OSTON
BRUSSELS
CHICAGO
FRANKFURT
HAMBURG
HONG KONG
LONDON
LOS ANGELES
MILAN
MOSCOW
NEW JERSEY

Latham & Watkins
ATTORNEYS AT LAW
WWW.LW.COM

ORIGINAL

NEW YORK
NORTHERN VIRGINIA
ORANGE COUNTY
PARIS
SAN DIEGO
SAN FRANCISCO
SILICON VALLEY
SINGAPORE
TOKYO
WASHINGTON, D.C.

September 12, 2002

Via Electronic Filing and Hand Delivery

ORIGINAL

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, DC 20554

Re: ***Ex Parte Presentation***:
IB Docket No. 01-185;
Motient Services Inc. and Mobile Satellite Ventures Subsidiary LLC
File No. SAT-ASG-20010302-00017 et al.;
TMI Communications and Company, Limited Partnership
File No. SES-ASG-20010116-00099 et al.

Dear Ms. Dortch:

Today, September 12, 2002, Donald Kennedy, Director, International Regulatory Affairs of Inmarsat Ventures plc, Jonas Eneberg, Manager, Spectrum of Inmarsat, and Alan Auckenthaler, Vice President of the Americas and General Counsel of Inmarsat, Richard Barnett of Telecomm Strategies and the undersigned, met with the following Commission representatives: Thomas S. Tycz, Dante Ibarra, Paul Locke, Trey Hanbury, Erik Salovaara, Alan Stillwell, Charles Rush, Chris Murphy, Douglas Webbink, Mark Uretsky, and Howard Griboff.

The topics of discussion were those described in the enclosed set of presentation materials and the Inmarsat positions of record in this proceeding. Copies of the record submissions listed on the attached page were made available to those individuals. Copies of this letter are being provided to those individuals as well.

An original and five copies are enclosed.

Respectfully submitted,

John P. Janka

Enclosures

555 ELEVENTH STREET, N.W., SUITE 1000 • WASHINGTON, D.C. 20004-1304
TELEPHONE: (202) 637-2200 • FAX: (202) 637-2201

TABLE OF CONTENTS

Presentation to the Federal Communications Commission

Terrestrial Use of the L-Band

Inmarsat Ventures plc

IB Docket No. 01-185

September 12, 2002

inmarsat

Topics for Discussion

- Current L-band use by mobile satellite systems
- Nature of terrestrial L-band interference
  - into MSS spacecraft
  - into mobile earth terminal receivers
- Why terrestrial L-band use in the U.S. affects MSS operations elsewhere in the world
- Why technical limits on terrestrial L-band use
  - would not solve these interference problems
  - would constrain future satellite system design
- Why terrestrial use of the L-band should not be permitted

inmarsat

Overview: The Inmarsat MSS System

- Successful commercial company organized under UK law
  - former IGO privatized in 1999
- Provider of maritime, aeronautical, safety and land mobile MSS services to:
  - commercial businesses (e.g., shipping, airlines, media, oil, mining)
  - government agencies (U.S. Navy, Coast Guard, FAA)
  - humanitarian aid organizations
- 9 geostationary spacecraft providing global MSS service to over 250,000 mobile earth terminals
- Over $1.6B Inmarsat-4 system ready for service 2004
- Only satellite system to meet stringent international standards for global maritime distress and safety system (GMDSS) and aeronautical safety services
- Not an alternative to cellular or PCS service

inmarsat

Overview: Extensive Satellite Use of L-Band

- L-band satellite services commenced in 1976 with Comsat's MARISAT system; Inmarsat commenced MSS in 1982
- Many satellite systems operating around the world share L-band on a co-channel basis
  - Inmarsat, MSV/TMI, Solidaridad (Mexico), Volna-More (Russia), MTSAT (Japan), Thuraya (UAE), ACeS (Indonesia), Optus (Australia), and others in future
- High demand has resulted in use governed by international coordination agreements (Mexico City 1996 and Dubai 1997)
  - sharing arrangements enhance efficient use of L-band spectrum by maximising co-channel reuse
  - require annual reassignment of L-band spectrum based on changing demand for MSS capacity
- FCC has repeatedly recognized the shortage of L-band spectrum that is needed for MSS

inmarsat

Overview: L-Band International Regulatory Factors

- ITU Table
  - No primary allocation for terrestrial services in the U.S. at L-band
  - Non-conforming uses in the U.S. must not cause harmful interference outside the U.S. (RR 4.4, 8.5)
- Mexico City L-band coordination agreement expressly obligates U.S. to avoid situations that potentially could give rise to unacceptable interference into MSS systems
- IMT-2000 studies confirm need for separate bands for satellite and terrestrial components of mobile comm. systems to avoid harmful interference (e.g., Annex 1, Rec. M.1036)

