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December 19, 1996

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554


RECEIVED
DEC 19 1996
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY


Re: Notice of ex parte presentation in RM-8811, ET Docket No. 95-183, RM-8553, PP Docket No. 93-253, ET Docket No. 94-124, RM-8308

Dear Mr. Caton:

Motorola Satellite Systems, Inc. ("Motorola"), through its attorneys, and pursuant to Section 1.1206 of the Commission's rules, hereby reports that an oral ex parte presentation was made on December 17th by representatives of Motorola to the International Bureau. In attendance at this meeting were Donald Gips, John Sloan, Virginia Marshall, and Steve Sharkey. During this presentation the attached documents were distributed and discussed along with the positions of Motorola as set forth in its comments in the above-referenced proceedings. In addition, Motorola distributed copies of the attached charts which set forth Motorola's understanding of the number and location of licensed fixed stations in the 38.6-40.0 GHz band as reflected in the Commission's records as of November 1996, as well as a compressed grouping of the licensed stations if the Commission were to reassign these channels.


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An original and six copies of this letter are being submitted for inclusion in the above-referenced dockets. Copies of this notice are also being sent to those Commission personnel in attendance at the presentation.

Respectfully submitted,

Philip L. Malet

Counsel for Motorola Satellite Systems, Inc.

cc: Mr. Donald Gips
Mr. Steve Sharkey
Mr. John Sloan
Ms. Virginia Marshall

# The M-Star System

## A Global Network of Non-Geostationary Communications Satellites Providing Broadband Services in the 40/50 GHz Bands

**Filed 4 September 1996 by:**

**Motorola Satellite Systems, Inc.**

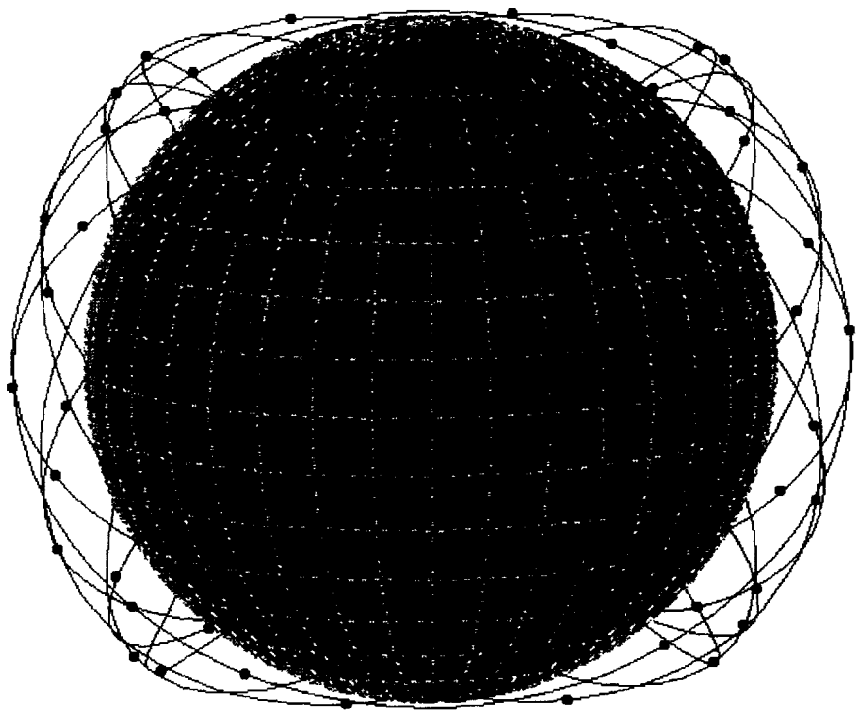
# M-Star Presentation Outline

- Introduction
- Business Plan
- System Architecture
- Spectrum Plan
- Sharing Considerations
- Sharing Rules
- Summary

