Exploring the Economic Valuation and Social Value of Spectrum

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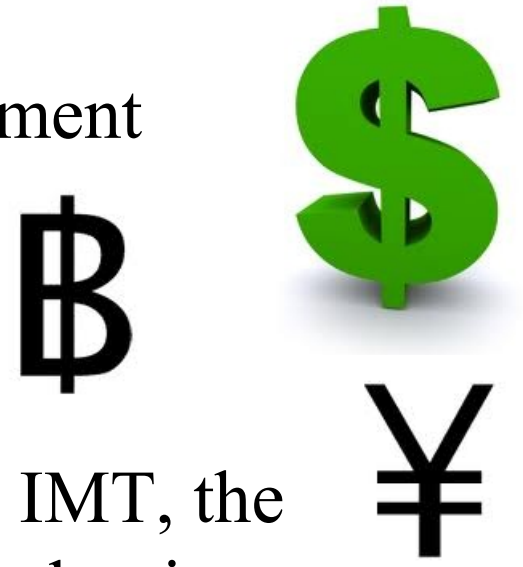
Introduction

- 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 is now a well-established track record for competitive bidding for commercial spectrum
  - To promote most efficient use
  - To raise revenues for government

Valuing Spectrum

- Market Valuation is used for several purposes:
  - Regulatory fees (initial and recurring)
  - Competitive bidding (auctions and tenders)

- 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)
- Direct v. Indirect Valuations
  - Direct – An amount paid or offered for a spectrum block at auction or in spectrum trading
  - Indirect (proxy) – Determining what a spectrum block might be worth without ever actually putting it on the market (e.g., AIP)

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

Valuation: An Inexact Science

- **The reality**: spectrum valuation is not static, but varies:
  - Over time
  - In different geographic areas
  - Depending on the amount of spectrum already on the market
  - Depending on the political, regulatory and business environments
  - Depending on the rules for the auction or competitive bidding
  - Depending on the technology that will employ the spectrum
- Basic decisions can **affect valuation**:
  - How many licenses will be offered
  - How many bidders will be pre-qualified
  - Will licenses be encumbered with technical rules or "technology neutral"

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

Auctions: A Basic Taxonomy

- Closed, single-round tenders
- Open, multiple-round bidding
  - Open, ascending-bid auctions
  - Simultaneous, multiple-round ascending-bid auctions
- Hybrid and innovative approaches
  - English/Dutch hybrid
  - Incentive auctions
  - "EBay" or dynamic models

Auctions: Some Things To Consider

- Setting Bidding Thresholds
- Transparency and Accountability
- Heading off Signaling & Other Anomalies
- **Irrational Exuberance**

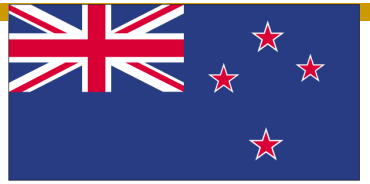
Secondary Trading

- 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
- The practice: An immature market and continuing tendencies for spectrum warehousing
- Governments are exploring ways to liven up the nascent secondary markets

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

Telecom

vodafone

Case Study: Germany

- Mass Auction of 359 MHz of Spectrum
- Four bands were put up for sale
- In the 800 MHz band only three licenses were offered – leaving one incumbent out.
- Auctions netted only EUR 4.4 billion out of an expected EUR 6-8 billion
- E-Plus was the operator left out in 800 MHz, but the auction raised more than the other bands on sale (1800 MHz, 2 GHz, and 2.6 GHz).

Spectrum Pricing Checklist - 1

- **Assess and weight each national goal to be achieved via a spectrum distribution**
  - *National Goals for spectrum distribution may include:*
    - Efficient and productive usage of the spectrum resource
    - Rapid and effective introduction of a new wireless technology
    - Development of wireless service in remote, rural or low-income areas (i.e., universal access)
    - Protection or promotion of social welfare and/or public service
    - Government revenue generation

Spectrum Pricing Checklist - 2

- **Determine the value of spectrum**
  - *Steps/Factors to Consider*
    - Assess the market (i.e., how many licenses to distribute, how much demand is there from operators, etc.)
    - Assess non-economic market factors (i.e., geographical, political, regulatory, competition policy etc.)
    - Use administered pricing approaches to set a potential price floor or expected bid level
- **Consider Non-Commodity Approaches**
  - *Steps/Factors to Consider*
    - Consider whether an unlicensed approach provides greater economic returns
    - Consider whether a non-commercial use such as promoting the development of public safety networks, would be desirable

Spectrum Pricing Checklist - 3

- **Determine assignment method – auction, administered pricing or no-fee distribution**
  - *Steps/Factors to Consider:*
  - Assess distribution approaches to determine which is appropriate
  - For administrative pricing approach, consider criteria to use
    - Consider setting prices based solely on underlying regulatory costs (i.e., regulatory fees)
    - Consider use of incentive pricing to promote efficient use

Designing An Auction - 1

- **Setting the stage**
  - Draft rules for use of the spectrum (license parameters, technology neutrality)
  - Set license terms and conditions (regulatory fees, term limits, renewal criteria)
  - Set auction rules
    - Consider spectrum distribution goals
    - Consider steps to curb collusive behavior
  - **Best Practice**: Seek public input and promote transparency of rule setting
- **Spreading the word**
  - Draft prospectus materials covering full range of spectrum and market environments
  - Conduct operator outreach activities such as road shows, visits and responses to queries
  - **Best Practice**: Continue emphasis on transparency, openness and responsiveness

Designing An Auction - 2

- **Pre-qualification**
  - Establish bidder criteria in a clear and open manner
  - Publish pre-qualification criteria as part of the solicitation of bids.
  - **Best Practice**: After the solicitation of bids is sent out, pre-qualification criteria should not be altered
  - **Cautionary Note**: Any failure to adhere scrupulously to published, transparent pre-qualification criteria will undermine the auction's credibility

Designing An Auction - 3

- **Auction infrastructure and procedures**
  - Employ neutral, professional auction specialists to design and operate the auction
  - Design and installation of auction software and hardware is vital to the integrity and effectiveness of the auction.
  - Develop security and cyber-security of the auction facilities
    - This is of paramount importance
  - Develop contingency and troubleshooting plans
  - **Best Practice**: Test end-to-end auction procedures, systems, and technologies used prior to the actual auction

Designing An Auction - 4

- **Follow-up policies and rules**
  - Formulate and publish policies and rules for payments (including any installment payment plans) well in advance
  - Determine and publish penalties and policies for auction payment defaults
  - Set re-auction timing in case of payment or other default
  - Monitor and follow-up on rules requiring network build-out milestones, etc.

Issues To Discuss

- Will non-profit/non-commercial users be able to keep pace in a commoditized spectrum market?
- 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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