

Motorola Interest

- **Need to balance licensed carrier, licensed private/public safety and unlicensed applications**
 - PLMRS / PS current and future services must be afforded protection
 - Use of 470-512 MHz by licensed services not encompassed by regions listed in 90.303 must be protected
 - New Broadcast services for mobile broad band must not be limited by unlicensed deployment
- **New applications enabled by unlicensed**
 - Broadband delivery to rural America
 - Home applications
- **Requirements on assessing potential of opportunity**
 - Broadband: Enough spectrum which would provide opportunity for 3-4 channels of broadband service in rural areas
 - Home: Minimum 3-4 channels to distribute services with-in the home
 - Out-of-band emissions requirements which are not too restrictive but will also protect licensed services



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How Much Open Spectrum?

- **Service area curves determined by the media bureau**
 - Accuracy of database must be ensured
 - <http://www.fcc.gov/oet/info/maps/mmb/>
- **Service area curves are extended by applying the appropriate propagation curve to a unlicensed transmitter at maximum power to meet D/U ratio**

Type of station	Protection ratios		
	Channel separation	D/U ratio (dB)	Propagation curve
Analog TV, Class A, LPTV, translator and booster	Co-channel	34	F(50,10)
	Upper adjacent	-17	F(50,50)
	Lower adjacent	-14	F(50,50)
Digital TV and Class A	Co-channel	23	F(50,10)
	Upper adjacent	-26	F(50,50)
	Lower adjacent	-28	F(50,50)