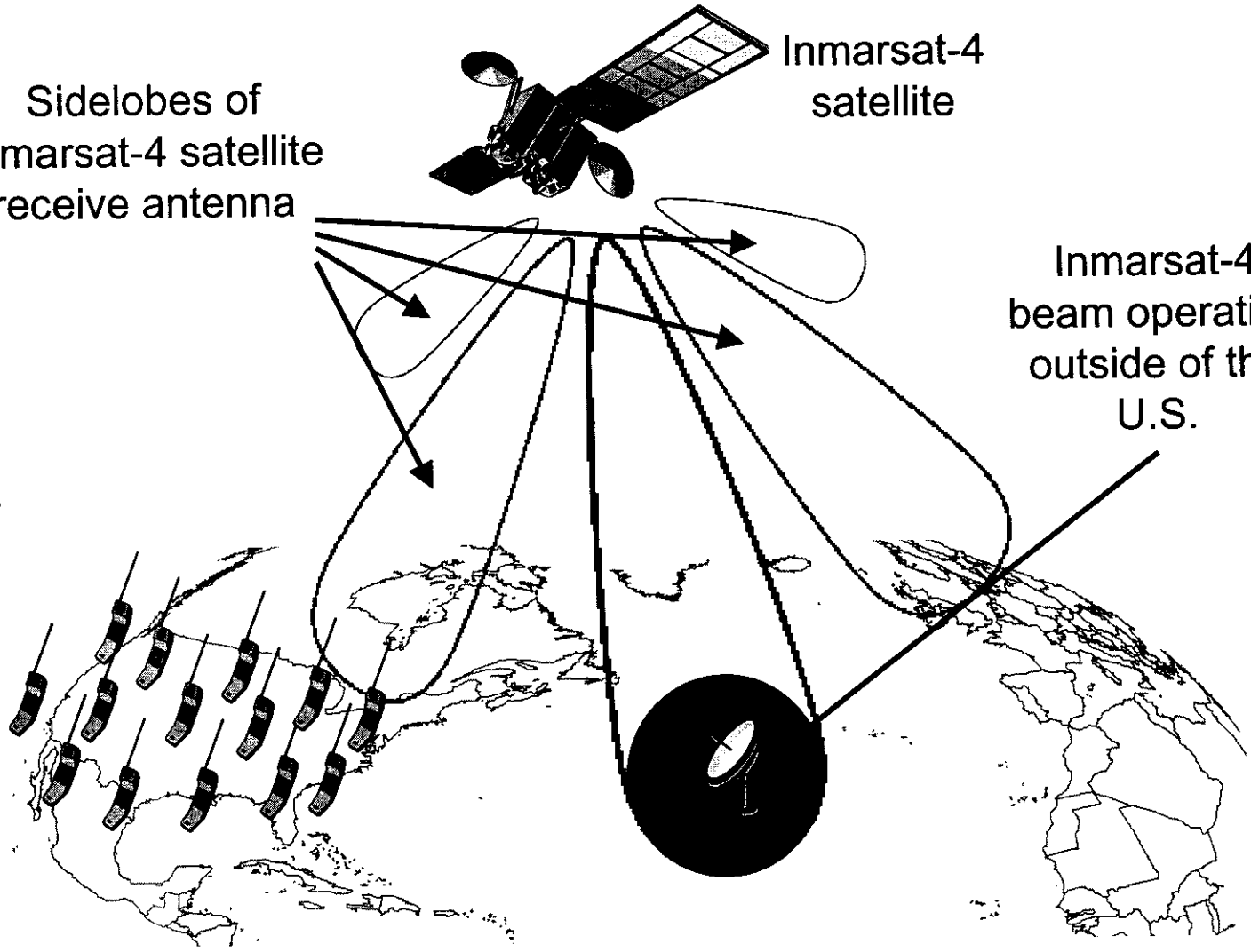
inmarsat

Nature of Terrestrial Interference into L-Band MSS Satellite

- Interference into Inmarsat satellite receiver
  - Aggregate emissions from multiple low-powered terrestrial handsets produce two types of interference
    - Co-frequency interference affects Inmarsat satellite receive beams serving areas *outside* the U.S.
    - Unwanted emissions interfere with Inmarsat satellite receive beams serving areas *within* the U.S.
  - More aggregate interference than another L-band MSS system ever would be expected to produce

