ORIGINAL

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January 21, 1997

Federal Communications Commission
Office of the Secretary
1919 M Street, N.W.
Washington, D.C. 20554

Re: ET Docket No. 95-183, RM-8553, PP Docket No. 93-253, and RM-8811

MEMORANDUM OF NON-RESTRICTED ORAL EX PARTE PRESENTATION

Advanced Radio Telecom Corp., by its attorneys W. Theodore Pierson, Jr. and Stephen D. Hayes of the above-named law firm, and its technical consultant Bart Huxtable of User Systems Inc., met on January 17, 1997 with Mssrs. David Siddall and Rudy Baca of the offices of Commissioners Ness and Quello, respectively, at the Commission's offices. The presentation was limited to a discussion of the proposed amendment of the Federal Communications Commission's Rules related to the allocation and licensing of spectrum in the 38 GHz frequency band, as contained in the Commission's *Notice of Proposed Rulemaking* in ET Docket No. 95-183, RM-8553, PP Docket No. 93-253 (released December 15, 1995) and in the *Petition for Rulemaking* in RM-8811 (filed by Motorola Satellite Systems Inc. on March 4, 1996). The materials attached hereto were distributed at the presentation and were also discussed during the course of the presentation.

Pursuant to Section 1.1206(b)(5) of the Commission's Rules, *ex parte* restrictions do not apply to the instant presentation (*see,* 47 C.F.R. 1.1206(b)(5)), however, in accord with Commission Rule Section 1.1206(a), Advanced Radio Telecom Corp. hereby files this disclosure (*see,* 47 C.F.R. 1.1206(a)). The original and six copies (two for each Docket or Rulemaking number) of this disclosure have been submitted to the Secretary's office.

Respectfully submitted,
ADVANCED RADIO TELECOM CORP.

Stephen D. Hayes
Its Attorney

Attachment

cc: David Siddall
Rudy Baca

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List ABCDE

The Motorola M-Star System

An Analysis of the Potential for Sharing With the Terrestrial 38 GHz Fixed Service

Presentation to Rudy Baca, Office of FCC Commissioner Quello

January 17, 1997

by

Stephen Hayes
Pierson & Burnett

Ted Pierson
Exec. VP, Industry Relations

Bart Huxtable
User Systems, Inc.

on behalf of

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Introduction to Advanced Radio Telecom

- Largest operating wireless local loop provider in the United States
  - 169 service areas covering 143 million people
  - 47 of the top 50 markets; 82 of the top 100 markets
- Operates in the 38.6-40.0 GHz Fixed Service (FS) bands
- Provides service to:
  - CAPs/CLECs and LECs
  - IXCs
  - ISPs
  - PCS Providers

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Introduction to Advanced Radio Telecom

- Currently has 115 employees, and is growing
- Has successfully raised operational financing
  - Raised $33 million in equity public offering in September
  - Has unused $50 million private debt line
  - Registered $125 million public high-yield debt
- Significant investors include Ameritech and Advent International

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Keys to 38 GHz Fixed Service

Essential to the technical feasibility, economic viability, and long-term growth of 38 GHz FS are:

- Deploying 10,000s of links nationwide in the next six years
- Ability to deploy and redeploy links rapidly (*e.g.*, 12-24 hours) and cost effectively
- High system reliability: 99.999% design (*i.e.*, maximum outages of only 5.3 minutes per year or less than one second per day)
- Improved frequency reuse through non-horizontal elevation angles
- Cost effective use of spectrum to service large markets
- Evolution to multipoint systems for sophisticated network topologies

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Self-Coordination Makes It Possible

- Rapid deployment of FS service links has been fostered by:
  - Self-coordination by the 38 GHz FS industry, which is essential for efficient operation
  - This self-coordination is the essence of the FCC's geographic licensing plan for 38 GHz FS
- Motorola's spectrum sharing proposal undermines the FCC's licensing plan and removes the benefits gained from self-coordination

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Sharing Brings Unavoidable Interference

- Sharing between the Fixed Satellite Service (FSS) and terrestrial FS in the 38.6 to 40.0 GHz band will result in interference by both services into the other
- This interference will be nearly impossible to avoid and would require impractical, or unduly expensive, methods to mitigate

