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May 3, 2002

Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

RE: WT Docket No. 02-55

To Whom It May Concern:

Enclosed are ten (10) copies of the comments of the New York State Office for Technology, Statewide Wireless Network Project outlining the position of New York State with regards to FCC WT Docket No. 02-55.

On behalf of the State of New York and pursuant to § 1.419 (b) of the Commission's rules the enclosed copies are intended for the following distribution:

- Commissioners – four (4) copies,
- Secretary – two (2) copies (the original plus one copy),
- Bureau – two (2) copies, and
- Information Office – two (2) copy.



You may direct any questions regarding this material to the New York State Office for Technology, Statewide Wireless Network Project Office at 518-489-2400.

**RECEIPT COPY**

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May 2, 2002

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

RE: WT Docket No. 02-55

Dear Mr. Caton:

Attached are the comments of the New York State Office for Technology, Statewide Wireless Network Project outlining the position of New York State with regards to FCC WT Docket No. 02-55.

The reorganization and consolidation of the 800 MHz band is an essential component for solving public safety issues that exist both within New York State and on the broader national level. Public safety and commercial operations currently share an interleaved 800 MHz channel plan that has produced interference to public safety systems in New York State, as well as elsewhere around the country. Public safety has an immediate need for additional spectrum. This is particularly true for New York State, especially along the Canadian border and in the New York City Metropolitan area.

The New York State Office for Technology, on behalf of the State of New York, is in the process of procuring a new Statewide Wireless Network (SWN) for State, Federal and local governmental entities that operate within or in the proximity of New York State's borders. It will be used in day-to-day operations, as well as for disaster and emergency situations to more effectively and efficiently coordinate the deployment of all levels of government resources to such incidents. It will also enhance international coordination along the US/Canadian border, and will play a critical role in supporting the homeland defense efforts within and immediately surrounding the State of New York.

The key to successful implementation of New York's new public safety communications network is the availability of usable spectrum. New York urges the Commission to use this proceeding as a vehicle to provide near-term spectral relief to public safety; relief that is desperately needed to protect our citizens, and provide homeland defense in an age where the security and safety of our people can no longer be taken for granted.

Sincerely,

Hanford C. Thomas, Director
Statewide Wireless Network

Attachment
cc: James Dillon, CIO, NYS Office for Technology
William Pelgrin, Director, NYS Office for Technology

This document has been received by:

_____
Federal Communications Commission

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Date

Please forward this document to:

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Hanford C. Thomas, Director
Statewide Wireless Network

Attachment
cc: James Dillon, CIO, NYS Office for Technology
William Pelgrin, Director, NYS Office for Technology

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www.oft.state.ny.us/

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Improving Public Safety Communications in the 800 MHz Band | ) | |
| | ) | |
| | ) | WT Docket No. 02-55 |
| Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels | ) | |
| | ) | |
| To: The Commission | ) | |



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**COMMENTS OF:**

**Statewide Wireless Network**
**New York State Office for Technology**
**6 Executive Park Dr.**
**Albany, NY 12203**

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**Before the**

**FEDERAL COMMUNICATIONS COMMISSION**

**Washington, D.C. 20554**



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**COMMENTS OF**

**New York State Office for Technology**

## EXECUTIVE SUMMARY

These comments from the New York State Office for Technology Statewide Wireless Network Project represent the position of the State with regards to FCC WT Docket No. 02-55. This Notice of Proposed Rulemaking (NPRM) is an effort by the Commission to address the need to improve and enhance public safety communications in the 800 MHz band, mitigate interference, and free additional public safety spectrum. We applaud the Commission for addressing these

issues, and especially for recognizing that public safety has immediate and critical spectrum needs.

