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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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September 15, 1999

Ms. Magalie Roman Salas, Secretary
Federal Communications Commission
The Portals, TW-A325
445 12th Street, S.W.
Washington, D.C. 20554

Re: Ex Parte Notification – WT Docket No. 99-168

Dear Ms. Salas:

This letter is being filed on behalf of Motorola, Inc. (Motorola). On September 14, 1999, Dave Eierman, Brad Hiben, Jason Losh, Bernie Olson, Steve Sharkey and Leigh Chinitz, all of Motorola, had two separate meetings with FCC staff during which we discussed the *Notice of Proposed RuleMaking* in the above-referenced proceeding. The first of these meetings was with Julius Knapp, Tom Derenge, and Sean White from the Office of Engineering and Technology and Joseph Levin and Martin Liebman from the Wireless Telecommunications Bureau. The second meeting was with Thomas Stanley, Diane Conley, Herbert Zeiler, Eugene Thomson, Nancy Boocker, Ronald Netro, Kathleen Ham, Martin Liebman, Louis Sigalos, and Michael Wilhelm from the Wireless Telecommunications Bureau and John Williams and Evan Kwerel from the Office of Plans and Policy.

The content of these two meetings was largely the same. Motorola expressed its opinion that, because of the propagation characteristics of the spectrum and its proximity to other mobile services, the 36 MHz under consideration in the 746-806 MHz band is ideal for meeting the demonstrated needs of mobile users. Accordingly, it should be licensed in a way that facilitates mobile use but does not prohibit fixed uses that are technically compatible. Motorola provided a plan demonstrating that active management of the 746-806 MHz band can substantially improve the efficient use of that spectrum and help satisfy the requirements of a wider range of users. Under Motorola's plan, the majority of the 36 MHz would be available for commercial services. A portion of the spectrum would, however, be made available, through auction, to private services.

Motorola demonstrated that highly dissimilar services operating in close proximity raise the potential of interference scenarios that can be addressed through proper spectrum management. Based on this, Motorola described how traditional high-power broadcast operations are incompatible with lower power mobile services and should not be permitted to operate in this spectrum. Motorola also provided analysis demonstrating the difficulties that traditional low-site, high frequency reuse cellular systems will have in providing the protection necessary to ensure interference-free operation of public safety systems operating in the 24 MHz of spectrum already allotted at 746-806 MHz. In order to provide proper adjacent-channel protection to public safety services, the types of wider bandwidth technologies currently being deployed for commercial operations will not be able to operate within approximately 1.5 MHz of the public safety services. Based on this, Motorola provided a plan that would allow private radio services to use the 1.5 MHz of spectrum at each edge of commercial bands. This results in a total of 6 MHz available for PMRS. This spectrum would be auctioned, and band managers would be allowed to bid, but use would be limited to private radio services.

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This plan creates a transition zone between public safety and consumer-oriented commercial uses. Interference from private systems into public safety systems would be managed, as it is now, by the frequency coordination process. Interference from commercial systems into private radio systems would be minimized through a band manager that could evaluate the radio environment and match the private use in a particular frequency segment in a way that would be compatible with the adjacent radio environment. Given the wide variety of private requirements, from low power, in-building systems to multi-site systems covering large areas, it will be possible to make efficient use of this spectrum without significant impact on CMRS or public safety services.

Accordingly, Motorola's plan for the 746-806 MHz band provides the greatest benefit to the public by maximizing efficient use of the spectrum and minimizing the amount of spectrum used as guard-band to protect adjacent services. Both commercial mobile service providers and the private radio community have demonstrated the need for additional spectrum. While the 36 MHz available in this proceeding falls far short of what is required to meet the long-term requirements of these services it is a critical first step. Through active management of the spectrum the Commission can maximize its value to both these groups. Motorola indicated its willingness to continue to work with Commission staff to develop service rules for this spectrum that would maximize its potential use.

Attached to this letter are the slides used at these meetings. Please contact either Leigh Chinitz at (202) 371-7940 or Steve Sharkey at (202) 371-6953 regarding any questions concerning this matter.

Respectfully Submitted,

Leigh Chinitz /MC

Leigh M. Chinitz
Steve B. Sharkey
Motorola, Inc.

