



Spectrum Policy Reform – The Road Ahead

A Congressional Perspective

Matthew Hussey

Telecommunications Legislative Assistant

Senator Olympia Snowe



Growing spectrum demand

Congress has concerns about making sure demands of all spectrum users can be met.

– Commercial/Constituents

- Emergence of smartphones, netbooks, etc.
- Exponential growth in wireless broadband!



– Federal / Military

- Greater need for support surveillance, fire control, “Network-Centric Warfare”, imaging radar, National Airspace System enhancements, eGov 2.0, etc.

– Public Safety

- Need for a nationwide interoperable network





Problems persist

United States Government Accountability Office

GAO

Report to Congressional Committees

GAO-02-906: "FCC and NTIA's efforts are not guided by a national spectrum strategy. The absence of such a strategy may make it more difficult for FCC and NTIA to avoid contentious, protracted negotiations when providing for future spectrum requirements."

GAO-03-277: "no one agency has been given ultimate decision-making authority over all spectrum in the United States or the authority to impose fundamental reform."

GAO-04-666: "the current structure and management of spectrum use in the US does not encourage the development and use of some spectrum efficient technologies." "NTIA and FCC do not have a sufficient understanding of the spectrum environment, including how and how much spectrum is used."

GAO-06-526T: "there is evidence that some of the spectrum is currently underutilized" and there is mounting concern "about the availability of spectrum for future needs" for federal and non-federal use.



Presidents & spectrum

- **President Bush's Spectrum Policy Initiative (2004)**

- Improve stakeholder participation (CSMAC)
- Reduce barriers to innovation in technologies and services
- Modernize Federal Spectrum Management Processes
- Promote efficient and effective spectrum use
- Improve long-term planning and promote market-based incentives



- **President Obama's Presidential Memorandum (2010)**

1. Release 500 MHz of spectrum
2. Provide tools to effectively reallocate spectrum
3. Enable spectrum to be put to its highest value uses
4. Public safety & deficit reduction





Improving spectrum policy

- **S.649, the Radio Spectrum Inventory Act**

- More detailed information
- Centralized portal
- Greater Transparency to facilitate the public debate

- **S.3610, the Spectrum Measurement and Policy Reform Act**

- Measurement studies and utilization metrics
- Establishes Spectrum Sharing/reuse pilot programs
- Greater collaboration and more strategic planning between FCC and NTIA
- Incentive to promote efficiency (spectrum fees & auction revenue sharing)

Why a spectrum inventory?



“In order to free up additional spectrum, decision makers at the FCC, NTIA, and Congress must have a clear, detailed, up-to-date understanding of how spectrum is currently being used and by whom—such data is essential to sound policy decisions.”

--Senator Olympia Snowe



Current databases disparate



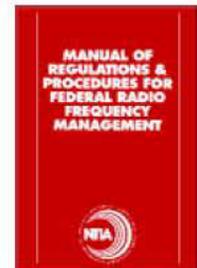
- FCC's Multiple Databases

- The [Universal Licensing System \(ULS\)](#) is the **easy**, online answer to your wireless licensing and research needs. **ULS simplifies** the application and licensing processes...
- [Broadcast Radio and Television Electronic Filing system \(CDBS\)](#)
- [International Bureau Electronic Filing system \(MyIBFS\)](#)



- NTIA's Government Master File (GMF)