The New York State Office for Technology (NYS OFT), on behalf of the State of New York, is in the process of procuring a new Statewide Wireless Network (SWN) for State, Federal and local governmental entities that operate within or in the proximity of New York State's geographic borders. SWN will provide an integrated, land mobile radio communications network that will be utilized by public safety and public service agencies in New York State, with a digital, trunked architecture that will provide both voice and data capabilities. It will be used in day-to-day operations, as well as for disaster and emergency situations to more effectively and efficiently coordinate the deployment of all levels of government resources. It will also enhance international coordination along the US/Canadian border, and will play a critical role in supporting the homeland defense efforts within and immediately surrounding the State of New York. Because it is a wireless network, the effectiveness of SWN, in terms of providing advanced functionality and promoting interoperability, lies entirely with the amount of spectral resources available with which to build the network. At the present time, the only viable spectrum that is available for construction of this network is essentially at 800 MHz. The 700 MHz public safety allocation, while a critical resource, is not available where channels are currently needed. This is due to the quantity of analog television broadcast services currently operating within this allocation, with no date certain when such operations will cease. Furthermore, as a result of the Canadian DTV Transition Allotment Plan, which is incorporated in the FCC's recently negotiated agreement with Canada, areas of the State in the vicinity of the US/Canadian border may not have 700 MHz available for more than a decade.

Reorganization and consolidation of the 800 MHz spectrum is required to mitigate against a number of issues that exist both nationally and within New York State. Public safety and commercial operations currently share an interleaved and mixed channel plan in the 800 MHz band. This has resulted in interference to public safety systems from cellular-type commercial systems in New York State, as well as elsewhere around the country. This interference exists even though often the commercial operators are operating in compliance with the Commissions rules, and within their licensed parameters. Additionally, public safety has an immediate need for additional spectrum within which it can operate. This is particularly true in New York State, and especially in the Canadian border and New York City areas.[1]

Within this response, the State of New York will:

- Address the issue of 800 MHz interference and its causes, and concur that this interference must be resolved,
- Comment on the ability of de-interlacing strategies to effectively mitigate the interference problems, including the NAM (National Association of Manufacturers) and Nextel proposals,
- Support the essence of the Nextel proposal, outside of the international border regions,
- Identify critical shortcomings within the Nextel plan in the Canadian border regions,

[1] The Commission has failed to protect Public Safety's access to 700 MHz in the Canadian border Regions, and has left New York lacking confidence in the Commission's commitment to border issues. Furthermore, the Commission's ineffective DTV transition policies are right now affecting NYC and other major metropolitan areas, which have had critical spectrum needs for several years. In this post-September 11, 2001 era, these spectral needs demand a quick and definitive response from the Commission; it clear that this Nation's ability to provide homeland defense is directly weakened by these spectrum shortages.

- Conclude that an alternative proposal must be created to effectively deal with Public Safety requirements and the international sharing agreements in these border areas,
- Illustrate that public safety has critical near- and long-term spectrum needs that remain to be addressed,
- Discuss means of handling the spectrum management, relocation, an re-coordination of the 800 MHz band,
- Consider complementary means to reduce interference,
- Note that an eventual narrowband migration of all 800 MHz Public Safety channels will free additional spectrum, and therefore request that any band reorganization reflect, at a minimum, 12.5 kHz spectral efficiency for new operations, with an eventual migration to 6.25 kHz spectral efficiency,
- In the event of a band reorganization, assert the need for new 25 kHz analog interoperability channels to replace the NPSPAC International Mutual Aid channels, and additionally provide comment on a possible set of new narrowband (digital) interoperability channels, and
- In the event of band reorganization, ask for a requirement that all new type-accepted public safety equipment within the band be able to operate on the analog interoperability channels utilizing an analog FM common air interface, and, if digital interoperability channels are adopted, on these channels, using a digital common air interface (CAI) consistent with 700 MHz operations.

# 1. INTRODUCTION

Reorganization and consolidation of the 800 MHz band is required in order to mitigate against a number of issues that exist both nationally and within New York State. Public Safety and Commercial Mobile Radio Services (CMRS) currently share an interleaved and mixed channel plan in the 800 MHz bands. This has resulted in interference to public safety systems from cellular-type commercial systems in New York State, as well as elsewhere around the country. This interference exists even though often the commercial systems operate in compliance with the Commission's rules, and within their licensed parameters.

