make MSS in the L-Band completely impossible.

2. Motient's Proposed Terrestrial Operations Will Adversely Affect Sensitive Receivers Operating In Adjacent Frequency Bands.

In addition to the co-channel up-link interference problems described above, Inmarsat believes that the power level of the transmissions from terrestrial base-stations could block the down-link to MSS terminals operating near to the base stations by overloading the sensitive receiving amplifiers of the MSS terminals. Inmarsat users have experienced such blockage in the past from terrestrial mobile transmissions in an adjacent band and manufacturers have been alerted to the problem via terminal specifications. It is difficult, however, to design a sensitive receiver to overcome the effects of high-powered terrestrial signals adjacent in frequency to the wanted low-power satellite signal.

Inmarsat provides transponders on the Inmarsat-3 and on future Inmarsat-4 satellites for the Radio Navigation Satellite Services at the GPS frequencies. Inmarsat is concerned that the level of transmitted power from terrestrial base-stations also will be sufficient to block reception of the satellite navigation signals in the adjacent GPS band. This is because the receivers have only a limited amount of filtering to reduce the adjacent band signal to a level that will not overload the receiving amplifiers. It is not a coincidence that the MSS down-link band is allocated adjacent to the RNSS down-link band, since both services use sensitive, low-noise front-end amplifiers which receive signals from satellites at similarly low levels. Motient ignores these issues and instead confines itself to commenting on the protection of GPS signals from out-of-band emissions of the base stations.²⁵

3. The Proposed Terrestrial Use Will Reduce The Amount Of Spectrum Available For MSS Use.

Both the degradation of co-channel up-link reuse and the adjacent channel blocking of the down-link described above would affect the total availability of spectrum for all MSS operators. If terrestrial use of the L-Band MSS spectrum increases the interference levels to the extent that reuse between certain satellite beams is no longer feasible, this will cause a serious reduction of the already limited amount of spectrum available to MSS.

Motient states that the operation of fill-in base stations will not require the assignment of “any more spectrum.”²⁶ Presumably this phrase refers to the amount of spectrum that Motient has acquired through the multilateral coordination process. But as shown above, Motient’s use of L-Band spectrum for terrestrial service will effectively block other operators from using that spectrum for MSS operations. Given

²⁵ Application at Appendix A, Section 8.2.2.

²⁶ *Id.* at 13.

the shortages that already exist in this band and the increasing demands being placed on this spectrum. the Commission should take no action that would reduce the availability of this spectrum to satellite operators as Motient's proposal would do.

Motient also states that there will be no need to subdivide the spectrum.²⁷

Again this statement appears to be based on the assumption that satellite spectrum can be reused by terrestrial systems without affecting the spectrum availability for the satellite systems. As shown above, the introduction of terrestrial mobile stations will degrade the reuse level among systems or within the Motient system. In this situation, Motient would effectively need additional spectrum to support the terrestrial fill-in service, whether this additional spectrum comes as a separate segment or not.

C. Motient's Proposal Would Allow The Terrestrial Tail To Wag The Satellite Dog.

As stated, Inmarsat strongly objects to any proposal that would reduce the amount of spectrum available for MSS use. The Motient proposal has the potential of doing just that if the proposed terrestrial network develops beyond a very limited fill-in service towards a larger scale terrestrial mobile network. Inmarsat especially notes Motient's statements such that its proposed new service "can be marketed to *millions of consumers* in both rural and *urban* areas."²⁸ Motient obviously believes that there is a mass market for the proposed service. Certainly there is a mass market for terrestrial mobile services. However, the terrestrial mobile mass market is served in different frequency bands with the appropriate technology that allows substantial frequency reuse. There is no spectrum to spare in the MSS allocations for this service: MSS technology is being stretched to its limits to improve frequency re-use as it is. Therefore, it should be used only for MSS systems. If Motient wishes, it can

²⁷ *Id* at Appendix A, Section 2.3.

²⁸ *Id* at 13 (emphasis added).

incorporate dual-band technology into its system, by combining the use of terrestrial Mobile Service bands with MSS bands to produce a dual-band package.