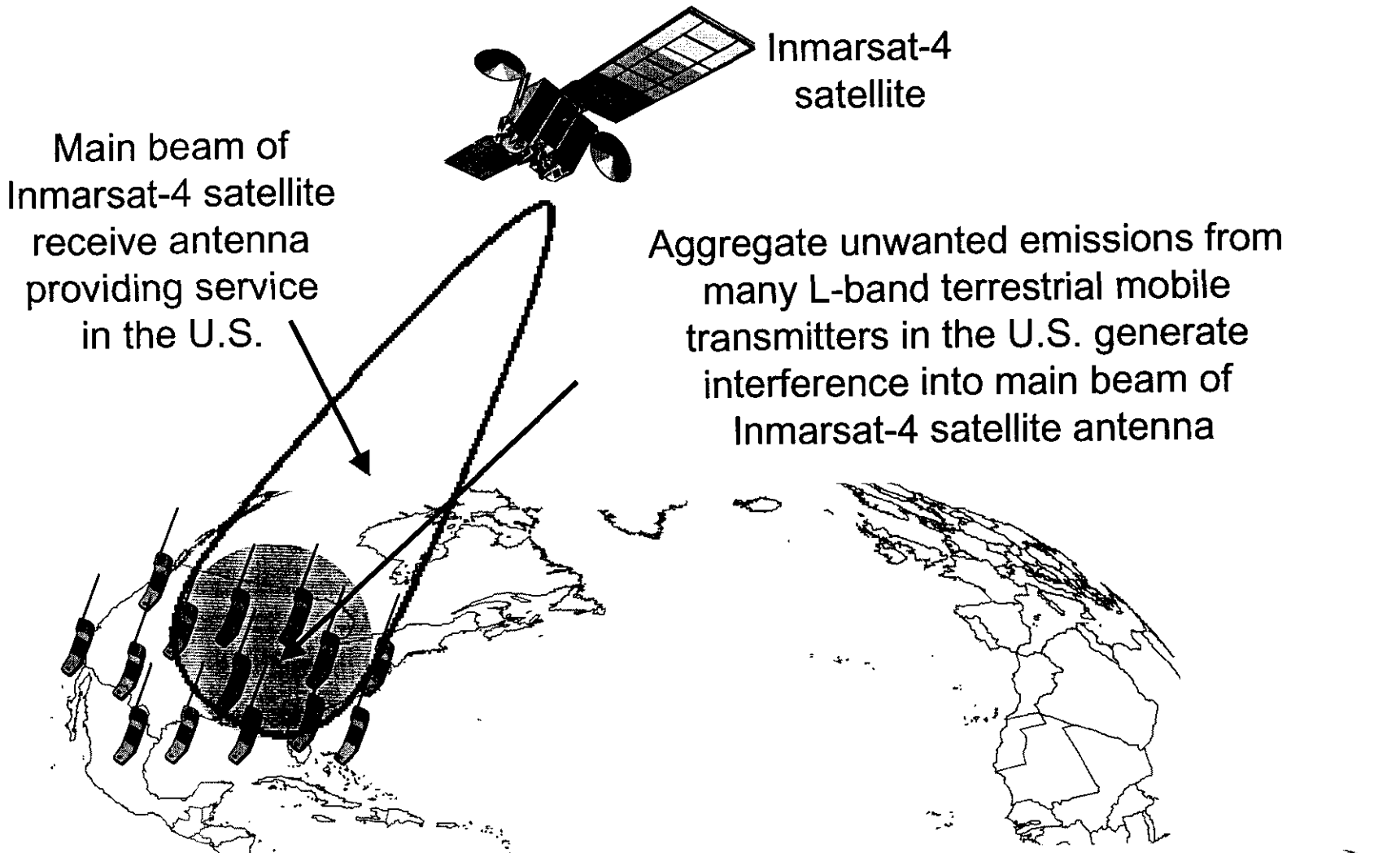
inmarsat

Uplink Interference from Terrestrial Transmitters (Co-Frequency, Non Co-Coverage)