Attachment
cc:

Mr. Julius Knapp
Mr. Eugene Thomson
Mr. Tom Derenge
Mr. Ronald Netro
Mr. Sean White
Ms. Kathleen Ham
Mr. Joseph Levin
Ms. Nancy Boocker
Mr. Martin Liebman
Mr. Louis Sigalos
Mr. Thomas Stanley
Mr. Michael Wilhelm
Ms. Diane Conley
Mr. John Williams
Mr. Herbert Zieler
Mr. Evan Kwerel

Agenda

- Experience at 800 MHz
  - Interference to 700 MHz Public Safety systems is guaranteed unless spectrum is well managed
- Motorola Band Plan
  - View from Motorola considering cellular/PCS, PMRS and Public Safety requirements

800 MHz Environment...and Changes

- High HAAT Sites
  - Units away from Sites
- Wide Area Coverage
- Predominately Mobile
- Fixed Frequency Assignments

- Multiple Low HAAT Sites
  - Units close to Sites
- Concentrated Local Area Coverage
- Portable (In-building)
- Rapidly Changing and Mixed Frequency. Assignments

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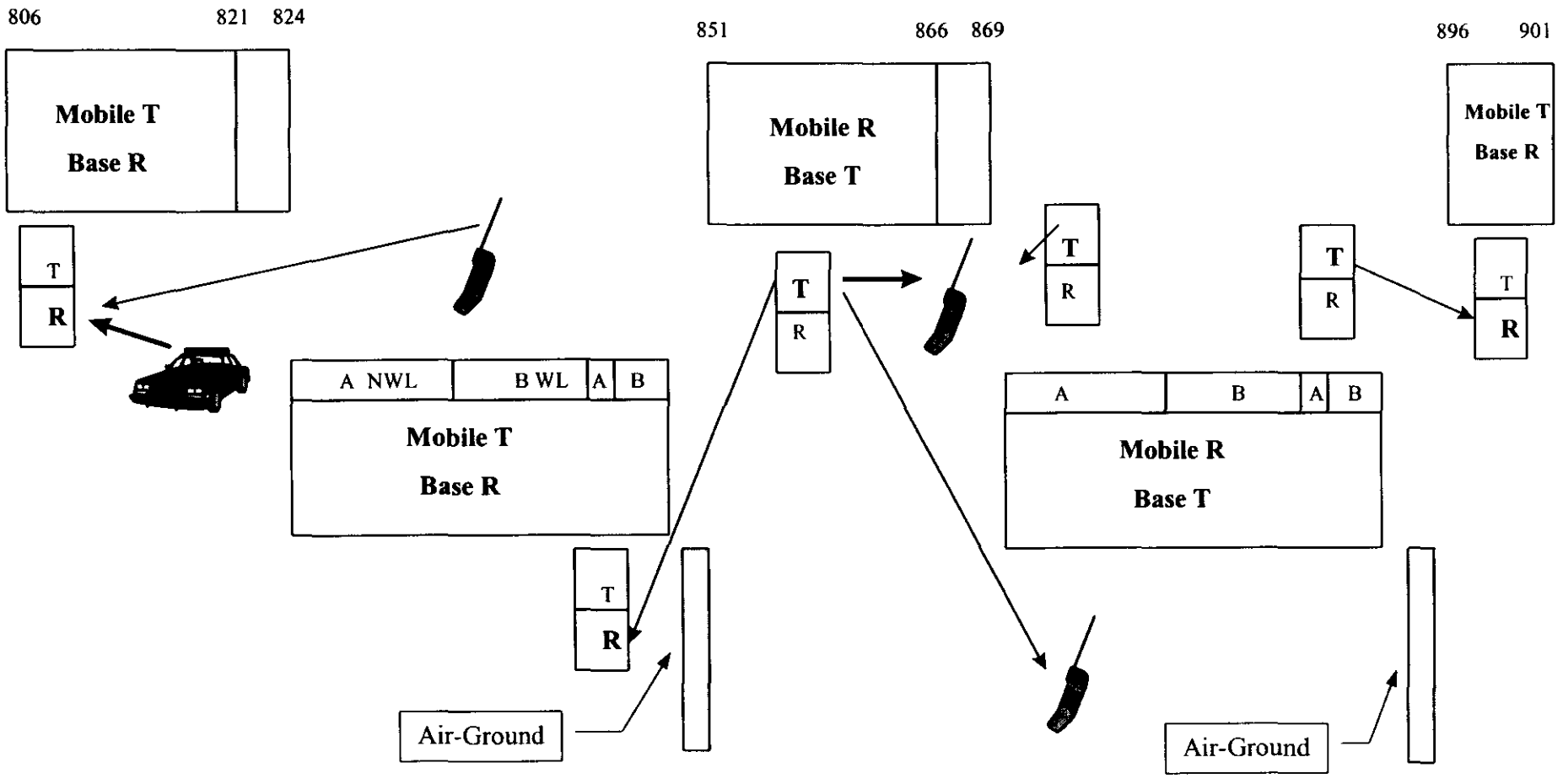
800 MHz Band Interference Scenarios