The root cause of this problem is directly related to the fact that the Commission had not adequately considered the engineering issues of mixing nationwide CMRS, particularly ESMRs (Enhanced-digital Specialized Mobile Radios) using interference-limited design methods in the same band with Public Safety, which has traditionally used noise-limited designs. Further, the Commission has not adopted rules to adequately protect Public Safety systems from the out-of-band emissions (OOBEs) of the nationwide ESMRs and other cellular operations, in which multiple adjacent-channel transmitters produce aggregated OOBEs that raise the noise levels in nearby receivers, degrading or totally masking desired public safety signals.

The Commission has also failed to protect Public Safety by its lack of commitment to ensure the availability of 700 MHz in border areas, and its inability to facilitate a rapid DTV (Digital Television) transition with a firm schedule. Its ineffective DTV transition policies right now affect NYC and other major cities, where Public Safety is starving for spectrum. It is

because of these issues that the Commission must use this opportunity to free addition Public Safety Spectrum to meet these needs.

On September 11, 1996, the Public Safety Wireless Advisory Committee (PSWAC) reported Public Safety's spectrum needs through the year 2010. The PSWAC Final Report in the Executive Summary, at page 3, stated:

- *More spectrum is required.*
- *Immediately, 2.5 MHz of spectrum should be identified for interoperability from new or existing allocations. In the short term (within 5 years), approximately 25 MHz of Public Safety allocations are needed. The present shortages can be addressed by making part of the spectrum presently used for television broadcast channels 60-69 available as soon as possible.*
- *Over the next 15 years, as much as an additional 70 MHz of spectrum will be required to satisfy the mobile communication needs of the Public Safety community.*

There was a considerable investment in time and money by Public Safety entities and others in the one-year process to develop the PSWAC Final Report. The Commission has yet to do more than allocate the recommended interoperability spectrum, only a portion of the 25 MHz of immediately required spectrum — which is not usable in the spectrum-starved New York City (NYC) Metropolitan area; and, with 8 years left until 2010, the 70 MHz remains unfulfilled. Hopefully, the Commission will recognize these facts and take advantage of the current proposal to provide some additional badly needed spectrum for Public Safety that will effectively integrate into the development and expansion of Public Safety systems. However, in this NPRM, the Commission seeks yet another analysis of Public Safety spectrum needs. Considering that PSWAC spent an entire year making a very extensive analysis of spectrum needs based upon forward-looking spectrum efficiencies that have not been achieved to date, it is not realistic to

expect that yet another study can be completed in only 30 days as contemplated in this NPRM. The Commission would be well advised to re-read the PSWAC Final Report, including its Sub-committee Final Reports.

## 2. THE 800 MHZ BAND TODAY

The 800 MHz (806-824/851-866 MHz) band is shared by many services, among them Public Safety and CMRS, such as SMRs (Specialized Mobile Radios)/ESMRs, and Business, Industrial and Land Transportation (B, I/LT) pools. The distribution of both channels and spectral bandwidth over the services is illustrated in Figure 1.

