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Director-
Federal Regulatory

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ex Parte

February 25, 1998

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

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

Yesterday, Betsey Granger, Senior Attorney, and Tarun Gupta, Microwave Engineer, Pacific Bell Mobile Services, and I met with Pamela Gerr, Chief, Negotiations Branch, and Chuck Magnuson of the Planning and Negotiations Division, Rudy Baca of the Satellite and Radiocommunication Division, Peter Pappas, Assistant Bureau Chief, and Mindy Ginsburg, Associate Bureau Chief, International Bureau, to discuss issues summarized in the attachment. 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,

Attachment

cc: R. Baca
P. Gerr
M. Ginsburg
C. Magnuson
P. Pappas

No. of Copies rec'd 0+7
List ABCDE

18 GHz Microwave and CMRS

18 GHz Microwave and CMRS

- 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.

18 GHz Microwave and CMRS

- 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

18 GHz Microwave and CMRS

- 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 Backbone - Cellular One Boston

- Frequency Range — 17.7 - 19.7 GHz TX Power, 19-29 dBm
- Currently 20 Systems in use, Capacity 4DS-1 - 1DS3
- Currently 4 systems under construction
- 2 future sites planned

Primary Reasons for Using 18 GHz Microwave Systems

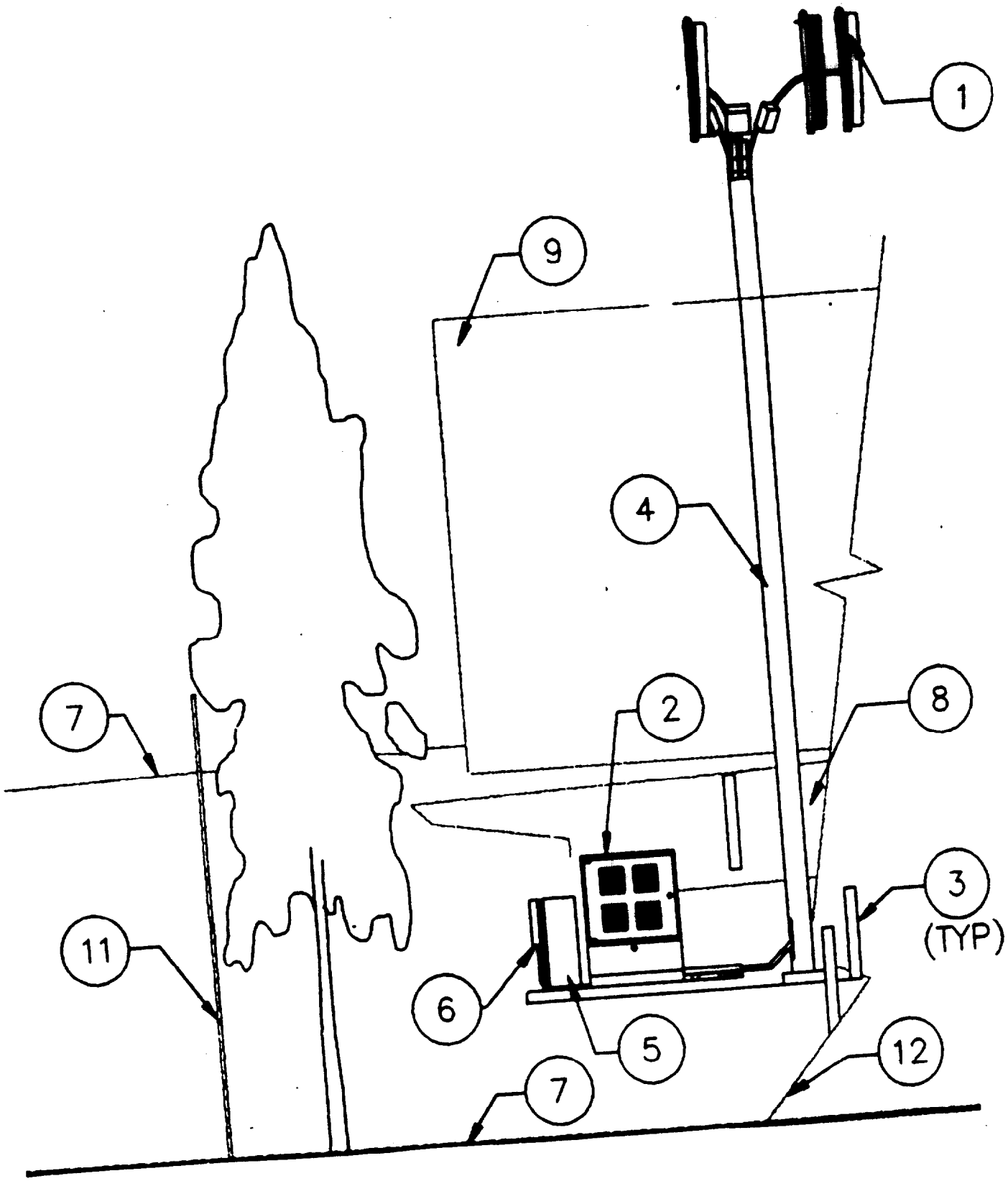
- COST EFFECTIVE

- SPACE CONSTRAINT - Digital Interface Unit (DIU) takes up on 1 equipment rack space
  - May be wall mounted if necessary to eliminate the need for floor space or where floor space is not available.