Interference is Increasing

- Field units "near", in close proximity, to an interfering site and "far" from desired site(s)
  - Mixed "high level" and "low level" systems
- More congestion at 800 MHz
  - Channels are intermixed
  - No Band Frequency Coordination Process
- More portable based systems
  - Mobiles typically have higher specifications

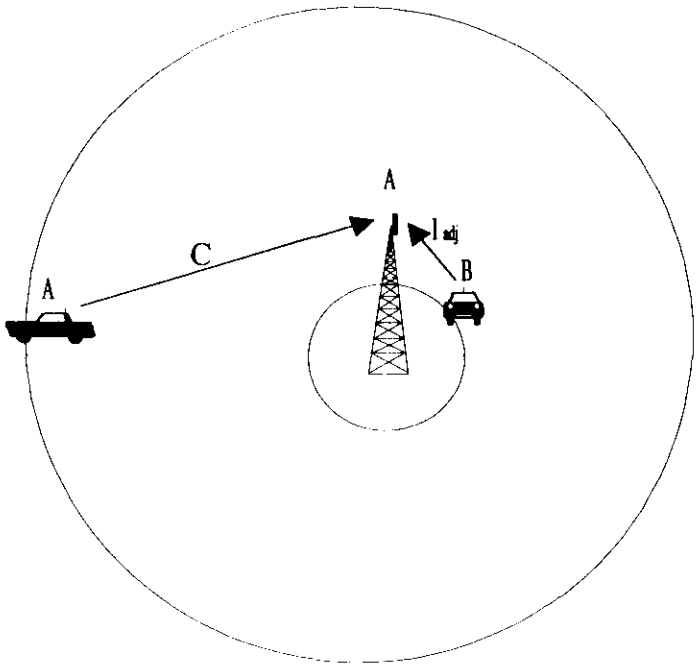
Major Interference Contributors

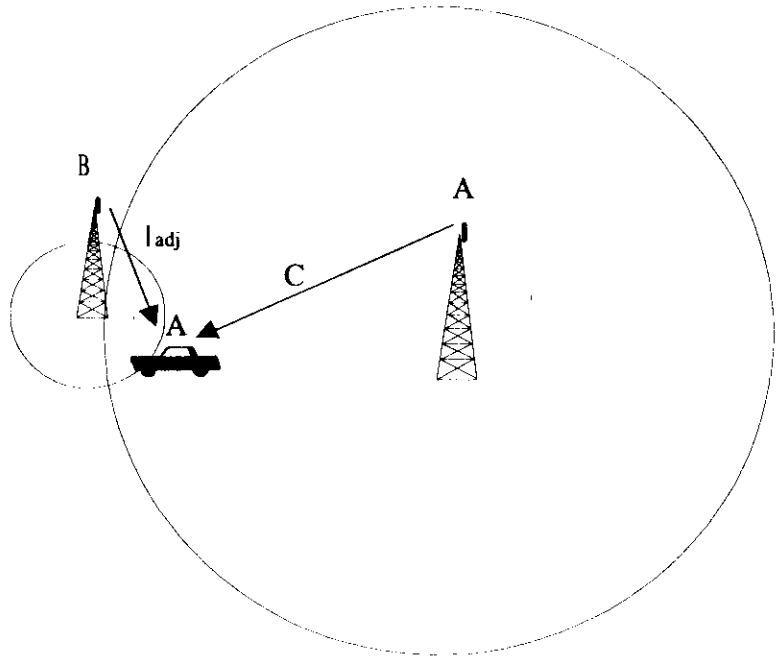
- "Low HAAT" site SMRs
  - Distributed throughout Service Area
  - Medium to High power and multiple transmitters
- Cellular Systems
  - Distributed throughout Service Area
  - High power and multiple transmitters
  - Linear Transmitter Power Amplifiers
    - Mixed transmitter modulations

Spectrum Compatibility

- Cellular Type Systems can cause Interference with Conventional usage
  - Classic Near-Far Problem
    - Interference Zone around Multi-transmitter Sites
    - Strong Interference Signal and Medium to Weak Desired Signal
  - Frequent Changes to Frequency Plan to increase Capacity
  - Average Power kept high to provide portable in-building coverage

Near - Far Scenarios





Unit transmitting close (**near**) to a Site on nearby undesired channel interferes with a weak (**far**) mobile talking inbound on the desired channel.

