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Ex Parte

January 29, 1998

Ms. Magalie Roman Salas  
Secretary  
Federal Communications Commission  
Mail Stop Code 1170  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

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JAN 29 1998  
FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

RE: RM 9005- Routine Licensing of Large Numbers of Earth Stations

Today, Betsey Granger, Senior Counsel, and Steve Aspell, Microwave Manager, Pacific Bell Mobile Services, and I met with, in the International Bureau, Pamela Gerr, Chief, Negotiations Branch, Planning and Negotiations Division; Peter Pappas, Assistant Bureau Chief; and Thomas S. Tycz, Chief, Steve B. Sharkey, Chief, Satellite Engineering Branch, and Rudy Baca of the Satellite and Radiocommunication Division; and in the Wireless Telecommunications Bureau, David Wye, Senior Advisor for Technology, to discuss issues summarized in the attached material. In addition, a copy of the attached was sent to Charles Magnuson. We are submitting two copies of this notice in accordance with the Commission's rules.

Please stamp and return the provided copy to confirm your receipt. Please contact me should you have any questions.

Sincerely,

cc: R. Baca  
P. Gerr  
C. Magnuson  
P. Pappas  
S. Sharkey  
T. Tycz  
D. Wye

Attachment

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List ABCDE



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# 18 GHz Microwave and CMRS

Stephen M. Aspell, P.E.

Betsy Granger

Gina Harrison

January 29, 1998

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- Introduction:

- Microwave is used to provide reliable, cost effective back haul for CMRS. The availability of appropriate spectrum bands is important to meeting the wireless communication needs of the United States.
  - New satellite communication systems continue to be announced that promise spectrum sharing then require compromising fixed microwave services.
  - Fixed microwave services are running out of bands to relocate into.
  - Relocation costs into other bands or segments should be paid for by new entrants.
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# 18 GHz Microwave and CMRS