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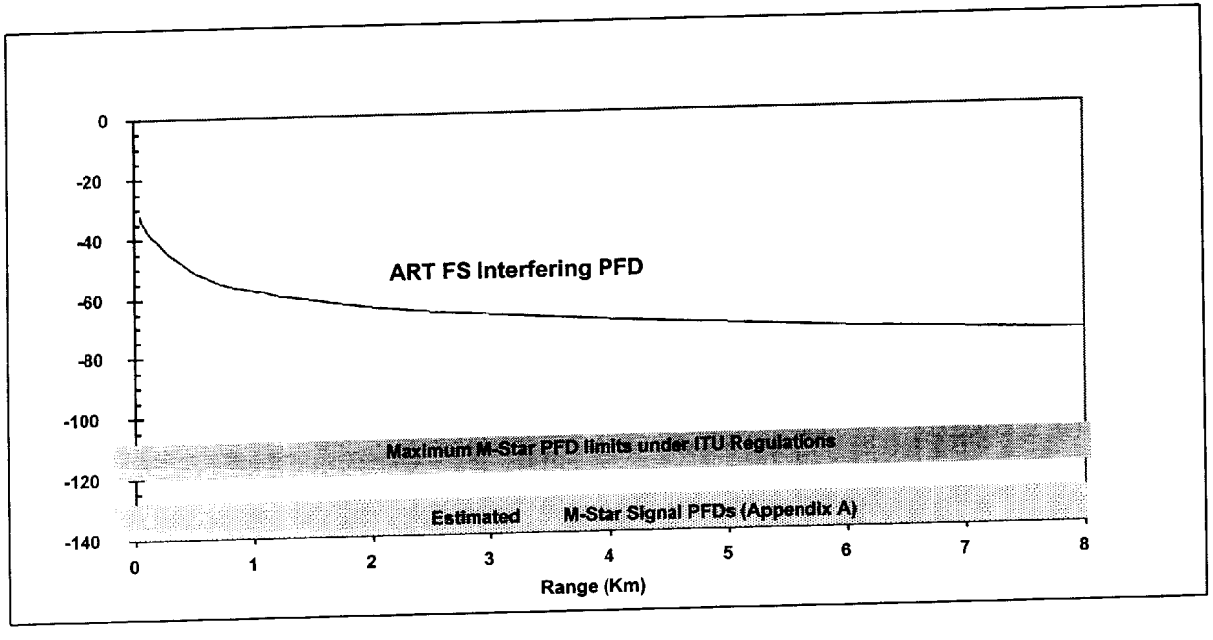
M-Star Application Interference Analysis

- FS Interference into FSS Ground Stations
  - Motorola acknowledges interference will occur



  - Motorola claims interference can be cured by:
    - » Geographic separation of FS and FSS ground sites
    - » Dynamic power controls on FS transmitters

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M-Star Application Interference Analysis (cont.)

- FSS Interference into FS Links
  - Motorola claims interference will not be a problem
  - "The M-Star system will meet the power flux density limits of Section 25.208(c) of the Commission's rules and ITU RR S21.16."
  - "The proposed system does not operate below a 22 degree elevation angle from the ground station, which enables it to meet the EIRP limits of Section 25.204 of the Commission's Rules."

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Flaws in Motorola's Analysis

- FS into FSS Interference
  - FS power control
    - » Dynamic controls would be expensive and difficult to install and operate
    - » Power-controlled equipment does not now exist
    - » Installed base does not employ power control
    - » Power control assumed by Motorola may not be technically achievable
  - Frequency coordination
    - » Coordination is difficult, expensive and time-consuming
    - » Rapid, cost effective deployment suffers as a result
    - » Undercuts FCC's geographic licensing plan

