

Network Competition and Net Neutrality Regulation in the Age of Digital Convergence

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October 2011

Abstract

Since its inception the Internet has been categorized by its *net neutrality* (NN), i.e. there has been *non-price discrimination* of transmitting packets based on the identity of the transmitter or receiver, application or type of content. Networks have been converging in such a way that each one offers all types of services (Voice, TV and Internet), and content providers (e.g. Google, Yahoo, YouTube) have been increasingly using networks to distribute their contents pushing Next Generation Networks (NGNs) to make significant investments that have to be financed. In the absence of regulation, NGNs might break the NN considering a multiplicity of discriminatory pricing schemes to increase revenues and allegedly finance the new investments. Though, allowing for discrimination may bring social perverse effects.

This paper proposes a two-stage regulatory guide using both competition policy and net neutrality regulation with the goal to boost the digital convergence process while minimizing the discrimination perverse effects. First, NN should be preserved to maximize network effects. In order to spur and finance the convergence investments under NN, the regulator may use competition policy: i) imposing the incumbent to open the network to entrant operators and, ii) setting the access price such that it increases (decreases) in incumbent's (entrant's) investment in the network. iii) If two networks co-exist the regulator may impose a cost-sharing rule, i.e., operators pay an access price proportional do the investment made by the competitor. Second, if competition policy is insufficient to generate the socially optimal investment, i) the regulator should set a minimum quality standard and ii) allow for NN departure.

Keywords: Digital Convergence, Competition, Innovation, Investments, Net Neutrality, Networks.

JEL Classification: L1, L4, L51, L52, L96.

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1. INTRODUCTION

Background and motivation. Nowadays, telecommunications, internet and TV services tend to converge in such a way that each one supplies all types of services (voice, TV, internet) and this is associated with IP-based networks and broadband access. The process of digital convergence has been putting all these networks growing together. For instance, the plain old telephone networks have accommodated the internet and TV services in order to be converging. Another example is the cable TV networks that have accommodated the internet and telephone services. Additionally, a number of new services common to all these networks have been appearing.

Shy (2000) and Wang (2010) defend the idea that digital convergence is pro-competitive since the different networks that were monopolies at the beginning are now offering similar services, and thus networks are now competing directly with each other and ultimately improving the social welfare. The digital convergence process increases networks competition while reduces the bargaining power of the individual networks against end-users. It also provides less incentive to exclude content providers. However, digital convergence is associated with large investments to accommodate all the quality of service requirements, and networks have to finance those investments.

Generically, converging networks have the following three possibilities regarding the quality of their services.

i) The network quality may be improved so that the requirements of all services are met simultaneously – this is the goal of Next Generation Networks (NGNs). Note that this possibility is compatible with net neutrality, i.e., does not imply discrimination of transmitting packets based on the identity of the transmitter or receiver, application or type of content. Although, if net neutrality is imposed by regulators there will be no room for network differentiation and networks will be essentially homogeneous, offering similar services. Therefore, competition among networks will be fierce creating difficulties in obtaining the funds required to invest and achieve full digital convergence. Networks would like to relax net neutrality in order to lessen competition. That is, by reducing net neutrality they can use discrimination and differentiate network services from each other via content and thus increase revenues.

ii) Another option, if allowed by regulators, would be the quality of services within each network to be differentiated, i.e. to prioritize the contents of the content providers that pay more per bit transported.¹ Though, in this case the net neutrality will be jeopardized; since the offer of different qualities of service will push some content providers to the “slow lane” of content distribution. The differentiation in terms of network service quality can be used to reduce competition allowing networks to achieve higher revenue levels that could finance the

¹ Comcast is one of the major communication networks in the US and have argued that they do not have enough capacity in place and thus the heavy content providers should pay more for network access.

investments required by digital convergence but that could also simply be redistributed among shareholders.

ii) Networks also have the (uninteresting) option to present a low service quality of lower cost and likely not satisfying the service requirements of some of the content providers. Though, this option would possibly dictate the end of the network being beaten by competitors.

Below are summarized the arguments pro and con of net-neutrality in what concerns networks charging differentiated prices to content providers.

The argument against net neutrality is frequently uttered by Internet Service Providers (ISPs).² Consider a content provider *CP* that is a source of video streams and requires a large bandwidth. The ISP may argue that to accommodate the traffic originating from *CP* he must make significant investments in the network, which he may not be able to recover from the end-users who buy access directly from the ISP. Nevertheless, *CP* makes additional advertising revenues when end-users consume new high-bandwidth services, which justify the investments. If ISPs cannot price discriminate in order to get a share of *CP*'s additional revenues, they will not invest as much to increase the network capacity. This situation causes poor network quality, reducing end-users demand, which by its turn leads to further reduction of incentives to invest both to *CP* and ISP.

The arguments in favor of net neutrality are typically claimed by content providers. Suppose that every ISP can charge discretionary the content providers for the right to access its end-users, then the freedom of ISPs to charge content providers would drastically increase.³ In turn, this would reduce the investment incentives for content providers thus lowering content quality.