# Business Application

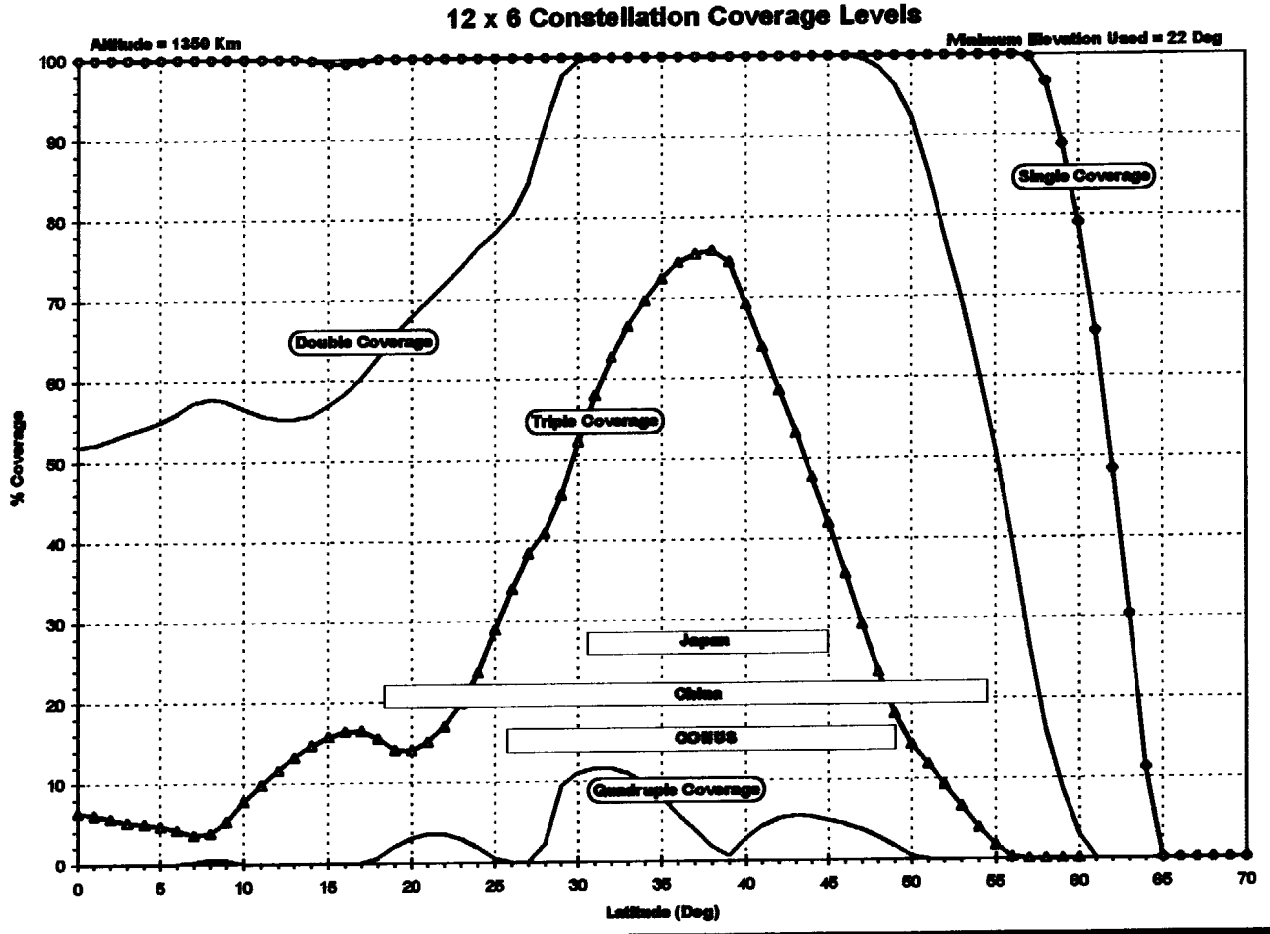
- The M-Star System Provides a Global Communications Network
  - That offers:
    - » Real time, wideband information transfer of digital video, data, voice, and Audio
  - Using Multiple Protocols:
    - » ISDN, X.25, FDDI, OC-1, Plus Others
  - At Data Rates From:
    - » 2.048 Mbps to 51.84 Mbps

