Spectrum Valuation – Economic Analysis Methodologies

September 21, 2010

Delivered to

Industry Canada

Prepared by

Nordicity and Network Strategies

Outline

- Nordicity & Network Strategies
- Presentation Team
- Background: Context & Go forward
- ODV
- Income
- Q&A

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NETWORK STRATEGIES

Nordicity/Network Strategies Economic Methodologies for valuing Canadian Satellite Spectrum

Nordicity – Strategy, Policy, and Economic Analysis in Media and Telecom

- Nordicity – established in 1979, merged with PricewaterhouseCoopers in 1997, spun off again in 2002
- Ottawa-based with strong regulatory and policy expertise, and grew market and business strategy and economic analysis
- Expertise in spectrum auctions, spectrum management/planning, spectrum valuation, and new entrant start-up support
- Experience in technical and business modeling with wireless incumbents & new entrants
- Offices in Toronto, London (UK), and Ottawa

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Network Strategies – a complete strategic consultancy service to the telecoms industry

- Established in 1997
- Offices in New Zealand, Australia and the UK
- Strengths in quantitative & qualitative analysis, supporting ICT policy & strategy development
- Expertise in radiocomms & economic analysis providing a comprehensive spectrum advisory service for policy makers, regulators & telecoms operators
- Extensive experience in business planning and spectrum valuation for operators and new entrants
- Strong focus on the Asia-Pacific region & Europe.

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Presentation Team: Nordicity/Network Strategies
Economic Methodologies for valuing Canadian Satellite Spectrum

- From our original satellite fees project team, we have
  - Jan Skora, MD of his own consulting firm and ex. DG Spectrum at IC;
  - Noelle Jones, Principal Consultant, Network Strategies, Australia;
  - Dustin Chodorowicz, Partner Nordicity UK & our specialist in economic and financial analysis,
  - Kurt Eby, Ottawa office & Manager Research, and
  - myself, Stuart Jack, partner, Nordicity Ottawa, project director for the Satellite Fees project

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Context & Objectives of Today's Presentation :

- The objective of today's presentation is to provide context to our work in the Satellite Fees project.
  - We'll discuss both economic methodology, advantages & limitations but also the policy & operational context of its development & application in global jurisdictions.
  - Jan will provide a perspective on the development of economic methodologies within IC in support of operations and policy
  - Noelle & Dustin will provide a synopsis on the ODV & Income approaches respectively applied in the Spectrum Fees study. For each approach, they'll provide the advantages & limitations, examples of use, and perspective.
  - While we won't have time to provide a similar perspective on the Benchmarking approach –under Kurt's lead we'll take questions on its application in the Q&A
- Q&A: Focus on options for NRAs on the use of economic methodologies in satellite & terrestrial spectrum with +/- of each

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Historical Perspective: Industry Canada's spectrum fees and the role of economic analysis

- Perspective on the development of economic methodologies within IC in support of operations and policy

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Using optimised deprival value for spectrum pricing

Noelle Jones, Principal Consultant

Presentation for Industry Canada
September 21, 2010

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Deprival methods are cost-based valuation approaches

If the operator was deprived of a portion of spectrum what costs would be incurred to maintain the quantity and quality of services to its customers?

- Incremental ODV calculates the difference in network and operational costs arising through deprival of a given quantity of spectrum

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Key concepts within ODV

- Costs based on modern equivalent assets (MEA)
- Optimisation of assets
  - configured in the most efficient way
- If MEA costs are higher than the costs of meeting customers' requirements by other means, then the economic value should be based on the NPV of charges that customers pay for an equivalent service using the least cost practical solution

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ODV assesses the costs that the provider avoids if holding the spectrum in question

- No consideration of future revenues
  - assumes that the revenues are the same both before and after deprival
- ODV does not take into account all the assets a new entrant would require to operate

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Implicit incremental ODV assumptions [1]