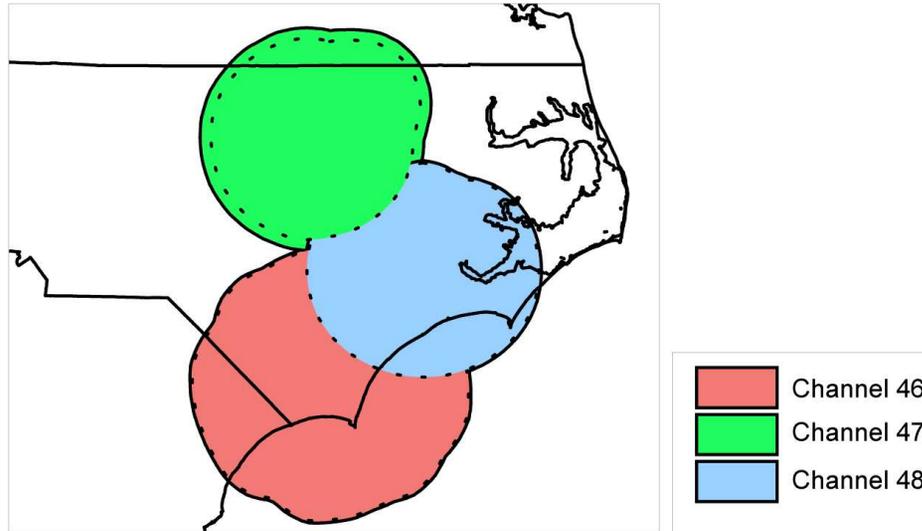
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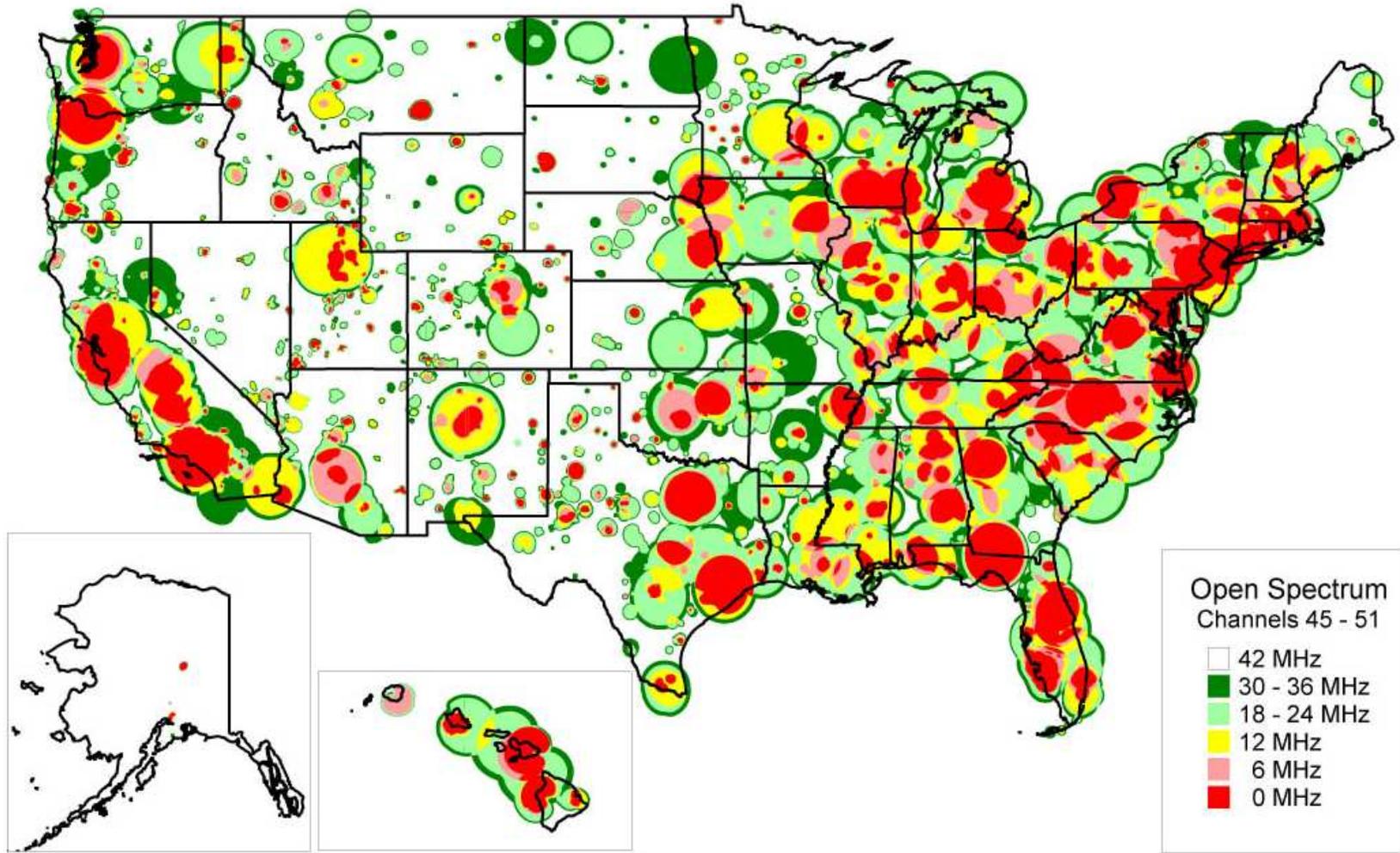


Determination of Open Spectrum



- **As example consider 3 channels located in North Carolina**
 - Channel 46 and 48 are DTV stations
 - Adjacent channels zones extended by < 2 km
 - Channel 47 is a TV station
 - Zone extended by 9 km
- **Total geographic area excluded from operation on channel 47 is entire area encompassed by overlap of all regions**
 - NPRM implies that operation inside adjacent channel contours for strong broadcast signals is permissible
 - This analysis on open spectrum assumes unlicensed devices would not operate with-in adjacent channel service contours