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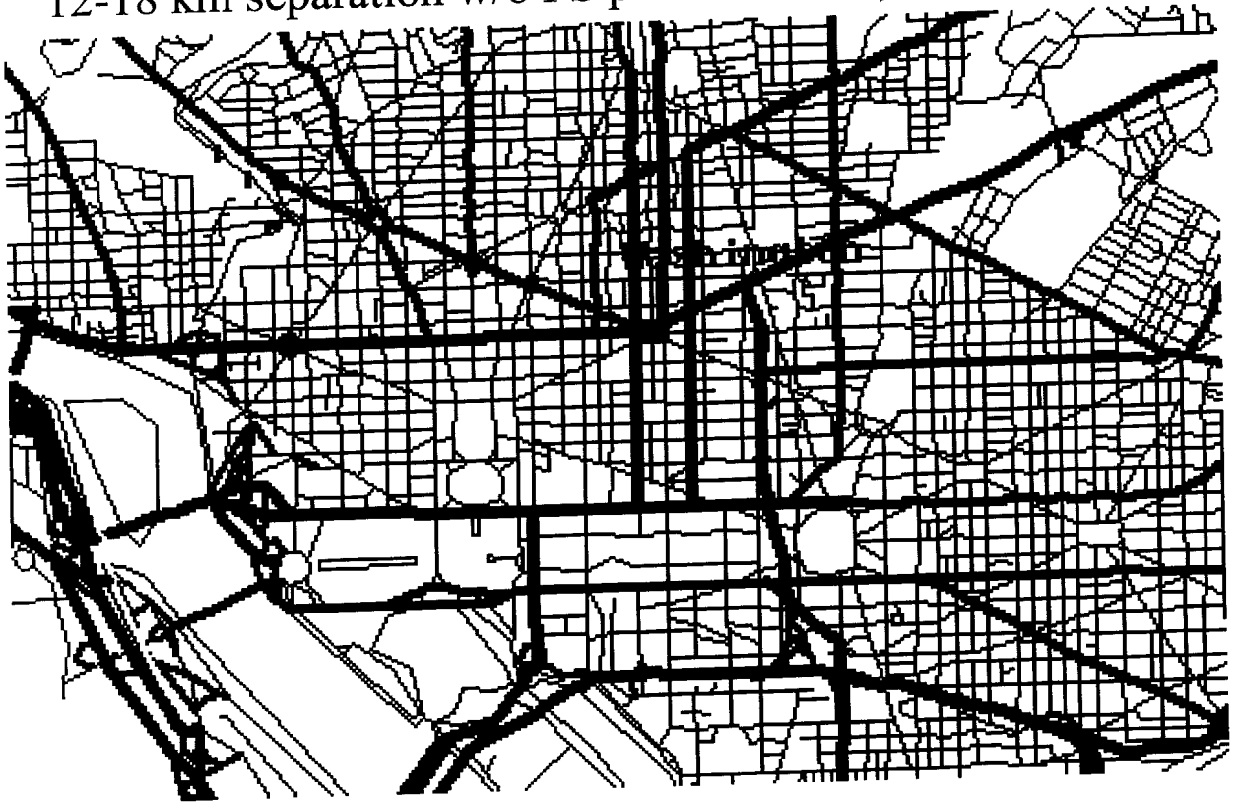
Flaws in Motorola's Analysis (cont.)

- Geographic separation
  - » Numerous FS sites deployed when M-Star comes on line
  - » Massive FSS ground station coordination zone around an FS site to avoid mainbeam interference (1 km separation w/ FS power control; 12-18 km separation w/o FS power control)



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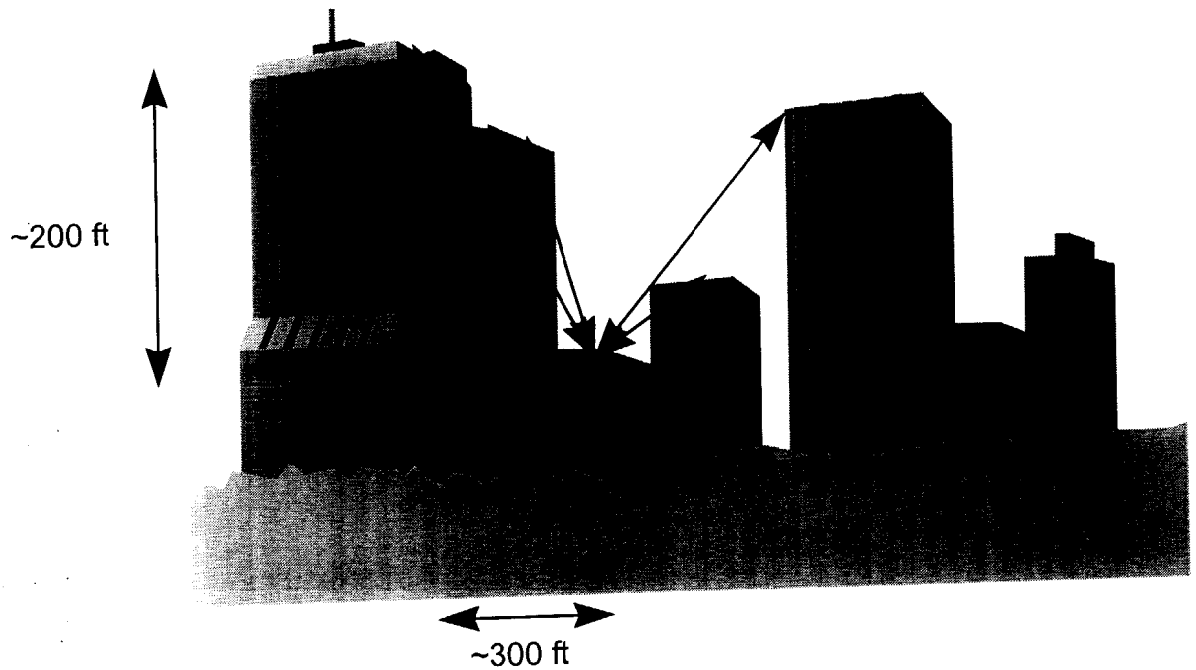
Flaws in Motorola's Analysis (cont.)

