

Exclusive Content and the Next Generation Networks

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Why Next Generation Networks (NGNs)?

- There is an upcoming revolution in the telecom industry.
- After 100 years of a stable technological framework based on copper networks, we are in front of a drastic innovation in the industry that will grant consumers with the advantages of optical fiber.
- Fiber based Next Generation Networks (NGN) increase drastically the speed of broadband services (up to more than 100 Mbps).
- NGNs will involve a huge investment effort in telecommunications infrastructure around the world.
- NGNs may change the model/structure of the industry.

Next Generation networks. Long term economic impact

- Potential productivity gains
 - Due to education and also to the increase in the efficiency of production processes (telecommuting, teleconference, outsourcing, etc...)
- Transformation of the health sector
 - NGN will allow for savings on medical expenditures (Spain has the largest number of visits by patients), allowing for increasing the coverage of high quality service, etc.
- Important impact on equality (digital divide)
- Development of digital content industry
 - Spain is a leading country in the digital content industry. In 2008, the industry generated 5.000 millions euros of revenues, 31% more than in 2007.

- The deployment of NGN is very expensive.
 - We assume an average cost of reaching a consumer between (600-1000 euros).
- The investment in NGN will be huge in the next decade around the world (around 250.000 million euros in EU)
- 70% of the total investment is civil infrastructure.
 - This investment is labor intensive, and specially valuable for countries with high unemployment rates (specially in the construction industry)

What Is the Role of Public Administrations/Private Sector in the Deployment of Next Generation Networks

- The first impression is that NGN is an improvement over existing technologies, and if it is efficient to implement them (gains higher than costs), then competition will lead firms to deploy them.
- However, we do not observe too much investment activity on the private sector.
- In fact, the most important investment efforts have been done by (or with the help of) governments and public administrations, but...
 - Public investment has obvious limits due to the cost of public funding and for the fear of crowding out private initiatives.
- Public goods and externalities can explain the interest of the public sector, but they are not enough to explain the passive behavior of the private sector.
- It is key to analyze the determinants for private investment in NGN.

Investment in NGN from a Telecom Company Perspective

- The deployment of NGN is an expensive and risky investment.
 - It reduces drastically the values of its current assets and business model (ADSL, fixed telephony, etc..).
 - The return is uncertain:
 - There is regulatory uncertainty.
 - It is long term investment and most of the applications that add value to it are still in developing process.

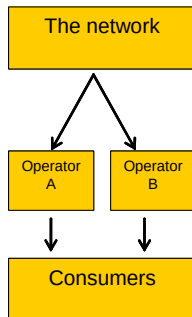
Investment in NGN from a Telecom Company Perspective

- The structure of the telecom industry may change drastically.
 - The NGN is based on IP world and it does not require a centralized network.
 - Important economies of scale but local.
 - Natural monopoly over connected consumers.
 - A small network may be efficient at national or regional level (IP technology).
- The growth of broadband possibilities and the introduction of web services is set to change the business paradigm for every player in the communications value chain.
 - It is unclear who in the production chain (network operators, service operators and providers of contents) is going to get the largest share of the value created.
- Operating NGN. Standard technology without a clear possibility of differentiation.

- Most of the factors that preclude the investment are easy to understand (but difficult to deal with).
- However, the interplay between all the agents of the production chain is not well understood yet.
 - Premium contents shape operators competition which is a determinant of the network profitability.
- This paper tries to shed light over this vertical interaction, and clarify who are going to be the winners and losers of the new NGN industry.
- On the normative side, we ask if competition policy and regulatory tools should affect the access to premium content by operators of NGN?
 - What is the relationship between the accessibility to premium content and the incentives to invest in NGN.
 - How NGNs will affect the accessibility.

Model: Open Network

- An open network that does not operate in the downstream market and gives access in a neutral way to two operators.



- Examples: Australia (NBN Project), Singapur (Next Gen NBN), Asturias (Asturcon), Viena (Blizznet), Pau (PBC), to mention only few of the existing cases and projects with this structure

Model: Operators and content

- Operators will be vertically differentiated as long as only one of them has access to the premium content.
- We take first the market of contents as given, but we parametrize the scope of exclusivity (i.e., regulation may force service operators to share sport broadcasting rights).
- Then, we introduce the content provider as a strategic player that takes two strategic decisions:
 - Whether or not to provide in exclusivity its premium content to an operator
 - Whether or not to keep the pricing control over its premium content (to sell directly to consumers).
- Note that NGN may open the possibility to content providers to sell directly to consumer the premium contents.

