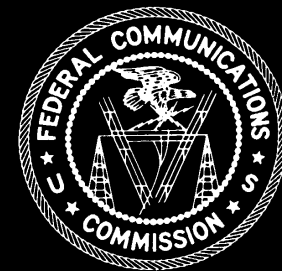


# Cognitive Radio Technologies in the Commercial Arena

**Bill Lane, Ph. D., PE**  
**Office of Strategic Planning & Policy Analysis**  
**Federal Communications Commission**



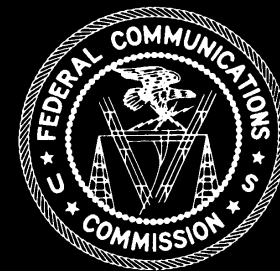
# Outline



- **SPTF**
- **Unlicensed Uses**
- **Secondary Markets**



# Spectrum Policy Task Force Report



- While the SPTF Report found continued demand for more spectrum; considerable spectrum is available when both space and time are considered
  - Hence **SPECTRUM ACCESS** is a major issue
- Report also found that in view of recent impact of Wi-Fi and other unlicensed systems, there is great interest in more spectrum where unlicensed access is facilitated



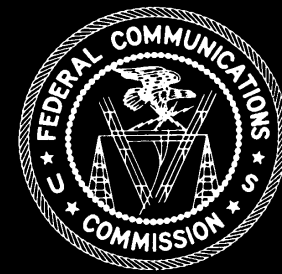
# Unlicensed NOI



- In DEC '02 FCC adopted an NOI in Docket 02-380 exploring unlicensed sharing of spectrum in TV bands below 900 MHz
- Interference could be avoided by:
  - Geographical separation and check of license database, *or*
  - Listen-before-talk algorithms



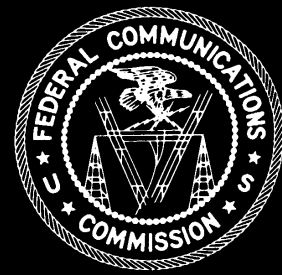
# Unlicensed NOI



- **There is a relationship between the sensitivity of the listen-before-talk detector, the allowed transmit power, and the probability of interference**  
(Although there has been little published in this area)
- **FCC 2/12/03 tutorial by John Betz, MITRE Corp., explored “feature detectors”**
  - **sensitive listen-before-talk detectors that are little known in commercial circles**



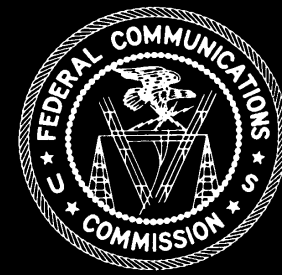
# Unlicensed NOI



**Can cognitive radio technology be used to improve unlicensed spectrum access while also avoiding harmful interference?**



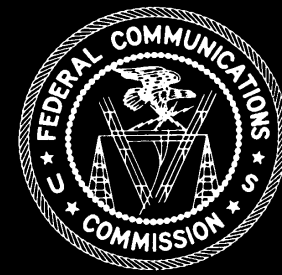
# Secondary Market Rulemaking



- In Docket 00-230, FCC is considering both short term and long term leasing of spectrum by licensees without case-by-case FCC approval
- Seen as possible method to improve spectrum efficiency by giving economic incentives to licensees to allow more intensive use



# Secondary Market Rulemaking

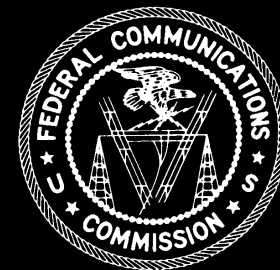


- **Multiyear leases could be done with conventional technology**
  - lessee just builds new system(s) using leased spectrum
- **Leases in the hours/minutes/seconds range are the subject of today's discussion**