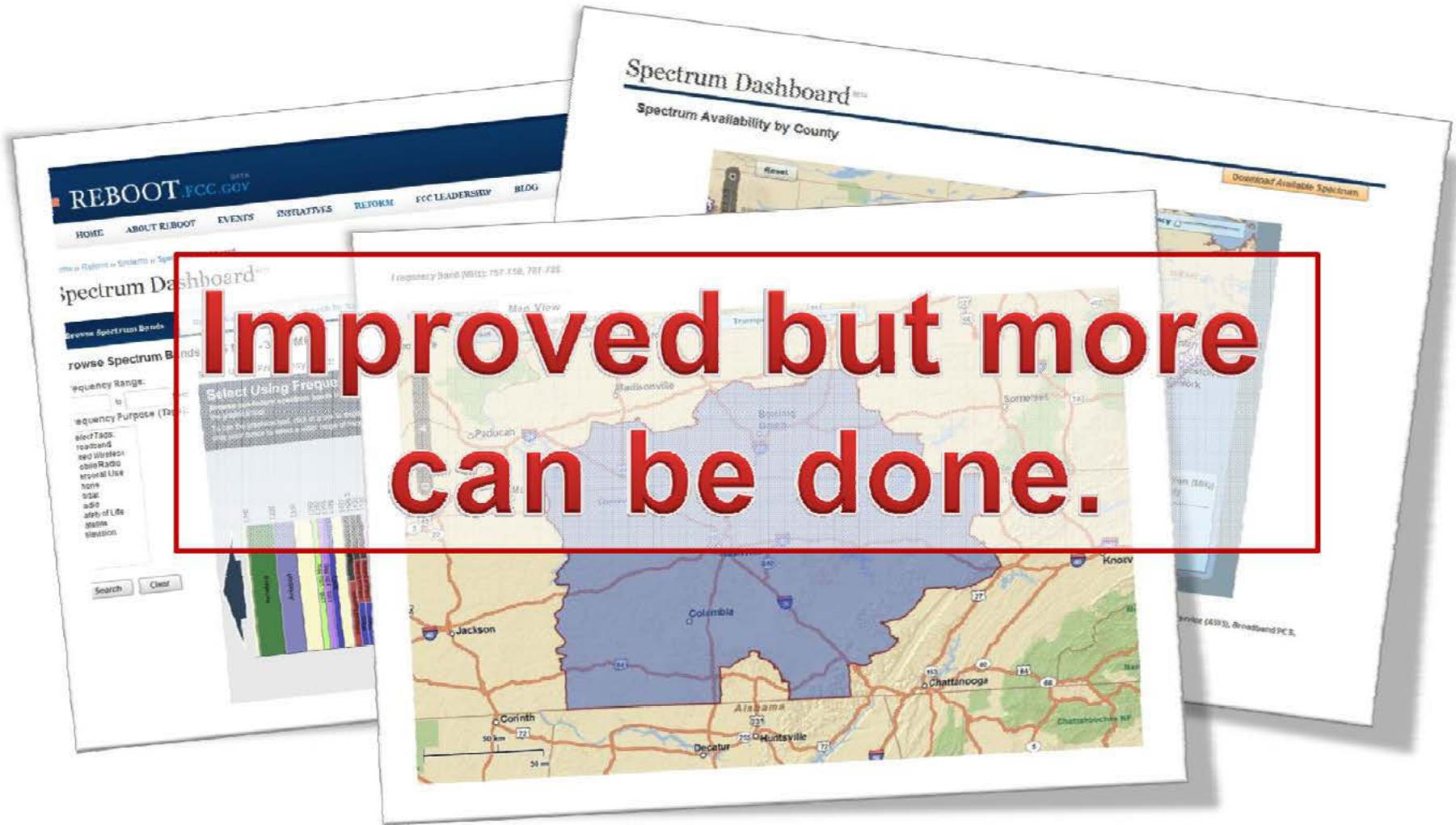
- The Government Master File (GMF) contains records of the frequencies assigned to all US Federal Government agencies in the US and its possessions.



