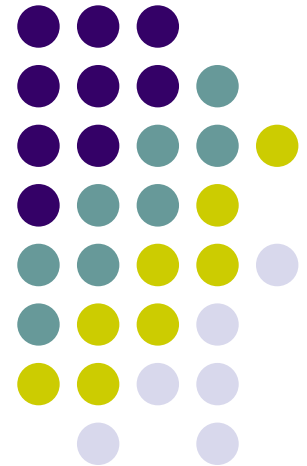
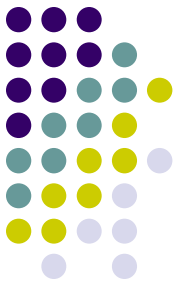


Spectrum policy: an overview

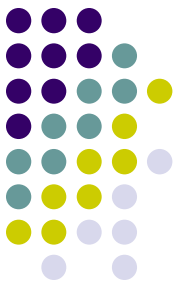
Johannes M. Bauer
Michigan State University
November 21, 2003





Background

- Increasing demand for spectrum
- Inadequacy and inefficiency of historical model of administrative licensing
 - In most bands no opportunity costs of usage
 - Significant amounts of unused (“white”) spectrum
 - Preservation of status quo, slow innovation
- Since 1980s experimentation with new approaches (lotteries, auctions, unlicensed)
- Significant advances in radio technology



Spectrum Task Force

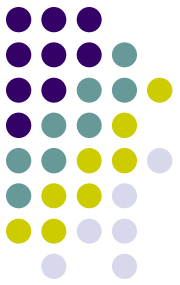
- Established 6/02, report 11/02, update 11/03
- Basic vision: mix of spectrum policy regimes
 - “Exclusive use” model with interference protection
 - “Commons” (unlicensed devices) model without right to protection from interference
 - “Command-and-control” model where appropriate
- Improved access to spectrum for users of unlicensed devices and licensed spectrum
- Toward new paradigm for interference protection (“interference temperature”)



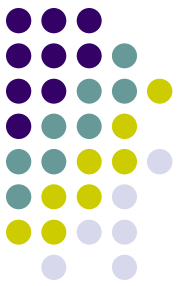
Common elements

- Maximum flexibility of spectrum use by both licensed and unlicensed users
- Clear and exhaustive definition of spectrum user's rights and responsibilities
- Incentives for efficient spectrum use
- Encouragement of grouping of users
- Periodic review and revision
- Efficient and reliable enforcement

FCC Initiatives



- Access to spectrum
 - Elimination of barriers to secondary markets (Adopted May 15, 2003, Report and Order October 6, 2003)
 - Spectrum leasing without FCC approval (as long as licensee retains *de facto* control)
 - *De facto* transfer of control over spectrum subject to streamlined FCC approval
 - Further Notice of Proposed Rulemaking on information and clearinghouse mechanisms and expansion of secondary markets (Comment date December 5, 2003)



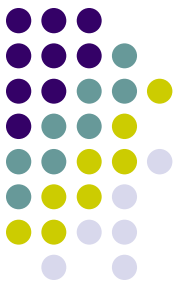
FCC Initiatives ...

- New bands, services, devices
 - Ultra-wideband (3.1-10.6 GHz)
 - Below 900 MHz and 3 GHz (NOI)
 - U-NII: additional 255 MHz of spectrum in 5.470-5.725 GHz band (adopted 11/12/03)
 - 90 GHz unlicensed rules adopted 10/03
 - 2.5 GHz (MDS/ITFS) considered for unlicensed and underlay use
- Improving access to spectrum in rural areas (NPRM adopted 10/03)

FCC Initiatives ...

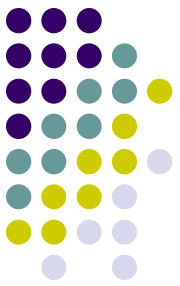


- Receiver interference immunity performance specifications (NOI issued March 2003)
- Interference temperature metric (11/12/03)
 - NOI seeks comments on need, development and implementation of interference temperature metric
 - NPRM seeks comments on technical rules that would test metric in 6.525-6.700 and 12.75-13.25 GHz bands
- Cognitive radio technologies (NPRM on advanced antenna technologies adopted 9/03)



Unlicensed issues

- FCC only slowly paying attention to design of rules and regulations governing unlicensed devices and services (mostly Part 15 of the FCC Rules)
- Poor understanding of effects of different rule specification on industry performance and stakeholders
- No workable model to determine allocation of spectrum to exclusive and unlicensed uses



Proposals to watch

- Faulhaber and Farber (2003), proposing that spectrum ownership and commons could co-exist (e.g., as underlay easements or spectrum parks)
- Kwerel & Williams (2002) “Big Bang” auction
 - Voluntary participation, need not sell but get flexible rights if they put their spectrum in auction
 - Do not get flexibility if they do not participate
- Werbach (2003): “Supercommons”
- Noam (1998): real time spectrum lease market
- Benkler (2003): Mixed model, experimentation