Open Spectrum in Channels 45-51



Database includes: Analog TV, Class A, LPTV, Translators, Boosters, Digital TV



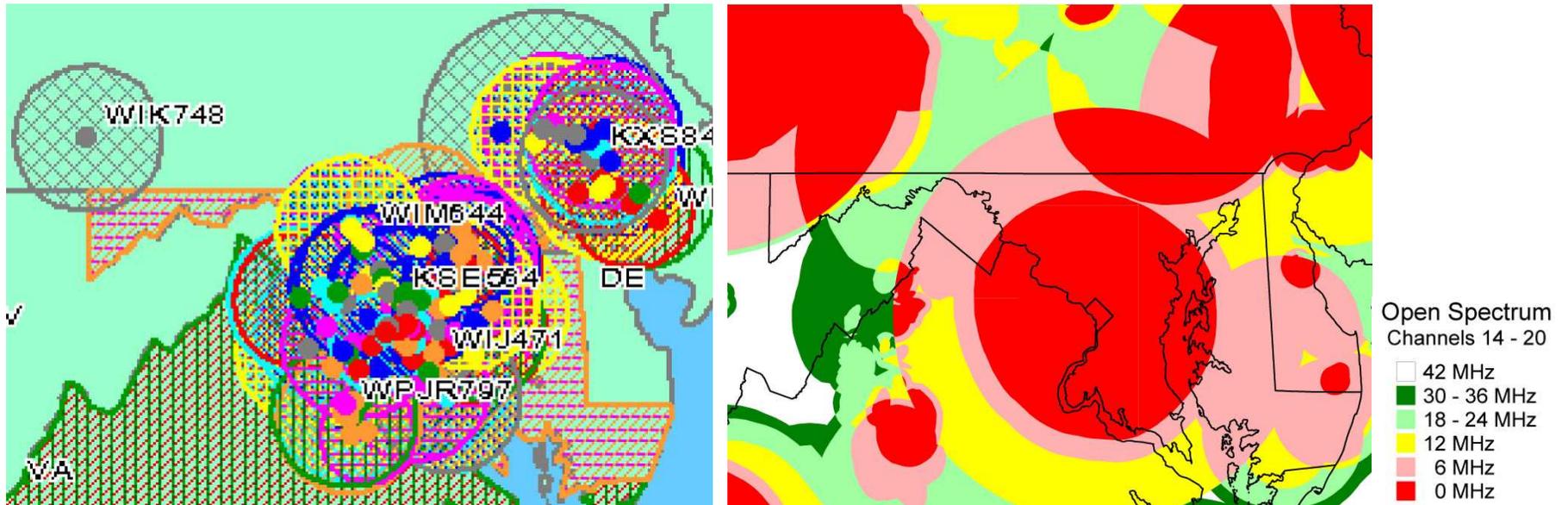
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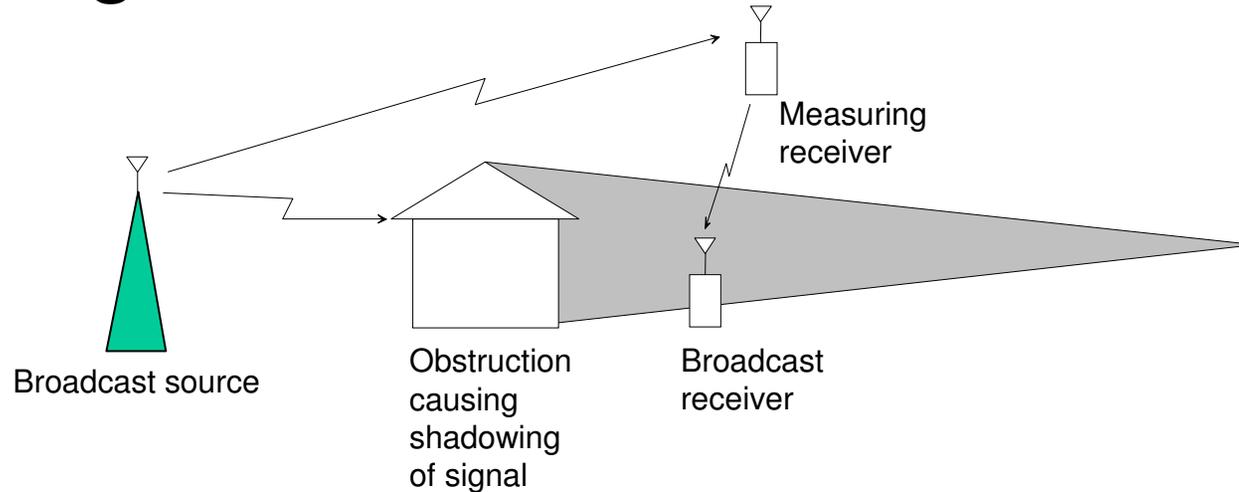
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Land Mobile / Public Safety in Channels 14-20



