



March 7, 2007

Marlene H. Dortch, Secretary  
Federal Communications Commission  
Office of the Secretary  
445 12th Street, SW  
Washington, DC 20554

Re: WT Docket 96-86  
WT Docket 06-150  
WT Docket 06-169

Dear Ms. Dortch:

Pursuant to Section 1.1206(b)(2) of the Commission's Rules, this is to notify you that on March 6, 2007, Steve Sharkey and Rob Kubik of Motorola, met with staff members of the Wireless Telecommunications Bureau and Public Safety & Homeland Security Bureau, including Cathy Massey, Peter Corea, Herb Zeiler, Linda Chang, Jeff Cohen and Tim Maguire regarding the above captioned proceedings.

During the meetings we discussed the attached presentation supporting reconfiguration of the 700 MHz band to facilitate deployment of public safety broadband technologies and noted the importance of providing flexibility for public safety to deploy both broadband and wideband technologies. We also discussed the Broadband Optimization Plan, which offers certain advantages over the current band arrangement. As part of the discussion we noted that additional clarification surrounding interference protection rights and mitigation responsibilities would provide greater certainty for commercial and public safety licensees should interference arise.

Pursuant to the Commission's Rules, one copy of this notice is being filed electronically with the Commission. If you require any additional information please contact the undersigned at (202) 371-6953.

Sincerely,

/s/ Steve B. Sharkey

Steve B. Sharkey, Director  
Director, Spectrum and Standards Strategy

Cc: Cathy Massey  
Peter Corea  
Herb Zeiler  
Linda Chang  
Jeff Cohen  
Tim Maguire

# 700 MHz



March 2, 2007

# Guiding Objectives

## Public Safety

- Protect Public Safety - Changes in commercial bands or use should not increase potential for interference
- Meet PS Requirements for Narrowband, Wideband and Broadband technologies

## Commercial Services

- Maximize Opportunity for Commercial Services
  - o Changes should not adversely impact use of commercial bands
  - o Provide technology neutral approach to power limits

## Ensure No Impact to Feb. 2009 DTV Transition Date

# Broadband Wireless Technologies are Evolving to OFDM ...

## OFDM-Based Technologies Offer Advantages

- Greater spectral efficiency,
- 1:1 frequency reuse
- Better performance in multi-path environments
- Improved throughput & capacity
- Low latency

## LTE – A world-wide, next generation broadband standard

- Suited to FDD spectrum
- Greatest scale → Lower costs

*Delivered Throughput*

*OFDM*

SPECTRUM EFFICIENCY

SIMPLIFIES ADVANCED RF

*CDMA*

LEVERAGES BANDWIDTH

OPTIMIZES SPECTRUM ALLOCATION

*GSM*

*Early '90s Mid-'90s Early '00s Mid-'00s*

The broadband evolution path for >80% of worldwide CMRS

# Look Forward: 10-15 Year Technology Platform

1997      2000      2003      2006      2009      2012      2015      2018      2021      2024

Most PS BB Deployments/Use

OFDM Technology (e.g., LTE, WiMAX)

CDMA Technology (e.g., EVDO)

The FCC Should Not Select A Broadband Standard Yet

- Technology Options are Evolving
- No Broadband Technology Developed for Public Safety

# Flexibility Should be Provided for Wideband or Broadband

**Wideband will provide cost effective solution in lower density areas**

- Flexibility supported by Public Safety
- Requires fewer transmitter sites
- Can be deployed using existing narrowband tower locations
- Data rates sufficient to provide video and data
  - Raw data rates: 230 kbps @ 50 kHz; 690 kbps @ 150 kHz

**Support for TIA 902 (SAM) should be required for wideband radios**

- Standard developed by public safety and industry

# Secondary Broadband Use of Narrowband Spectrum Should Not be Permitted

## **Narrowband Voice Services Critical to Public Safety**

- **No justification for risking interference**
- **Solving interference after the fact is unacceptable**

## **Unclear How Sharing Could Be Implemented**

- **Broadband channel with necessary guardband would cover large portion of narrowband spectrum**
- **Narrowband channels for a given system spread across band**

## **Cognitive Technology Not Sufficiently Developed or Tested to Provide Viable Sharing**

- **Cognitive sharing with mobile is very different than with fixed**
- **Sensing is unproven**

# Reconfiguring PS Spectrum Provides Significant Benefits

## Current Plan - 4 MHz for PS broadband\*

746	747	752		762	764			776	777	782			792	794			806			
<b>Public Safety</b>										<b>Public Safety</b>										
A	C		D	B	NB	G	BB/WB	G	NB	A	C		D	B	NB	G	BB/WB	G	NB	
1	5 MHz		10 MHz	2	3	B	4 MHz	B	3	1	5 MHz		10 MHz	2	3	B	4 MHz	B	3	
	60		61		62		63		64		65		66		67		68		69	
	43+10logP				76+10logP															