Unit **far** from desired site is interfered with when close (**near**) to nearby undesired channel base.

Transmitter Sideband Noise

- An issue when desired signal is weak and undesired signals are relatively strong. This is the near-far problem.
- Sideband noise power decreases with increasing frequency separation
- Multiple transmitters contribute to SBN at approximately $10Log_{10}(N)$

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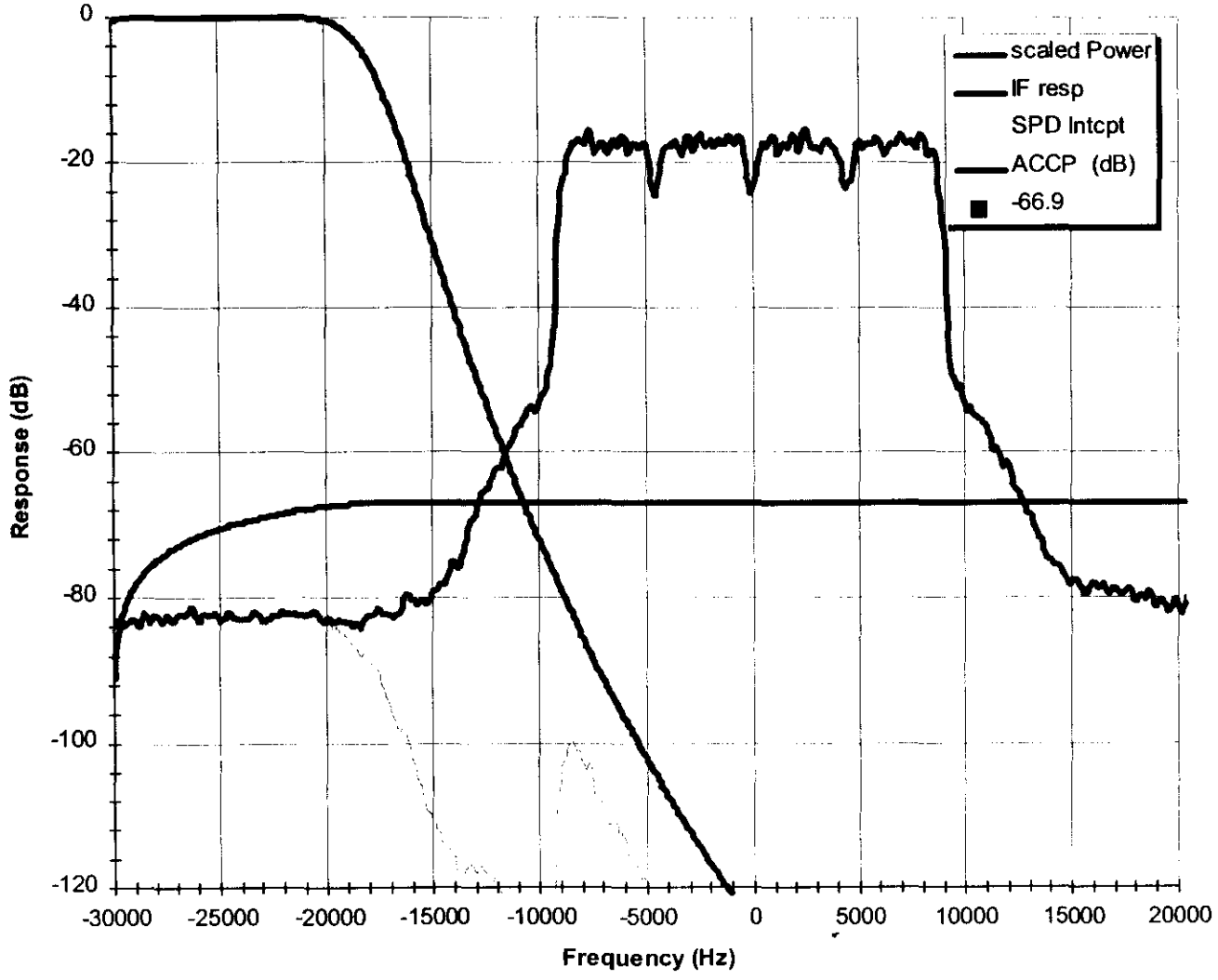
iDEN Provides Good Adjacent Channel Protection