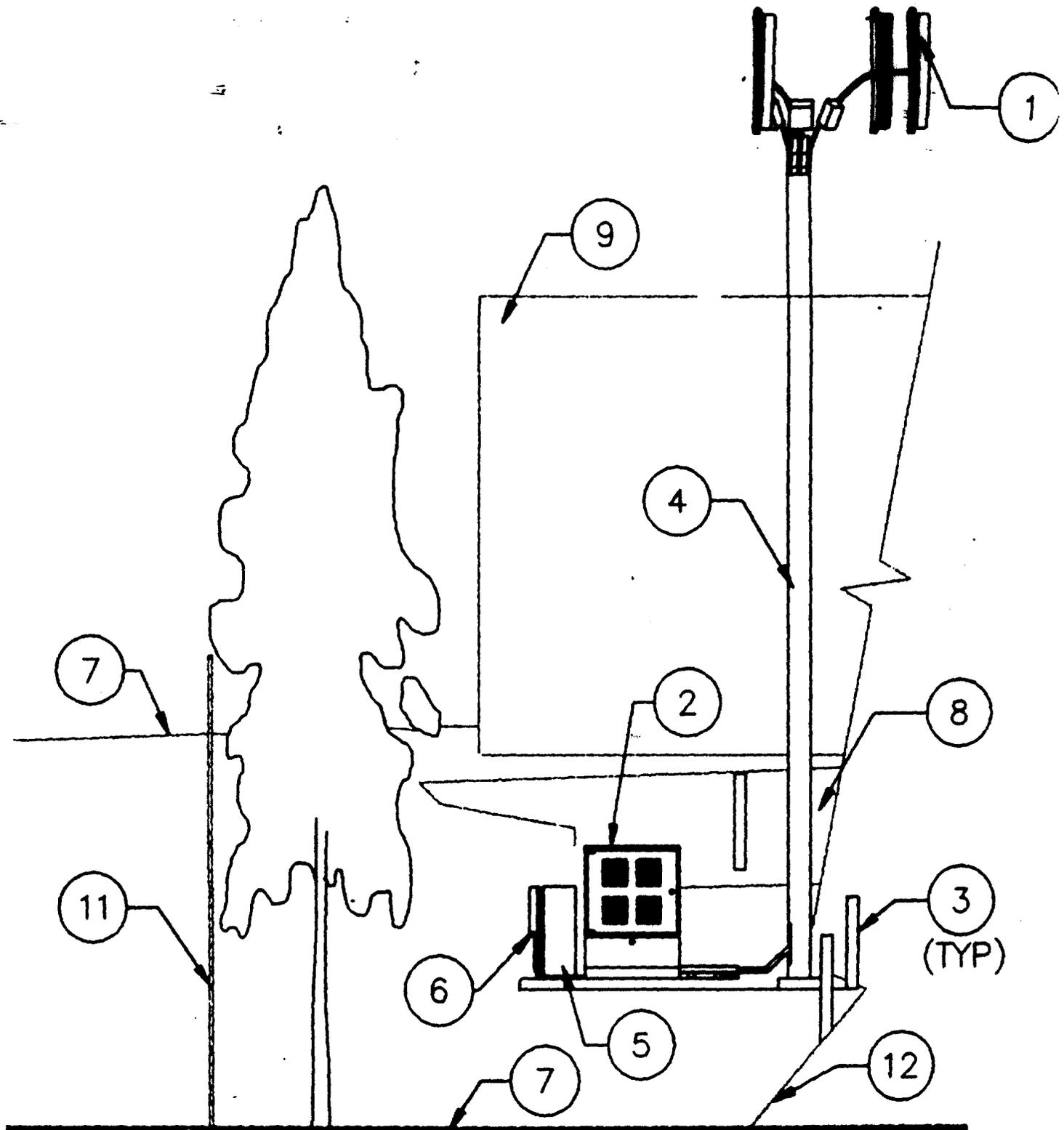
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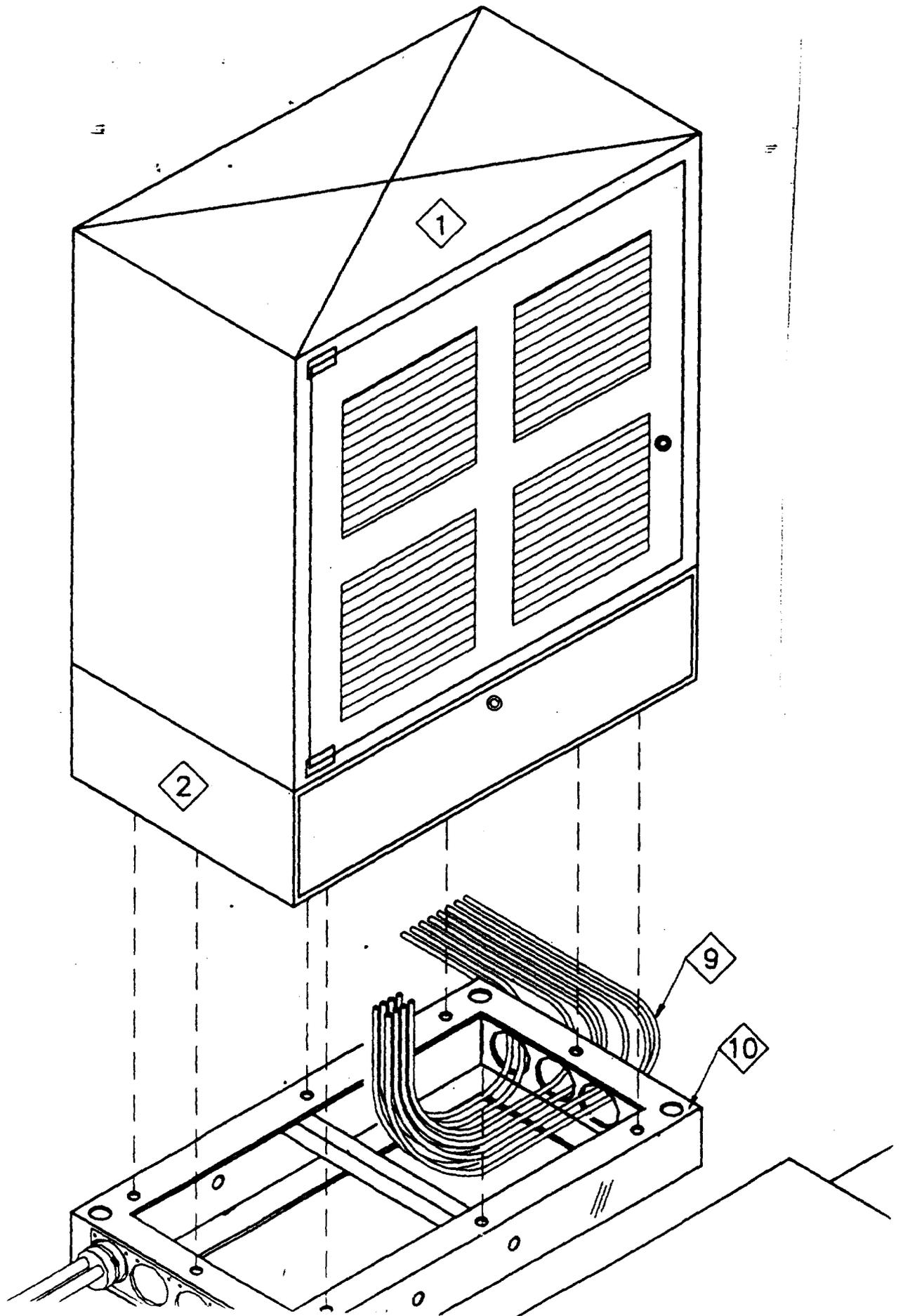


- Overview:
    - Microwave Interconnect and CMRS
    - Examples of 18 GHz in CMRS Networks
    - Spectrum Sharing with Mobile Satellite Operators
    - 18 GHz Relocation Options
    - 18 GHz Relocation Costs
    - Fixed Microwave Service Spectrum Needs
-



- Microwave Interconnect and PCS
    - Microwave deployment depends on cost and capacity
    - Microwave interconnect
      - Cost
      - Availability of leased DS-1
    - Space Limitations for GSM PCS Providers
      - Single Cabinet
      - 5 rack units available for all interconnect functions
      - microwave limited to 1 or 2 rack units at most
    - Tower limitations
-