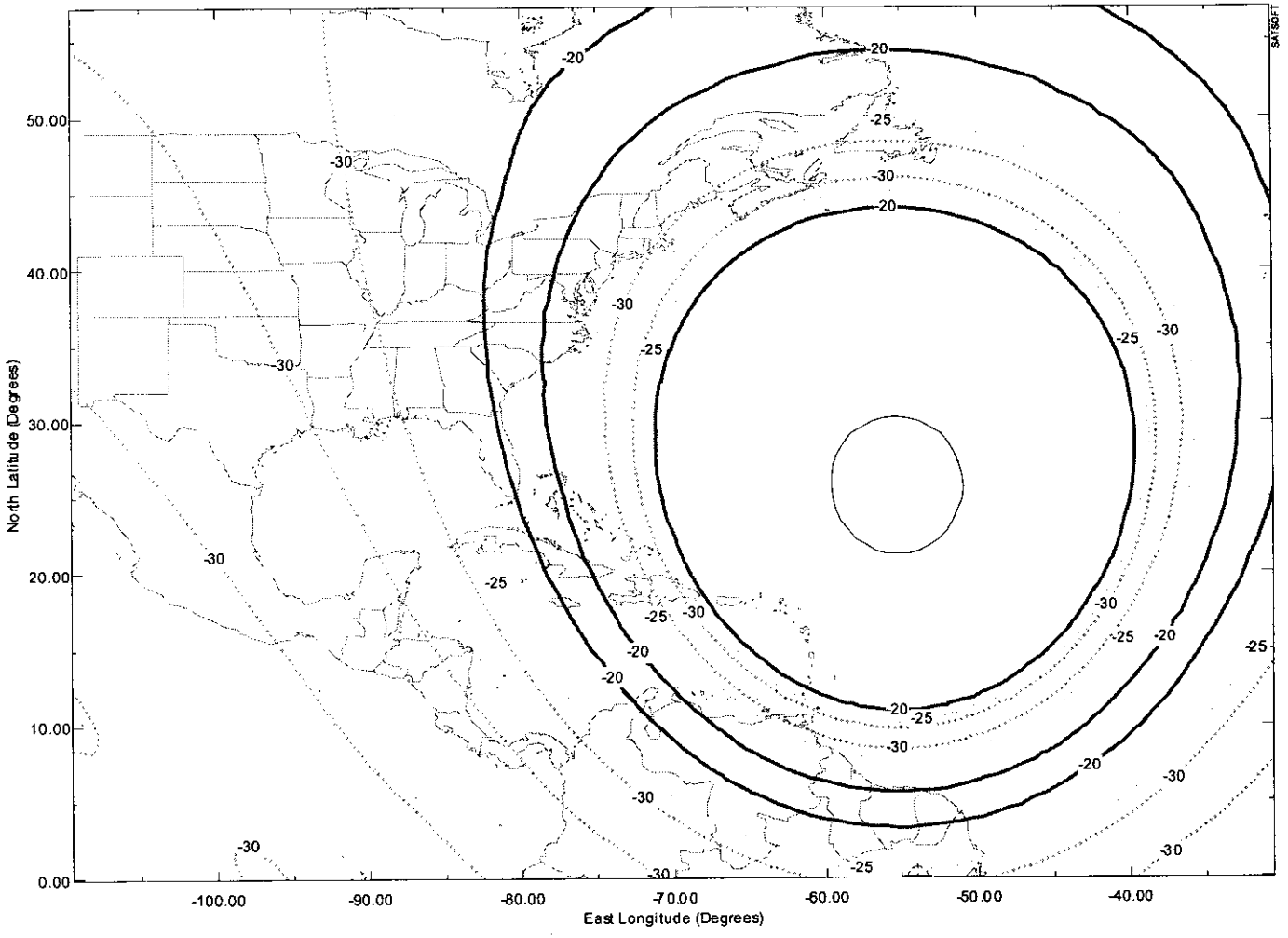
inmarsat

Uplink Interference from Terrestrial Transmitters (Unwanted L-Band Emissions, Co-Coverage)