Butterworth Filter Intercepted Power



Conclusion

- Shared Spectrum for different System Types requires more special attention
- Frequency separation is required to minimize interference zones around sites
- Regional Frequency planning is strongly encouraged
  - Create Awareness of potential impact
  - Minimize impact of Transmitter Side Band Noise
- Frequency Coordination solutions are complex
    - Constant changing of frequency plan for capacity
    - Frequency coordination data is necessary

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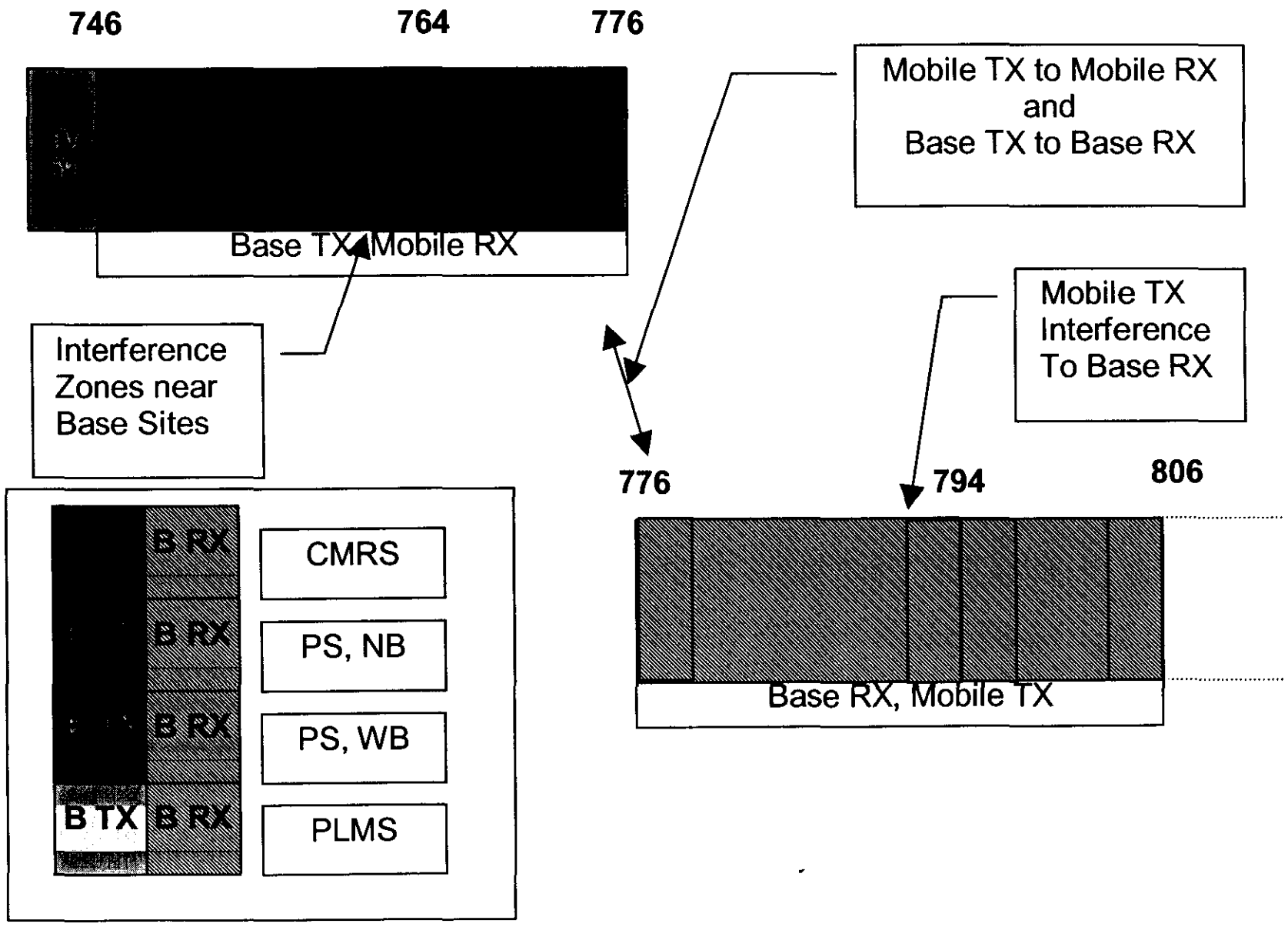
746 - 806 MHz Potential Interference Interfaces