- Spectrum rights are freely tradable and usable in small units
- No market entry or exit barriers
- Market has many participants, who are willing, non-anxious buyers and sellers
- No participant has market power
- No information asymmetries

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Implicit incremental ODV assumptions [2]

- Above a minimum amount of spectrum, network configuration and spectrum are substitutable
  - hence the amount of spectrum (above the minimum) does not affect revenues
- The modelled technology is the highest value use of the spectrum in question
- Buyers and sellers are profit maximisers
  - spectrum used and traded to maximise profits

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Selection of an increment for satellites was not straightforward

- Two options:
  1. shift services to another spectrum band – generally not feasible
  2. shift services to another satellite – does not represent substitution of spectrum by network configuration
- Key ODV assumption does not hold
  - deprival of a portion of spectrum can prevent the operator from offering an equivalent quality service
- The methodology we used was therefore not true ODV, but illustrative of the process of ODV modelling

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ODV seeks to model an efficient operator

- A hypothetical efficient operator has a limited amount of spare network capacity
  - for terrestrial infrastructure it is straightforward to upgrade the network
- Satellite capacity is fixed for its lifetime
  - significant spare capacity in its early years
  - may be fully loaded towards the end of its lifetime

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Difficult to create a “generic” satellite operator

- Characteristics of the individual satellites differed markedly
- Certain assumptions had a significant effect on the costs of deprival
  - nature of the services offered on the satellite
  - transition costs – who pays?
  - number of sites affected by deprival

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Spectrum Valuation:

Overview of Income Approach Valuation Methodology

September 21, 2010

Presentation to:

Industry Canada

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Outline

- Background: Income approach valuation
- Key attributes
- Economic theory
- Methodology
- Implementation issues
- Summary

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Background: Income approach valuation

- Commonly used method for ***estimating*** the market value of a real/financial asset
- Essentially forecasts the net cash revenue generated by:
  - real asset, financial asset, business opportunity
- Estimates intrinsic value
  - this becomes the basis for the valuation realized in a market transaction
- Can be applied to spectrum *assets* or licences
- Used by broadcasting regulators in the UK and New Zealand to estimate the market value of spectrum asset/licence and set licence renewal prices

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Key attributes

- Value of an asset – such as spectrum – is a function of the discounted cash flow (DCF) generated by the asset
- Forward-looking
- Takes into account the cost of capital: i.e., investors' required rate of return
- Mimics the investment decision-making process of spectrum-auction bidders
- Underpinned by economic theory
- Provides an estimate of *economic profit* as opposed to accounting profit

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Economic theory

- Estimate of the net present value (NPV) generated by the asset = ***economic profit***
- The market protection offered by spectrum licence limits competition (to some degree)
  - Perfect competition: economic profit = 0
  - Imperfect competition: economic profit > 0
- ***Economic rent:*** Economic profit = *f*(input factor)
- Where the input factor limiting competition is a spectrum licence:
  - Economic rent = market-based spectrum licence fee