- NTIA's Federal Spectrum Management System (FSMS) – TBD

- Outlined in President Bush's Spectrum Policy Initiative

FCC Spectrum Dashboard



**Improved but more
can be done.**

S.649, *Radio Spectrum Inventory Act*



- **Data Sets (300 MHz to 3.5 GHz)***
 - Authorized licensees or government users
 - Total spectrum per user in band (% and sum)
 - Number of transmitters, end-user terminals, or receivers
 - Type of transmitters, end-user terminals, or receivers
 - Contour maps & geo-locations of base stations
 - Extent of use
 - Activities, capabilities, functions, or missions supported
 - Unlicensed authorization/activity

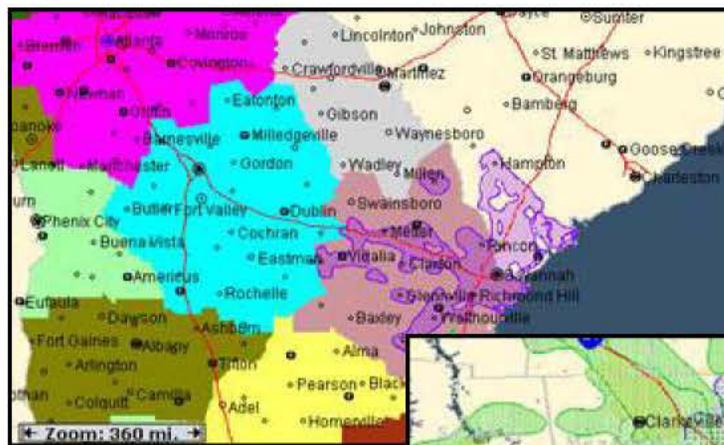


**House companion bill HR.3125: 225 MHz to 3.7 GHz (min) / 10 GHz (max)*

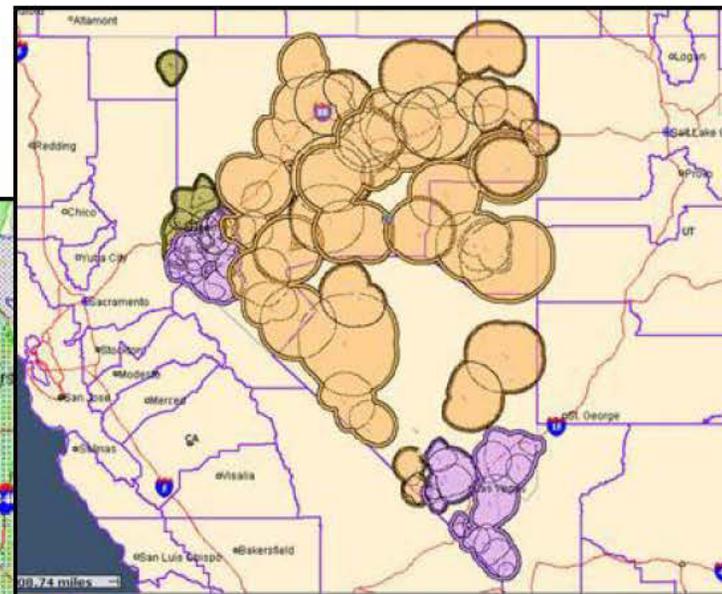


Inventory will greatly help

Deriving information from the data...