Public Safety Spectrum Protection

- Interference from CMRS spectrum modeled as a 1.25 MHz CDMA carrier
- This is the widest of the existing technologies deployed in the cellular and PCS bands
- All other technologies, such as IS-136, GSM, EDGE, are narrower and will also meet proposed protection rules

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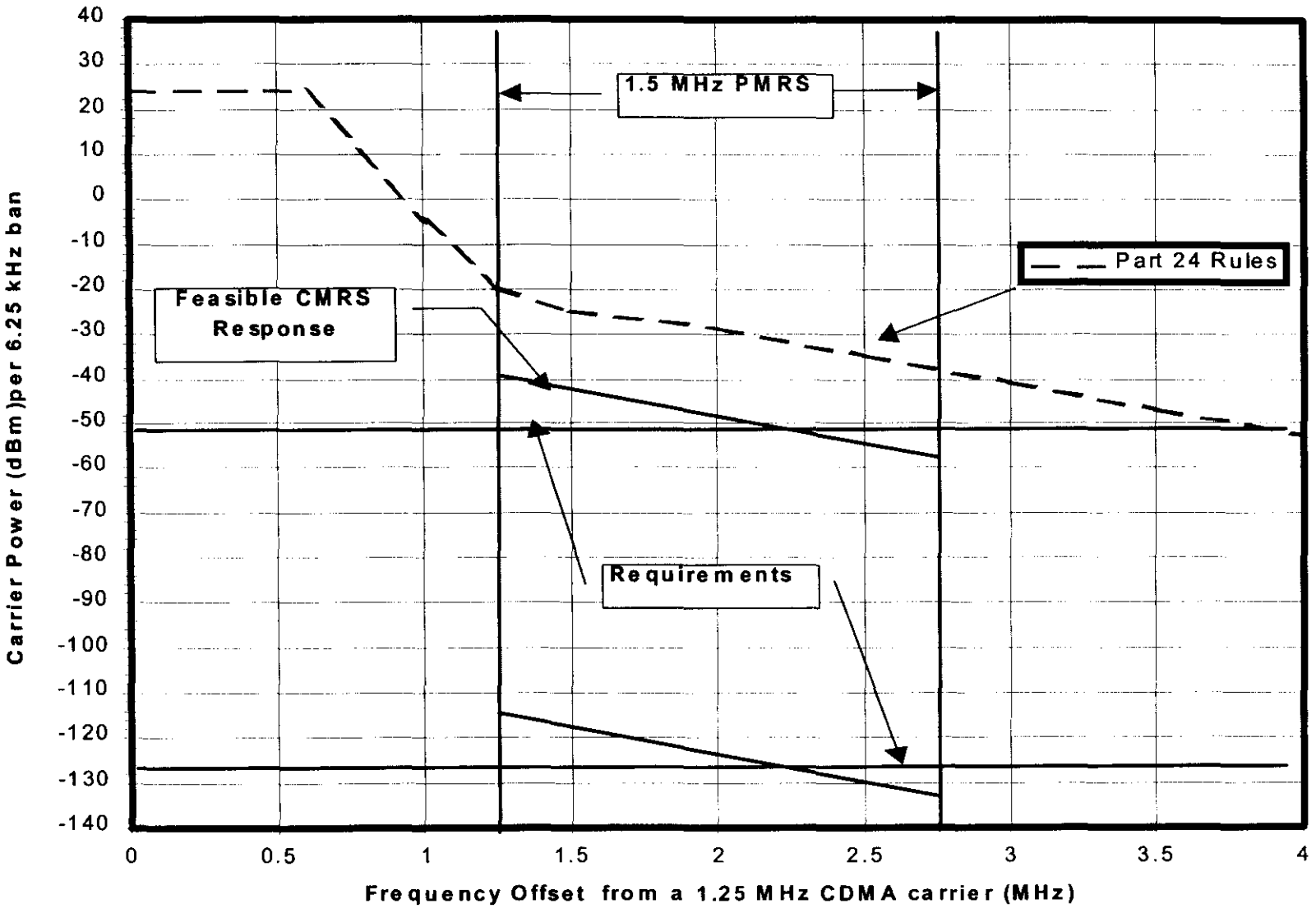
Current & Proposed Masks for 1.25 MHz CDMA