# M-Star Constellation

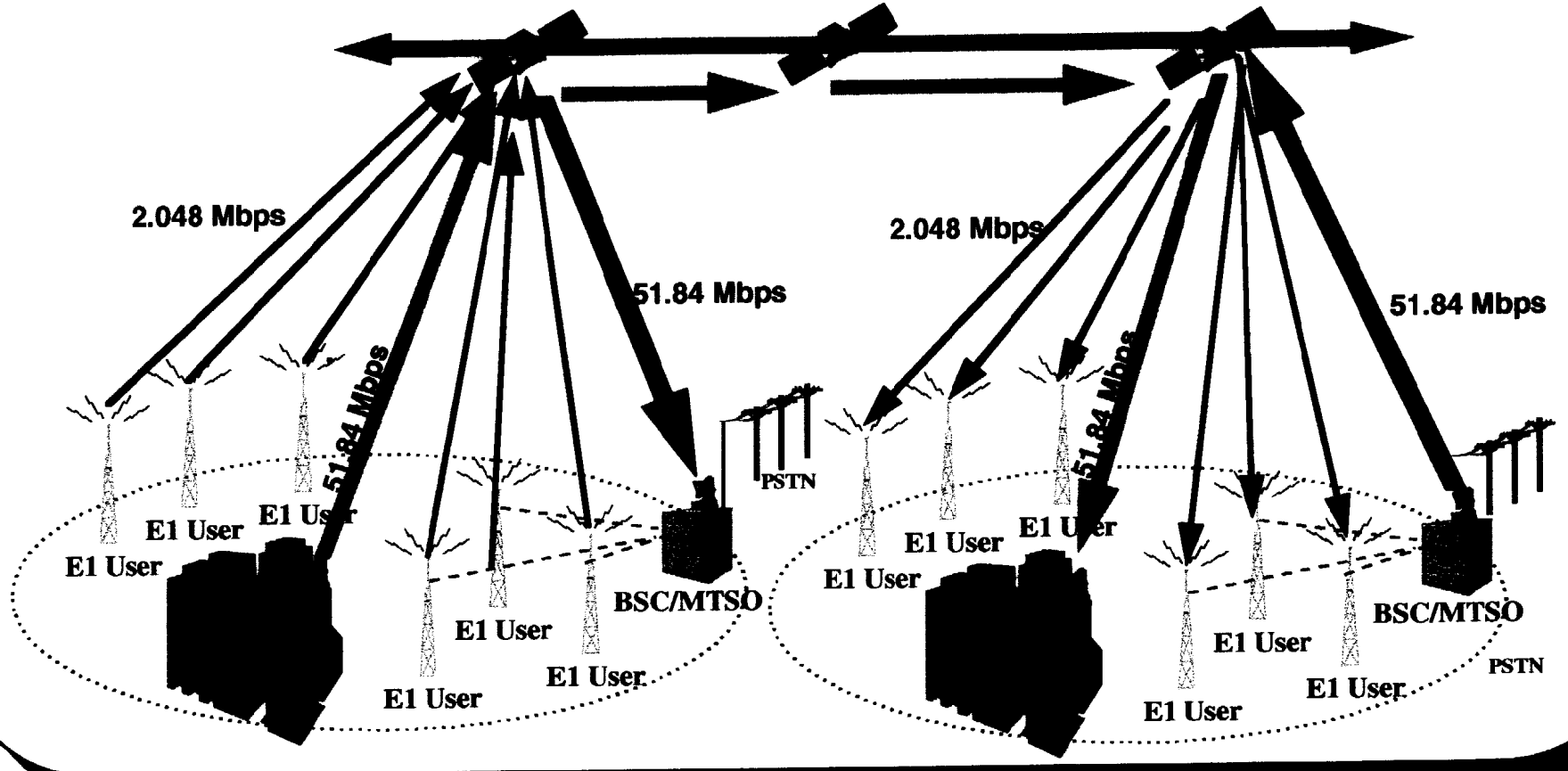


| | |
|---|---|
| Number of Planes: | 12 |
| Satellites per Plane: | 6 |
| Inclination: | 47° |
| Altitude: | 1350 km |
| Minimum Elevation Angle: | 22° |

# M-Star Multiple Coverage



# Global Satellite Network



# M-Star Services

- Interconnection Between Wireless Backhaul
- Large Private Data Networks
  - Large business terminals
  - Enterprise networks
- LAN-to-LAN Direct Connections
- Small Services Connectivity or Aggregate Of Service Providers (E-1)

# M-Star Spectrum Requirements

- **Service Links:**
  - space-to-Earth: 37.5 - 40.5 GHz
  - Earth-to-space: 47.2 - 50.2 GHz
- **Inter-Satellite Links:**
  - 59.0 - 64.0 GHz or 65 - 71 GHz
- **TT&C Links (normal):**
  - Operates in service link bands
- **TT&C Links (launch and emergency):**
  - Earth-to-space: 1750 - 1850 MHz and 2025 - 2110 MHz
  - space-to-Earth: 2200 - 2290 MHz

# Spectrum Selection Criteria

- Sufficient Bandwidth to Provide High Data Rate Services
- Last Usable Satellite Spectrum
- Global Availability