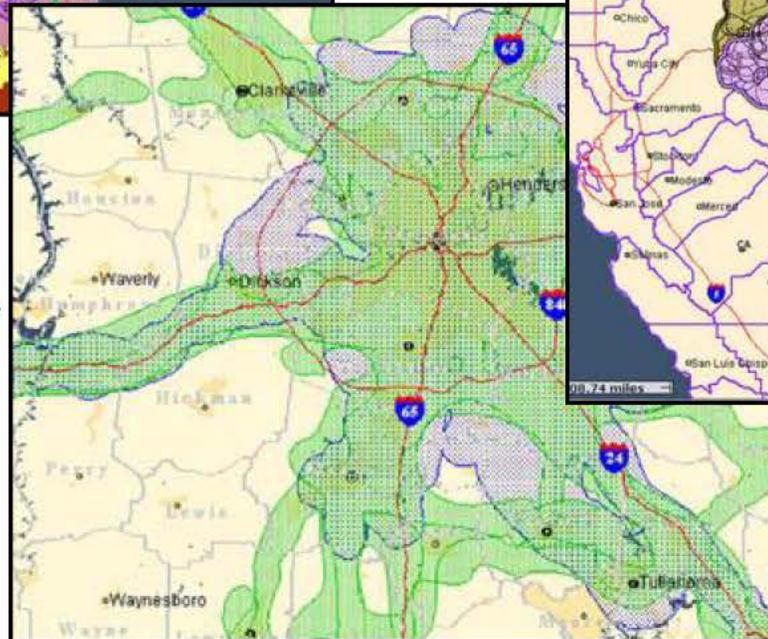


← Licenses



↑ Deployment

Contour Maps →



S.3610, *Spectrum Measurement & Policy Reform Act*



Introduced by Senators Snowe & Kerry last week!

- **Spectrum measurements**

- Provide more up-to-date surveys of spectrum usage
- Correlate with inventory data to determine accuracy



- **Metrics & utilization study**

- Develop benchmarks to evaluate spectrum efficiency and utilization

- **Spectrum pilot programs**

- Sharing, reuse, layering, and Just-In-Time Spectrum programs in noncritical areas



- **Relocation cost-benefit analysis**

- Move incumbents thru emerging technologies to free up MHz

S.3610, *Spectrum Measurement & Policy Reform Act*

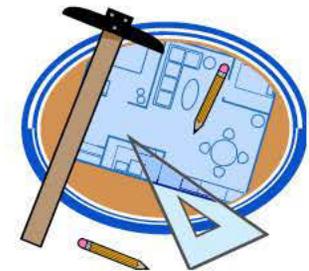


• Greater collaboration between FCC & NTIA

- Adhering to Sec. 112 (47 U.S.C. 922)
- Achieve long term goals and better management

• More strategic planning

- Creation of Spectrum Advisory Committee
- Completion of the National Strategic Spectrum Plan

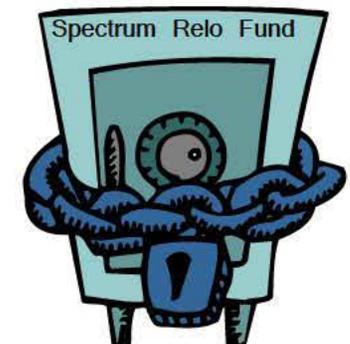


• Carrot & stick to drive efficiency

-  Auction Incentives
- Spectrum Fees 

• Spectrum Relocation & Efficiency Fund

- Greater flexibility for planning, research, upgrades
- Allowance for long-term planning (8 to 20 yrs)



S.3610 Spectrum Measurement Provision



- **Spectrum measurements**

- 100 MHz to 10 GHz
- Several diverse locations over an appropriate period of time (translation: ~ 20 locations, 2 weeks each)

- **Survey results**

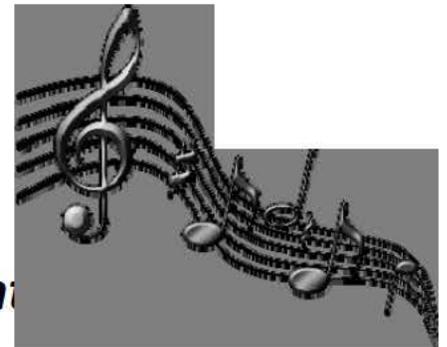
- Ascertain usage patterns (spatial & temporal) for spectrum sharing and reuse pilot programs
- Correlate with Spectrum Inventory to determine accuracy of records
- Assist FCC and NTIA in developing long-term spectrum strategies

Sound spectrum policy reform



- Spectrum alone will **NOT** solve a *looming crisis*.
 - **Robust spectrum policy and management**
 - Underutilization \neq band-clearing
 - Utilization has different definitions
 - Spectrum sharing & reuse critical (spatial & temporal)
 - **Technical innovation**
 - Femtocells & dual mode = offload options
 - Cognitive radio / dynamic access = efficiency and intelligence
 - MIMO = fiber optic speeds over air!