- MICROCELL APPLICATIONS - DIU can be placed within the Microcell cabinet. Most units run 24 or 48 volts, eliminating external power requirements.

Primary Reasons for Using 18 GHz Microwave Systems (cont.)

- DISH SIZE - Path can be engineered and licensed with a 1' or 2' dish which is more acceptable in many locations.
- FREQUENCY CONGESTION - 18 GHz frequencies are more easily obtainable.
- TOWER LIMITATIONS - Smaller dishes are easier to place, based on structural condition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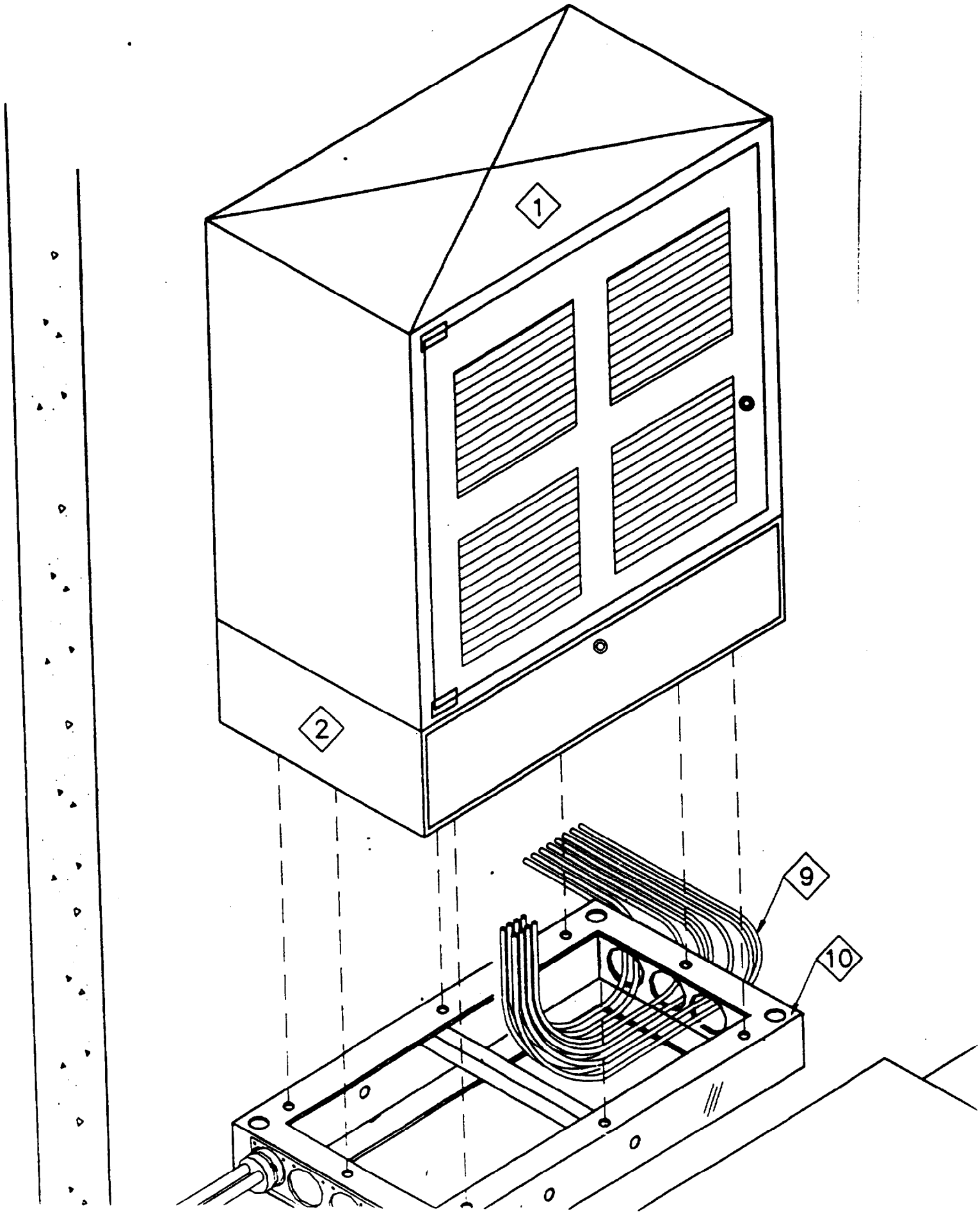
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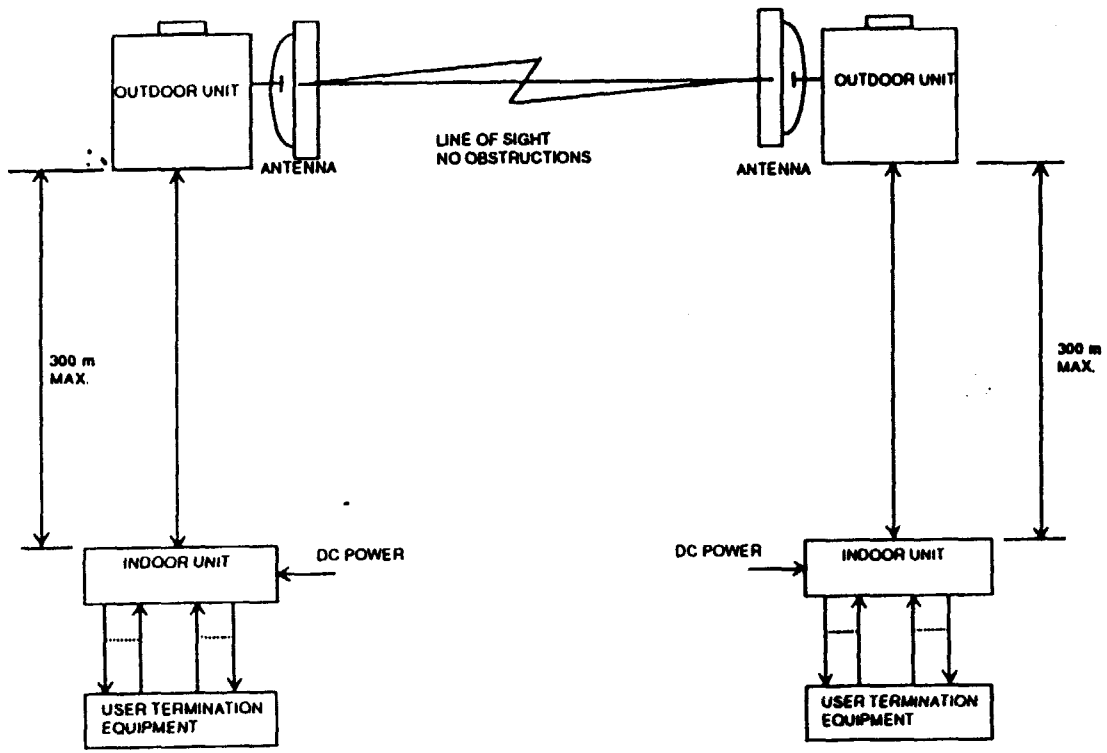
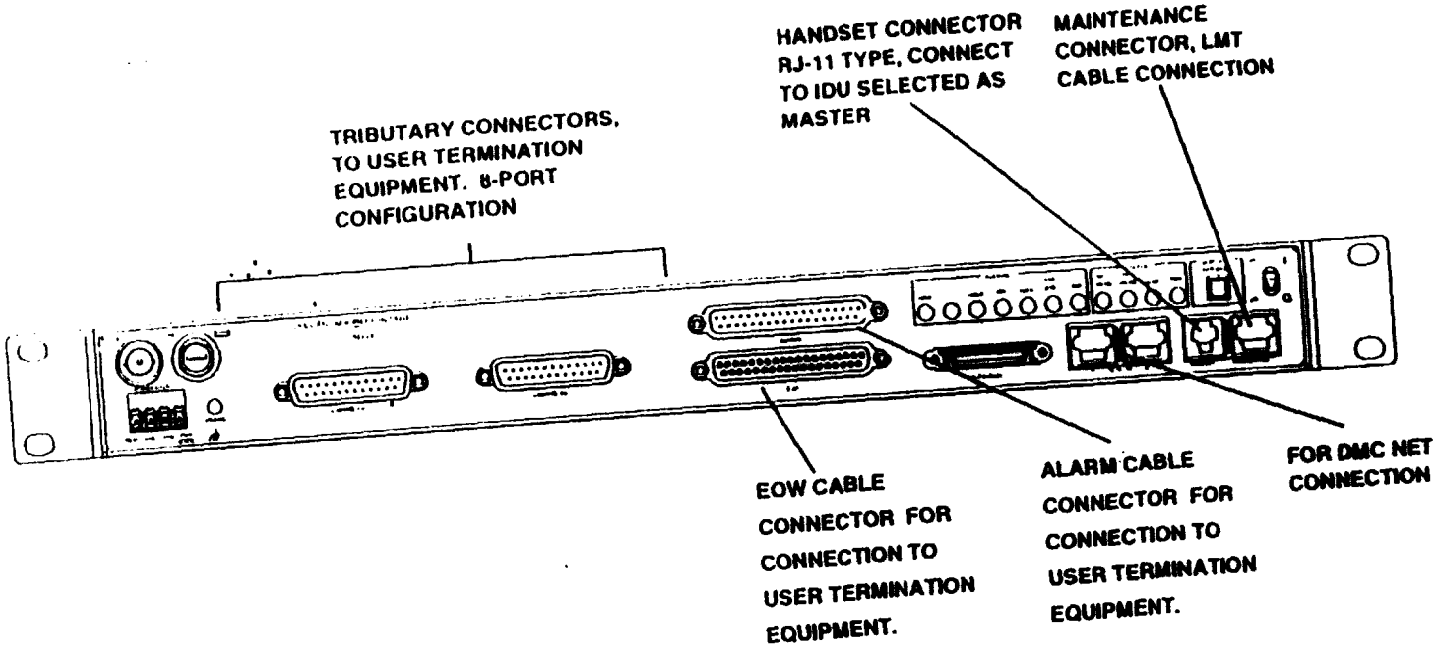
18 GHz Microwave and CMRS