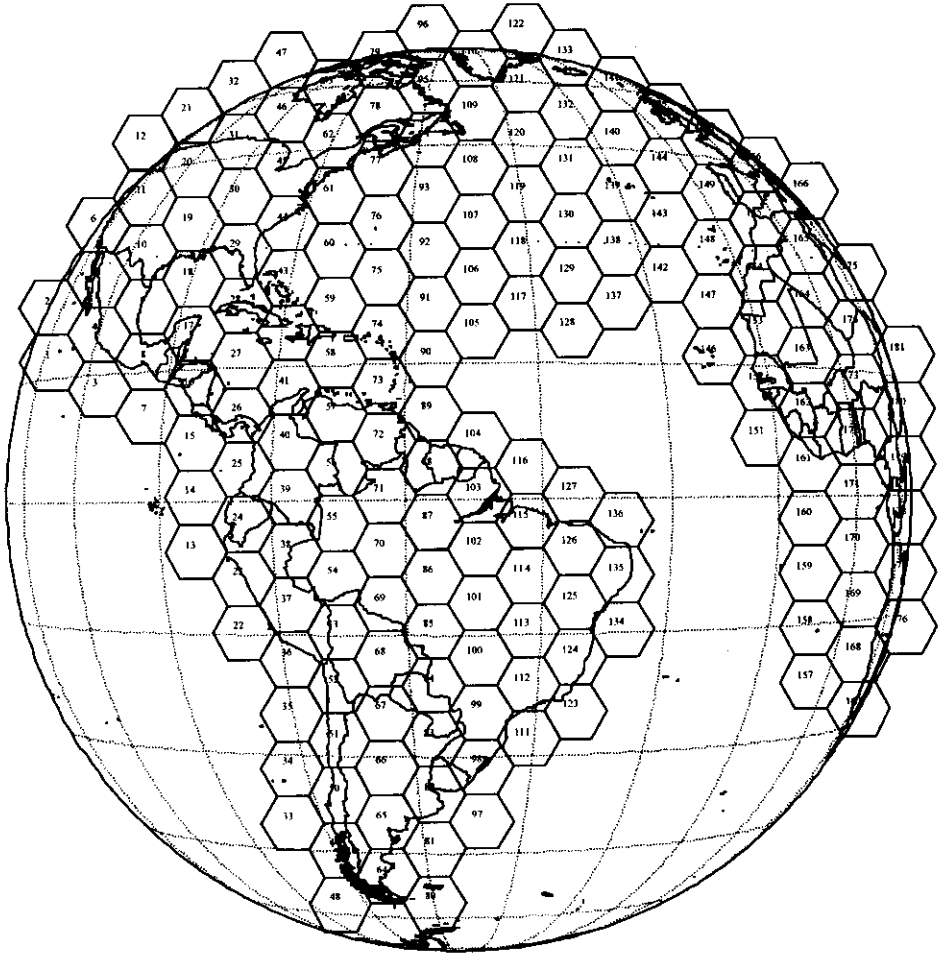
inmarsat

Example of Inmarsat-4 Sidelobes



inmarsat

Example of Inmarsat Service Area (Inmarsat-4 at 54° W.L.)

