

Gina Harrison
Director
Federal Regulatory Relations

1275 Pennsylvania Avenue, N.W., Suite 400
Washington, D.C. 20004
(202) 383-6423

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Group-Washington

February 24, 1995

EX PARTE

William F. Caton
Acting Secretary
Federal Communications Commission
Mail Stop 1170
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Dear Mr. Caton:

Re: Gen. Docket No. 90-314, Personal Communications Services;
ET Docket No. 92-9/Redevelopment of Spectrum to Encourage Innovation

Today, Stephen M. Aspell of Pacific Bell and I met with John R. Williams, Senior Electronics Engineer, FCC to discuss PCS relocation of incumbent microwave users. Please associate these materials with the above-referenced proceedings.

We are submitting two copies of this notice in accordance with Section 1.1206(a)(1) of the Commission's Rules.

Please stamp and return the provided copy to confirm your receipt. Please contact me should you have any questions or require additional information concerning this matter.

Sincerely,



Attachment

cc: John R. Williams

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PCS and Microwave Relocation

Cost Sharing and International Coordination

February 24, 1994

PACIFIC BELL
Mobile Services

Pacific Bell Mobile Services

Stephen M. Aspell, P.E.
Microwave Engineer

4420 Rosewood Drive, Bldg. 2, 4th Floor
Pleasanton, California 94588
(510) 227-3187
Fax (510) 227-3079
Email: saspell@pacbell.mobile.com

- PCS will be a tougher business to enter and compete in than most people realize:

- More Sites Required than Cellular
- Entering Established Markets
- Higher Initial Costs before Reaching Market
- More Competition for Site Locations
- Microwave Relocation Issues

Microwave Relocation is an Issue that Affects all PCS Providers

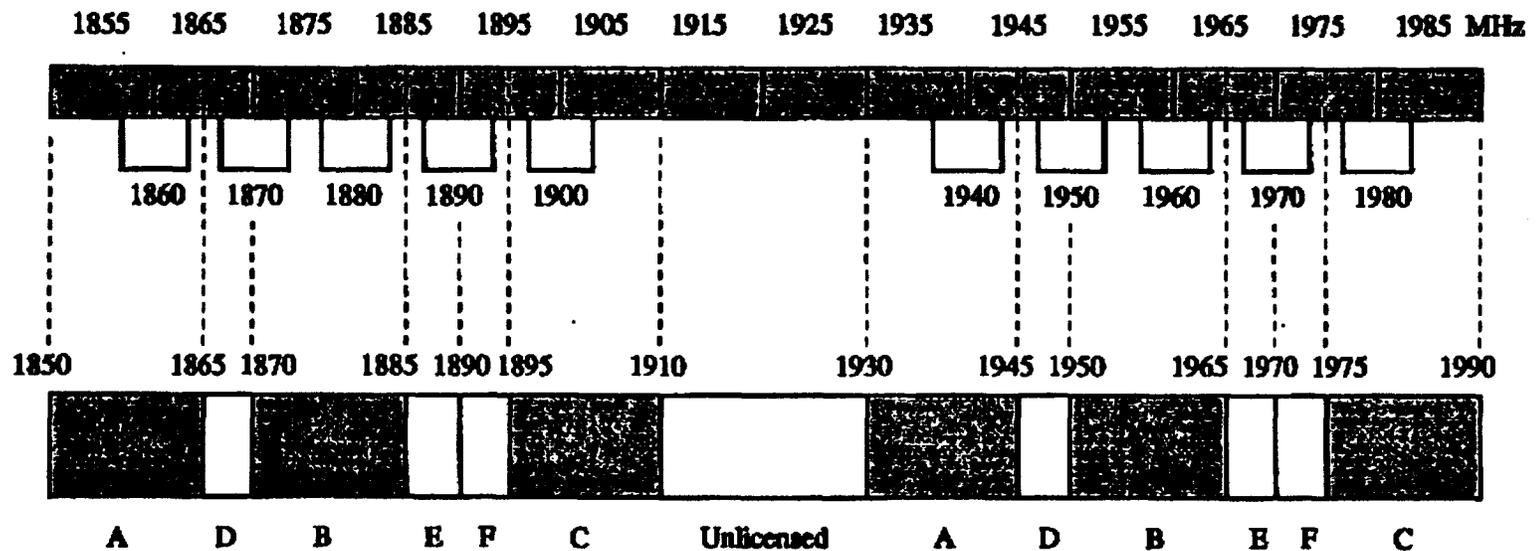
- All PCS providers will have to face the issue of which microwave links must be relocated before offering competitive wireless services. However, the timing will depend on the when all the PCS auctions are completed.
- PCS providers that want to provide wireless services as soon as possible will have to relocate existing microwave users that are not in their spectrum block to avoid causing harmful interference.
- Free-riders will have a substantial cost advantage over the early providers, unless appropriate cost sharing can be implemented.