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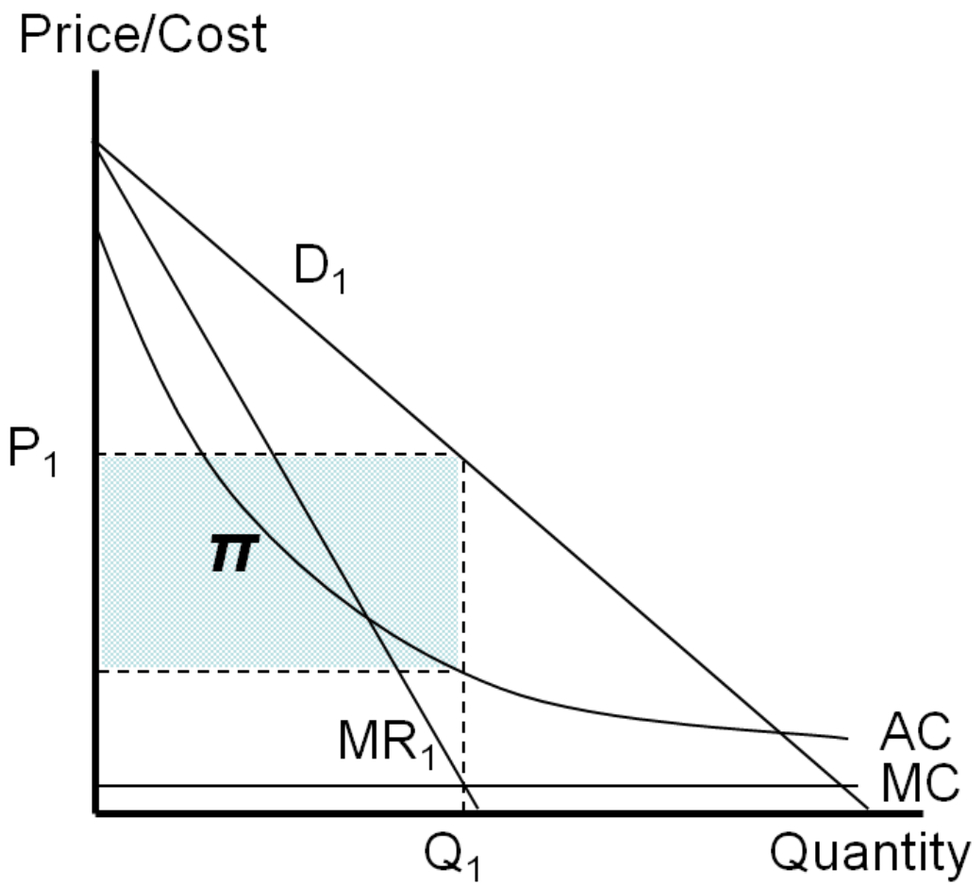
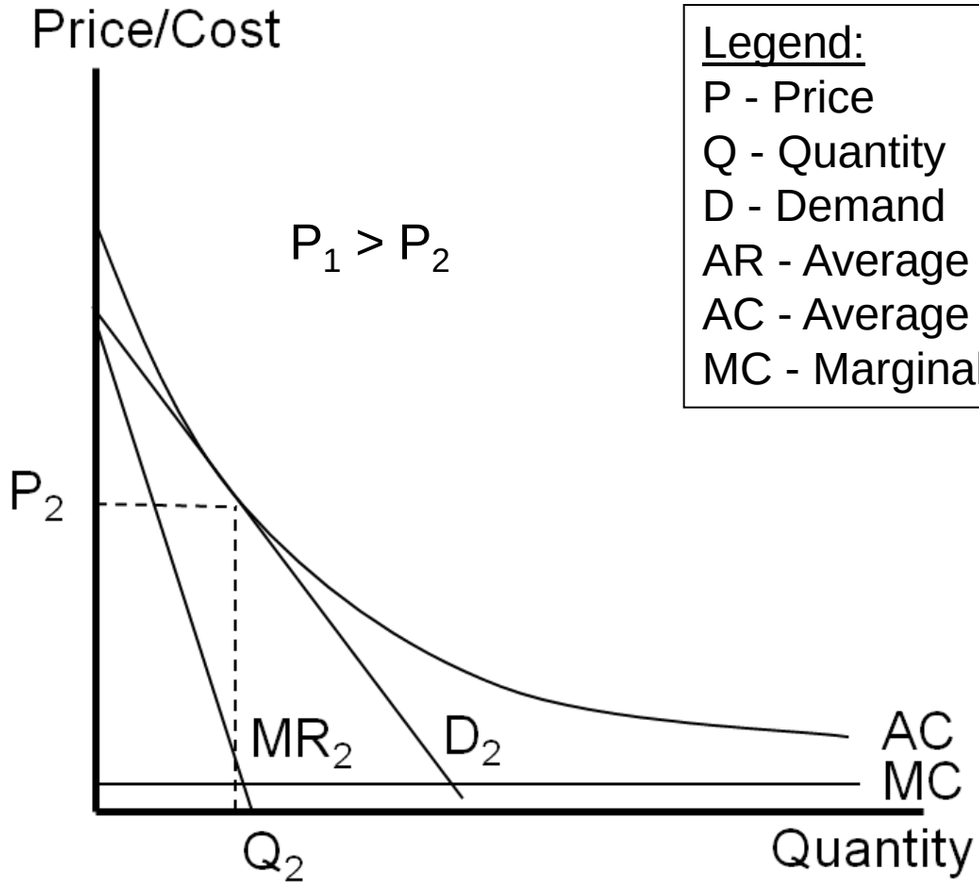
Economic theory (cont'd)