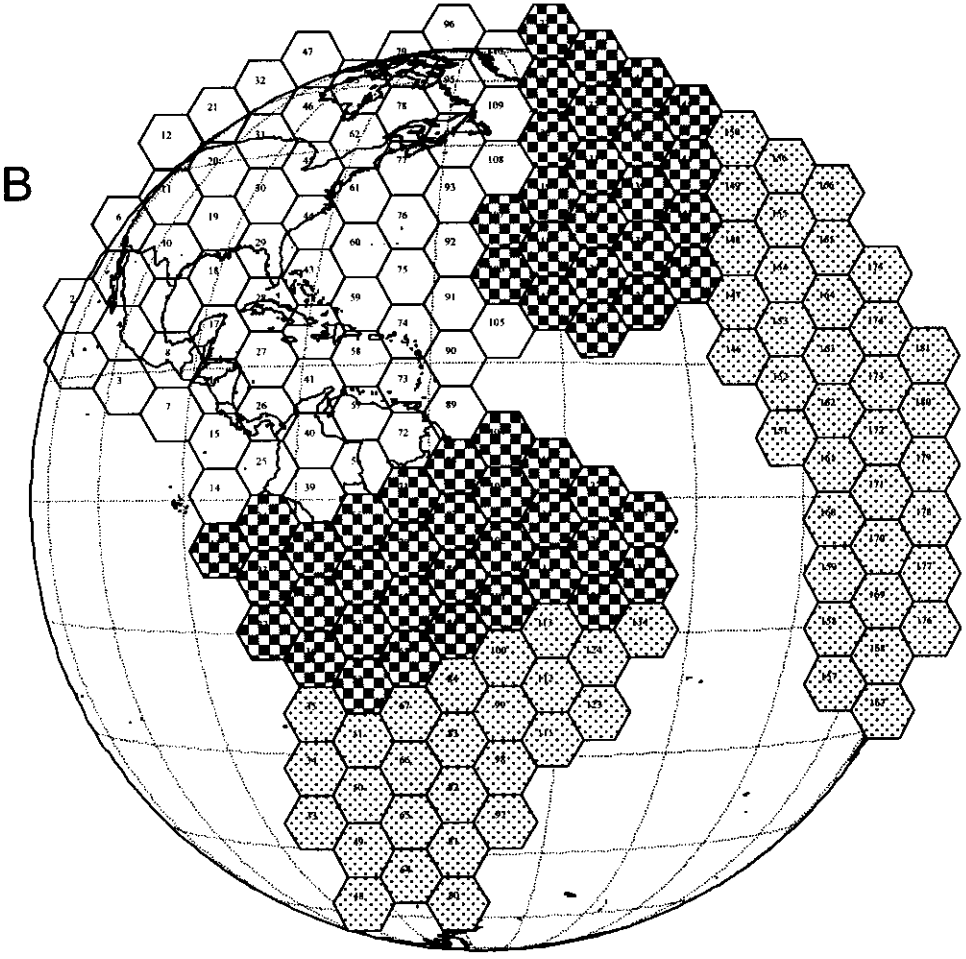


inmarsat

Example of Terrestrial Use Limiting Capacity of Inmarsat-4 Spacecraft

20-30 dB

>30 dB



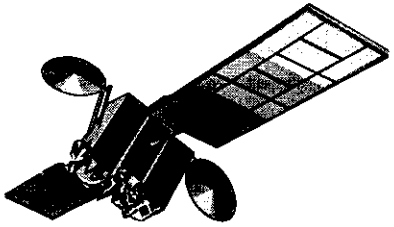
<20 dB

I-4 beams in which terrestrial use in the U.S. impacts co-frequency coverage outside the U.S.

I-4 beams in which MSV satellite use likely precludes co-frequency reuse

inmarsat

Nature of Terrestrial Interference into L-Band MSS Mobile Earth Terminals (METS)

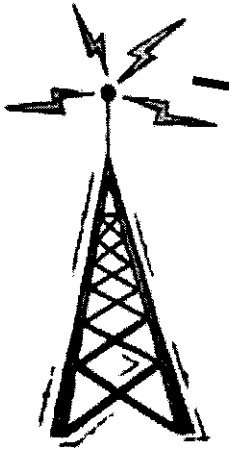


Inmarsat
satellite

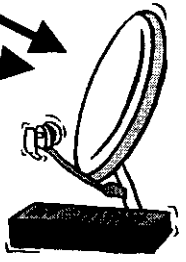
Wanted signal received from >36,000,000 meters

Inmarsat
Mobile Earth Terminal
(MET)
(designed to operate with
low level signals from space)

Interfering signal received
from 100-10,000 meters



Terrestrial
Base Station
Transmitter



inmarsat

Nature of Terrestrial Interference into L-Band MSS Mobile Earth Terminals (METS)

- Interference into Inmarsat terminals within the U.S.
  - High level terrestrial signal outside of the MET receive bandwidth causes overload of the MET receiver.
  - Unwanted emissions from terrestrial transmitter fall in the MET receiver band
- Consequences of interference:
  - Aeronautical terminals will not operate when flying near or over a terrestrial base station
  - Land mobile terminals will not operate near terrestrial base station
  - Maritime terminals will not operate near terrestrial base station
- Inmarsat METs have experienced this type of terrestrial interference before

inmarsat

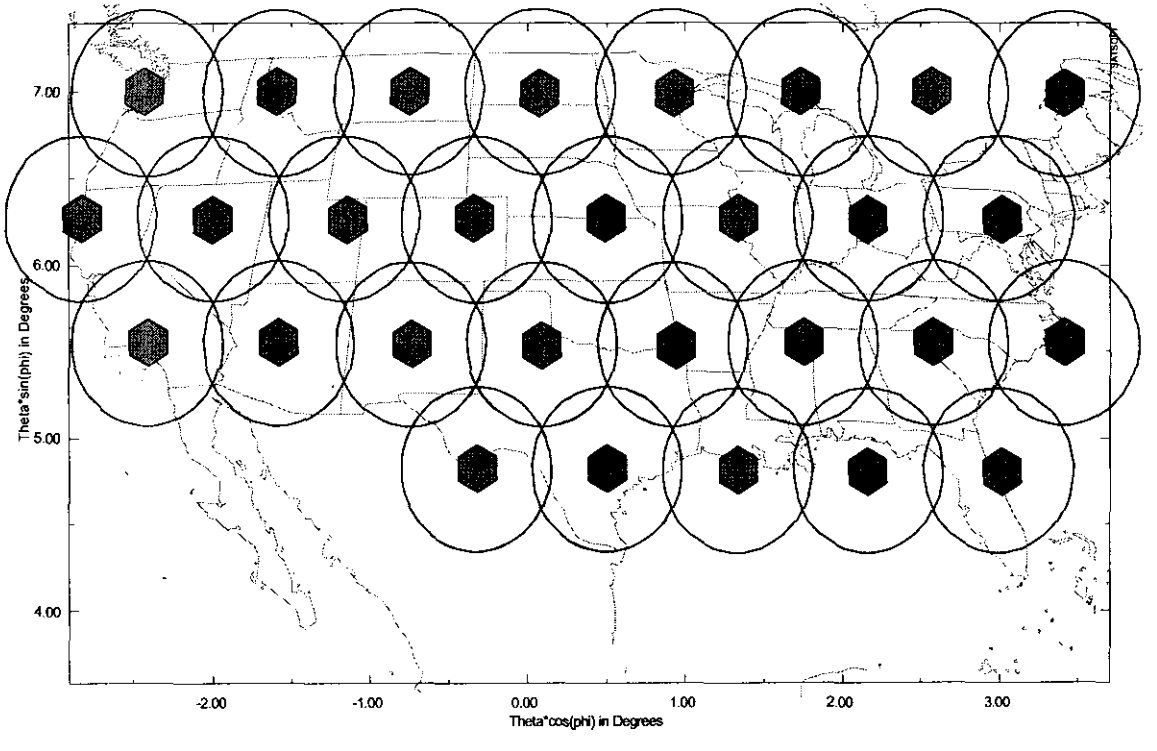
MSV Self-Interference From ATC Would Consume Additional L-Band Spectrum

