Spectrum: Its Value and Valuation

Exploring Market-Based Spectrum Management and the Value of Radio-Frequencies As a Public Good

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Introduction

• Liberalization has fundamentally changed the way we view and manage spectrum
• New paradigms of spectrum management
  – Property rights model
  – Spectrum “commons” approaches
  – “Command and control” approach
• For operator-driven services, such as IMT, the property rights model has become predominant
  – This has led to a growing economic predominance in views of spectrum – i.e., its growing commoditization
Spectrum: Exploding Demand

• By the end of 2010, there were 5.3 billion mobile wireless subscriptions globally, including 940 million subscriptions to 3G services.

• Mobile communications and Internet are converged onto the same platforms

• With the race to be part of Info Society, spectrum for mobile data is being increasingly seen as a building-block to national economic prosperity.

• Meanwhile, there are multiple ways to assign spectrum
  – License-exempt/class license
  – First-come, first served
  – Administrative decision (beauty contest)
  – Competitive bidding
Valuing Spectrum

• Market Valuation is used for several purposes:
  – Regulatory fees (initial and recurring)
  – Initial spectrum assignments (auctions and tenders)
  – Secondary markets
• Several approaches can be taken:
  – Income approach – Determining the value of services that can be marketed using spectrum as an input
  – Market comparable approach – Deriving value through comparison with the same or similar spectrum rights marketed elsewhere (i.e. benchmarking)
• Net Present Value (NPV) Calculation
  – Calculates the sum of discounted cash flows from a project and compares them to the capital outlay and ongoing costs for the project
  – Can use a LRIC, fully allocated and “bottom up” approach to gauge investment costs
Opportunity Cost

• Definition: The value of the next-best choice in a series of choices, or the value of something one forgoes in order to choose something else.
  – E.g. – In choosing a Corvette over a Mustang, the value of the Mustang represents the opportunity cost.
  – This provides a rough threshold valuation – had the value of the first choice been less than the opportunity cost, one might’ve picked the second choice.

• Opportunity cost in spectrum – The value that justifies investing in that spectrum opportunity rather than another investment opportunity

• Problem: Moving beyond arcane economic theory
Competitive Bidding

• Auctions, public tenders
  – Single-round, closed bid submissions
  – Multiple-round, open bid processes

• Valuation is used to assess the opportunity
  – Regulators set reserve amounts/price floors and treasury revenue estimates
    • Can be expressed as price per megahertz pop
  – Potential bidders and financial backers use valuation to estimate bidding opportunity and determine participation
  – Results set true floor of spectrum value
Secondary Trading

- **The Pioneers:** UK, Australia, New Zealand, US
  - Results: Somewhat “thin”
- **The theory:** Leasing and trading help:
  - Get spectrum into the hands of entities willing and able to use it,
  - Sets ongoing value of spectrum, and
  - Provides a safety net for initial auction failures
- **Valuation:** Different dynamics for secondary markets
  - Spectrum holder will need to generate profits from leasing
  - MVNO expectation of lower cost for spectrum inputs
  - Spectrum holder may perceive “private value” of foreclosing competition
Administered Incentive Pricing (AIP)

- An indirect costing regime
- Notable proponent is the UK’s Ofcom
- Based on opportunity cost assessment
- Designed to act as a proxy for market forces
- Embodied in regulatory fees paid by essentially all users, including gov't. entities
- Incentive is to induce holders to release spectrum in order to reduce fees.
Valuation: An Inexact Science

• **The reality**: spectrum valuation is kinetic, not static
  - “Intrinsic” variables are innate in the spectrum band:
    • Propagation characteristics
    • Manufacturing focus on the band
    • Degree of global harmonization
  - “Extrinsic” factors – depend on the specific market
    • Physical characteristics: topography, geographic isolation, climate, etc.
    • Socio-economic characteristics: demographics, population density, economic growth
  - General legal and political framework
    • The overall political, regulatory and business environments
  - Spectrum management and telecom regulatory regime
    • Market structure
    • Competition policy
    • Competitive bidding rules
    • Technology neutrality or service restrictions
Regulatory Factors

• Regulations applying to spectrum use
  – Spectrum caps
  – Service & network neutrality
  – License renewal periods and processes

• Market structure and competition policy
  – How many operators granted licenses
  – Roaming rules
  – Secondary markets – leasing, resale, disaggregation

• Bidding rules and processes
  – Bidding discounts or set-asides
  – Transparency & Accountability
Non-Commodity Viewpoints

• Unlicensed uses
  – WiFi – an unlicensed success story
  – Determining the value of unlicensed spectrum

• Public safety, public service and government uses – they have economic value, too
  – Public safety – a “third rail” for spectrum pricing
  – How do taxpayers “bid” for spectrum
  – The tightening space for government spectrum uses

Fees and Auction Revenues: Government Rent-taking or Legit Recovery of National Asset Value?
Case Study: India

- 2010 3G and BWA auctions
- DOT expected USD 8 billion in revenues; auctions raised nearly USD 23 billion
- Held two sequential auctions
- BSNL & MTNL required to pay highest private bid for licenses received pre-auction
- Other licenses awarded in multiple-round simultaneous bid auctions
- High bids raised concerns of overbidding and under-capitalization
Case Study: New Zealand

- Policies for renewing fixed-term licenses
- Determination: Incumbents could renew by paying a market-oriented renewal fee, or relinquish spectrum
- Two approaches used to determine market-oriented fee:
  - TV and radio broadcasting – An income approach, based on past and forecasted revenues
  - Cellular – *Optimal Deprival Valuation* approach estimated the cost of modifying the incumbent network to maintain a given level of service following a marginal reduction in spectrum rights.
- Both TNZ and Vodafone accepted the renewal price offer
Issues To Discuss

• What situations call for non-commodity-based distribution of spectrum access?
• How can we broaden consideration of spectrum’s economic value in the context of unlicensed, public safety and government uses?
• Are current economic models for spectrum valuation sufficiently robust to avoid undervaluing or overbidding?
• Do potential bidders have sufficient information on spectrum opportunities to engage in competitive bidding effectively?
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