With market protection



Without market protection



Legend:
P - Price
Q - Quantity
D - Demand
AR - Average revenue
AC - Average cost
MC - Marginal cost

π = economic profit = economic rent

No economic rent

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Methodology

Upfront capital investment

Forecast of free cash flows (FCF)

Terminal value

Cost of capital

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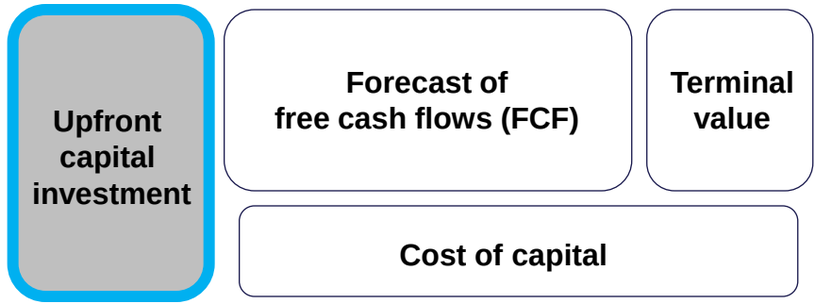
Methodology:
Upfront capital investment



- Most businesses or assets involve some type of upfront capital investment
- Sunk cost of network buildout or launch marketing
- Very important in wireless telecom markets, including satellite market
  - satellite operators must build, launch and insure satellites (approx. $350 million)

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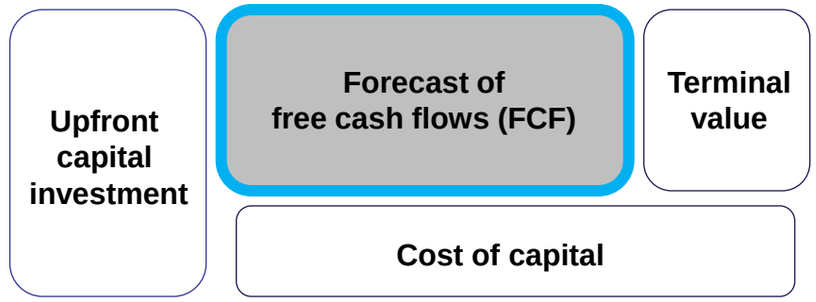
Methodology:
Forecast of free cash flow



- Core of valuation model; can be quite detailed
- Licence term: 15-year forecast for satellite business

$$FCF = OCR - OCC - O\text{-}CAPEX + \Delta WC$$

- Annual forecasts of operating *cash* revenues (OCR), operating *cash* costs (OCC), ongoing capital expenditures (O-CAPEX) and changes in working capital (ΔWC)
- OCR = *f*(average pricing, no. of subscribers/transponders)
- OCC = *f*(EBITDA* margins)
- O-CAPEX (satellite) = 0; O-CAPEX (cellular) > 0

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* Earnings before interest, taxes, depreciation and amortization