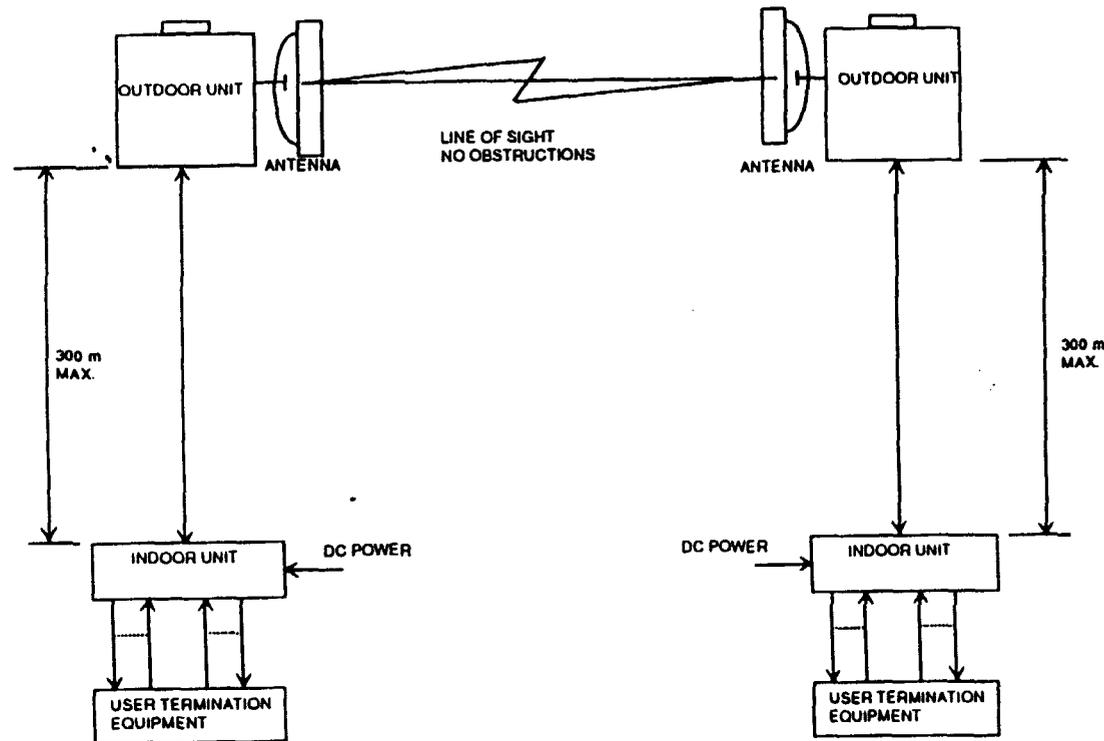




# 18 GHz Microwave and CMRS



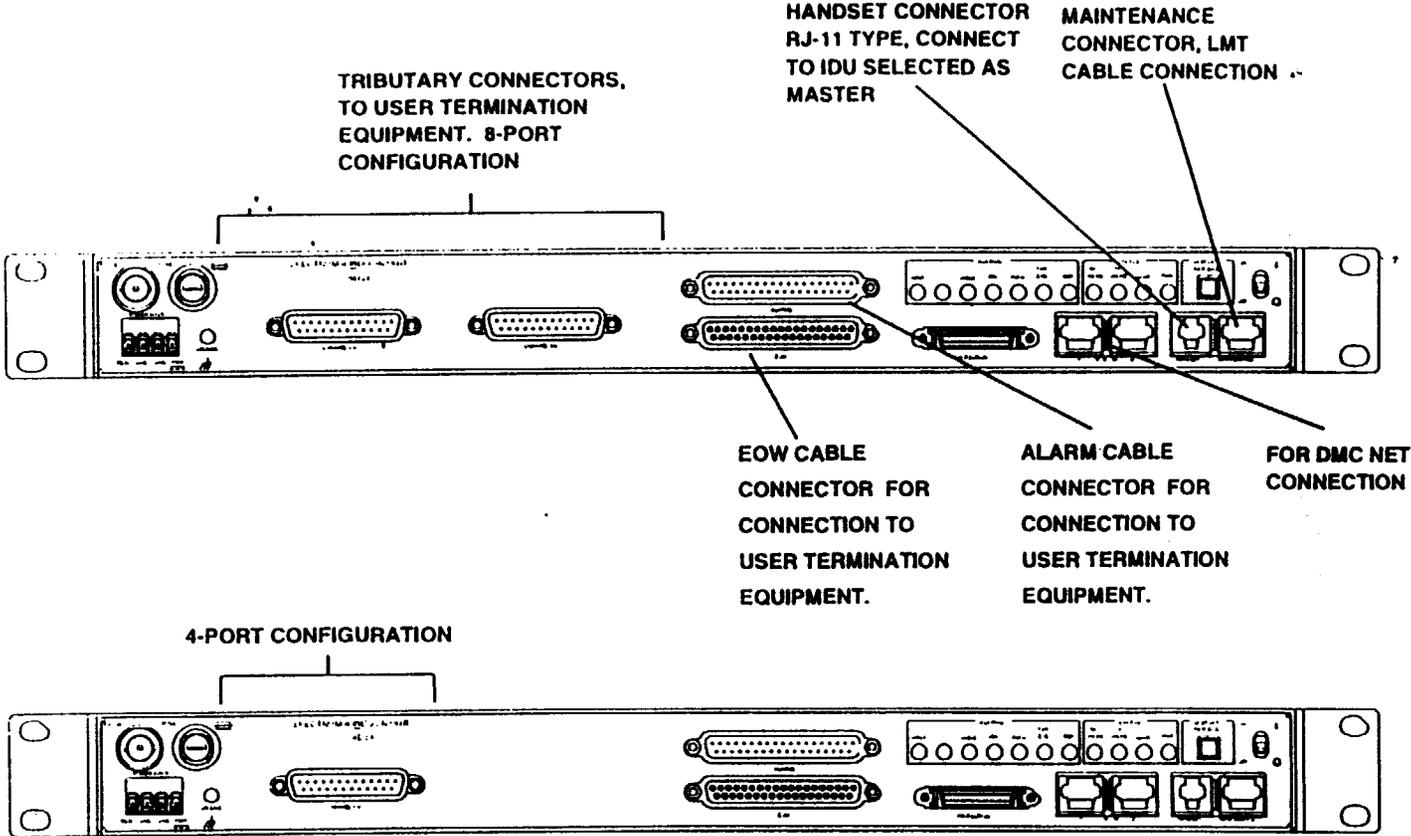
- System Block Diagram



# 18 GHz Microwave and CMRS



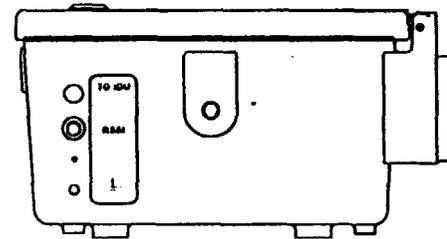
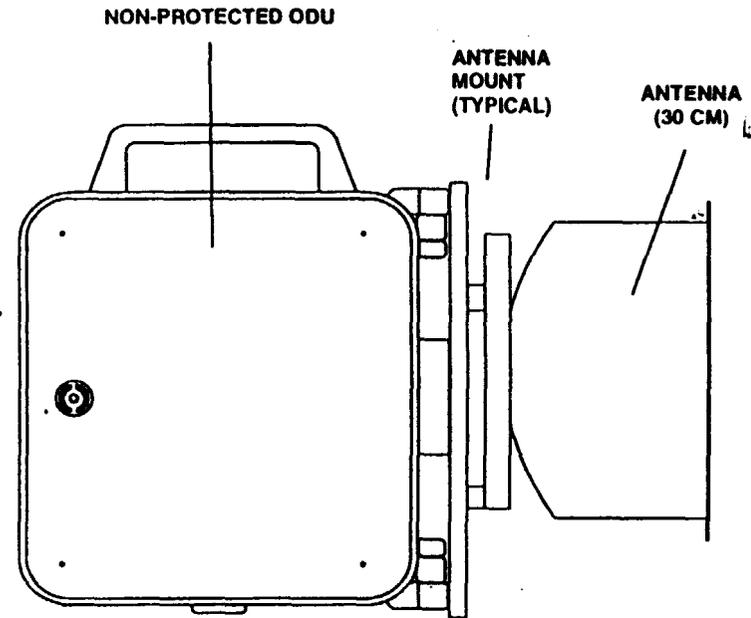
- Indoor Unit Detail