A Single Microwave Link Can Affect Multiple PCS Blocks

- Existing Microwave Channel Plan and PCS Channel Blocks Causes a Number of Overlaps Based on Transmitted Frequency. For example, an 1865 MHz receiver would affect both the A and D blocks.
- Not All Incumbent Microwave Links Follow the Standard 80 MHz Separation between Transmit and Receive Frequencies. A link operating at 1870/1970 MHz could be characterized as affecting B, D, E and F PCS Blocks.
- Microwave Receivers receive interference from much wider bandwidths than the nominal transmitter channel bandwidth. This leads to harmful interference outside of the PCS Block.

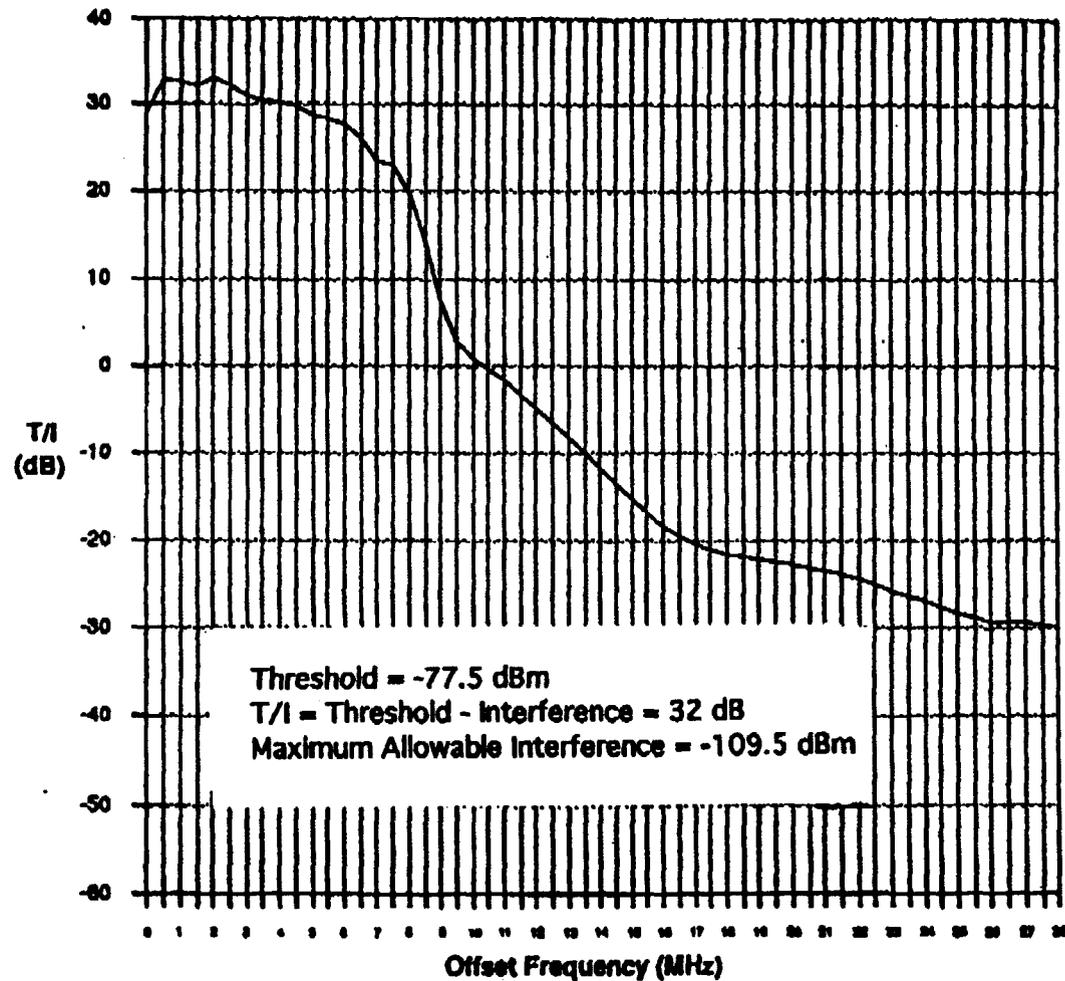
Existing Microwave Channel Plan and PCS Channel Plan