IV. Conclusion.

Motient's application is a fairly candid statement that its previous spectrum demands have been excessive and that it has been unable to generate much consumer interest in its existing MSS service. Motient's proposal to introduce an in-band terrestrial service also would suggest that it has more spectrum than it can use. Motient claims in its application that it can operate both satellite and terrestrial units on an interference-free basis but provides very little technical support for that claim.

Motient's application represents a very bad solution to its technical and financial problems. It clearly is in derogation of the Table of Frequency Allocations in the Radio Regulations and current Commission L-Band policy. Motient's request for waiver of these rules amounts to an effort to change the nature of its L-Band service in a way that will make the scarcity of L-Band MSS allocations much worse and jeopardize the provision of safety-related maritime and aeronautical services. In addition, it could prevent operation of mobile earth stations in the MSS operating near to any base-station, due to overloading of the front-end receiver by the high-level signals coming from the base stations. The base stations will interfere with the operation of nearby GPS receivers in the adjacent band in the same way.

Inmarsat continues to support efforts by members of the satellite community to enhance the services they offer to the public. But Motient's proposed terrestrial L-Band operations are unnecessary, would cause more harm than good and are not in the public interest. For the reasons stated herein, the FCC should reject Motient's request to provide terrestrial mobile service in the MSS bands.

Respectfully submitted,

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ATTACHMENT 1

Degradation of frequency reuse

1. Calculation of the maximum number of co-channel terrestrial users

The following table illustrates how interference from terrestrial mobile stations could cause unacceptable interference into an MSS system, even if the mobile system was operating in a shielded environment (e.g. indoors) and in a geographically separated area. The example is equally valid for inter- and intra-system interference.

C/(N+I) requirement (Note 1)	20	dB
C/(N+I) without terrestrial mobile interference (2)	21	dB
Mobile earth station mode EIRP (3)(mobile to satellite)	5	dBW
Mobile station mode EIRP (4)(mobile to base station)	0	dBW
Satellite antenna discrimination	20	dB
Average shielding (5)	15	dB
Number of co-frequency carriers from mobile stations	20	
C/I MS to MSS (6)	26.87	dB
C/(N+I) total	20.02	dB

Notes:

(1) C/I requirement of the MSS carrier under consideration. This value includes thermal noise and other interference sources, including contributions due to reuse, either within the network or with another network, or both.

(2) It is thus assumed that there is a 1 dB margin available for interference from terrestrial fill-in stations. It should be noted that the margin available for

additional interference is typically very small in MSS systems and may be needed for other interference sources.

(3) This value is taken from the MSV filing, Table 1-6 (p. 20). It can be noted that this is the maximum EIRP. For interference calculations the minimum EIRP should normally be used. Using the minimum EIRP would reduce the number of possible users.

(4) Taken from the MSV filing, Table 2-1 (p. 30).

(5) This level of shielding towards the GSO is considered a realistic average for a number of terminals operating indoors or in heavily cluttered environments.

(6) This assumes that the propagation loss is equal for the wanted and interfering signal paths

Thus, in this example it would only be possible to introduce twenty radio carriers from terrestrial mobile terminals to base stations, operating co-frequency with the MSS carrier throughout the United States and Canada. It is considered that the values chosen for the example are realistic; both better and worse cases could occur.

2. Estimation of the possible scale of terrestrial fill-in service

It is assumed that Motient would operate the terrestrial fill-in service in spectrum assigned to Motient but not used for MSS in a given area. On this basis, it is estimated that Motient would have approximately 6 MHz of spectrum available for such use. Since the carrier bandwidth of the proposed terrestrial service is quoted as 200 kHz (Table 2-1 of Motient filing), there would thus be 30 carriers available. Assuming each carrier can support six voice channels, there would be 180 voice channels available. However, assuming that all the 30 carriers are made available in a single terrestrial fill-in station cell, we calculate the traffic volume that can be

supported by this fill-in station¹, using the Erlang-B formula². For a Grade of Service of 1%, this total traffic volume is 160 Erlangs³.