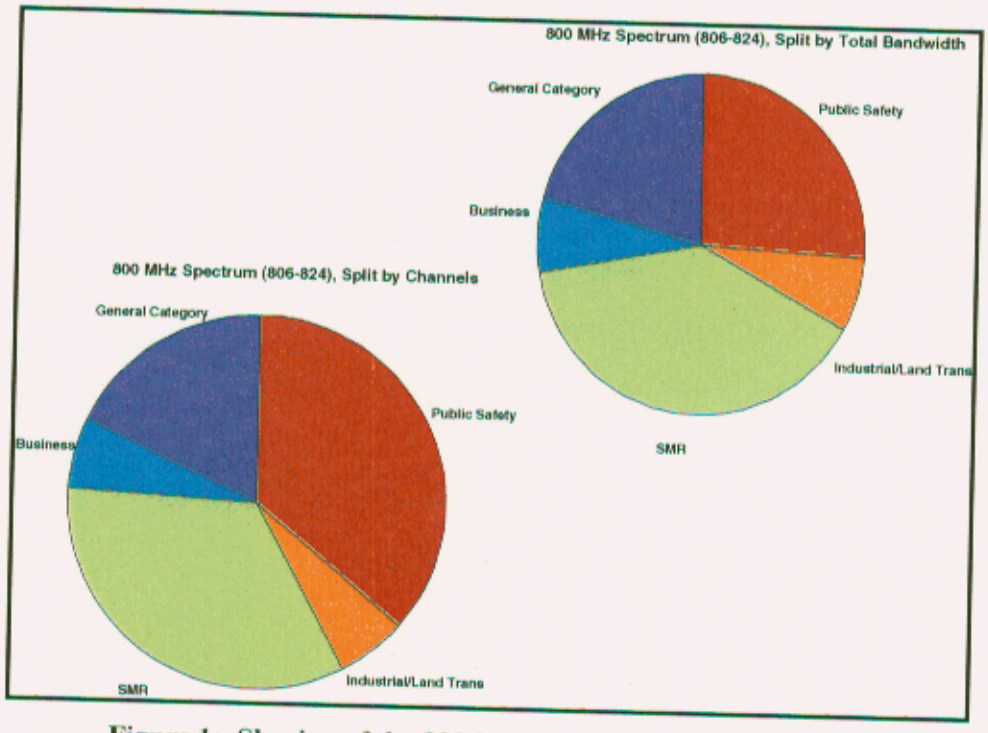


**Figure 1: Sharing of the 800 MHz Band by Various Services**

The current configuration of the 800 MHz band is such that the spectrum of these services is often interlaced. Therefore, public safety is often adjacent channel to other services — with the most common "neighbor" being SMR services. This is seen in Figure 2, which illustrates the spectral layout of the 800 MHz band.

