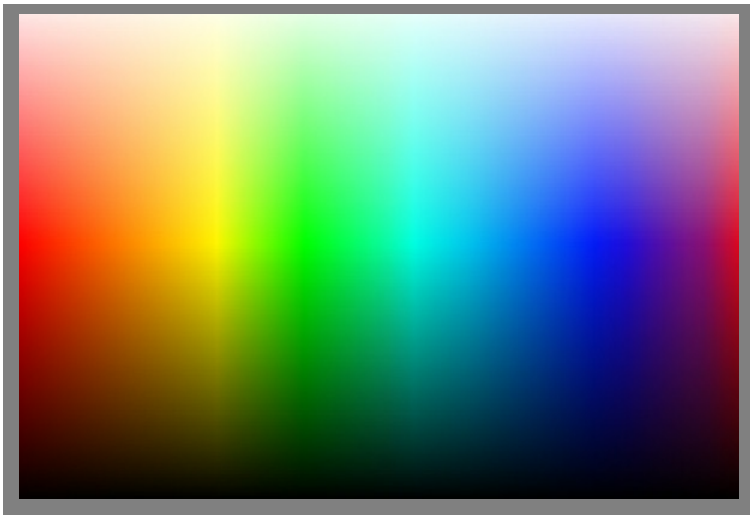


National Academies Improving Spectrum Management

Steve Sharkey
Director, Spectrum & Standards Strategy
March 1, 2006



MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners. © Motorola, Inc. 2002.



Seamless Mobility Driving Technology

- Connected Anywhere, Anytime to Anything
- Seamless availability of information regardless of network
- Applies to all services
 - Commercial to public safety and everything in between
- Applies to all networks
 - Licensed/Unlicensed
 - Satellite/Terrestrial
 - Wired/Wireless
- Driven by smart devices

How does this impact Spectrum Management?



No “One Size Fits All” Approach

- No single incentive structure is appropriate for all services
 - **Market incentives should apply where possible**
 - **Stick - Auctions & fees**
 - **Carrot – Maximum flexibility to lease or use for other services**
 - **Regulatory oversight is still appropriate in some cases**
- No single definition of efficiency is appropriate for all services
 - **Efficient use will vary from service to service**
 - **Service must meet user requirements**
 - **Look at trends in use band-by-band**
 - **Goal should be to meet user requirements and minimize fallow spectrum**
 - **Encouraging use of secondary markets and sharing**
- No single technology solution that meets all needs
 - **“Latest” technology may not be best solution for all needs**
 - **Best match for coverage, capacity and evolution from existing services**
- No single regulatory structure is right for all services
 - **Licensed spectrum with property rights maximizes opportunity for investment and deployment of efficient services**
 - **Unlicensed plays important role for innovation and consumer networks.**



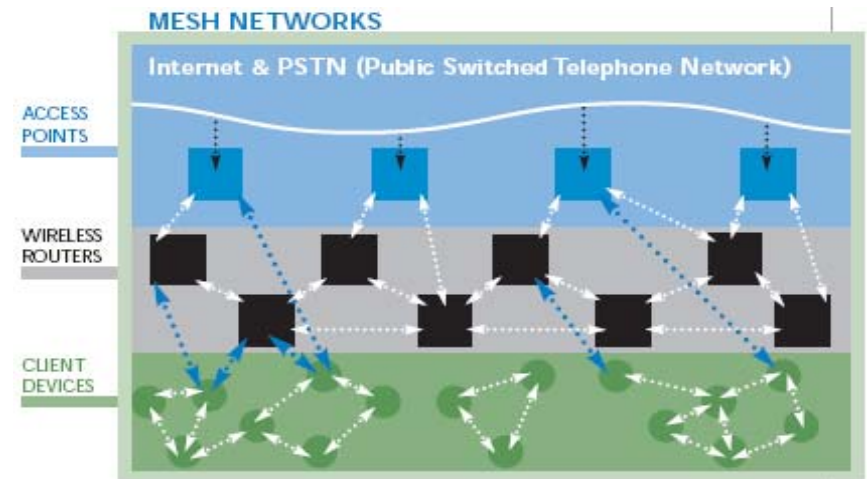
Flexibility & Certainty Key to Maximizing Potential

- Flexibility for services and technology
 - Allow services and technologies and deployments to best meet demand
- Certainty regarding technical rules and operating environment
 - Licensed spectrum maximizes certainty and drives investment
 - New technologies are efficient at operating closer to the noise floor to maximize data rates
 - Underlay use can raise noise floor and harm ability to maximize efficient use
 - Clear and consistent rules for technical operation
 - Clear licensee rights regarding the level of interference expected
 - Lack of clarity can impact implementation of adjacent services



Technology Advances Facilitate Innovation...