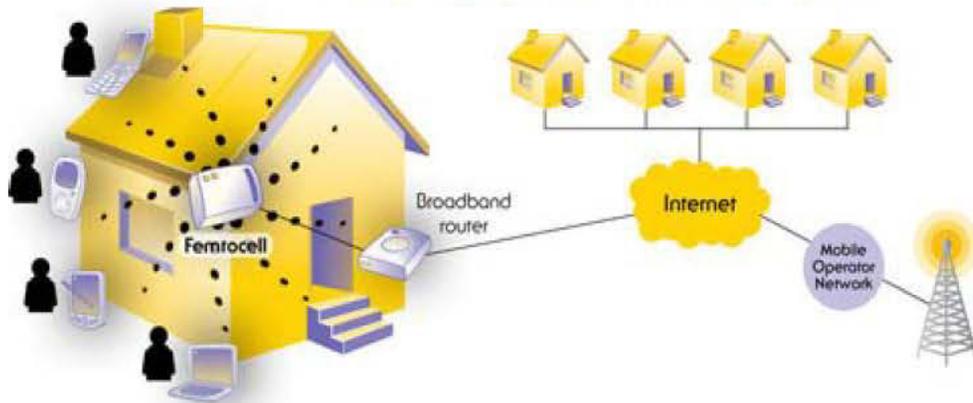
“In order to achieve harmony, you must play different





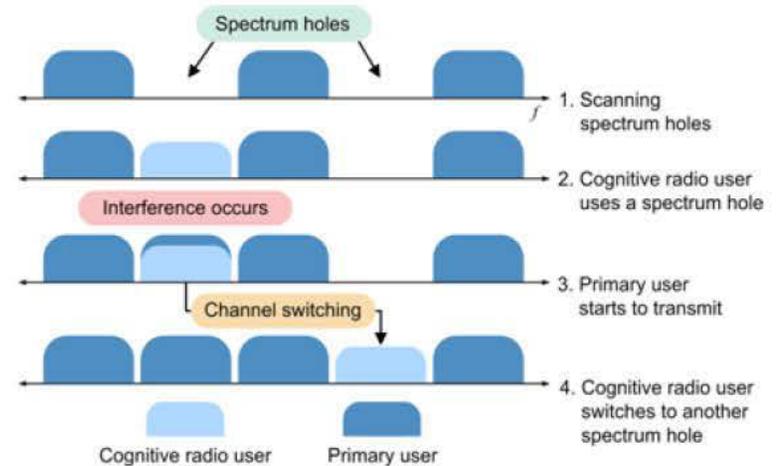
Sound spectrum policy reform...

Femtocells: offload wireless traffic onto broadband wireline networks



will allow and encourage...

Cognitive Radio: utilizing idle spectrum



Spatial Multiplexing: more bandwidth



Figure 1. MIMO transmission and reception in a dispersive environment. In a MIMO system, different information is transmitted simultaneously on each transmit antenna.



Future is difficult to forecast

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."

-- Western Union internal memo, 1876

"I think there is a world market for maybe five computers."

--Thomas John Watson, Sr. of IBM, 1943

After extensive analysis, our forecasts for cell phone penetration in the U.S. by 2000 is expected to be only 900,000 subscribers.

-- McKinsey & Company report to AT&T, 1980

Actual figure: 109 million

"640K [memory] ought to be enough for anybody."