## Current Plan with rearrangement of PS spectrum – 5 MHz for PS BB/WB

746	747	752		762	764			776	777	782			792	794			806			
<b>Public Safety</b>										<b>Public Safety</b>										
A	C		D	B	BB/WB	G	NB	NB	A	C		D	B	BB/WB	G	NB	NB			
1	5 MHz		10 MHz	2	5 MHz	B	3	3	1	5 MHz		10 MHz	2	5 MHz	B	3	3			
	60		61		62		63		64		65		66		67		68		69	
	43+10logP				76+10logP															

### Consolidate narrowband channels

- Reduces internal guardbands - increasing usable spectrum by at least 1 MHz
- Provides additional flexibility for broadband deployment
- Facilitates deployments with adjacent commercial carriers

# Impact to Convert Imbedded 700 MHz Equipment to New Plan

- 750-800K dual band 700/800 mobiles/portable deployed
- Very high confidence mobiles/portables can operate on new plan by simple code plug programming, i.e., no change in hardware or firmware

New codeplug software must be developed once plan is adopted

- For units fielded but not yet operating on 700 MHz, no incremental costs incurred; programming needed even if plan were not changed
- Translation of base stations to new narrowband block comparable to tuning channels for any system deployment

RPC plan/coordination/licensing approval for frequency translation

No hardware/firmware change

Technician time to tune site filters, etc. to new frequencies

- Deployments of systems have started and are increasing



# Issues Raised in Relationship to the BOP

- **Concern that relaxation of Cellular Restrictions for new A-block could result in Interference to Public Safety**
  - Lack of definition regarding Public Safety deployment dictates caution before relaxation is provided
- **Concern that loss of 1 MHz GB between Upper and Lower 700 MHz increases interference to commercial**
  - But, 1 MHz unlikely to make much difference in interference
- **Public Safety has Asked for Interference Mitigation Procedures Similar to 800 MHz rules**
  - Need to define appropriate threshold limits when interference must be mitigated that are suitable to protect Public Safety based on anticipated broadband/wideband/narrowband deployments and but are not overly burdensome to commercial licensees
  - Clear limits provide certainty for commercial licensees in C & D blocks

# Guardband Restrictions Are Appropriate Under Current Conditions

## Protection required for Public Safety broadband system will depend on system deployment

- Potential conflict between PS high site broadband and Commercial low site systems
  - similar interference mechanism experienced at 800 MHz
- Public Safety deployments may depend on location and requirements
  - low site broadband in urban areas
  - higher site broadband or wideband in suburban/rural areas

## Different OOB limits from Commercial into edges of PS band is insufficient to ensure deployment of compatible PS system configuration

- Need to better define protection requirements

## Commission Should Take Conservative Approach to Modifying Restrictions on Guardband Use

- If restrictions on cellularized deployments and ACP limits in GB are lifted they must be replaced with alternative such as OOB requirements and PFD limits on the ground for GB operators

## Can include provisions for additional relaxation pursuant to agreements between Public Safety and Guard Band Licensee

# Will Loss of Current A-block GB between Upper & Lower 700 MHz Impact Interference ?

Deployment Scenarios - Lower 700 MHz -C-Block (LC)

Upper 700 MHz  
C-Block (UC)

	TDD	FDD	Broadcast	
TDD	<b>LC Mobile ↔ UC Mobile</b> LC Mobile ↔ UC Base LC Base ↔ UC Base LC Base ↔ UC Mobile	<b>LC Mobile → UC Mobile</b> LC Mobile → UC Base LC Base ← UC Base LC Base ← UC Mobile	<b>LC Mobile ← UC Mobile</b> LC Mobile ← UC Base LC Base → UC Base LC Base → UC Mobile	<b>LC Mobile ← UC Mobile</b> LC Mobile ← UC Base LC Base → UC Base LC Base → UC Mobile
FDD	<b>LC Mobile → UC Mobile</b> LC Mobile ← UC Base LC Base ← UC Base LC Base → UC Mobile	<b>LC Mobile → UC Mobile</b> LC Base ← UC Base		LC Mobile ← UC Base LC Base → UC Mobile

Flexibility for TDD/FDD in commercial rules creates numerous interference scenarios

Duplex convention is **opposite** as Upper 700 MHz

Duplex convention is **same** as Upper 700 MHz

TDD = Time Division Duplex, FDD = Frequency Division Duplex

# Mobile-to-Mobile Interference

**Will loss of the 1 MHz guard band between Upper 700 MHz C-Block and Lower 700 MHz C-Block increase potential for interference?**

- Not likely
- Interference will come from three sources, out-of-band emissions, receiver overload and IM