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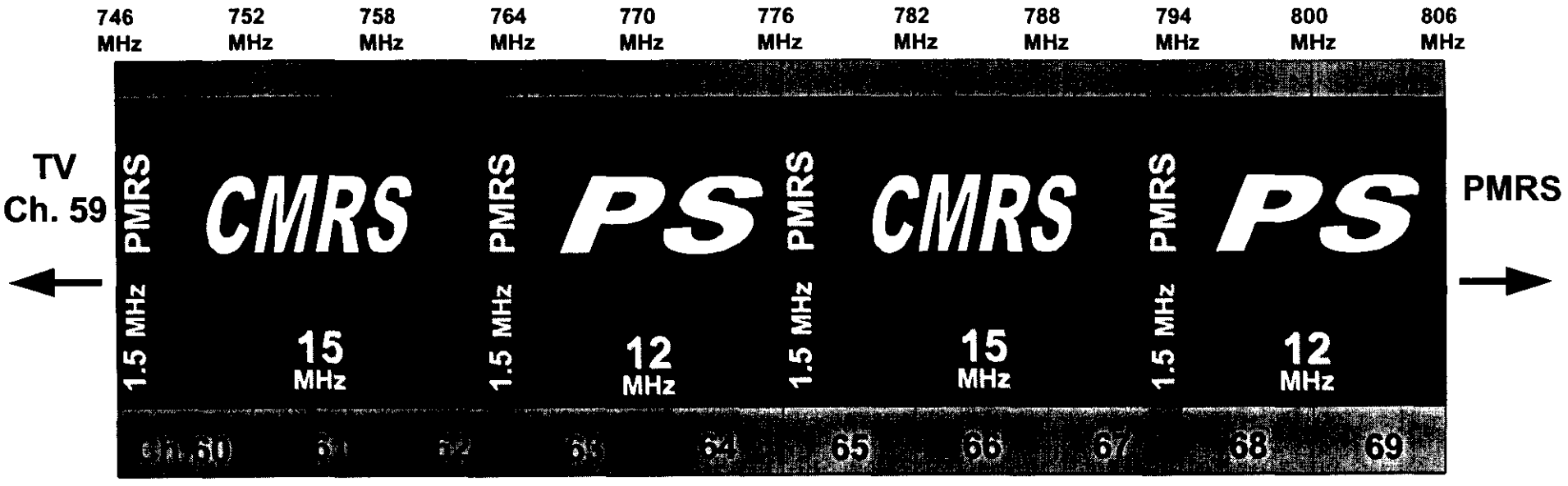
Band Plan



- 6 MHz allocated for private (PMRS), in two blocks of 1.5 + 1.5 MHz
- 30 MHz for Commercial Carriers (CMRS); 15+15 MHz.
- 24 MHz for public safety (allocation completed)

Recommended Rules

- Maximum interference power in 6.25 kHz bandwidth at the PMRS/PS edge is -57 dBm, conducted.
- Maximum interference at the CMRS/PMRS edge is -39 dBm.
- Min(43+10logP,80) remains the rule for intra-band interference for the CMRS licensees.
- PMRS conforms to PS rules for interference and power/height (90.635)
- Cellular power/height between cellular and PCS band limits.
  - EIRP of base transmitter and cellular repeaters need to facilitate wideband signals with spectral densities comparable to that used in the PCS band. Power limits should allow carriers to make use of existing tower locations and still maintain coverage areas with these wideband signals.