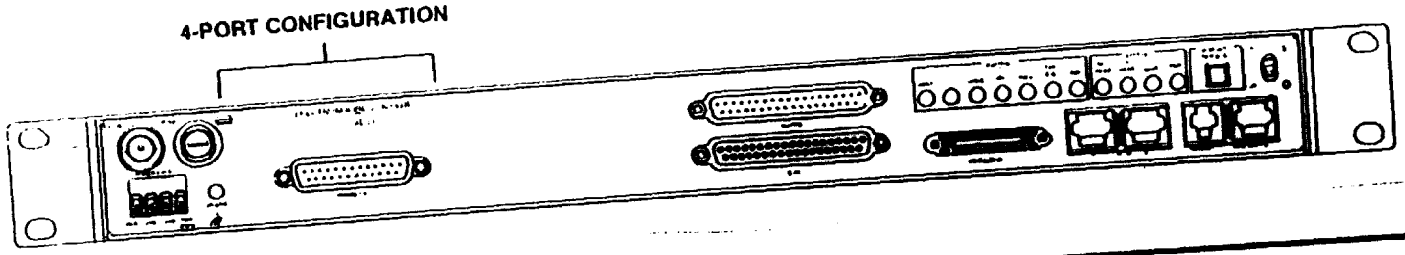
- System Block Diagram



18 GHz Microwave and CMRS

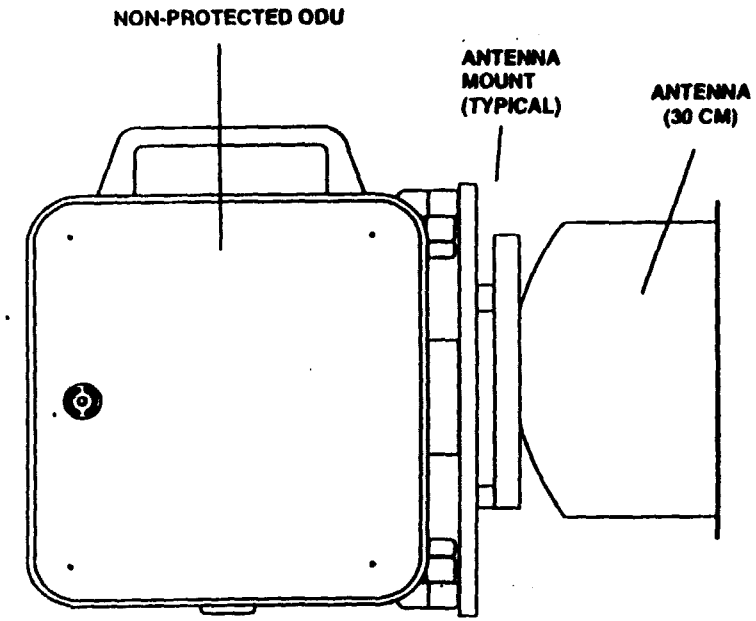
- Indoor Unit Detail

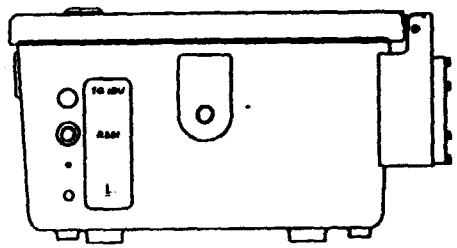


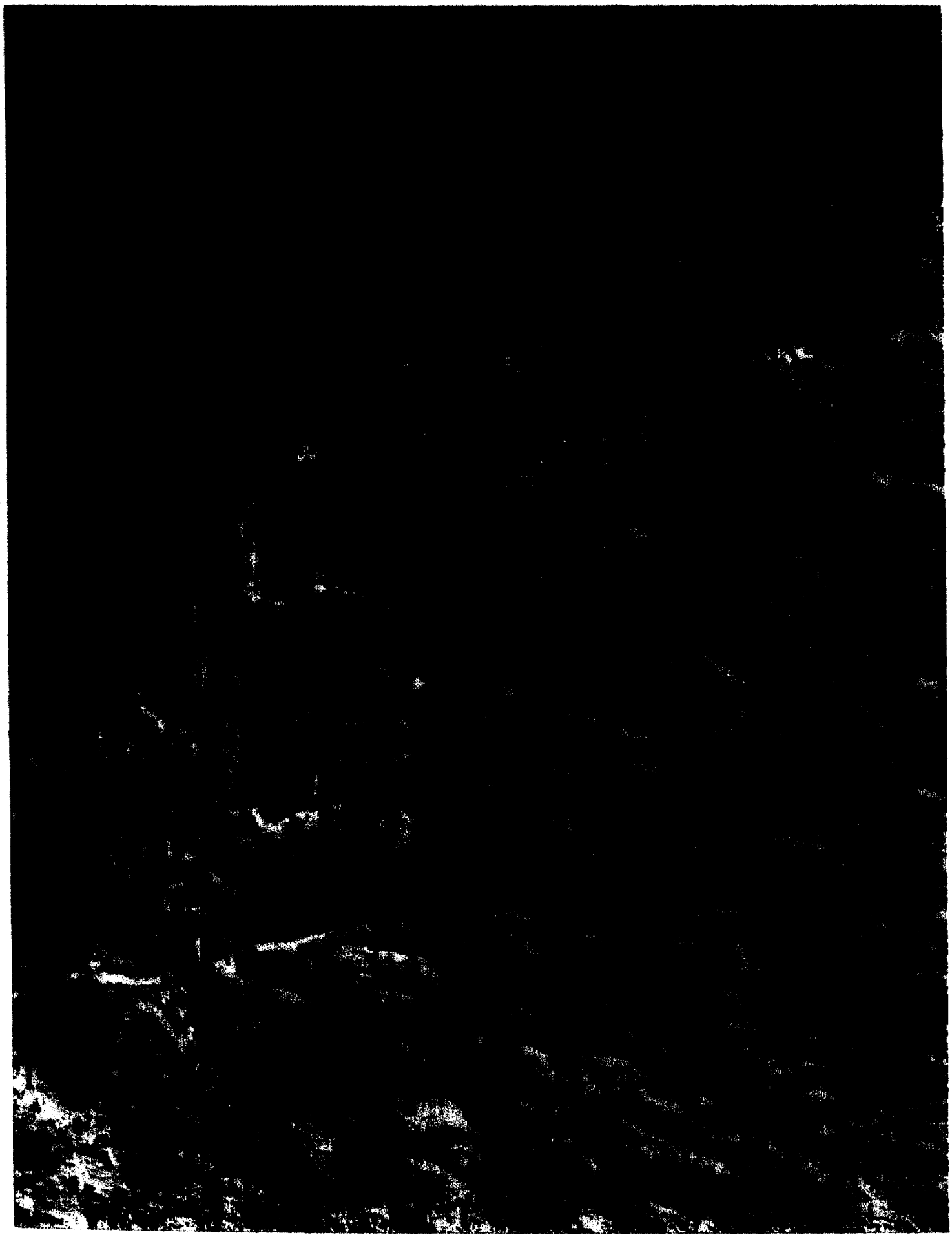


18 GHz Microwave and CMRS

- Outdoor Unit Detail







18 GHz Microwave and CMRS

- 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)

