

# THE QUESTION OF SPECTRUM: TECHNOLOGY, MANAGEMENT AND REGIME CHANGE

Gerald R. Faulhaber  
*The Economics of the Commons: Organizing Private  
Transactions in Communications*  
CITI, Columbia University  
May 25, 2005

5/25/2005

Question of Spectrum@CITI Columbia

Slide 1

## Review of the Spectrum Debate

- Commons vs. Property:
  - Round 1: Adam Smith vs. John Perry Barlow:  
*Hurray for our side!*
  - Round 2: Is there common ground? *More than you might think*
  - Round 3: Roll up our sleeves and do the hard work: define the problem carefully, assess transaction costs, dispute resolution, etc. of each regime. *Which regime delivers the goods?*
    - This paper plus Goodman, Werbach, Speta, Hatfield/Weiser...

5/25/2005

Question of Spectrum@CITI Columbia

Slide 2

## Parsing the Problem

- “Property Rights vs. Commons” mis-specifies; it’s all just different forms of property rights.
- Four parts:
  1. New Technology: agile radio, UWB, mesh networks
    - But these work under either regime.
  2. Spectrum Use: what is it being used for? High power, low power, two way, directional, ....
    - Some uses call for exclusive use, some for commons
  3. Spectrum Management: Are bands managed for exclusive use or commons (Part 15)?
    - *We all agree... We need both!*

5/25/2005

Question of Spectrum@CITI Columbia

Slide 3

## The Core Issue

4. Overarching Legal Regime
  - a) Traditional Regulated Command and Control *We all agree... Yech!*
  - b) Fully Commons *Cannot accommodate any exclusive use that we all agree we need)*
  - c) Fully Property Rights (including public & private commons)
  - d) Mixed Commons/Property Rights, overseen by regulator
- Only feasible candidates: c) and d)
  - Evaluate costs and benefits of each
    - Assume the “end state” for each (transition for a later paper)
    - Assume technology evolves as forecast.
    - Assume regulation and the courts behave as they always have.
    - Transaction costs, dispute resolution, incentives to economize, incentives to adapt new technologies.

5/25/2005

Question of Spectrum@CITI Columbia

Slide 4

## New Results - 1

- Exclusive use does *not* lead to tragedy of the anticommons (i.e., holdout problem)
  - Commons advocates claim aggregation of individual properties for one big property (e.g., commons) victim of the holdout problem (e.g., mall and park developers)
  - But this *assumes* contiguity to anchored property; new technologies largely eliminate this problem. SDR means we can stitch together non-contiguous bands for a single application
  - ...and didn’t the PCS firms solve this problem in the 1990s when they created national networks...using the market?

5/25/2005

Question of Spectrum@CITI Columbia

Slide 5

## New Results -2

- Tragedy of the commons is not in congestion, it’s in enforcement.
  - If everyone has a stake in radio commons peace, then who has incentive to punish offenders? *No one.*
  - With lots of excess capacity *today*, no need for concern about congestion...but tomorrow?
    - When it’s free everyone will use it, and use it up
  - And how come commons advocates tell us they need more, more, more now, when new technologies should mean we can conserve on bandwidth and use less, less, less!
    - FCC has created huge swaths of Part 15, yet we hear calls for more!

5/25/2005

Question of Spectrum@CITI Columbia

Slide 6

## New Results - 3

---

- Power mix: even with high-powered agile radios, can't mix high and low powered devices in the same commons
  - Low power works well in commons; UWB the poster child for spectrum underlays
  - High power agile radios downright dangerous; their agility means interfering radios cannot be identified and prosecuted
    - Should be called "hit and run" radios; without stringent controls agile radios will be the AK-47s of the wireless world, *under any regime!*
    - Today, interfering radios generally easy to identify and hold accountable. This may not be true in the future.

5/25/2005

Question of Spectrum@CITI Columbia

Slide 7

## New Results - 4

---

- But regulation is the key difference between the two overarching regimes, and the performance of regulation has been disastrous; WHY?
  - *"as long as there is a regulator to complain to, market participants will complain and the regulator will be forced to respond. The scope and intensity of regulation inevitably expands to meet the demands of market participants."*

5/25/2005

Question of Spectrum@CITI Columbia

Slide 8

## Old Results Redux

---

- Faulhaber-Farber proposed *non-interfering easement* for all propertied licenses
  - Anyone can use any spectrum provided they do not interfere with licensee.
    - Definition of interference, detection issue, etc.
  - NIE give commons advocates all the *functionality* they claim they want. *So why is there still an argument?*
- But is non-interference really feasible, especially with agile radio? I now have deep reservations about this.
  - Defining, detecting and enforcing true non-interference may be quite costly

5/25/2005

Question of Spectrum@CITI Columbia

Slide 9

## Conclusions

---

- Transactions costs less with property rights
  - Actual transaction fees higher, but regulatory costs much lower; holdup problems not an issue with new technology
- Dispute resolution costs less with property rights
  - Judicial resolution costs lowered using injunctive relief (rather than nuisance); regulatory resolution has proved itself a nightmare
  - Social norms? Literature shows that social norms work only in exceptional circumstances.
- Property rights encourages economizing, deploying new technology; commons accepts new technology but little incentive to deploy.
- And if non-interfering easements really work, then what is left for commons advocates to advocate, except property rights with NIE?

5/25/2005

Question of Spectrum@CITI Columbia

Slide 10