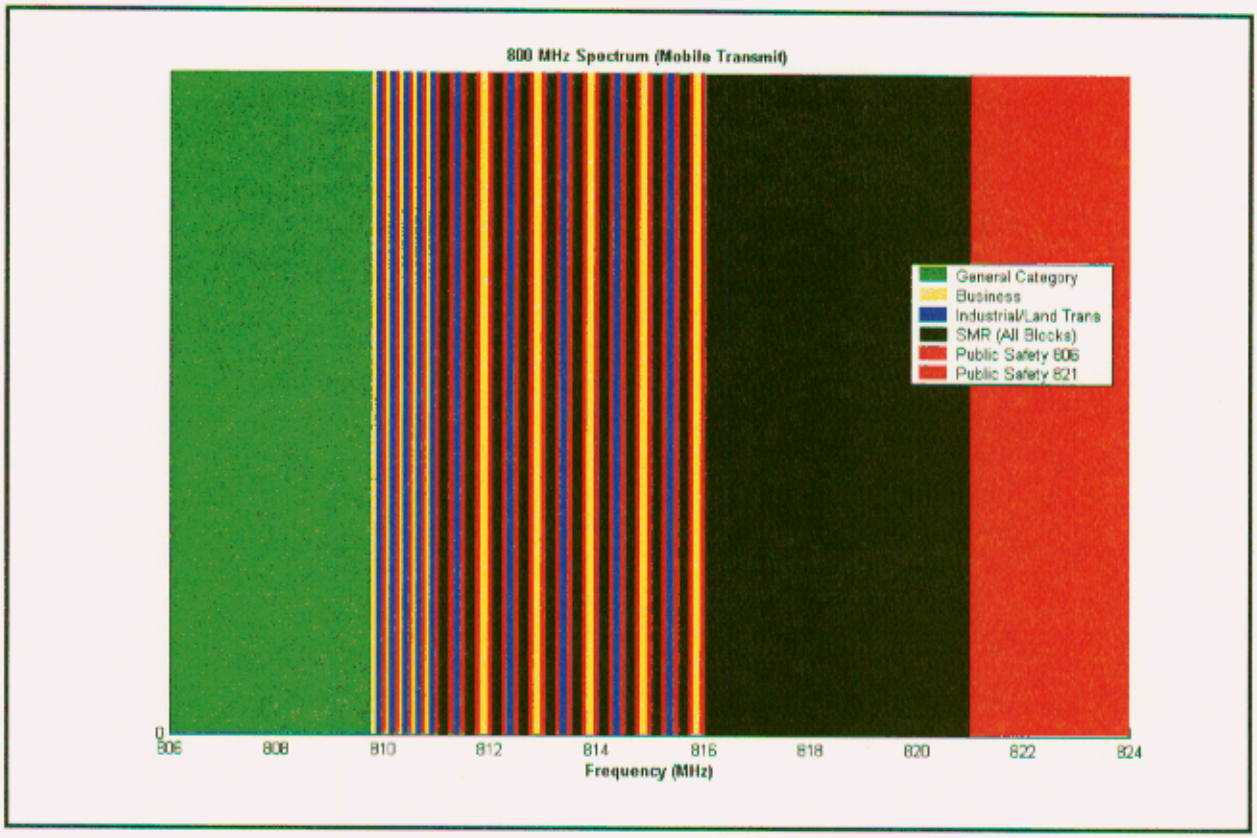


**Figure 2: Current 800 MHz Band - with Interlaced Services**

## 2.1 Current Configuration of Public Safety and Digital SMR Systems

While 800 MHz may be home to many services, the typical system designs of these services are not always consistent. Public Safety has traditionally designed its systems with maximum coverage area at minimal cost. This has led to noise-limited designs that are usually characterized by high-site elevations, tall towers, and high output powers. Since reliable 800 MHz radio coverage is generally possible only over short ranges (often < 10 miles), Public Safety sites typically require a large number of channels so that point-to-multipoint talk group operations can be supported. In effect, the communications from any single user may load all sites within the general service area, even if only a single user from his/her talk group is registered at each of the sites.

This essentially leads to a multiplicative loading effect, hence requiring a large channel set at each of the sites. Compounding this effect is that Public Safety systems need to be designed to a low call-blocking probability (Grade of Service, or GOS), so that reliable communications can be achieved, even in extreme situations.

CMRS, such as SMR, Business, Industrial/Land Transportation pools, often followed similar design philosophies, as large coverage areas tended to minimize the expenses relating to providing the mobile communications capability for a business, or as a service. Of these pools, the SMRs have traditionally utilized a large number of channels at each site to service their customer base. Industrial users tend to often require campus or indoor facility coverage; hence their operational requirements diverge from those of the other groups.

In the last 10 years, the traditional SMRs have slowly evolved into cellular-type system designs. A large number of low-elevation sites, utilizing relatively short towers and strict radiation control characterize these types of designs. These designs maximize frequency reuse by decreasing the size of the individual-site coverage area and introducing more sites that effectively reuse the available spectrum at much shorter distances. This is possible because the power levels at the mobile unit are now much higher than in noise-limited designs, due to the decreasing distance to the "closest" tower site. In effect, these cellular-type designs are interference limited — the internal system interference is much higher than the thermal noise floor. In these types of designs, the internal system interference levels act as the limiting factor that determines the coverage range of the sites within the system.

It is important to note that Public Safety has always had requirements for highly reliable coverage[2]. Additionally, this coverage is steadily expanding, due to the need to support portable radio and in-building-coverage operations. These expanded requirements also require high signal strengths everywhere within the defined serviced area. This is forcing public safety to slowly migrate toward interference-limited system designs[3] in order to provide both reliable coverage and spectral efficiency.