# Near Real Time Secondary Market

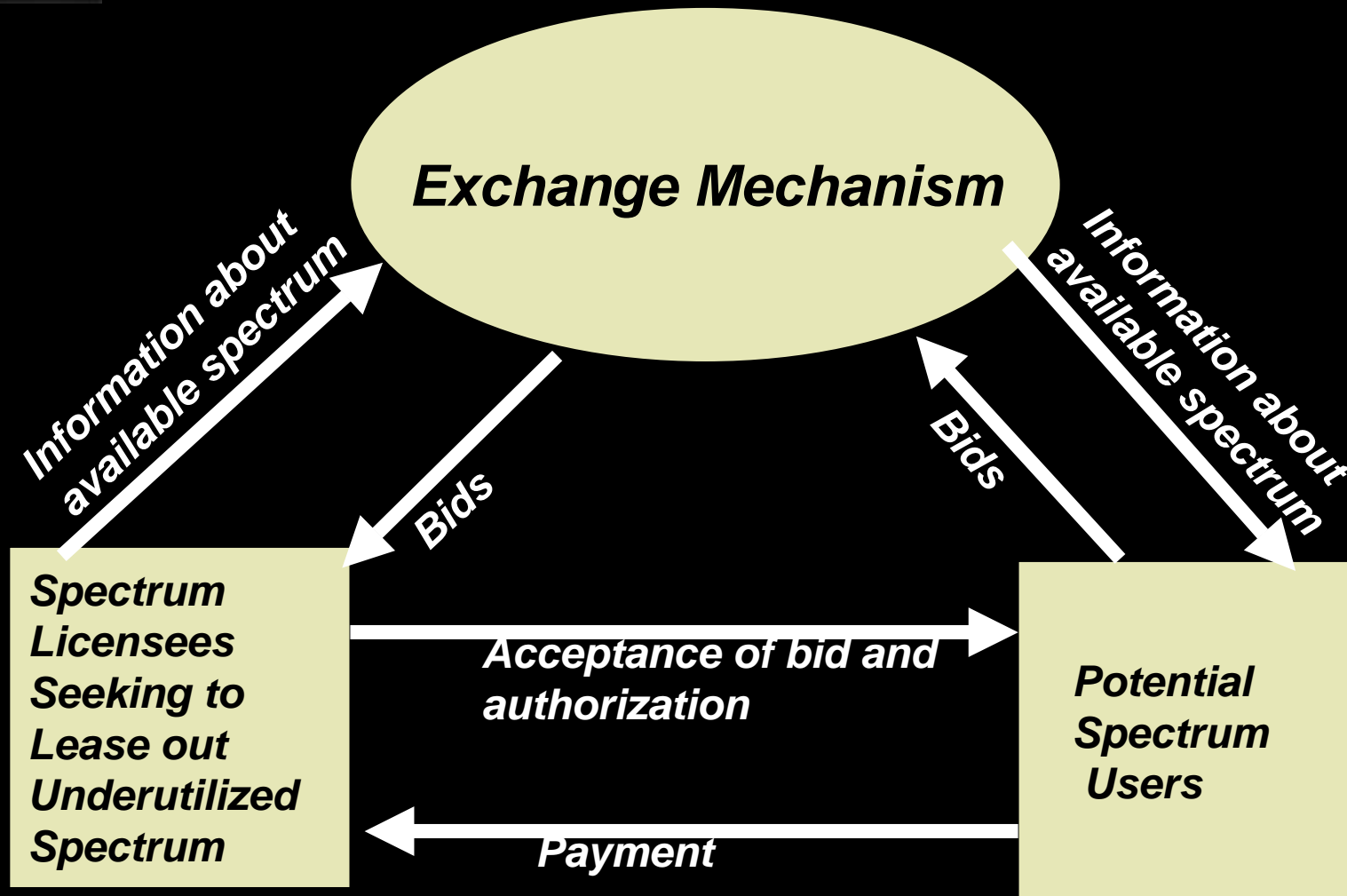
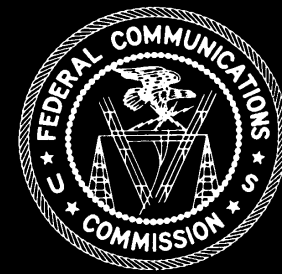


- In the electric power industry there is an hour-to-hour market for power exchange
- Should we remove any barriers to such a market in the commercial spectrum area?
- Such a market might require:
  - An exchange mechanism to bring buyers and sellers together
  - A standard definition for what is being bought and sold ← *Not subject of today's discussions*
  - A real time spectrum management monitor to insure compliance



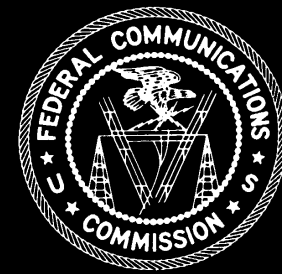
# Near Real Time Secondary Market:

Possible Information Flow





# Near Real Time Secondary Market

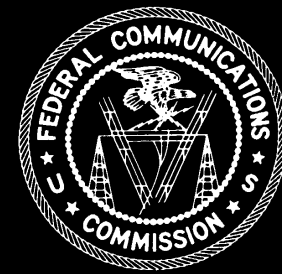


**Cognitive radios and dynamically reconfigurable software radios could provide a means to implement such a spectrum commodity market**

**Is a near real time secondary market practical and/or desirable?**



# Near Real Time Secondary Market



**What present FCC rules and policies inhibit the development of such approaches or create uncertainty for developers?**

**Should FCC have a role in defining standard interfaces for such information flow and spectrum exchange?**



**We look forward to your views on how we should address these issues!**