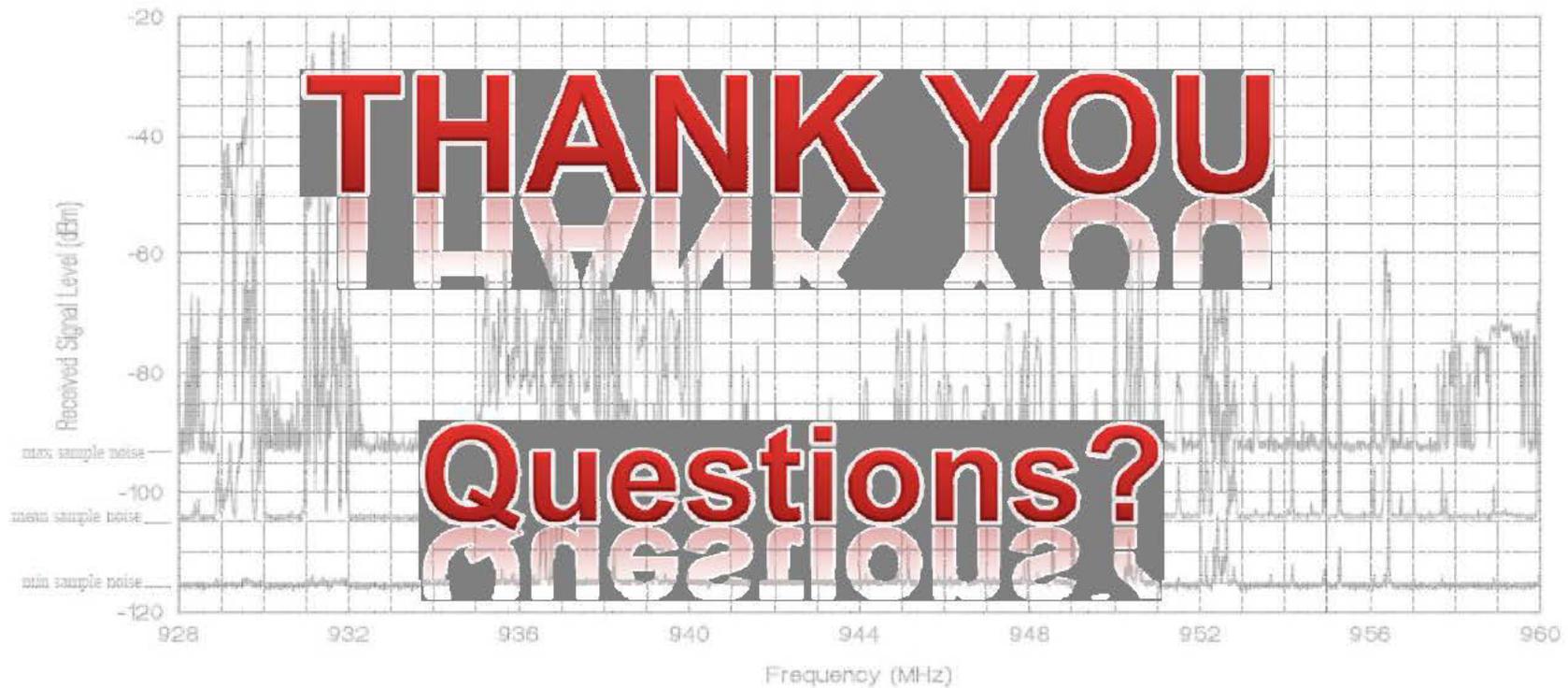
-- Bill Gates, 1981

"We're talking about 50 to 60 million [cell phones] over the next 20 or 30 years."

-- Peter Erb, President of Millicom, 1982



GOVERNMENT ALLOCATIONS:			FIXED.			FIXED.	
NON-GOVERNMENT ALLOCATIONS:	1.	LAND MOBILE	FIXED.	LAND MOBILE.	5.	FIXED.	FIXED.
GENERAL UTILIZATION:	1.	2.	3.	Private land mobile (base), 4.	3.	Auxiliary broadcasting, private fixed microwave, studio-to-transmitter links (STL's), 6.	
	928	929	932	935	940	941	944
							960



1. FIXED: Private fixed microwave, public and private land mobile, telemetry applications. Two-way services paired with 952-953 MHz.
2. Public and private land mobile.
3. Paired band for point-to-point and point-to-multipoint communications.

4. Trunked and conventional systems in 12.5 kHz channels (paired with 895-901 MHz).
5. MOBILE.
6. 944-952 MHz: Primarily, studio-to-transmitter links. 952-953 MHz paired with 928-929 MHz. 953-960 MHz: Primarily, fixed point-to-point communications.