### 2.2 Causes of Interference and FCC's Characterization of Interference

When services utilizing both noise- and interference-limited system designs are interlaced onto adjacent channels, the result is likely to be interference or, equivalently, a reduction in coverage reliability. We believe that the Commission has accurately categorized the interference mechanisms in the Docket 02-55 NPRM; therefore, we defer to the findings of APCO Project 39[4] and the *Best Practices Guide*[5]. We only offer an additional illustration of the now infamous "near-far" problem resulting from this interlacing of services and designs that plagues the current 800 MHz band.

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[2] The most often utilized industry recommendations call for 97% Coverage reliability by area, evaluated in a faded environment, and accounting for both noise and interference parameters (see Telecommunications Industry Association, Technical Service Bulletin, TSB-88A WIRELESS COMMUNICATIONS SYSTEMS PERFORMANCE IN NOISE- AND INTERFERENCE-LIMITED SITUATIONS RECOMMENDED METHODS FOR TECHNOLOGY-INDEPENDENT MODELING, SIMULATION, AND VERIFICATION).

[3] Even reliable mobile coverage in irregular terrain does not allow for noise-limited designs and essentially results in a large number of sites and in high power levels throughout the service area.

[4] Project 39, Interference to Public Safety 800 MHz Radio Systems, Interim Report to the FCC, December 2001; and Six-Month Status Report, March 19, 2002.

[5] Avoiding Interference Between Public Safety Wireless Communications Systems and Commercial Wireless Systems at 800 MHz (Best Practices Guide), December 2000, by committee (CTIA, APCO, PSWN, Nextel, and Motorola).

Table 1 presents some typical parameters for a situation in which a noise-limited Public Safety system is servicing an area of 12-20 miles (reliability-dependent) with a single site. Surrounding the Public Safety site is a hexagonal grid of adjacent-channel CMRS sites, each covering ~3 miles, and together providing aggregate coverage over the same general area. The near-far problem arises when the public safety mobile unit is far from its associated site, but near one of the adjacent-channel CMRS sites. In order to simplify an explanation of the underlying interference mechanisms, no shadowing, multipath, or Doppler channel models are applied to the signals in this example.

**Table 1: Parameters for Near-Far Example**

| Parameter | Value |
|---|---|
| Number of Public Safety LMR Sites | 1 |
| Number of Adjacent-Channel CMRS Sites | 98 |
| CMRS ACCP into LMR | 40 dB |
| LMR HAAT | 400 m |
| CMRS HAAT | 30 m |
| LMR ERP | 54 dBm |
| CMRS ERP | 54 dBm |
| LMR Receiver Noise Floor | -125 dBm |
| Lognormal Shadowing Variance | 0 dB |
| Delay/Doppler Multipath Model | None |
| | |
| Mean D( I+N): | 21.7 dB |
| Median D( I+N): | 20.2 dB |
| Fraction of the D(I+N) values > 12 dB | 89% |
| Fraction of the D/N values > 12 dB | 95% |

ACCP - Adjacent-Channel Co-Channel Protection

HAAT – Height Above Average Terrain

ERP – Effective Radiated Power

Table 1, Figure 3, and Figure 4 illustrate the effects of the near-far problem. It is clear that the Public Safety mobile unit will experiance coverage "holes" near all CMRS sites, and that the size of these "holes" will increase with the distance from the mobile unit to its associated base. This is often refered to as the "Swiss-Cheese" effect. The reason for this is that the adjacent-channel rejection (40 dB in this case) is insufficent to maintain the necessary desired signal-to-noise-plus-interference level, $D/(I+N)$, over the entire service area — and especially in close proximity to the CMRS sites. In this example, the net effect of mixing these systems together is to decrease the coverage of the Public Safety site by 6%. This is unacceptable[6], since a life threatening incident may occur in any of the affected areas[7]. Clearly, similar design philosophies by both parties would have resulted in minimal or no interference.

Note the near-far issue illustrated in this example also affects the reverse link (albeit somewhat differently), and contributes to many of the other problems identified by the Commission within its discussions in the NPRM. These other problems include intermodulation interference and receiver overload.

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[6] Again, this is to be compared to the typical requirement for 97% reliability by area.

