

# STEPTOE & JOHNSON LLP

ATTORNEYS AT LAW

1330 CONNECTICUT AVENUE, N.W.  
WASHINGTON, D.C. 20036-1795

PHOENIX, ARIZONA  
TWO RENAISSANCE SQUARE

TELEPHONE: (602) 257-5200  
FACSIMILE: (602) 257-5299

Philip L. Malet  
(202) 429-6239

STEPTOE & JOHNSON INTERNATIONAL  
AFFILIATE IN MOSCOW, RUSSIA

TELEPHONE: (011-7-501) 258-6250  
FACSIMILE: (011-7-501) 258-5251

(202) 429-3000  
FACSIMILE: (202) 429-3902  
TELEX: 89-2503

**DELIVERY BY HAND**

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

RECEIVED  
DEC 17 1996  
Federal Communications Commission

December 17, 1996

EX PARTE OR LATE FILED

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 this date by representatives of Motorola to Mr. David R. Siddall in Commissioner Ness's office. 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.

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. David R. Siddall



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*Satellite Communications Group*

**M-Star Presentation  
to FCC**

December 17, 1996

# **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.**





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## **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**



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## **M-Star Constellation**



<b>Number of Planes:</b>	<b>12</b>
<b>Satellites per Plane:</b>	<b>6</b>
<b>Inclination:</b>	<b>47°</b>
<b>Altitude:</b>	<b>1350 km</b>
<b>Minimum Elevation Angle:</b>	<b>22°</b>



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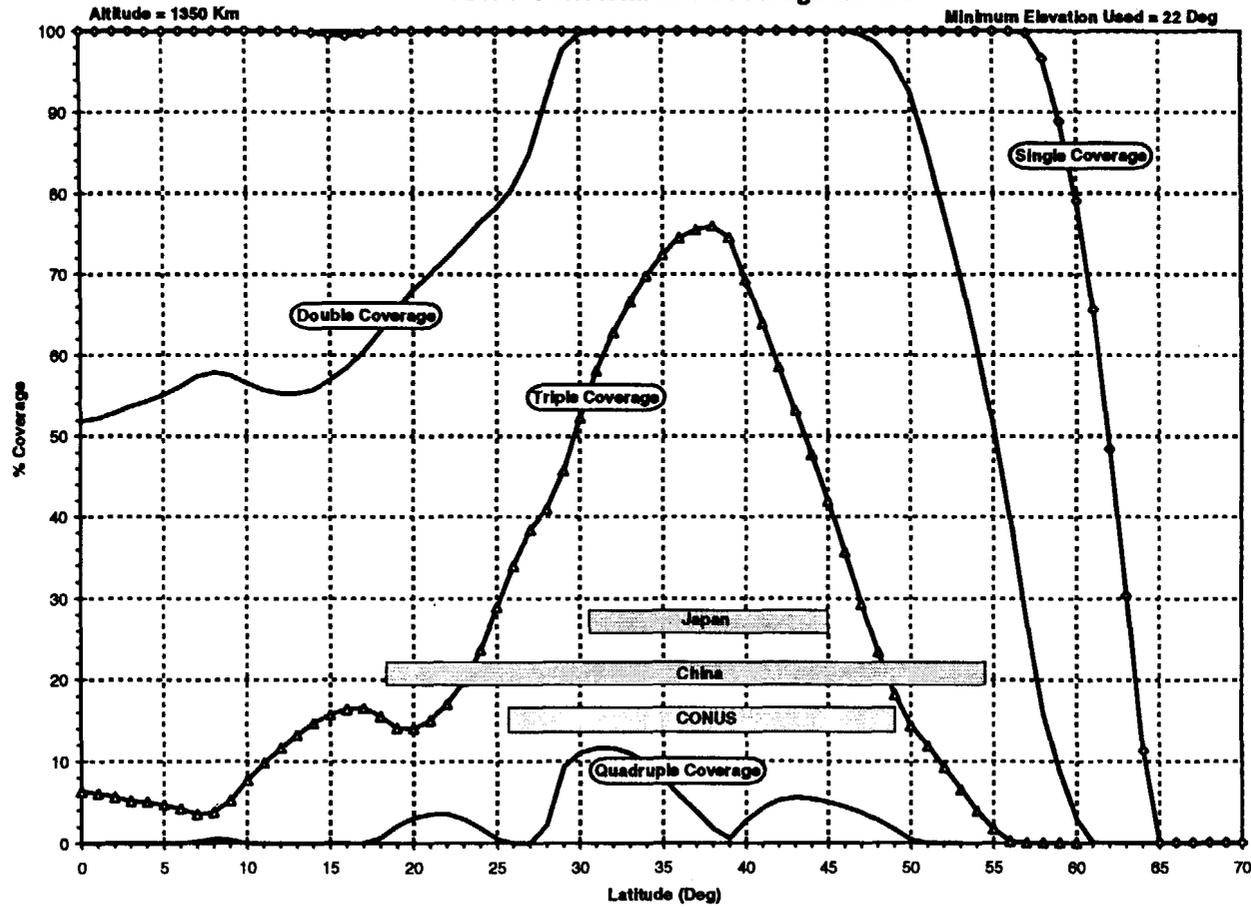
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## M-Star Multiple Coverage