18 GHz Microwave and CMRS

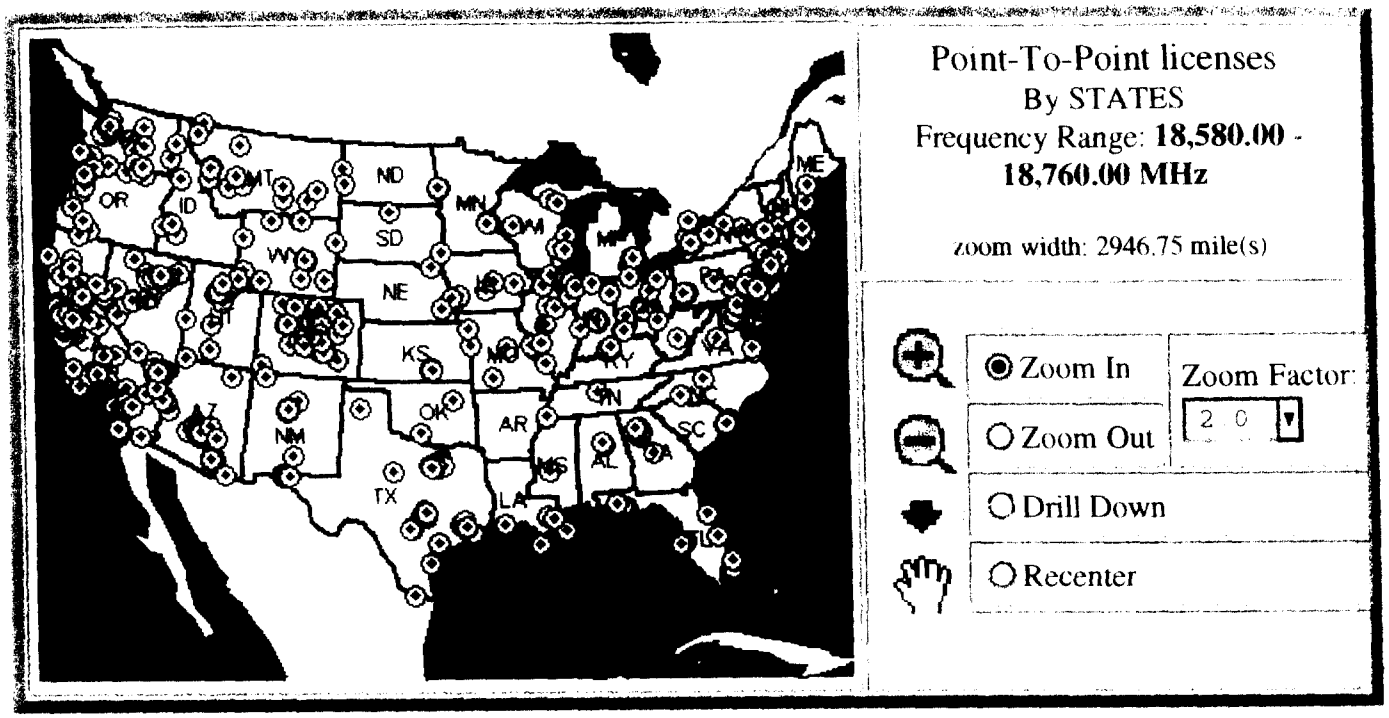
- Spectrum Sharing with Mobile Satellite Operators
  - Worst Case:
    - Main Beam - No Antenna Discrimination
    - Co-Channel - No RF or IF Discrimination
    - Distance from Terrestrial Receiver to Satellite: 400 km
    - 4' Antenna at Terrestrial Receiver (44 dBi Gain)
  - Free Space Path Loss
    - FSL=32.45 + 20 log D + 20 log F = 169.6 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:
    - $-100 = EIRP_{sat} - FSL + Ant\ Gain$
    - $EIRP_{sat} = 25.6$ dBm (0.36 W)

18 GHz Microwave and CMRS

- 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.

18 GHz Microwave and CMRS

- 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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KBC20,COLORADO, STATE OF,EAGLE,CO
KBD28,U S WEST COMMUNICATIONS INC,CORTEZ,CO
KCM97,COLORADO, STATE OF,CRAIG,CO
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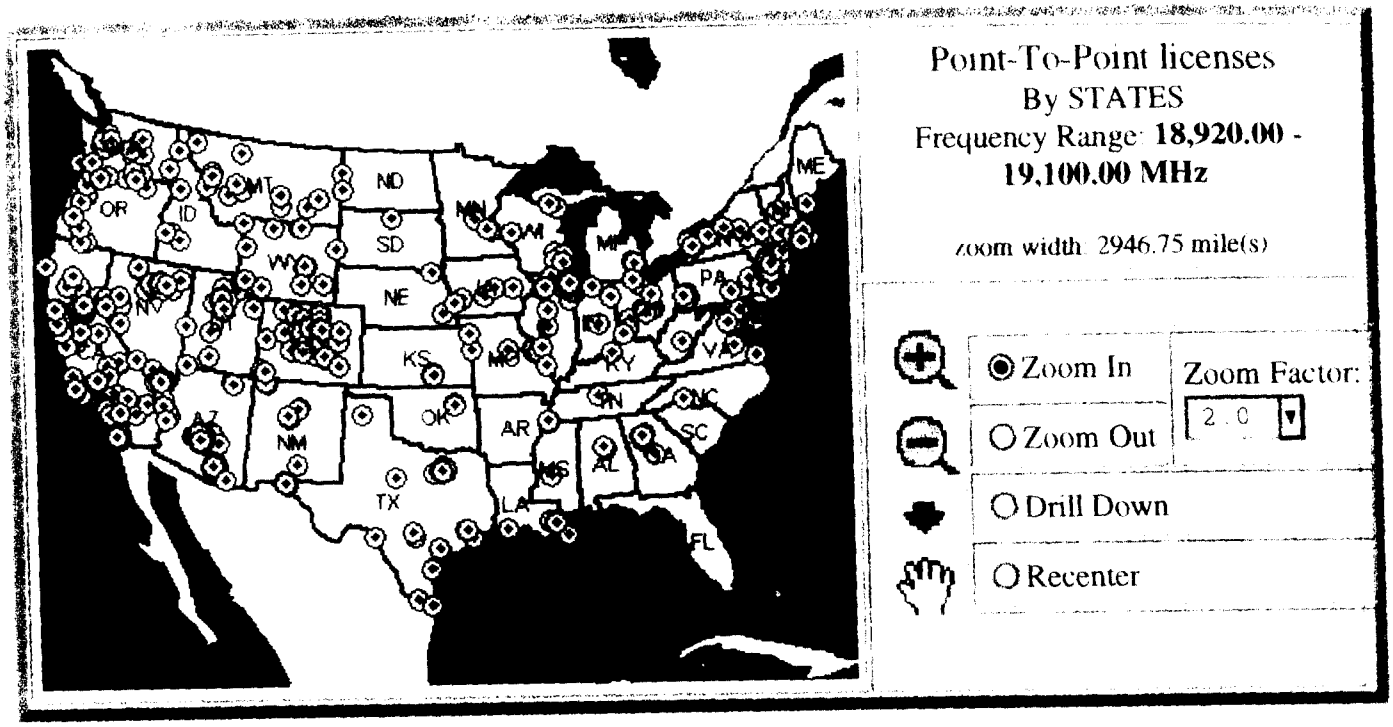