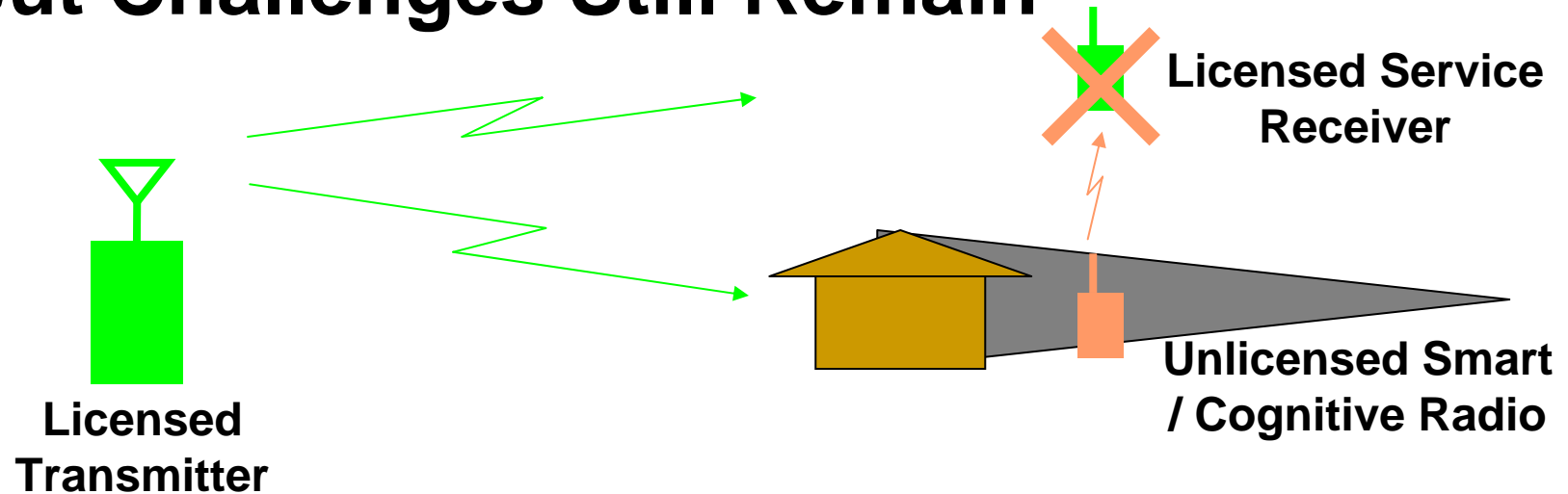
- New opportunities for sharing and flexible use of spectrum
 - Cognitive Radio, Software Defined Radio, Smart Antennas
- Mesh and Ad Hoc Networking
 - Dynamic establishment of networks to meet user requirements
 - Reduced Infrastructure costs and requirements



Advances in technology leads to a blurring of services

- The traditional hard line between service definitions is no longer appropriate
- Technical rules for protection should be defined and arbitrary limits associated with allocations (fixed, mobile, broadcast, etc.) should be eliminated.