- Next generation networks.
 - Brito, Pereira and Vareda (2008, 2009), Nitsche and Wiethaus (2009), Goetz (2009). In contrast to our paper, all of these papers model the industry as a duopoly, where a vertically integrated incumbent competes with a downstream entrant that requires access to the incumbent's network.
- Exclusive contents
 - Armstrong (1999), Weeds (2009)), Hagiu and Lee (2009).
- Papers in telecommunications assuming vertical differentiation, but also vertical integration, are Kotakorpi (2006) and Foros (2003).
- Similar framework but outside of telecoms industry.
 - Retailers are vertically differentiated, Bolton and Bonanno (1988) and Spiegel and Yehezkel (2003).
 - Casadesus et.al.(2010) study how competition between microprocessors (operators) affects the profits of a firm producing operating systems (network). They assume simultaneous price setting.

The model

- There is a continuum of uniformly distributed consumers indexed by $\theta \sim U [0, 1]$.
- They decide about subscribing to the service to one of two operators A and B , offering contents valued v_A and v_B .
- $\lambda = \frac{v_B}{v_A} < 1$, measures the advantage of operator A in term of premium contents.
- Consumer θ obtains surplus

$$v_i \theta - p_i \quad i : A, B$$

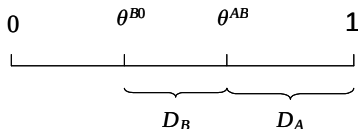
The Demand/Penetration

- The indifferent consumer (normalizing $v_A = 1$) between subscribing to A and B , is given by $\bar{a}$

$$\theta^{AB} = \frac{p_A - p_B}{(1 - \lambda)}$$

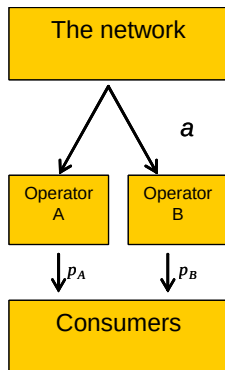
- The indifferent consumer between subscribing to B and not subscribing to any of them, is given by

$$\theta^{B0} = \frac{p_B}{\lambda}.$$



Operator Profits and the Network

- Operators need access to an open and neutral network infrastructure that sets them an access fee per subscriber a .



- The network charges the fee in a non-discriminatory way. Profits of the operators are given by $\pi_i = (p_i - a) D_i \quad i : A, B$.

- Marginal cost of the network is zero, a fixed cost $F \sim G(F)$ to deploy the infrastructure.
- Penetration (demand) for the network is the sum of the demands for both operators. Profits (gross of F) of the network are

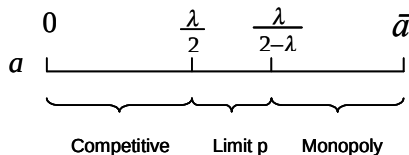
$$\Pi = a(D_A + D_B)$$

- We assume that the probability of deployment is measured by $G(\Pi)$.

- The timing of the game is the following:
 - 1 The network decides about deployment and sets a .
 - 2 Operators compete in prices and consumers take subscription decisions.

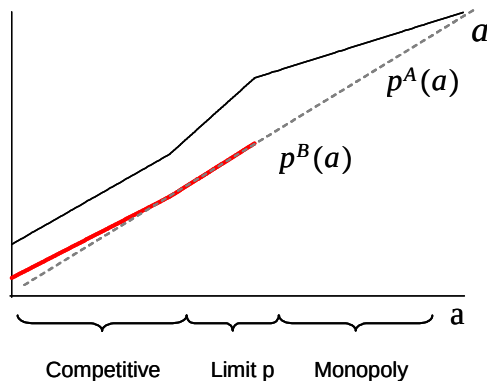
Price services equilibrium

- a determines the price services equilibrium $(p_A^*(a), p_B^*(a))$ and the operators market structure



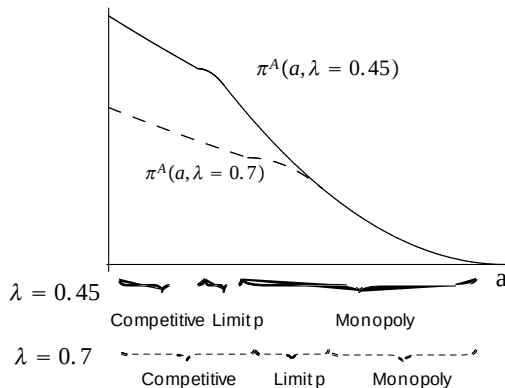
- If $a < \frac{\lambda}{2}$ (Competitive Regime), both firms get positive profits.
- If $\frac{\lambda}{2} \leq a \leq \frac{\lambda}{2-\lambda}$ (Limit Pricing Regime), operator B set price equal to marginal cost, does not get a positive demand, but exerts a competitive pressure over A .
- if $a > \frac{\lambda}{2-\lambda}$ (Monopoly Regime) A operates as a monopoly.