Existing Private Microwave Channel Plan



Broadband PCS Channel Band Plan

T/I Curve for a 672 Channel Digital Receiver

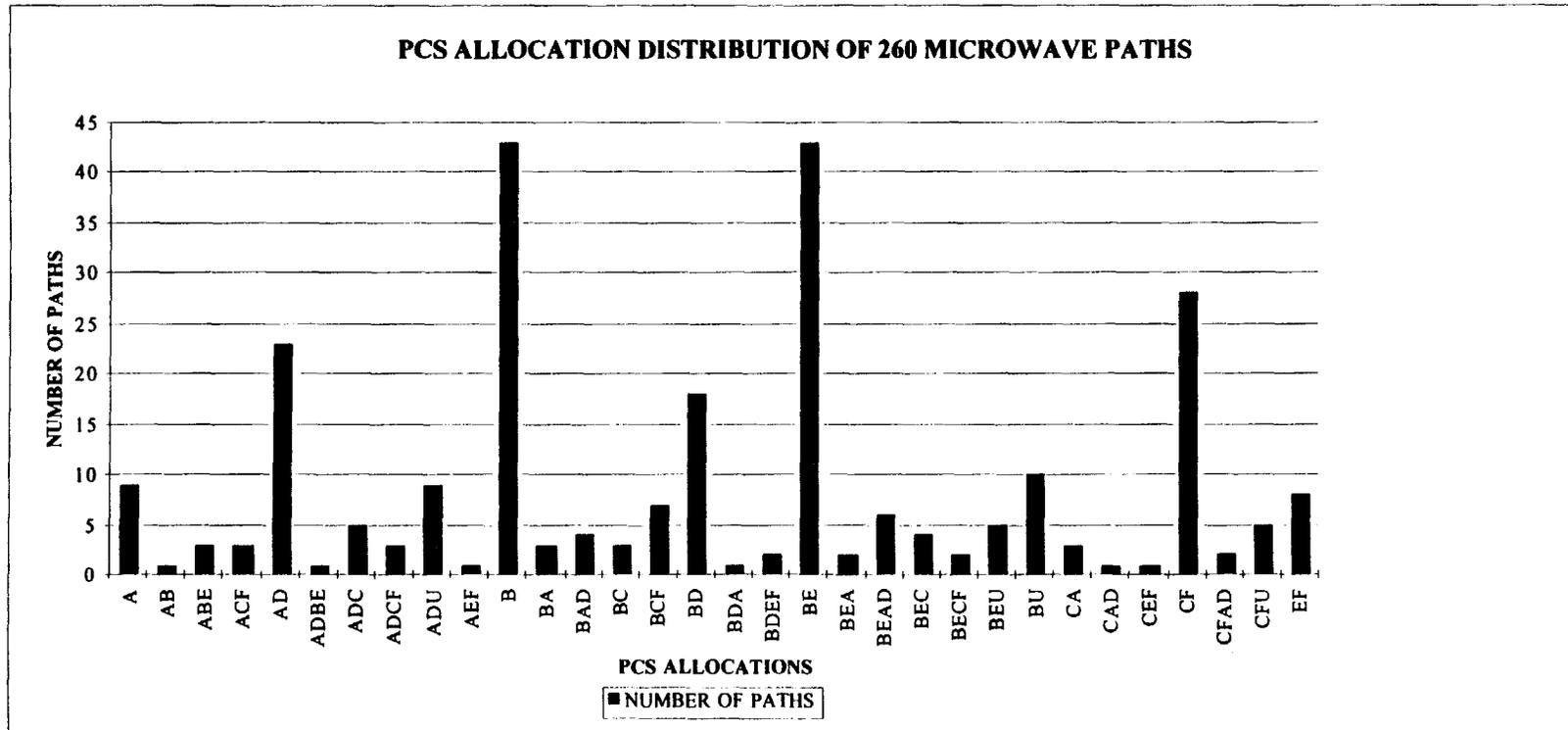


Interference Example for a 672 Channel Digital Receiver

- 10 MHz away, a single mobile station transmitting 0.25 mW can cause interference from 1 mile away along the main beam of the microwave antenna.
 - » Threshold = -77 dBm, T/I @ 10 MHz = 0, Antenna Gain = 32 dBi
 - » $P_r = P_t + G_t + G_r - \text{Path Loss}$
 - » Max. Allowable interference = $(-77 - 32) = -109$ dBm
 - » Path Loss from 1 mile away = 103 dBm
 - » Mobile Transmit Power = $(-109 + 103) = -6$ dBm = 0.25 mW