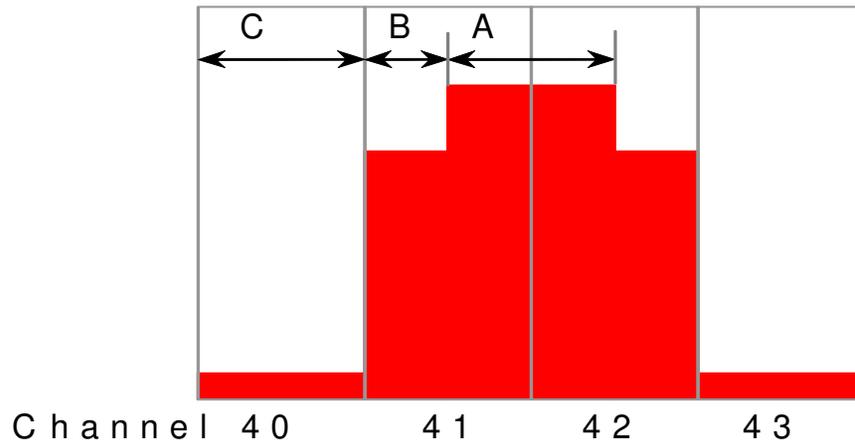
- **Maryland Example**
 - ULS Database has 245 active Part 90 licenses (Graphic on left)
 - Media Bureau coverage contours indicates little open spectrum available
- **Opportunity appears small for unlicensed devices**
- **Critical nature of communications warrants these channel not be considered for now**

Issue: Operation with-in adjacent channel coverage areas



- **Can operation occur with-in geographic coverage areas of adjacent channels?**
 - Inside of the geographic coverage area of an adjacent channel the NPRM implies that a potential exists for unlicensed devices to meet D/U requirements
 - While it is technically feasible to ascertain the level of signal from the broadcast signal it will be difficult to ascertain if the receiver is protected
 - Strong adjacent channel emissions could impact usability for unlicensed device

Issue: Out-of-band emissions are severe



- A: Main emissions of the device
- B: Outside the bandwidth of the device but in the TV broadcast channel the device operates (-20 dB)
- C: Outside of the TV broadcast channel where the device operates (15.209(a))

- **Consider emission bandwidth of device to be 5 MHz with EIRP of 4 W**
 - EIRP density = 19 dBm/100 kHz (assuming flat spectrum)
 - Region B: Emission level required to be -1 dBm/100 kHz
 - Region C: Emission level required to be -50 dBm/100 kHz
 - Attenuation of 69 dB
- **If device is operating in single channel then requirement is extremely difficult to achieve**
 - If emissions are relaxed into adjacent TV channel then need to ensure licensed services are protected.

Conclusions

- **Minimal spectrum is available for unlicensed operation in major urban areas**
- **Systems which provide rural fixed broadband service could be added in TV bands and provide adequate protection**
 - Channels 38 – 51 appear most promising
- **Radios that listen to licensed transmissions and react may not protect licensed operations, any consideration must be rigorously reviewed**
- **Unlicensed operation in channels 14-20 should not be considered at this time**
 - Spectrum use is critical to land mobile / public safety
 - Spectrum is less likely to be available due to numerous land mobile licenses



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