- To avoid self-interference from co-frequency operations, adequate isolation must exist in a satellite antenna beam between satellite and ATC uses of the same spectrum
- A satellite system cannot achieve this adequate level of isolation everywhere in the U.S., thus resulting in regions where additional spectrum would be needed for ATC service

inmarsat

Example of Terrestrial Use Consuming Additional L-Band Spectrum in the U.S.

- MSV would need to achieve 30dB of antenna isolation between terrestrial and satellite co-frequency uses of MSS spectrum, but even achieving only 20dB of isolation *precludes* co-frequency terrestrial reuses *virtually anywhere in the US*
- Even accepting MSV's 10 dB of isolation (for the sake of argument) yields the large hexagonal areas identified below where MSV would need additional spectrum to provide terrestrial service



inmarsat

Adopting Terrestrial Limits at L-Band Constrains Future Satellite Technology

- New technology that increases satellite system efficiency also raises susceptibility to terrestrial interference
  - Smaller spot beams
    - provide greater capacity
    - increase co-frequency reuse of spectrum
    - allow geographically closer coverage for co-channel sharing among competing satellite systems
    - support lower cost, lower-power-density METS capable of transmitting at higher data rates
    - BUT higher satellite gain makes links more interference sensitive
  - Higher order modulation schemes (such as 8PSK and 16 QAM)
    - increase efficiency by allowing information to be transmitted in less bandwidth
    - BUT these modulation techniques also require higher C/N and therefore are more sensitive to interference

inmarsat

Adopting Terrestrial Limits at L-Band Constrains Future Satellite Technology

- Trend is demonstrated in evolution of Inmarsat 2, 3 and 4 systems

	I-2/I-3 Global beam	I-3 Spot beam	I-4 Spot beam
Gain (dBi)	18.5	27	41
Reuse	1	1.7	8-10
Number of beams	1	5	~200

- Establishing fixed levels of "permissible" terrestrial interference constrains continued satellite network evolution

inmarsat

Limiting L-Band Terrestrial Emissions Into METS Does Not Solve the Problem

- Cannot balance required protection of METs with operational requirements of terrestrial systems
- EIRP limits that protect METs result in unreliable terrestrial operation (e.g. in buildings)
- EIRP limits that allow reliable terrestrial operations result in "exclusion zones" where Inmarsat METs could not reliably operate
- METs are used in and near urban and suburban areas
    - airports and flight paths
    - waterways and ports
    - emergency, news gathering and other high-data-rate communications on land

inmarsat

Limiting L-Band Terrestrial Emissions Into Satellites Does Not Solve the Problem

- To protect satellites, must limit aggregate power emitted in MSS uplink band
  - Must constrain *all transmitters* within affected sidelobes of MSS satellites
    - In U.S., Mexico, Canada, Central and South America, etc.
  - In MSV's case, limit should correspond to 10 simultaneous co-channel uses in the U.S.
- Problems:
  - No aggregate terrestrial areal EIRP limit is effective or enforceable
    - Cannot be accurately measured at the spacecraft
    - Noise contributions from different sources cannot be identified
  - Limits that protect MSS satellite receivers would not support a viable terrestrial service

inmarsat

Shielding and Other Propagation Effects Do Not Adequately Mitigate Interference

- Measured propagation data contradicts MSV assumption that terrestrial signal fade can protect spacecraft and METs for virtually all of the time
- Shielding is greatly reduced by geometries that exist in cities (e.g. orientation of roads towards GSO)
- Significant fading occurs for small percentages of the time, which allows wanted links to perform satisfactorily
- Since the fading models quoted by MSV are meant for wanted links, they do not predict fading levels for large percentages of the time, as needed for predicting levels of interfering signals
- Unreasonable to assume ATC uses will occur mostly in buildings