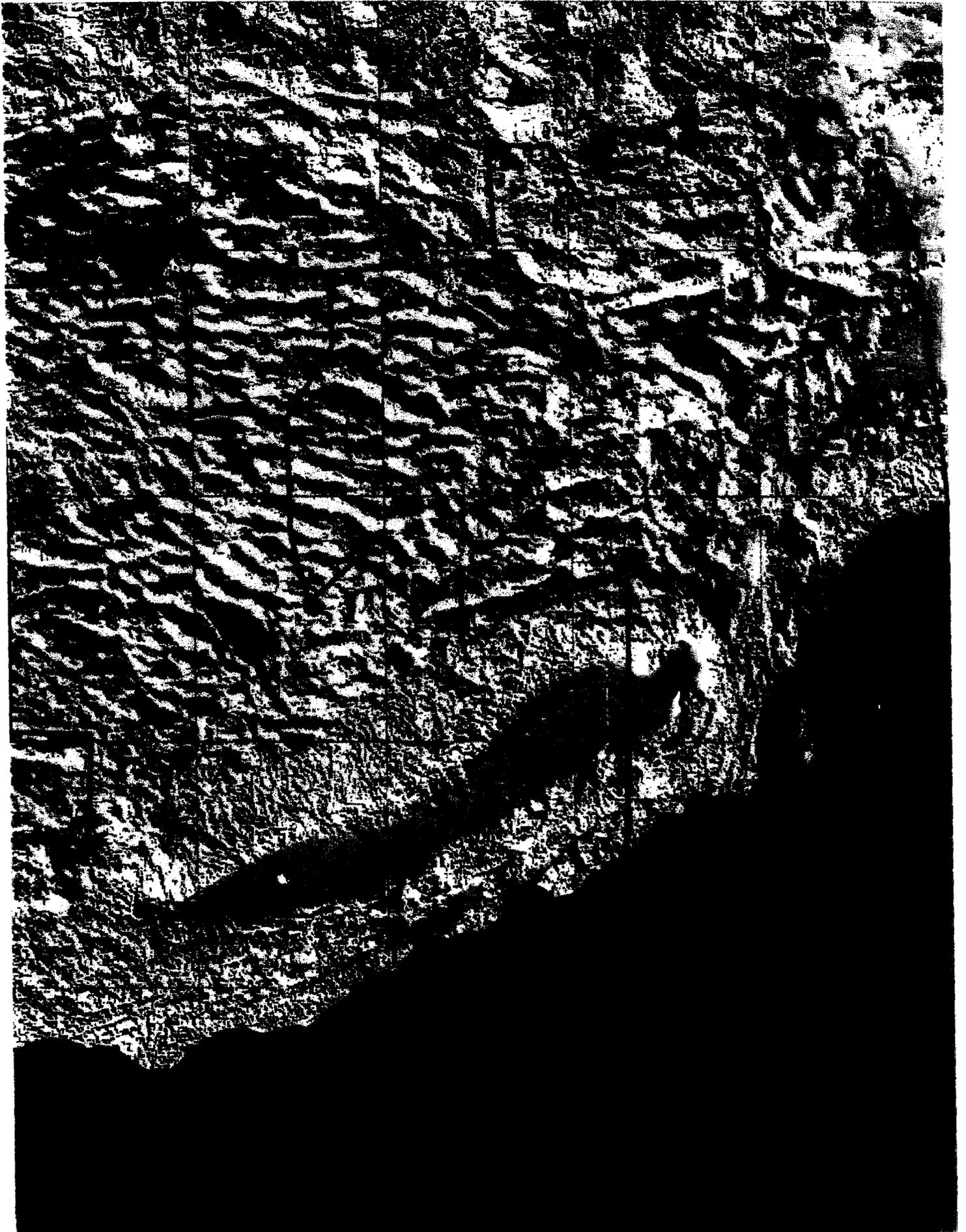


# 18 GHz Microwave and CMRS



- Outdoor Unit Detail







- Examples of 18 GHz in CMRS Networks
    - 18 GHz has been used to provide interconnect to rural areas that could not be covered without substantially higher costs.
    - I-15 between Barstow and Las Vegas, NV
    - I-5 between Stockton and Bakersfield, CA
    - 18 - 20 mile range of 18 GHz fits the 35 km maximum distance of GSM
    - Single rack unit eliminates need for buildings, reduces costs, improves reliability
    - 60% of PBMS microwave interconnect is 18 GHz. (19% for Cellular One in Boston)
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# 18 GHz Microwave and CMRS

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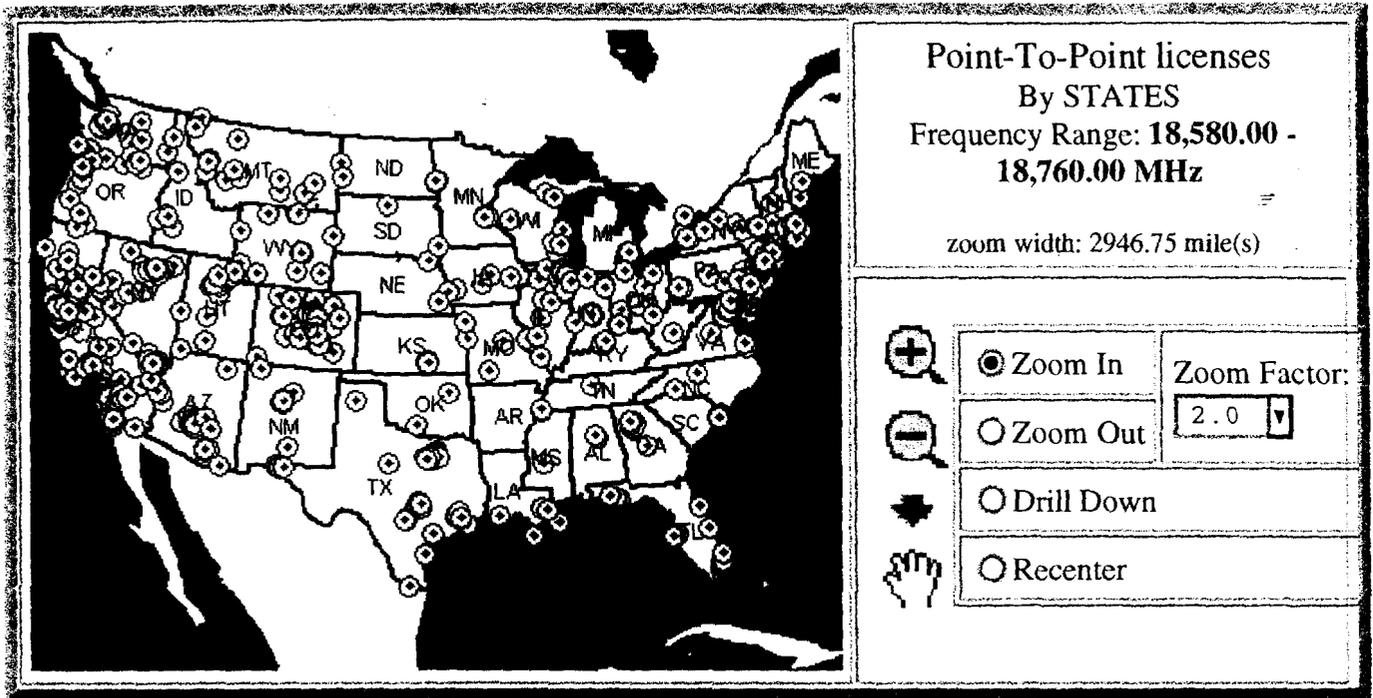
- Spectrum Sharing with Mobile Satellite Operators
    - Worst Case:
      - Main Beam - No Antenna Discrimination
      - Co-Channel - No RF or IF Discrimination
      - Distance from Terrestrial Receiver to Satellite: 400 km
      - 4' Antenna at Terrestrial Receiver (44 dBi Gain)
    - Free Space Path Loss
      - $FSL = 32.45 + 20 \log D + 20 \log F = 169.6 \text{ dB}$
    - Maximum Allowable Interference Level:
      - -100 dBm, based on 20 dB T/I, per TR-14.11, Bulletin 10-F
    - Transmit Signal Level for - 100 dBm Interference level:
      - $-100 = EIRP_{\text{sat}} - FSL + \text{Ant Gain}$
      - $EIRP_{\text{sat}} = 25.6 \text{ dBm (0.36 W)}$
-



- Spectrum Sharing with Mobile Satellite Operators
    - A satellite on the same frequency could cause interference to a terrestrial microwave path transmitting as little as **25.6 dBm (0.36 W)**.
    - Typical satellite operations use transmit powers between 60 and 90 dBm, (1000 to 1,000,000 W)EIRP.
    - Typical satellite operation will cause a complete failure for the terrestrial user for as long as these conditions last. This will drop all user calls, including 911.
    - Given the number of satellites that are proposed for ubiquitous coverage, the interference conditions will be catastrophic for the terrestrial microwave users.
-