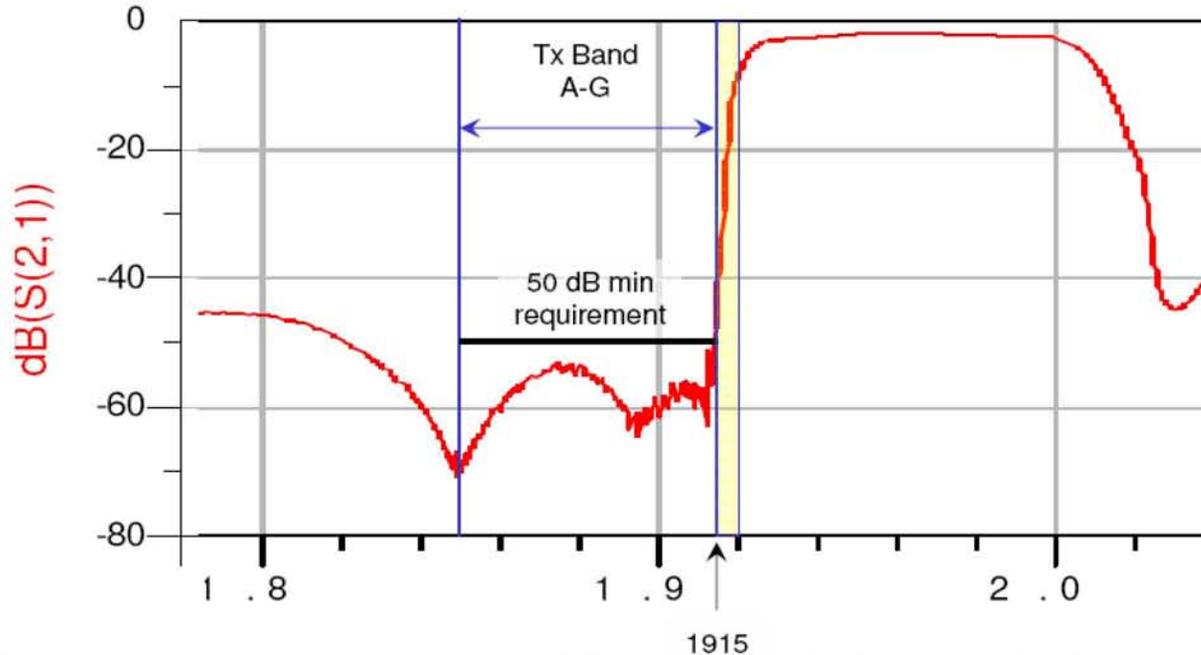
**Out-of-band emissions are not proposed to change so no impact to interference**

**The receiver front end for devices will not have enough spectrum spacing to provide any rejection of the interfering carrier signal**

**Will not significantly change IM**

# Motorola Comments in 00-258

## Typical Filter Roll-off Characteristics



- Rx filter also needs tweak/sort with associated risk
- Split band filters possible for H band
  - but expensive option in cost and size
  - performance degradation due to extra losses with switches
- Need commercial design margins for G band



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# 700 MHz Adjacent Channel Power (ACP) Requirements

## 7<sup>th</sup> NPRM Docket 96-86 for Public Safety

**ACP Requirements into Paired Receive Band Should be Reduced from -100 dBc to -85 dBc**

### **ACP changes requested by TIA Private Radio Section**

- FCC adopted narrowband ACP table changes requested in August 2001
- FCC has yet to act on wideband ACP table changes requested in July 2002 (add 50/100 kHz tables)
- July 2002 request asked that “paired receive band” ACP be reduced from -100 dBc to -85 dBc for wideband base transmitters
- December 2002 requested same change for narrowband base transmitters

### **-100 dBc Mandate Requires Filters to be Built into Equipment for Authorization**

- Drives up system cost by requiring multiple filters
- Limits system and site design options
- Limits licensees ability to reuse existing system components when expanding or upgrading systems (driving up costs)
- Limits competition for filter components

### **Unnecessary for the Commission to Mandate -100 dBc**

- Limiting emissions into paired receive band necessary to avoid self interference
  - -85 dBc proposal exceeds requirements in other bands by 17 dB for 100 watt transmitter

# Summary of Motorola Recommendations

- **Reconfigure Public Safety 24 MHz to consolidate narrowband spectrum**
- **Provide Flexibility for Broadband or Wideband**
  - Adopt requirement to support TIA 902 (SAM) for wideband
  - No clear Broadband Standard for Public Safety Yet
- **Do not Permit Secondary Broadband use of Narrowband Channels**
- **Provide Greater Certainty for both Public Safety and Commercial Carriers Regarding Interference Protection Rights/Obligations under BOP**
- **Reduce ACP limits for PS from -100 dBc to -85 dBc**
- **Ensure No Impact to Feb. 2009 DTV Transition Date**