Next, we estimate the traffic requirement of each user in the busy hour. As Motient’s proposed service appears to be similar to the planned third generation mobile service (IMT-2000), we can take estimates from the ITU-R Report M.2023, “Spectrum requirements for IMT-2000”. The relevant parameters from Report M.2023 are reproduced in the table below. Report M.2023 considers six “services” and three “environments” for terrestrial IMT-2000. In the table below, three of these services and two of the environments have been included, as these would seem to correspond to those that would be supported by the proposed fill-in service.

Service \ Environment	Busy hour call attempts		Call duration (sec)	
	In-building	Urban pedestrian	In-building	Urban pedestrian
Speech	3	0.8	180	120
Simple messaging	0.6	0.3	3	3
Switched data	0.2	0.2	156	156

The traffic per user can be calculated for each combination of service and environment by the formula (BHCA)*(Call duration)/360. The results are shown below.

BH traffic per service (Erlangs)	In-building	Urban ped.
Speech	0.150	0.027
Simple messaging	0.001	0.000
Switched data	0.009	0.009
Total	0.159	0.036

¹ Using all the thirty carriers in one fill-in station means that it is not possible to implement another fill-in station immediately adjacent to the first one. On the other hand, if several nearby fill-in stations are required, only a sub-set of the 30 carriers could be made available to each. It is more likely that the thirty available carriers would be used to create, for example, a four or seven-cell reuse pattern among cells. The results in terms of the limit to the number of operating mobile terminals set by co-channel interference to a satellite up-link carrier is similar. The first case would support a greater number of users in total, since the trunking efficiency in each cell would be maximised.

² The Erlang-B formula is valid for circuit-switched traffic. Although some of Motient’s traffic may be packet switched, the Erlang-B formula can be used to get an estimate of the traffic volume.

Thus, users in the “in-building” environment are expected to generate 0.159 Erlang in the busy hour and “urban pedestrian” users 0.036 Erlang. Taking an average of 0.1 Erlang per user, a single fill-in cell could support 1600 users (160Erlangs divided by 0.1Erlang per user). If the per user Erlang demand is larger, the number of users must be reduced for a given grade of service.

Since in this example 20 simultaneous co-frequency channels would be acceptable, for the traffic levels assumed per user, these carriers would be able to support $(20 \times 1600) = 32,000$ users.

Finally, it should be noted that the above example has assumed that all carriers are used for voice telephony only. However, Motient plans to provide data services at rates up to 160Kbits/sec.⁴ Since a data transmission at that rate would require one full carrier, the total number of users would be reduced accordingly.

3. Conclusion

Through an example, and using non-worst case assumptions, it has been shown that only a limited number of terrestrial mobile stations can be implemented without causing degradation to the frequency re-use of MSS systems. For the example used, a total of 20 carriers throughout the US and Canada would be possible, and the maximum number of users that could be supported would be about 32,000.

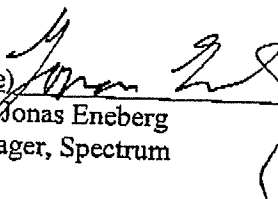
³ GoS of 1% is taken from ITU-R Report M.2023, which makes this assumption for terrestrial IMT-2000.

⁴ Application at 9.

CERTIFICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this pleading and its attachment, that I am familiar with Part 25 of the Commission's Rules, that I have reviewed the engineering information submitted in this pleading, and that it is complete and accurate to the best of my knowledge and belief.

17 April 2001
Date

(signature) 
Name: Mr. Jonas Eneberg
Title: Manager, Spectrum

CERTIFICATE OF SERVICE

I, Maria Cabico, a secretary to the law firm of Powell, Goldstein, Frazer and Murphy LLP, certify that copies of the attached Partial Petition to Deny of Inmarsat Ventures plc were delivered April 18, 2001, via 1st class mail, postage prepaid, to the following parties:

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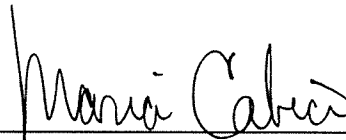
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