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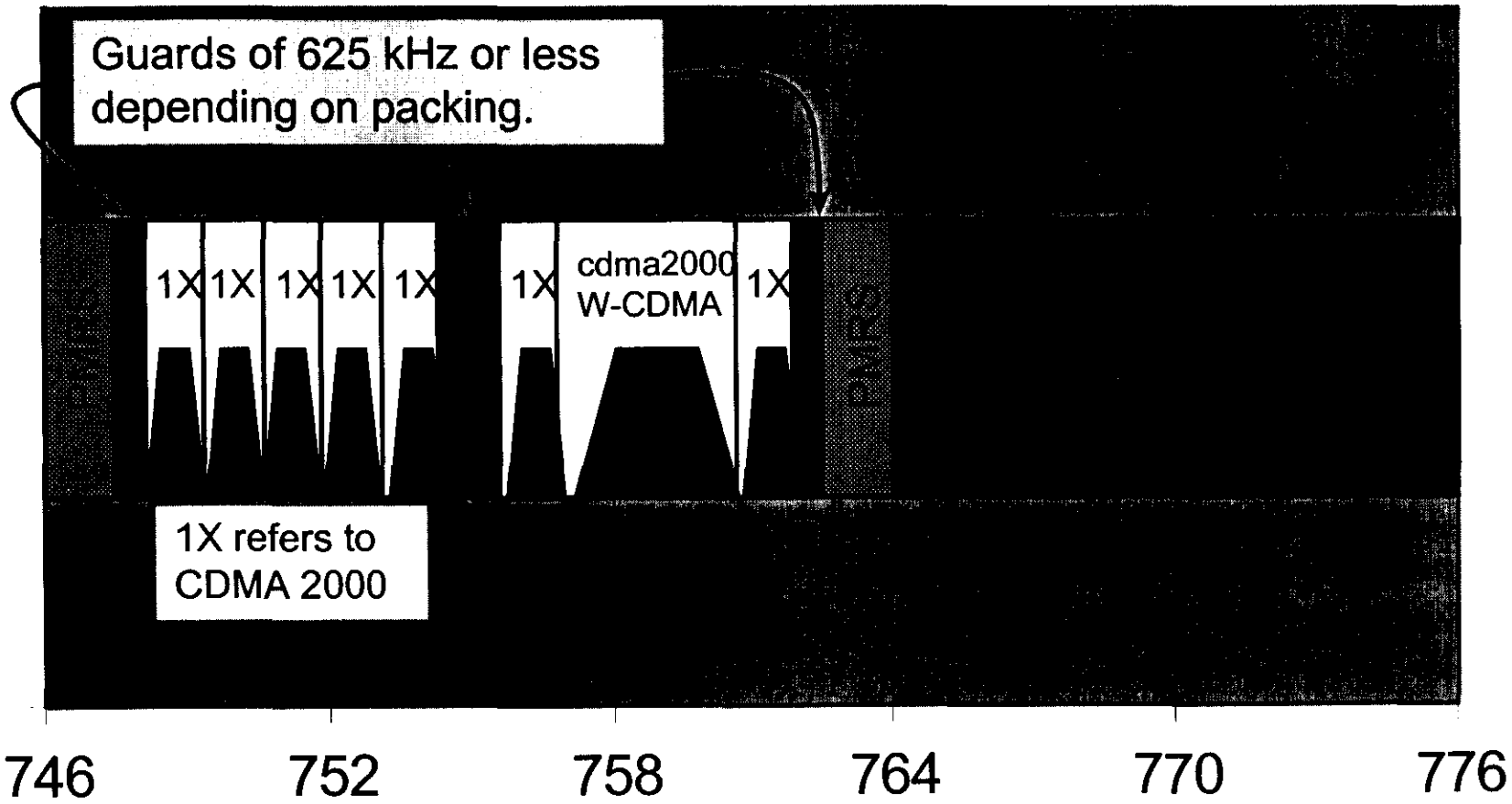
Example of two 7.5 MHz licenses



Usability of the PMRS spectrum

- Band managers have authority to make these decisions, however some suggestions would be:
  - Wide band applications adjacent to CMRS
    - CDMA interference appears as uncorrelated noise.
  - Narrow band applications adjacent to Public Safety band
    - Meet same rules as Public Safety
    - Channel 59 would then be narrow band radios
  - Split the band 750 kHz WB and 750 kHz NB
  - Promote PMRS closest to CMRS band edge for well defined local area systems where the average desired power is high
    - Offer to provide sites for CMRS to allow co-location

High Power Broadcast Use

- Similar problems to those discussed
- High HAAT/high ERP causes severe interference to lower height/lower ERP services
- Mobile services cause interference in fringe broadcast coverage areas