Price services equilibrium



- An increase of the marginal cost leads to a larger comparative advantage of firm A.

Operator A profits



- The regime depends on λ . Larger λ leads to a wider set for the competitive regime.

The network problem

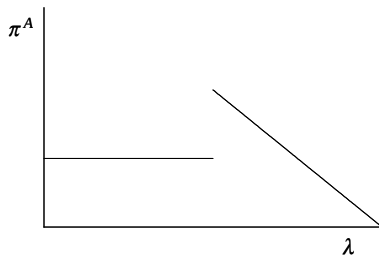
- The network faces a trade-off: it may set a low fee to induce competition and large penetration or a high fee that will lead to a monopoly market.
- *The network sets the following access fee*

$$a = \begin{cases} \frac{1}{2} & \lambda < \frac{1}{2} \\ \frac{1}{2}\lambda & \lambda \geq \frac{1}{2} \end{cases}.$$

- Proposition 1: *The probability of deployment is increasing in λ*

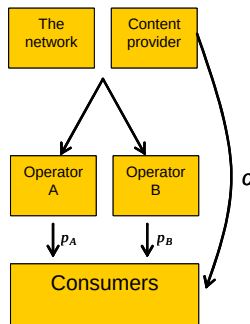
Exogenous market of contents: results

- Proposition 2: *Penetration, consumer surplus and total welfare are weakly increasing in λ*
- *Profits of the operator A are given by*



- There is room for a Pareto improvement (by avoiding double marginalization)

A strategic content provider



- The difference in the set of premium contents that generates differentiation is controlled by content provider.
- The content provider may negotiate "affiliation" (exclusivity) with operator A that should pay a fixed fee for it.
- The content provider may set the price that subscribers have to paid for the content, c . Then subscribers to operator A pay $p_a = p_A + c$.

Exclusivity versus non exclusivity

- If content provider can not charge directly to consumers, and operators pay for content exclusivity a fixed fee, exclusivity is the equilibrium outcome for any λ (Armstrong(1999)).
- If content provider retains the pricing control of the content, non exclusivity may be an equilibrium outcome.
- Welfare analysis (ongoing research): imposing non exclusivity, when exclusivity is the equilibrium outcome, may lead to a loss for every agent: "triple marginalization better than double marginalization"

Implications for the industry

- The profits of the content provider are always larger when it can set a positive variable fee, c , for the premium content.
- If the content provider can set prices directly to consumers, the content provider will do ($c > 0$): **NGNs will impulse non exclusivity!**
- Under non exclusivity there is no differentiation between operators then, their profits tend to zero.
- Service operators should find the way to get differentiation (very high risk of Bertrand trap).
- Profitability of the network is uncertain: it is likely to be closer to the corresponding to the long term infrastructure (as highways) than to the traditional telecoms.

Implications for the industry

- NGNs imply a technological change/revolution
- As in every technological revolution there will be winners and losers:
content providers are clear winners
- Only those firms which adapt to the new world will be successful
- A deep change in the firms' business model is called for if they want to continue being successful
- Government and regulators must facilitate this process
- We should avoid defend and maintain a model that is obsolete

- We can be in a situation in which the Industry by itself may not have incentives to make an efficient investment.
 - The total surplus may be larger than the cost, but private appropriation of this surplus for the telecom operators is limited (new business model, depreciation of current assets, and externalities)
- In Spain the situation can be worst for the position of the incumbent.
 - Very high market share, prices and profits in ADLS.
 - The incumbent if not willing to, but it has to...it has a large competitive advantage (easy to deter potential entrants).

What the public sector could do?

- Invest directly in NGN?
- Concessions/PPP
 - has infrastructure competition sense in NGN world?
- Provide a clear and long term regulatory rules:
- Our proposal: Structural separated / Open and Neutral Network.
 - Incentives to create Neutral operators. Interesting for attracting the construction firms in Spain.
 - We need NGN but also the creation of employment!!