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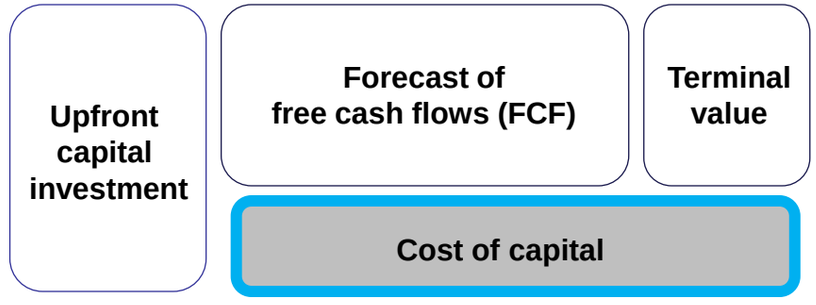
Methodology: Cost of capital



- Weighted average cost of capital (WACC)
- Cost of debt (*r*)
  - Based on bond yields (not coupon rate)
- Cost of equity (*k*)
  - Required rate of return
  - Not directly observable; needs to be modelled using capital asset pricing model
- *r* and *k* weighted by industry-average capital structure

WACC = r×(debt share) + k×(equity* share)

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* Market value of equity

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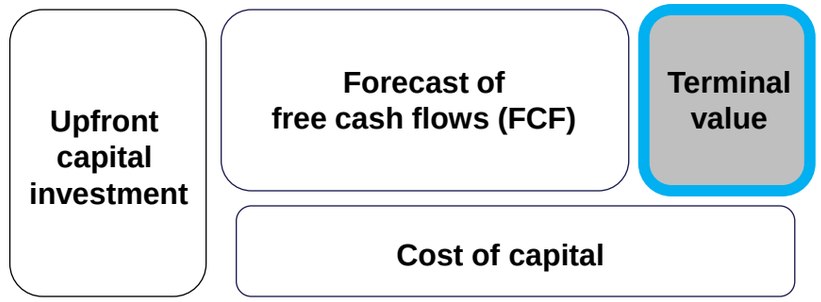
Methodology: Terminal value



- Can have substantial bearing on overall valuation
- Value in final forecast year of FCF beyond licence term
- Constant growth rate (*g*)
- Value that asset/licence can be sold at in the future
- Renewal terms can have a bearing
- Canadian satellite licences have high likelihood of renewal but licensee must reinvest in new satellite
- Cellular spectrum: very high terminal value

$$\text{Terminal value} = \frac{FCF_{T+1}}{WACC - g}$$

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Implementation issues

- Data availability
- Knowledge of licensee's/bidder's business plan
- Can 100% of NPV (economic profit) be attributed to market protection (i.e., spectrum asset/licence)?
  - Are other inputs priced below market, too? E.g., trademarks
  - In spectrum auction, winning bid equals valuation of runner up (+ bid increment)
- NPV results very sensitive to assumptions, particularly upfront capital expenditures and cost of capital
- Analyst must conduct sensitivity analysis

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Summary Income Approach

- Income valuation approach can be applied to any income-generating asset, including spectrum *assets* or licences
- Has been used by other spectrum regulators
- Mimics business decision-making process of investors or spectrum-auction bidders
- Assumes that all or most of economic profit is due to market protection offered by spectrum licence
- Requires considerable industry data; a multi-year forecast; very sensitive to certain assumptions
- Can be applied to all spectrum markets, but is most reliable for stable-growth markets with fixed licence terms

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Benchmarking

- Market-based transactions (auctions, corporate transactions) are often used as benchmarking data for a valuation of spectrum on a per-pop-MHz basis.
- With available data, the benchmarking analysis can seem straightforward to implement.
- Not all transactions are directly comparable
  - the drivers of spectrum valuation vary from jurisdiction to jurisdiction and through time and spectrum type (satellite vs. terrestrial)
- Analysts must also collect related market data (e.g. competition, economic conditions, duration of licence, regulatory goals) and develop a (econometric) model to control for the effect of these other factors.
- Becomes a very data-intensive exercise

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Question & Answer

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