PCS Block Distribution of 260 Microwave Links in California

- 160 Links Involve the B Block, 100 Links are not in the B Block



Microwave Relocations Involve Substantial Costs

Sample Microwave Relocation Costs:

- Estimated per Link Relocation Costs vary between \$200,000 and \$ 300,000 each. Actual Costs will vary, does not include installation.
 - Analog Radio Lo: $2 \times \$ 27,852 = \$ 55,704$
 - Analog Radio Hi: $2 \times \$ 30,492 = \$ 60,984$
 - Digital Radio Lo: $2 \times \$ 42,944 = \$ 85,888$
 - Digital Radio Hi: $2 \times \$ 56,474 = \$ 112,948$
 - Antenna Lo: $2 \times \$ 5000 = \$ 10000$
(for paths longer than 30 miles) = $4 \times \$ 5000 = \$ 20,000$
 - Antenna Hi: $2 \times \$ 8,000 = \$ 16,000$
(for paths longer than 30 miles) = $4 \times \$ 8,000 = \$ 32,000$
 - Standard Multiplex: Analog - \$ 15,000 Digital - \$ 25,000
 - Transmission Line: \$ 21 per foot of antenna height + \$ 50 connectors
(for paths longer than 30 miles) = $2 \times \$ 21.24$ per foot of antenna height
 - Connectors: \$ 900, (for paths longer than 30 miles) \$ 1,800
 - Twin Flex: \$ 1000, (for paths longer than 30 miles) \$ 2,000
 - Pressure Windows: \$ 100, (for paths longer than 30 miles) \$ 200
 - Kits: \$ 500
 - Dehydrator: $2 \times \$ 2,500 = \$ 5,000$
 - Engineering Fees: $2 \times (\$ 1,100$ Coordination + \$ 300 License + \$ 2,300 Survey + \$ 4,000 Feasibility Study)
 - Training: \$ 2,000
 - Test Equipment: \$ 3,000
 - Spare Parts: \$ 5000
 - DC Power Upgrade: \$ 10,000 per site, expected 20% of the time = \$ 2,000
 - Disposal: $2 \times \$ 2,500 = \$ 5,000$ for removal and disposal of old equipment.
 - Miscellaneous: $2 \times \$ 5,000 = \$ 10,000$
 - Tower Upgrade: \$ 150,000 per site over 30' tall, expected 20% of the time = \$ 30,000 per site when needed
 - Tower Inspection: \$ 3,000 per site where tower exceeds 30'

Possible Microwave Relocation Cost Sharing Proposals

- **\$/dB** - This sharing proposal would assess PCS providers cost shares based on the total amount of interference calculated at each microwave receiver from each PCS system. Difficult to resolve technical disputes, no way to incorporate measured data.
- **L-TAM** - Similar to the unlicensed band's UTAM, would require the creation of a single coordinator for all microwave relocations with costs distributed to the entire PCS industry based on population/MHz criteria. Large organization required, unable to respond to individual needs.
- **Channel Plan Mapping with Cost Recovery** - This proposal would make each PCS provider responsible for all the links within the PCS channel block. Joint microwave links will be distributed evenly.

PCS - Microwave Coordination with Mexico

- Current PCS rules require coordination with microwave users in Mexico. However, no information appears to be available concerning the location or technical parameters concerning existing microwave users in Mexico.
- This is a serious concern throughout the southwestern US.
- US - Canada information has become available, but no progress has been reported to the south.
- Is there anything the PCS industry can do to assist the FCC in obtaining the required information?

Conclusion

- Existing microwave links will affect a wide variety of PCS blocks due to the channelization of private microwave and PCS spectrum; the technical characteristics of the microwave systems; and the type of PCS systems that are deployed.
- Microwave relocation cost sharing will reduce the penalty for coming to the market early and eliminate the cost advantage of free-riders.
- PCS coordination with Mexico is an industry priority.