# M-Star System Designed to Share Spectrum

- With Other Fixed Satellite Service Systems Using Space Diversity Techniques
  - GSO's
  - NGSO's
- With Point-to-Point Fixed Systems
  - Subject to Reasonable Sharing Rules
- Sharing Not Feasible
  - Mobile Service
  - Point-to-Multi-point
  - SkyStation

# Fixed Satellite Service/Fixed Service Sharing Scenario

- **37.5-40.5 GHz**
  - Spectrum Sharing Is Achievable When Following Sharing Constraints Are Met.
    - » **M-Star Interference Into Fixed Service:**
      - Can share without coordination
    - » **Fixed Service Into M-Star Earth Stations:**
      - M-Star will accept interference without coordination
        - If: Fixed Service transmitters are limited to an EIRP of less than -22 dBW/MHz
        - And: Adaptive Power Control is applied for fading conditions
- **47.2-50.2 GHz**
  - Spectrum Sharing Is Achievable by Coordination or Band Segmentation.

# ADAPTIVE POWER CONTROL

- Technical Approach
  - Design Considerations
    - » EIRP Density Limit (-22 dBW/MHz) => Have approximately 10 dB of margin to meet BER rate of $10^{-6}$ in unfaded conditions for a 2.3 km link.
    - » Dynamic Range => Need approximately 50 dB for full fading conditions due to precipitation. Fading rates are expected to be less than 1 dB/s.
    - » Detection Criteria => Use error rate detector to set link power.
- Minimal Increased Capital Cost
  - Typically less that $300 per site
  - Multiple hardware design approaches are available, all are with today's technology.

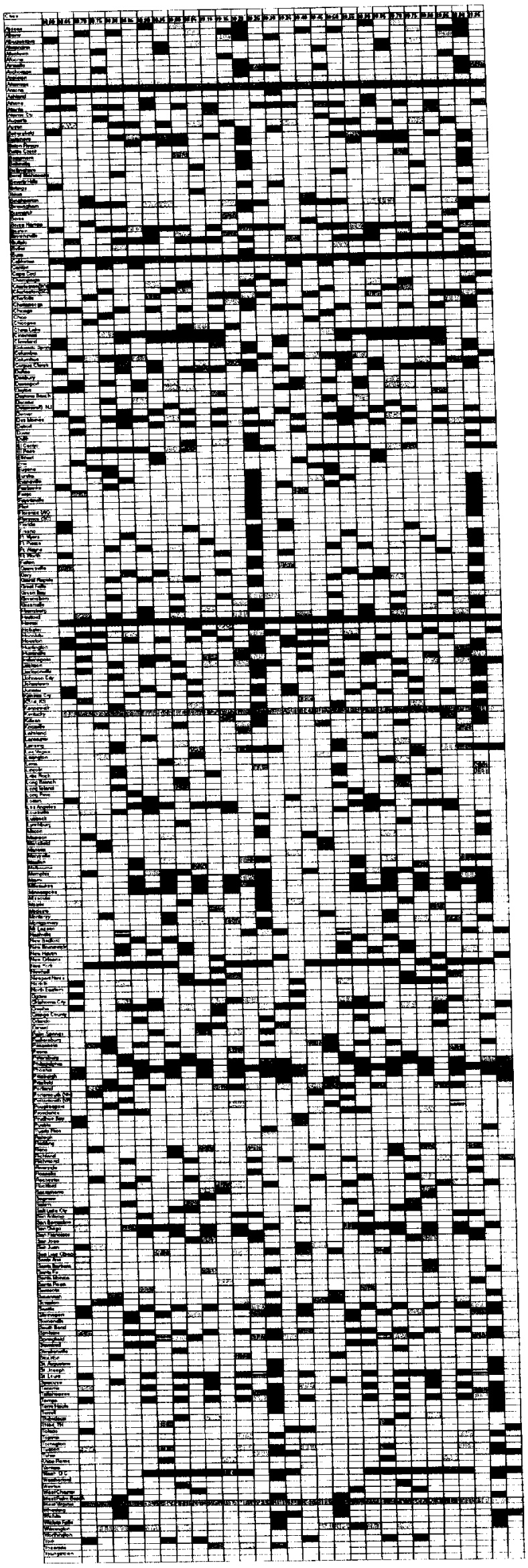
# ADAPTIVE POWER CONTROL (Cont.)