12 x 6 Constellation Coverage Levels





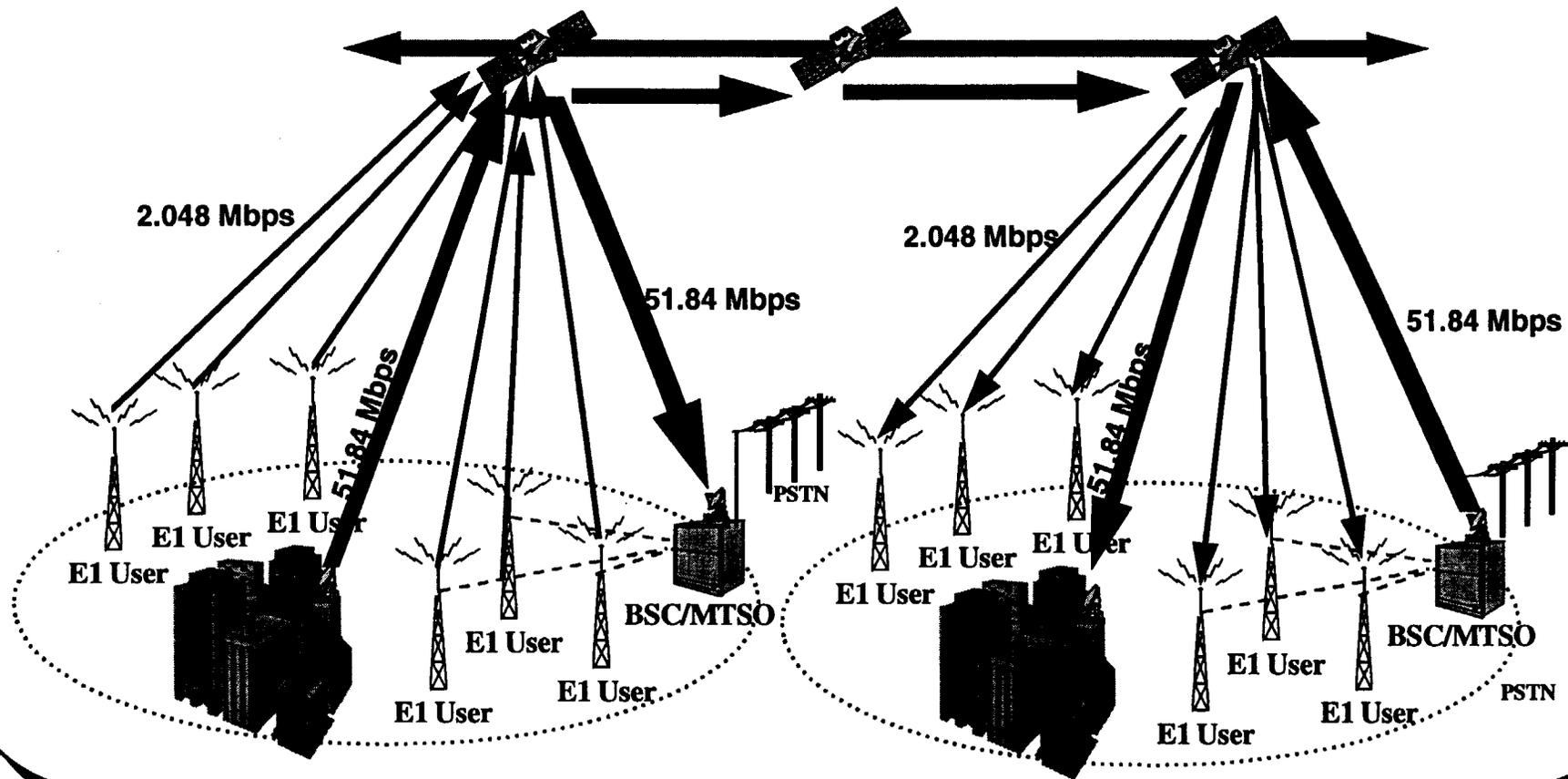
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# Global Satellite Network





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## **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)**



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## **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**



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## **Spectrum Selection Criteria**

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



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## **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



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## 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.**



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## **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 than \$300 per site**
  - **Multiple hardware design approaches are available, all are with today's technology.**



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## **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**



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## **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**