- FSS into FS Interference
  - Assumption is invalid- elevations up to 40° (or perhaps more) required for some FS installations and preferred for many to increase spectrum reuse (*i.e.*, avoid horizontal radiation)



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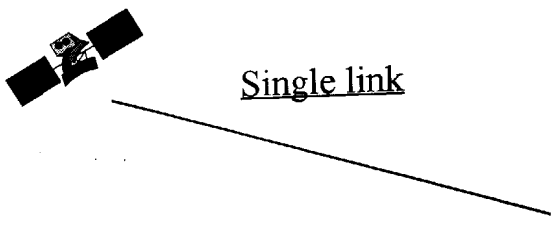
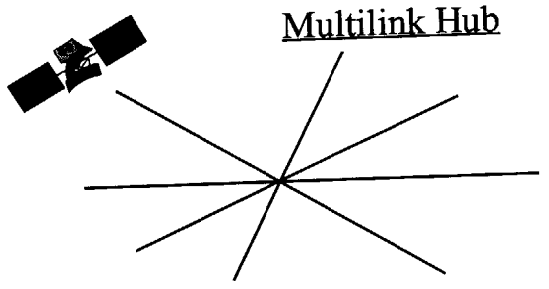
Flaws in Motorola's Analysis (cont.)

- FSS into FS Interference (cont.)
  - Interference will significantly decrease system reliability (99.999% design reliability, < 1sec/day outage)
  - M-Star would prevent meeting design reliabilities for any links with elevations above 20°
    - » Outages totaling ~40 sec/day on average (243 minutes/year)
    - » Typical outage period 10 - 20 seconds
    - » Impact of outages proportionally more severe for networks using multilink hubs



Single link outage ~ 40 sec/day average



10 node hub outage ~ 400 sec/day average

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Flaws in Motorola's Analysis (cont.)

- FSS into FS Interference (cont.)
  - Link budget analyses show C/I of -2.8 dB at 22° elevation for M-Star HRB downlink (90M0G7W)
  - At elevation angles above 20°, FSS signal strength increases
    - » +3 dB at 40° elevation, +5 dB at 60° elevation
  - M-Star rain-compensating 8 dB power increases will result in increased interference to FS sites where rain is not occurring
    - » M-Star beam footprints are 40 km to 200 km in diameter
- Cures for interference are not viable
  - Installing and managing alternate redundant routes will increase costs by at least 2.5 times

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Summary of Concerns

- M-Star would create and receive much greater interference than stated, if FS-FSS spectrum sharing is required
- Measures to avoid interference, if available, are difficult and expensive to implement
- Sharing is at odds with the FCC's geographic licensing/self-coordination approach
- Sharing undermines the viability of the 38 GHz terrestrial industry

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Lasting Effects on the Industry

- Ability to quickly and efficiently deploy and redeploy links severely reduced
- Maintaining current reliability guarantees to customers prohibitively expensive; degradation will be forced
- Improved frequency reuse, and satisfaction of certain customer demand through steeper elevation angles will be greatly limited
- Evolution to sophisticated multipoint architectures will be curtailed

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Lasting Effects on the Industry (cont.)

- Taken together, these outcomes will make the use of the allocated radio spectrum much less efficient and cost effective, leading to downturns in usage
- This will likely result in the abandonment of many existing links that would require redesign and retrofit, and the deployment of many fewer new links

Band Segmentation is the Right Solution

- In light of the tremendous difficulties imposed by sharing between FS and FSS at 38 GHz, band segmentation is the only viable solution
- The tentative segmentation plan outlined by FCC staff at the December 17 meeting of the WRC-97 Advisory Committee's Ad Hoc Working Group for Millimeter Wave Issues appears to be a workable solution that would permit both FS and FSS to operate effectively and efficiently

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