inmarsat

Terrestrial Needs Can Be Met Without Harming L-Band MSS Systems

- Goal: increase quality of mobile service in urban and suburban areas
- Solution: deploy multi-band terminals that use other spectrum when satellite signal is not available
  - Multi-band/mode wireless phones are common today
  - Wireless operators in Europe and Australia successfully "resell" capacity they lease from facilities-based wireless providers
  - MSV could seek license or leased access in other bands where its terrestrial needs would not impact L-band users
    - Would leave MSV in full control over sales, billing and marketing

inmarsat

L-Band Warrants Different Solution Than 2 GHz May Warrant

- Heavy incumbent use for satellite services
- Disruption of existing military, safety, commercial and humanitarian services
- Billions invested in in-orbit spacecraft and hundreds of thousands of METs
  - Next generation spacecraft already being built
- Existing U.S. commitments under Mexico City MOU
- Inadequacy of available spectrum to support current MSS demands at L-band

inmarsat

Interference Issues with Terrestrial Use of Big LEO Band

- Terrestrial use of the Big LEO band presents an interference issue for satellite receive antennas operating in the L-band
- 1610-1626.5 segment of the Big LEO band is immediately adjacent to the L-band uplink band
- Large numbers of terrestrial transmitters in the 1610-1626.5 GHz band could produce, in the aggregate, harmful levels of out-of-band emissions
- Out of band emissions from 1610-1626.5 GHz would need to be constrained to avoid interference into Inmarsat satellite receive antennas

inmarsat

Consequences of Allowing Terrestrial Use of L-Band

- Disrupt U.S. and international service provided over Inmarsat spacecraft
  - Harm safety-related and "regular" commercial traffic alike
  - Potential for high and visible catastrophic loss from terrestrial interference into emergency communications
- Limit spectrum L-band spacecraft can use, and geographic areas they can serve
- Prevent L-band mobile earth terminals from operating in the vicinity of terrestrial base station transmitters
- Consume more L-band spectrum than MSV otherwise needs for satellite service alone
- Violate the 1996 Mexico City L-band international coordination agreement

inmarsat

Conclusion

- Terrestrial use of the L-band should not be authorized due to heavy incumbent MSS use of the band
- Terrestrial use of the L-band would
  - Cause harmful interference into Inmarsat spacecraft and mobile earth terminals
  - Constrain deployment of more efficient satellite technology
  - Reduce L-band spectrum critically needed for MSS service
- Effective limits on broad-scale terrestrial use of the L-band are not feasible
- Co-frequency terrestrial operations in uplink part of L-band must be avoided, even in non-co-coverage cases
- Mobile satellite and mobile terrestrial services require separate band segments to prevent interference
- Urban and suburban "fill-in" service can be provided in other frequency bands than the L-band

inmarsat

Sources: Inmarsat Technical Analyses

- *Technical Annex to Comments of Inmarsat Ventures plc*, IB Docket No. 01-185 (filed October 22, 2001)
- *Supplemental Technical Annex to Reply Comments of Inmarsat Ventures plc*, IB Docket No. 01-185 (filed November 13, 2001)
- *Ex parte* presentation of Inmarsat, IB Docket No. 01-185, File No. SAT-ASG-20010302-00017 *et al.* (filed February 26, 2002)
- "Quantification of Harmful Co-Channel L-Band Uplink Interference into Inmarsat-4 From MSV ATC Uses, Versus MSV Mobile Earth Terminal Uses," at Attachment, *ex parte* presentation of Inmarsat, IB Docket No. 01-185, File No. SAT-ASG-20010302-00017 *et al.* (filed May 10, 2002)
- "Inmarsat Response to MSV Ex Parte of March 28 Concerning 'Monitoring and Control of Ancillary Terrestrial Emissions by MSV's Space Segment,'" *ex parte* presentation of Inmarsat, IB Docket No. 01-185, File No. SAT-ASG-20010302-00017 *et al.* (filed May 15, 2002)
- "MSV is Unable to Operate ATC Without Using Additional Spectrum Beyond That Used for Its MSS System" at §3, *ex parte* presentation of Inmarsat, IB Docket No. 01-185, File No. SAT-ASG-20010302-00017 *et al.* (filed May 21, 2002)
- "Inmarsat's Reply to the 'Further Technical Analysis' of Mobile Satellite Ventures, dated July 29, 2002," *ex parte* presentation of Inmarsat, IB Docket No. 01-185, File No. SAT-ASG-20010302-00017 *et al.* (filed September 9, 2002)

inmarsat