- Spectrum Sharing with Mobile Satellite Operators
    - Co-channel spectrum sharing is not a viable option.
    - Repeated, short disruptions of service for satellite interference is not tolerable.
    - Band segmentation will be required to provide sufficient frequency separation between the terrestrial and satellite services.
    - Relocation costs for the terrestrial services should be paid for by the satellite services.
-

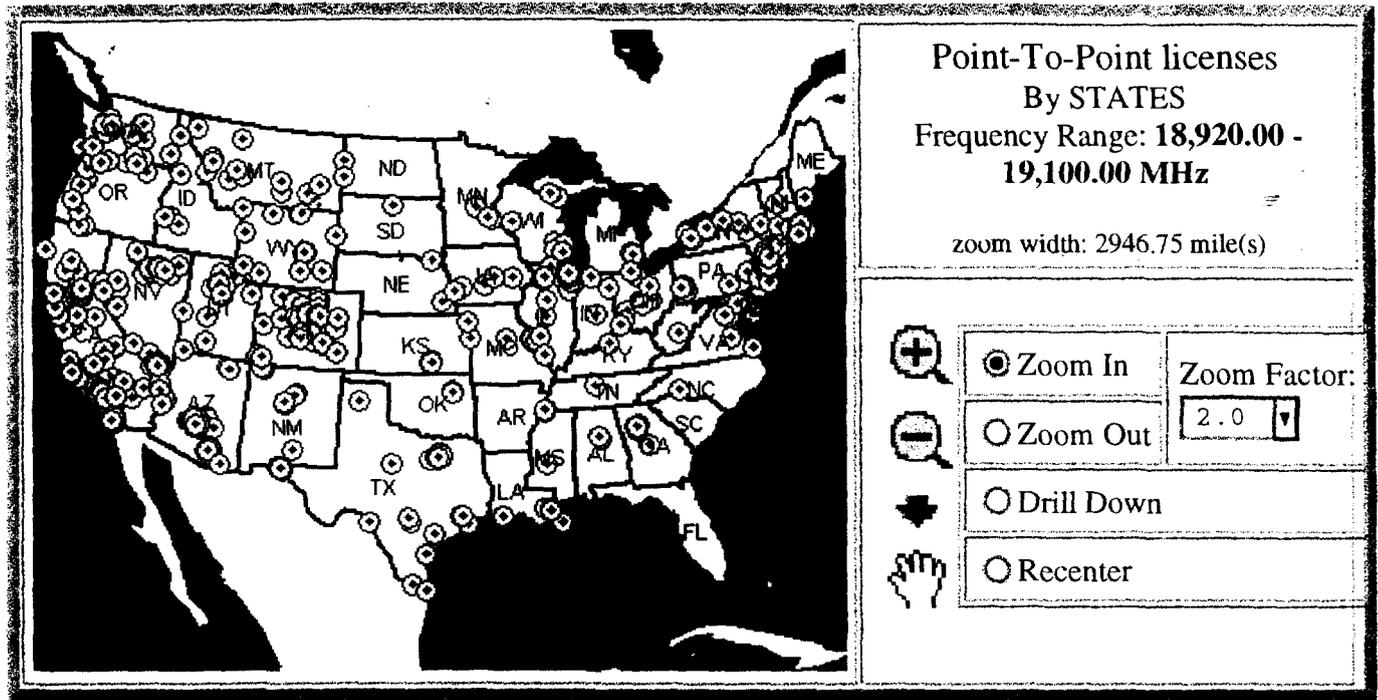


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KAZ42	UNION PACIFIC RAILROAD COMPANY	OMAHA	NE	
KBC20	COLORADO, STATE OF	EAGLE	CO	
KBD28	U S WEST COMMUNICATIONS INC	CORTEZ	CO	
KCM97	COLORADO, STATE OF	CRAIG	CO	

Send comments and questions to:  
[<betacomm@fcc.gov>](mailto:betacomm@fcc.gov)



