



Economics of Spectrum Management

CYBR 4400 / 5400: Principles of Internet Policy, Lecture 4-3

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Today's Lecture

- ❖ Start recording!
- ❖ Remote learning
- ❖ Finish Spectrum Management Lecture
- ❖ Economics of Spectrum Management Lecture

Economics of Spectrum Management

Interference Policy

- ❖ Historically: poorly defined standard of “harmful interference”
 - ❖ Too stringent or lax guidelines: high opportunity costs
- ❖ Normative goal: Devise guidelines that maximize spectrum value by allowing diverse technologies to flourish and permit “right” level interference
 - ❖ Force incumbents to internalize opportunity costs

Interference Policy (cont'd)

- ❖ Coase: “the gain from [allowing additional] interference more than offsets the harm it produces”
- ❖ Regulators must balance competing priorities
 - ❖ Lightsquared-GPS: need for greater spectrum efficiency vs. need to keep critical infrastructure operable
- ❖ FCC yet to establish comprehensive interference policy

Goal of Spectrum Auctions: Competition in Wireless

- ❖ Multiple, facilities-based networks supporting improved redundancy and reliability
- ❖ Rivalry on coverage, pricing, and service
- ❖ Encourages innovative services, terms, and applications
- ❖ Assign available spectrum to “highest valued” use
 - ❖ Maximize consumer value of wireless services less the cost of production

Using Auctions to Assign Spectrum

- ❖ Encouraging new entry for competition
 - ❖ Incumbent advantages of economies of scale and scope
 - ❖ Incumbent value driven in part by deterring new entry
- ❖ Should raising revenues be a goal?
 - ❖ Can reduce the amount of spectrum
 - ❖ Sell to a monopolist
- ❖ Low revenues bad if due to auction design, tacit collusion, or entry deterrence by incumbents

Market Failures to Consider

- ❖ Less natural monopoly (market concentration) in wireless — but network effects might be sufficient source of concern to merit some regulation
- ❖ Bidders private values may differ from social values (e.g., incumbent includes private value plus value of keeping it away from competitor)
- ❖ Policy instruments impact competition both in the auction and downstream market for wireless services

Current Setting

- ❖ Spectrum Auctions used to assign and price spectrum since 1994 in U.S.
 - ❖ About 90 auctions, raising over \$130B
 - ❖ Goal of economic efficiency: put the spectrum to highest-valued use
- ❖ Policy instruments for competition available to regulators using auctions
 - ❖ Set-asides
 - ❖ Bidding credits
 - ❖ Spectrum caps
 - ❖ Band plan design
 - ❖ Auction format
 - ❖ Antitrust enforcement

Designated Entities and Bidding Credits

- ❖ FCC auction authority stems from Omnibus Budget and Reconciliation Act of 1993: Revenue maximization is not to be the goal of auctions!
 - ❖ Section 309(j): FCC should ensure opportunity of small businesses, businesses owned by women and minorities, and rural telephone companies (“Designated Entities”)
 - ❖ Supreme Court *Adarand* decision trimmed list to small businesses
- ❖ How do you define “small business”? — Large company entering new market?
- ❖ Bidding credits used assuming additional participation can increase revenues
 - ❖ Allows government to put a “face value” on some policy goal (e.g., new entrant)
 - ❖ FCC auction evidence shows bidding credits typically “bid away” as qualified entities compete for licenses

Important to Enforce Rules



- ❖ In 2014, Northstar Wireless and SNR Wireless LicenseCo borrowed from Dish in exchange for Dish's de facto control
 - ❖ Also expected to qualify for FCC's bidding credits for small business (revenue below \$40M)
 - ❖ FCC accepted their \$13.3B in bids but denied requests for \$3.3B in credits
- ❖ "2G Scam" in India in 2008 when Minister of Communications and IT forced "first come, first served" licensing scheme
 - ❖ Illegally undercharged major companies (\$28B) by tipping off favored companies to conditions required (all happened in matter of hours)
 - ❖ In 2011, Time listed scam at #2 of "Top 10 Abuses of Power" list, right behind Watergate!!!!

Sources of Spectrum: Reclaiming Government-Held Bands

- ❖ Government agencies do not internalize opportunity costs
- ❖ President's Council of Advisors in Science and Technology (PCAST) in July 2012
 - ❖ Comprehensive reallocation of federal spectrum not going to happen
 - ❖ "Norm for spectrum use...should be sharing, not exclusivity"
- ❖ Industry response: "Gold standard...remains cleared spectrum"