- **Benefits**
  - Minimizes Intra-System Interference
    - » Allows for Fixed Service links to be closer together
  - Enhances Sharing with Fixed Satellite Service Terminals
  - Increase Reliability resulting in lower operational and maintenance cost
  - Allows unrestricted deployment of Fixed Service links

# SUMMARY

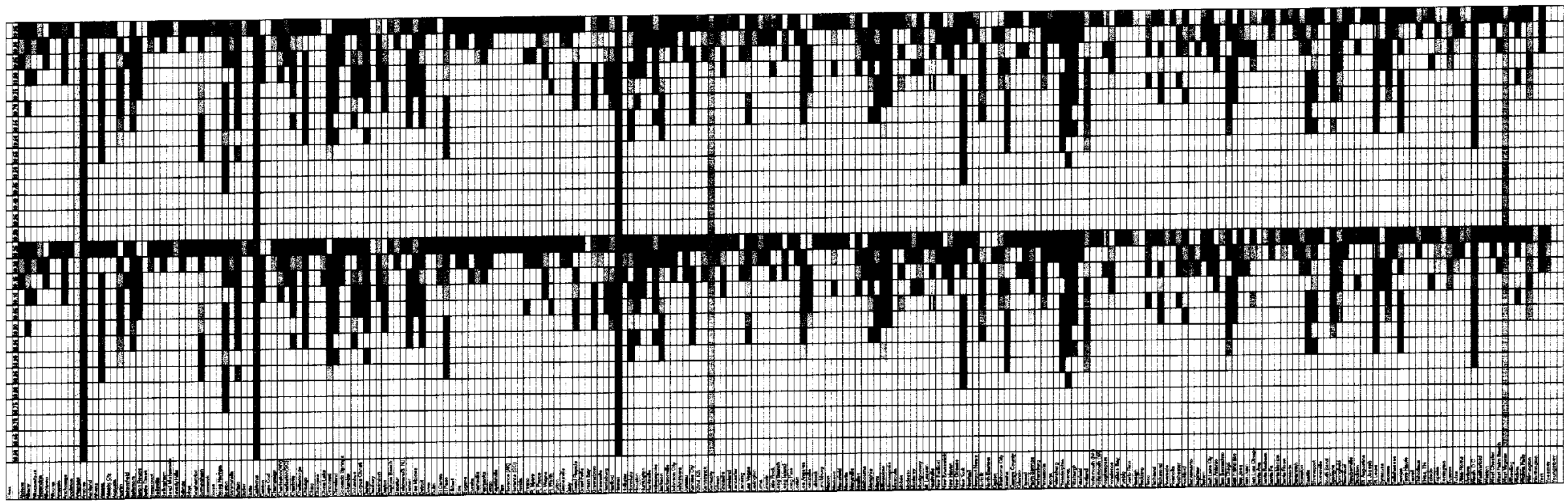
- Important to Preserve Fixed Satellite Service Spectrum Above 30 GHz
- Satellite Technology is currently available to use the 40/50 GHz Bands
- Proposed Fixed Satellite Service/Fixed Service Sharing Rules are Feasible
- Significant Demand Exists for Global High Speed Data Networks
- Satellites are Uniquely Positioned to Serve This Market

# 38 GHZ POINT-TO-POINT SPECTRUM USAGE



**List of Companies**

- Winstar
- Biztel
- Milliwave
- Advanced Radio
- AT&T
- Hicap Networks
- Cambridge Partners
- Alascom
- Linda Chester
- Altron Comm.
- Bachow Comm.
- Columbia Capital
- Columbia Millimeter
- COMMCO
- Kirkland & Assocs.
- Litchfield Cnty Cellular
- Local Area Telecomm.
- New England Digital
- GHZ Equip. Co.
- Elar Cellular
- DCT Comm.
- Pacific Bell Mobile
- Bay Area Teleport
- One World Telecomm.
- Pacific Telesis Wireless
- Extended Comm.
- American Cellular
- Paul Likins
- Microwave Partners
- OCOM Corp.
- Sintra Capital Corp.
- Cornelius T. Ryan
- Pinnacle Nine Comm.
- Plaincom Inc.
- Pacific & Eastern Digital
- SMC Associates
- Southfield Comm.
- Spectrum Comm.
- Telecom One Inc.
- Video Multipont
- Wireless T-1 Inc.
- Wireless Telco
- No Wire LLC
- Mountain Microwave Inc.
- Clear Comm. Group
- Wexler Video Inc.
- Citizens Utilities Co.
- Broadcast Sports Technology

* CHART INCLUDES ALL LICENSES RECEIVED FROM ITS GETTYSBURG OFFICE

** STRIPED CELLS INDICATE SPECTRUM SHARED BETWEEN TWO FS LICENSES