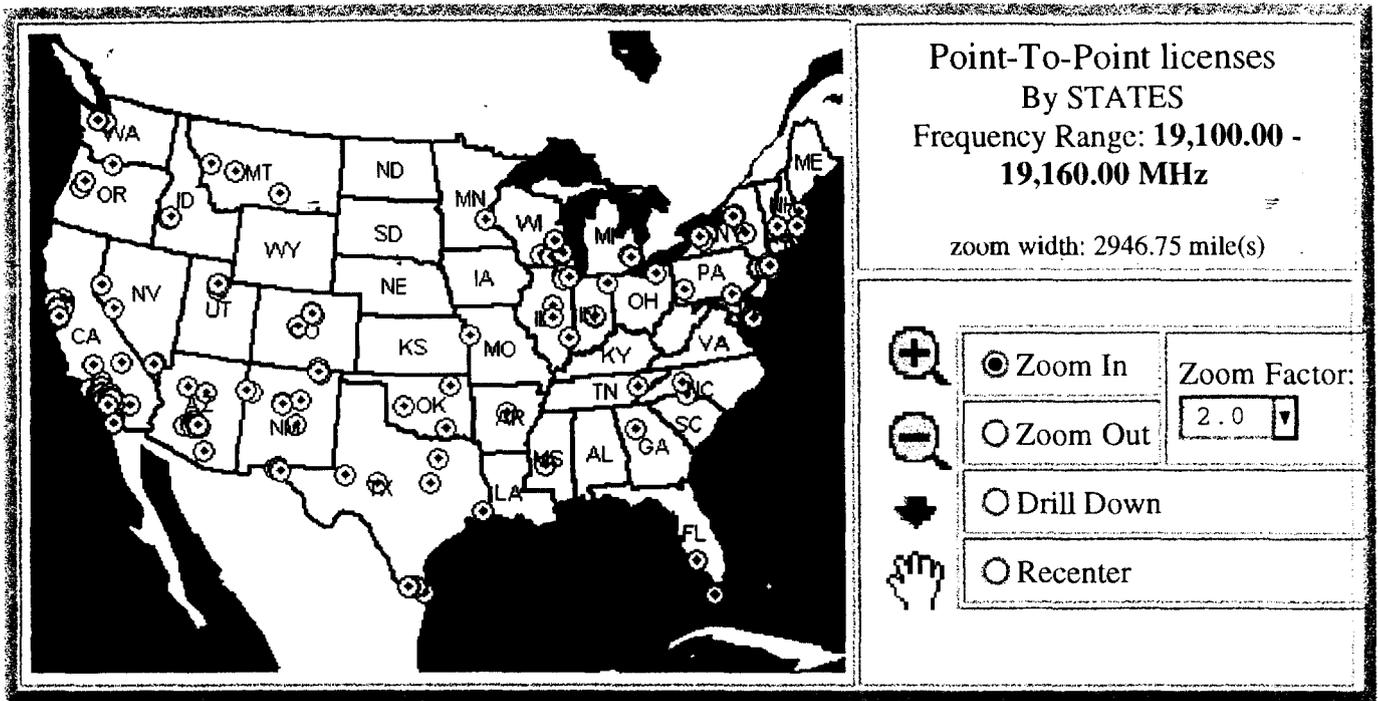
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KBJ22	EL PASO FIELD SERVICES COMPANY	FARMINGTON	NM	
KCE54	BOSTON EDISON COMPANY	BOSTON	MA	

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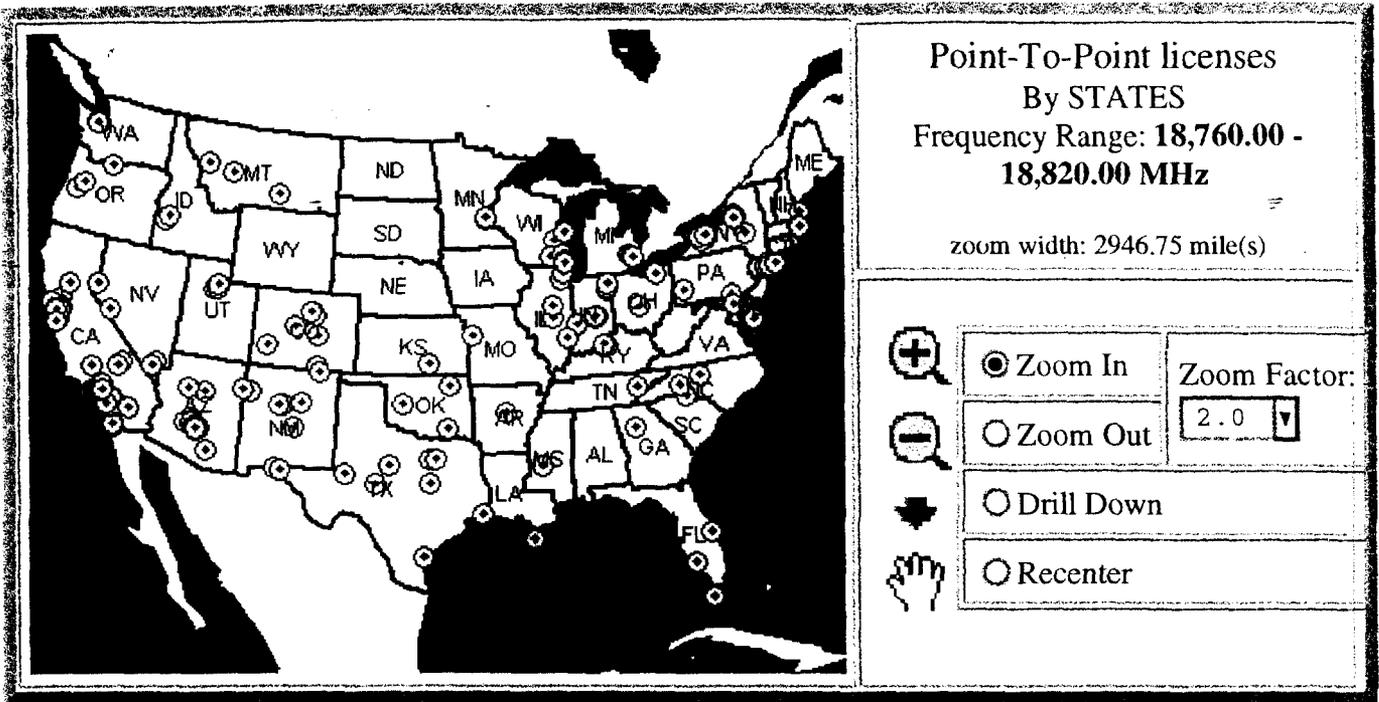


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KEY37	QUESTAR INFOCOMM INCORPORATED	SALT LAKE CITY	UT	
KFO94	EL PASO NATURAL GAS COMPANY	FLAGSTAFF	AZ	

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KKS79	EL PASO NATURAL GAS COMPANY,	EL PASO	TX	
KMM20	LOS ANGELES, COUNTY OF,	LANCASTER	CA	

