Access regulation and investment in Next Generation Networks – a ranking of regulatory regimes

Facilitating the roll-out of Next Generation Access Networks

London 22 April 2009

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Introduction (I)

Telecommunication industry is in the midst of a disruptive technological development

• Next generation networks (NGN) allow data transmission speeds to increase from the current 16 Mbit/s to – at least – 100 Mbit/s
• Enable new applications and potential benefits to consumers
  – higher bandwidth allowing IPTV, HDTV
  – interactive gaming and TV
  – higher capacity than copper based access
• However, uncertainty whether consumers are actually willing to pay for new services

Debate as how to regulate access to next generation networks

• Relatively slow NGA take-up in Europe
• Incumbents cite tight or uncertain regulatory regimes as barriers to investment
• Entrants seem to consider the existing regulatory regime appropriate for NGA
• Regulators have to balance (ex-ante) investment incentives and (ex-post) access / competition
Introduction (II)

Practical approaches to NGA regulation (examples)

• Existing regulatory regime
  − practically, often based on long-run incremental cost regulation (LRIC)

• Risk premium

• Risk sharing
  − Deutsche Telekom (and others) proposition

• Regulatory holiday (fibre to the cabinet)
  − Ofcom consultation, Proposed variation to BT’s Undertakings under the Enterprise Act 2002, 2009

Question

• What is the relative performance of different regulatory approaches?
• While many suggested approaches to NGA regulation may stimulate investments, do they benefit consumers?
Introduction (III)

Purpose of this presentation

• Introducing the main elements of a quantitative equilibrium model, incorporating
  - uncertainty about NGA market success
  - (ex ante) investment incentives
  - (ex post) access / competition conditions
  - different regulatory regimes in a consistent single framework

• Based on independent research undertaken by ESMT CA (EEA conference paper)

• Presenting numerical solutions to the model
  - illustrating outcomes of the model
  - no ultimate recommendation for a specific regulatory regime, further robustness checks necessary

• Suggesting directions for further investigations
Structure

The model and regulatory regimes

Results

Extensions and refinements

Summary and conclusions
Main elements to model effects of different regulatory regimes

**Investment incentives**
- Investment decision (e.g. by the incumbent)

**Risk**
- NGA success
- NGA failure

**Access Regulation**
- **NGA success:**
  - Competitive intensity
  - Investment cost recovery via wholesale price
- **NGA failure:**
  - Competitive intensity
  - Investment cost recovery via wholesale price

Consumer surplus as a function of *both* investments *and* access regulation
**Long-Run-Incremental-Cost (LRIC) regulation as the benchmark case**

### Investment incentives

- **NGA success:** Entrant gets access at costs
- **NGA failure:** Entrant chooses no access

### Risk

- **NGA success**
- **NGA failure**

### Access Regulation

- **NGA success:**
  - Entrant gets access at costs
  - Incumbent recovers investment costs via (increased) wholesale price
- **NGA failure:**
  - Entrant chooses no access
  - Incumbent can’t increase the wholesale price, no cost recovery

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*Consumer surplus as a function of both investments and access regulation*
**Alternative #1: Fully Distributed Cost (FDC) regulation**

**Investment incentives**
- Investment decision (e.g. by the incumbent)

**Risk**
- NGA success
- NGA failure

**Access Regulation**
- **NGA success:**
  - Entrant gets access at costs
  - Incumbent recovers investment costs via (increased) wholesale price
- **NGA failure:**
  - Entrant gets access at costs
  - Incumbent recovers investment costs via (increased) wholesale price

**Consumer surplus as a function of both investments and access regulation**
Alternative #2: Regulatory Holiday

**Investment incentives**

- Investment decision (e.g. by the incumbent)

**Risk**

- NGA success
- NGA failure

**Access Regulation**

**NGA success:**
- Entrant does **not get access**
- Incumbent does not recover investment costs via (increased) wholesale price

**NGA failure:**
- Entrant does not get access
- Incumbent can’t increase the wholesale price, no cost recovery

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**Consumer surplus as a function of both investments and access regulation**
Alternative #3: Risk Premium

**Investment incentives**
- Investment decision (e.g. by the incumbent)

**Risk**
- NGA success
- NGA failure

**Access Regulation**
- **NGA success:**
  - Entrant gets access at costs + premium
  - Incumbent does not recover investment costs via (increased) wholesale price
- **NGA failure:**
  - Entrant chooses no access
  - Incumbent can’t increase the wholesale price, no cost recovery

Consumer surplus as a function of *both* investments *and* access regulation
Alternative #4: Risk Sharing

Investment incentives:
Incumbents and entrants agree ex-ante how to share costs and benefits from the investment.