...But Challenges Still Remain



Cognitive Radio

Shadowing of smart / cognitive radio antenna impairs detection

Fast dynamic sharing requires ability to look forward in time

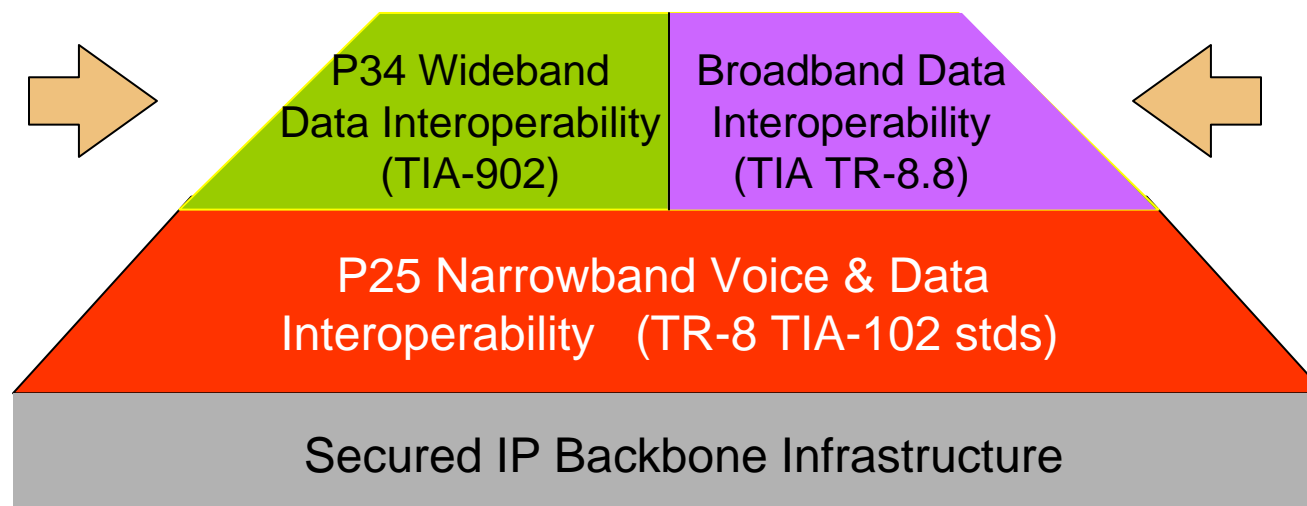
5 GHz a good start, but for relatively straightforward scenario

NTIA and FCC should move forward with identification of 10 + 10 MHz to provide test bed