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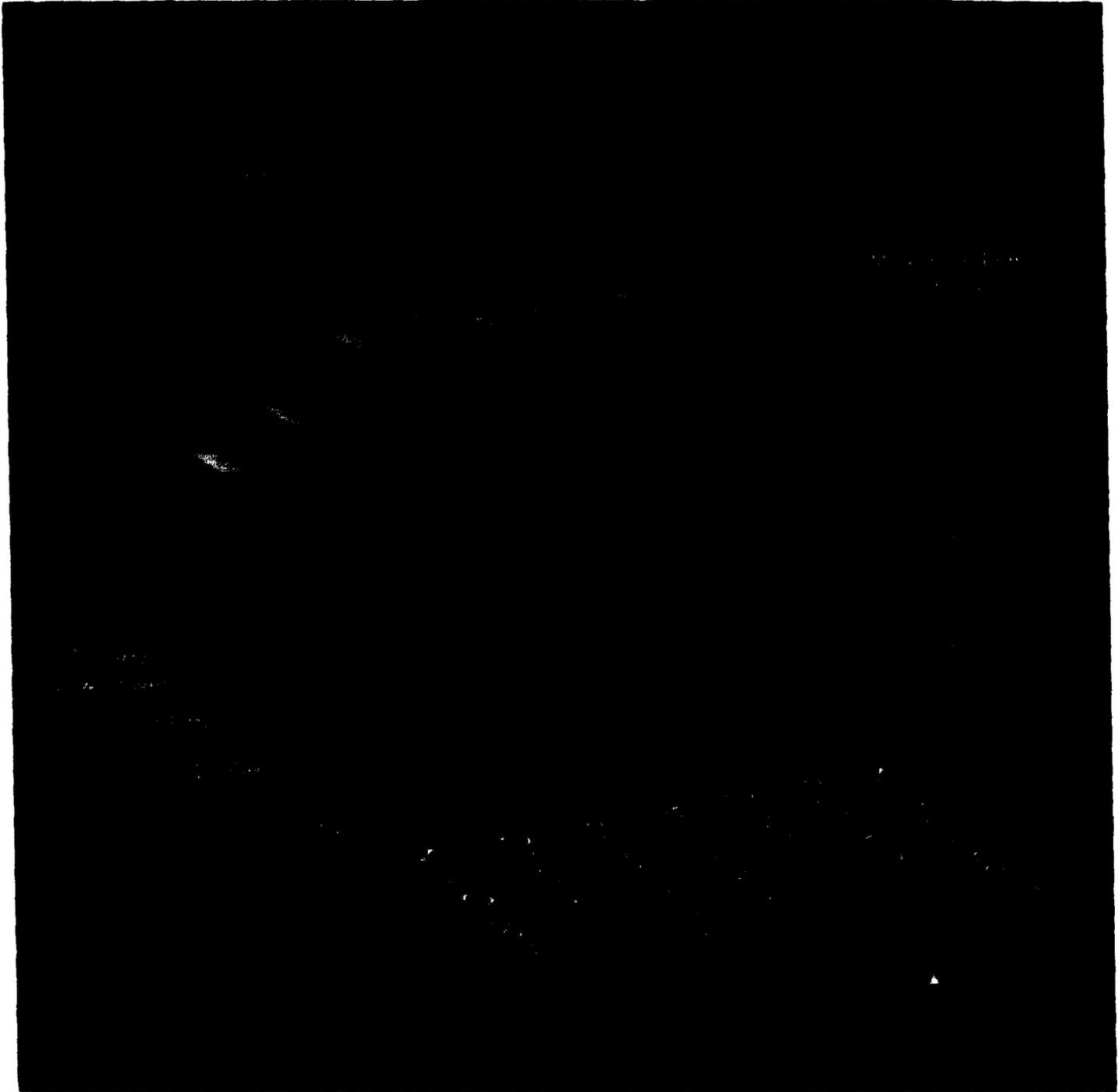
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- **Spectrum Sharing Is Not An Option**
    - Satellite operations have larger interference exclusion zones based on all elevation, all azimuth operation.
    - Interference objectives should be coordinated between fixed and satellite services.
    - Prior Coordination Notice process is required to safeguard the investment in terrestrial fixed services.
-



- 18 GHz Relocation Options
    - Thousands of links to relocate
    - Shared by all fixed microwave services
    - 23 GHz has higher attenuation
    - 11 GHz has higher minimum payload requirements, will require more complex modulation at higher cost.
    - 11 GHz also proposed for satellite sharing
    - 6 GHz band requires more expensive and much larger equipment
    - Segmentation of 18 GHz band
-



**Courtesy of Alcatel's Microwave  
Transmission Engineering  
Department**



- 18 GHz Relocation Costs
    - Depending on the specific plan selected relocation could be accomplished with as little work as changing the frequency on the front panel display or as much work as re-building the entire microwave system.
    - Loss of the 340 MHz split (and associated 5 MHz channels) will require replacement of at least the outdoor units.
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- 18 GHz Relocation Costs
    - Best Case (Same Band, Same T/R Split): Frequency Coordination, FCC Application Fees, 2 person site visit - \$ 5,000.
    - Medium Case (Same Band, Different T/R Split): Best Case + install new outdoor units : \$15,000 - \$25,000 per link.
    - Worst Case (6 GHz Option): Best Case + 2 new towers + 2 buildings to house 6 GHz radios + 2 new dehydrators + 2 runs of waveguide + 2 new 6 GHz radios: \$150,000 - \$200,000.
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- Relocation Costs Should be Paid by New Entrants
    - PCS Precedent
    - Faster transition
    - Costs borne by those who benefit
-