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KBC21,COLORADO  STATE OF,EAGLE,CO
KBJ22,EL PASO FIELD SERVICES COMPANY,FARMINGTON,NM
KCE54,BOSTON EDISON COMPANY,BOSTON,MA
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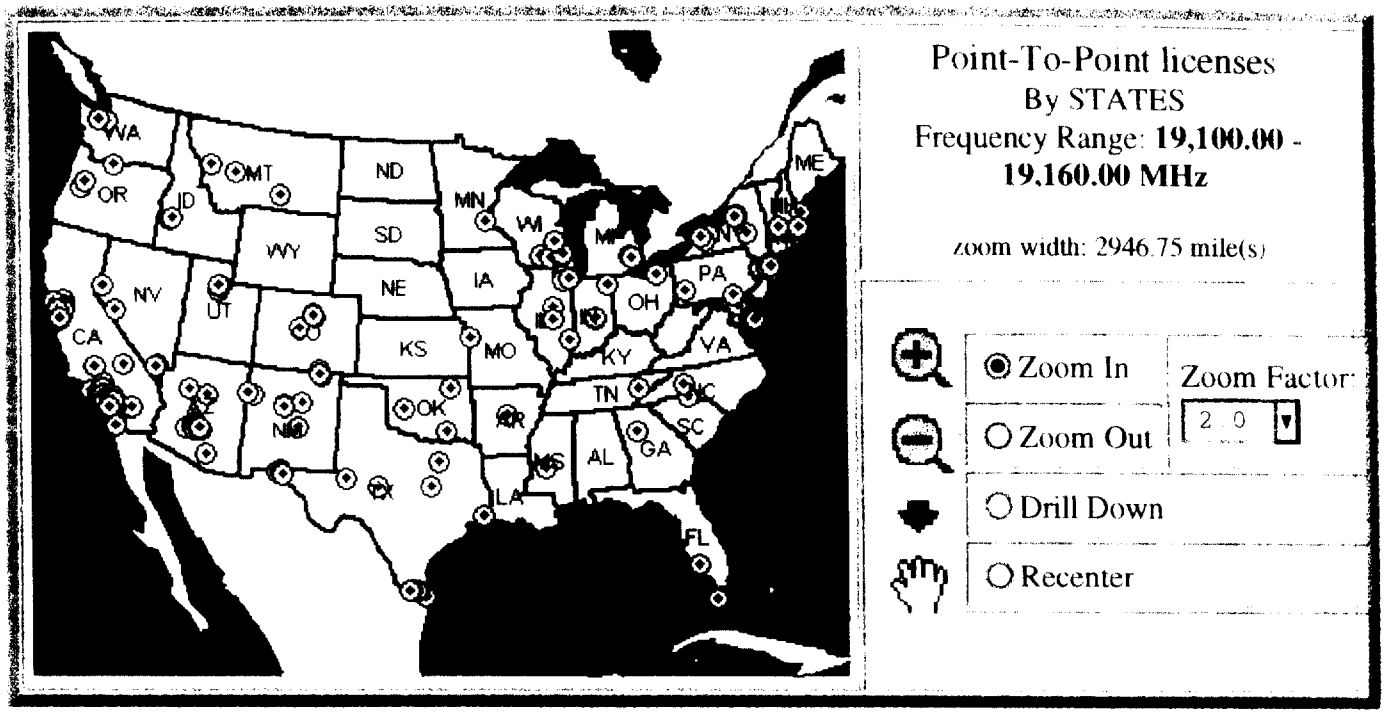