[7] In fact, since the CMRS sites follow population demographics, a case can be made that incidents requiring public safety responders are more likely to occur in these areas.

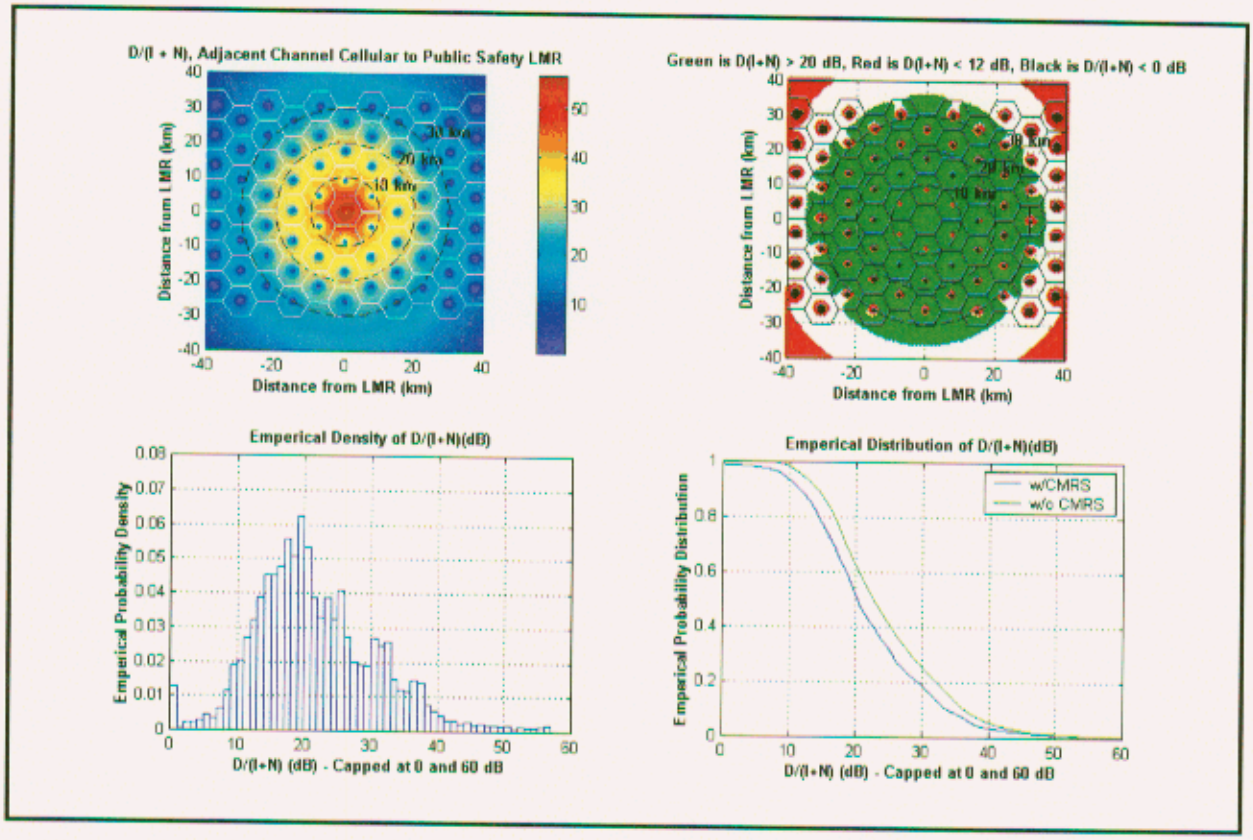


**Figure 3: "Swiss-Cheese" Effect from Near-Far Problem**

## 2.3 The Need for a Remedy

Clearly there is a need to rectify the interference problems between the different services sharing the 800 MHz band. The number of recorded cases is very large, and new incidents are being reported and documented on a daily basis. We commend the Commission for reacting to these issues, and for taking the initiative to investigate ways to solve them within this NPRM.