Risk:
- NGA success
- NGA failure

Access Regulation:
- NGA success:
  - First to win a retail customer uses NGA
  - No wholesale price arrangements, no investment cost recovery
- NGA failure:
  - First to win a retail customer uses NGA
  - No wholesale price arrangements, no investment cost recovery

Consumer surplus as a function of both investments and access regulation
Mathematical implementation

- Two players
  - investor (incumbent)
  - access seeker (entrant)
- Both firms have symmetric access to the legacy network
- Two-stage game theoretical framework
  - NGA investment stage
  - Cournot retail competition, given the regulatory setting, the legacy network and NGA (non-)success
- Solution via backward induction
- Formal results and numerical results via Mathematica
  (robust over the plausible parameter range, caveats apply for risk-premium case)
Structure

The model and regulatory regimes

Results

Extensions and refinements

Summary and conclusions
Investments are stimulated by all regulatory alternatives

- **Fully distributed costs (FDC)** stimulate investments
  - lower risk of stranded assets
  - ex-post cost recovery via wholesale price softens competition and increases returns on investment

- **Holiday**: in the case of success, access asymmetry as disadvantage for the entrant, incumbent has incentive to invest

- **Risk sharing** stimulates investments
  - investment costs and risks are shared
  - *but* no ex-post cost recovery via wholesale price intensifies competition and decreases returns on investment somewhat

- **Risk premium** has relatively low (high) leverage if the probability of success is low (high) [example, requires more robustness checks]

Source: ESMT model, parameters: $a = 100$, $c = 20$, $y = 5$, risk premium (1+20%)
Consumer surplus is only increased by some regulatory alternatives

- **Risk sharing** creates the biggest benefit to consumers
  - increased investment (less as under FDC)
  - ex-post access to all participating Parties
  - *no* ex-post investment cost recovery via wholesale price (intensifies competition)

- **Fully distributed costs (FDC)** benefit consumers
  - increased investment
  - ex-post access to all Parties
  - *but* ex-post investment cost recovery via wholesale price (softens competition)

- **Risk premium** also seems to induce asymmetric market structure (to a lesser extent as holiday); if it has any leverage, it may not benefit consumers
  [example, requires more robustness checks]

- **Holiday** induces asymmetric market structure; high NGA investments do not seem to benefit consumers

Source: ESMT model, parameters: $a = 100$, $c = 20$, $y = 5$, risk premium (1+20%)
### Summary of key results – Ranking

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<th>Largest NGA investments</th>
<th>Highest consumer surplus</th>
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<td>LRIC</td>
<td>5</td>
<td>3</td>
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<td>Holiday</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Fully distributed costs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Risk premium (1)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Risk sharing</td>
<td>3</td>
<td>1</td>
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**Notes:**
- All results are valid for success probability being sufficiently small, e.g. smaller than 85%.
- (1) Result and ranking depend on the premium (here + 20%). Further sensitivity checks necessary for validation.
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Extensions and refinements

Extension and refinements (I)

**Risk premium**
- Robustness check with respect to other risk premium cases (optimal risk premium?)

**Incorporate ex-post margin squeeze regulation**
- Current set-up only regards ex-ante regulation
- However, in practice there is an ex-post non margin squeeze obligation
- A non margin squeeze obligation may limit the incumbent’s scope to set low retail prices and to penetrate the market
- Hence, a non margin squeeze obligation affects the incumbent’s investment decision in the first place
- Does a non margin squeeze obligation benefit consumers in the context of investments under uncertainty?

**Risk sharing**
- Current set-up supposes no ex-post wholesale price arrangements
- Explore effects of alternative risk-sharing arrangements
  - wholesale prices according to NGA investment costs
  - wholesale prices freely set by risk-sharing firms
Extension and refinements (II)

More than one entrant

• Current set-up only regards one incumbent and one entrant
• Impact of numerous entrants on investment incentives and competition
• Sufficient number of entrants to sign risk-sharing agreements

Incumbent / entrant asymmetry

• Current set-up only considers asymmetry in terms of investor / non-investor role
• Check results for further asymmetries regarding e.g. market share
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Summary and conclusions
Summary and conclusions

• Currently, little theoretical and empirical evidence of how different regulatory approaches perform, taking into account both ex-ante investment incentives and ex-post access / competition

• NGA regulation should simultaneously consider both aspects, investment incentives and access / competition conditions
  - all regulatory alternatives seem to induce more investment than LRIC
  - however, results derived from the ESMT model suggest that only risk sharing and fully distributed costs may also create higher consumer surplus

• Regulatory alternatives may involve gains for all stakeholders: incumbents, entrants and consumers (model extension required)

• ESMT model offers framework for integrated analysis, further analysis is necessary to gain comprehensive understanding
  - validate robustness
  - allow for extensions
Thank you!

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