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KCP56,EL PASO NATURAL GAS COMPANY,GALLUP NM
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KEY37,QUESTAR INFOCOMM INCORPORATED,SALT LAKE CITY,UT
KFO94,EL PASO NATURAL GAS COMPANY,FLAGSTAFF,AZ
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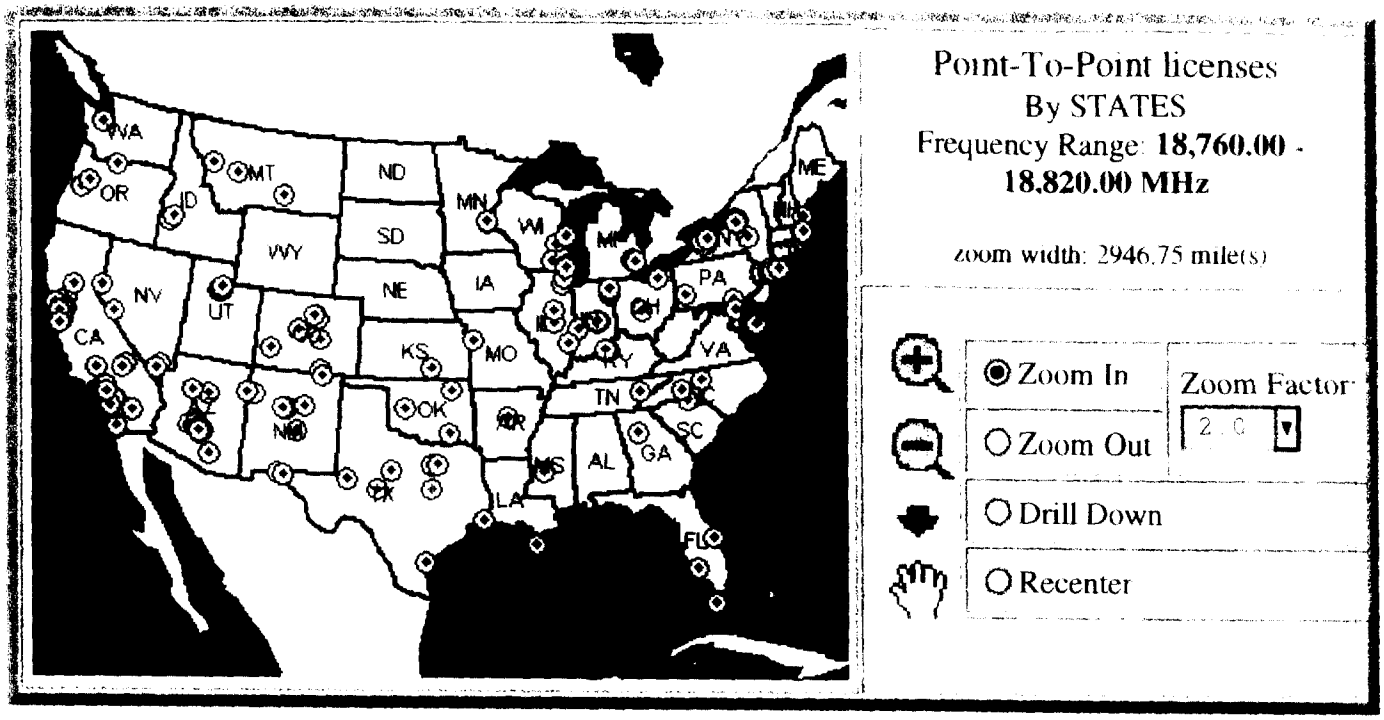

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KKS79,EL PASO NATURAL GAS COMPANY,EL PASO TX
KMM20,LOS ANGELES, COUNTY OF,LANCASTER,CA
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RELOCATION

- Relocation to higher frequency band, for example 23 GHz. will reduce reliability in an average 18 GHz path by 10-15 dB without an increase in dish size due to higher attenuation characteristics.

- Relocation to 38 GHz would decrease reliability even more than above. 38 GHz would need to be leased by an authorized provider.

- Relocation to a lower frequency raises cost of interconnect, frequencies may not be obtainable and dish sizes will to be increased from 1' and 2' to 4' and 6'.

RELOCATION (cont.)

- 10 GHz Minimum dish size is 4'. Conditional license cannot be obtained currently without a waiver, which extends licensing period substantially. Much more congested, therefore frequency availability is non-existent in some areas.
- 11 GHz Minimum dish size is 4'. Frequency congestion problems exist in many areas.
- 6 GHz Minimum dish size is 6' which is unacceptable on many building applications as well as towers which are structurally loaded. Equipment cost higher. Congested Bandwidth throughout Massachusetts. Many frequencies have never been relinquished making it extremely difficult to obtain 6 GHz microwave links in the Boston area.

18 GHz Microwave and CMRS

- 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