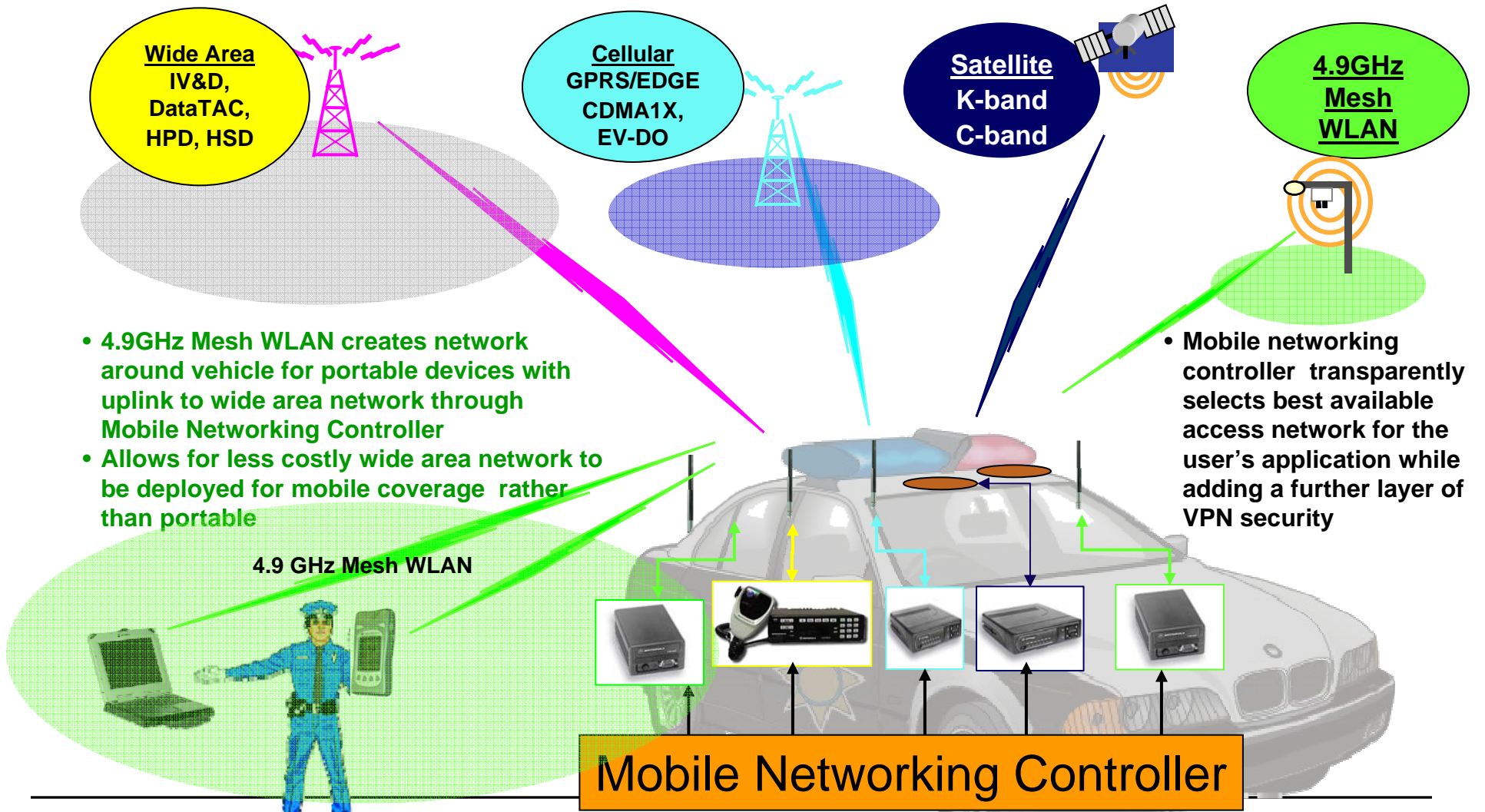


Public Safety Communications - Interoperability

- 700 MHz
 - Interoperable voice P25
 - TIA-902 (SAM) standard for interoperable wideband
 - optimized and cost effective solution for large geographies/low density
 - Provide flexibility for broadband – look for additional opportunities to meet requirements
- Deploy TR-8.8 standard for 4.9GHz broadband data networks for municipalities and for fixed and deployable networks in states and counties
 - Highest bandwidth and capacity to support highest user densities and extreme broadband traffic profiles with heavy fixed and mobile video



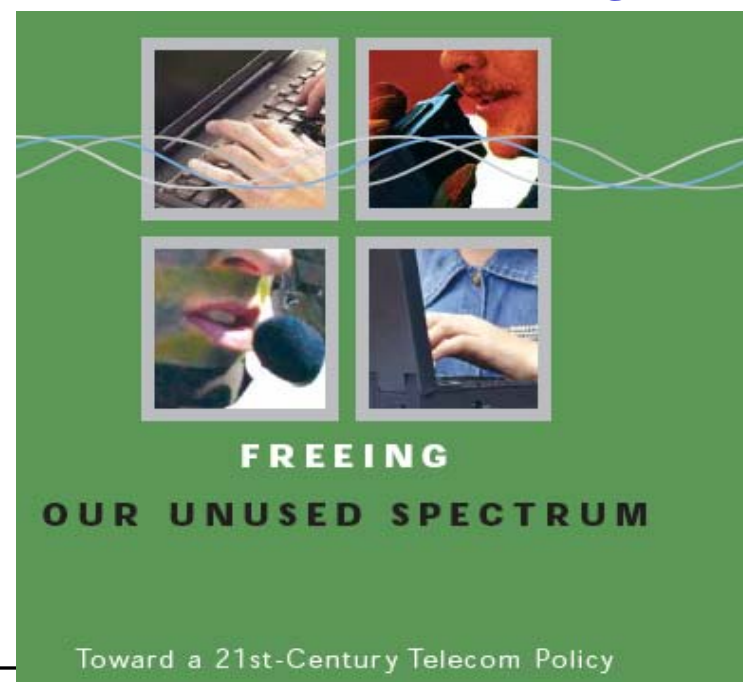
Seamless Data Connectivity for Public Safety



Summary Recommendations

- **Break down barriers to innovation and services**
 - Provide service and technical flexibility
 - Eliminate unnecessary restrictions associated by traditional allocations
 - Provide greater opportunities for sharing spectrum between government and non-government users
- **Encourage efficient use of spectrum**
 - Maximize opportunities for secondary market
 - NTIA and FCC should conduct periodic review on band-by-band basis to look at technology and user evolution to determine if regulatory action is necessary
 - Emphasis for unencumbered bands should be on licensed services
 - Pursue opportunities for unlicensed use in bands where primary user can be protected (5 GHz, TV Whitespace)
 - Provide spectrum test bed

Technology CEO Council
www.techceocouncil.org



MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners. © Motorola, Inc. 2002.