Economides (2008) argues that a key consequence of net neutrality pricing has been successful content innovation resulting, for example, in Google, Yahoo, Skype, MSN and YouTube as well as a large number of applications developed by start-up companies that do not have their own network facilities. Many companies have been able to innovate at the "edge of the network". These innovations include new techniques of content distribution (e.g. information and entertainment), the distribution and adaptation of applications, and the surge of several new applications such as targeted advertising. Net neutrality has also increased competition among applications and services of content providers that did not need to own a network in order to compete. A departure from net neutrality is likely to increase content prices, which will lessen network effects and hold back innovation.

² Interview with Ed Whitacre, *BusinessWeek* November 7, 2005.

Q. How concerned are you about Internet upstarts like Google (GOOG), MSN, Vonage, and others?

A. How do you think they're going to get to customers? Through a broadband pipe. Cable companies have them. We have them. Now what they would like to do is use my pipes free, but I ain't going to let them do that because we have spent this capital and we have to have a return on it. So there's going to have to be some mechanism for these people who use these pipes to pay for the portion they're using. Why should they be allowed to use my pipes?

The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! (YHOO) or Vonage or anybody to expect to use these pipes [for] free is nuts!

³ Economides (2008) argues in favour of net neutrality and compares price discrimination as "if a telephone company were (...) charge more for phone calls between investment bankers (...) because such phone calls are more likely to generate value than the average phone call."

Economides (2010) also claims that the additional revenues due to price discrimination may only benefit the shareholders instead of being invested in the network. Moreover, price discrimination might bring perverse incentives such as the creation of congestion in order to increase the price for premium services.

For more detailed and extensive argumentation on net neutrality, see also ACLU (2006), Farber (2007), Felten (2006), Lessig (2006), Owen & Rosston (2003), Sidak (2006), and Yoo (2006).

In a nutshell, both lines of reasoning state that their preferred regime would generate higher social welfare. However, both sides cannot be simultaneously correct. A more detailed analysis is required to clarify the trade-off between more investment to achieve digital convergence and net neutrality preservation.⁴

This paper proposes a regulatory guide discussing to what extent regulators should protect the net neutrality paradigm, in particular whether service differentiation and content surcharges should be allowed.

The proposed idea. This paper proposes a two-stage regulatory guide using competition policy in stage I (*ex-ante*) and net neutrality deregulation in stage II (*ex-post*) with the goal to boost the digital convergence process while avoiding the social perverse effects from price discrimination. During the analysis it is assumed that we are on the case that the required investments to achieve full Digital Convergence are indeed socially desirable.

The crucial argument against net neutrality is: networks claim that need price discrimination to raise revenues and ultimately invest more. However, there are many pros to keep net neutrality (e.g. content innovation and enhance network effects). Therefore, the paper proposes that *ex-ante*, regulators should try the “first-best”, i.e. preserve net neutrality (NN) while increasing network investments. To accomplish the task of raising network investments under NN, it is suggested the regulator to define a competition policy promoting investment competition/ incentives, based on the following three principles.

- i) The incumbent network is open to entrant operators and any operator is allowed to invest on the incumbent network.
- ii) The marginal access price that the entrant pays per customer decreases with its investment on the network, while it increases with incumbent's investment.⁵ Principles i) and ii) together would create *intra-network* investment competition.
- iii) If two (or more) infrastructures co-exist, then impose a cost-sharing rule, i.e. each network pays an access price proportional do the investment made by

⁴ Besides the USA, where the NN debate has started, the NN discussion has also been being promoted in Portugal, namely by ANACOM that organized the fourth ANACOM Conference 2010 on October, 6th, 2010 to discuss networks regulation and content regulation.

⁵ The approach of access price indexation on investments is based on Henriques (2008). A similar approach is also used in Sauer (2010).

the competitor.⁶ This principle would create *inter-network* investment competition.

If applying such competition principles reveals to be insufficient to raise the desirable social investment, it might be the case that networks will need to raise revenues in order to invest more. Hence, net neutrality may have to be sacrificed to achieve the socially desirable full digital convergence. Though, the paper proposes that NN departure should only be allowed under the guarantee of a minimum quality standard to avoid networks to engage in a “damaged good”⁷ strategy type.

In what follows, table 1 summarizes the proposed two-stage regulatory guide. Section 2 discusses the economic rationale behind the three principles proposed for stage I and why they would result in higher network investment. Section 3, discusses in more detail the gist of imposing a minimum standard quality and allow for price discrimination, if stage II of regulation is required. Section 4 concludes.

Table 1: A Regulatory Guide in the Age of digital convergence

Stage I: Competition Policy Principles - Net neutrality imposed at this stage.

- i) Force incumbents to provide network access to entrants at a regulated access price.
- ii) Access price per customer defined as a decreasing (increasing) function in the investment level made by the entrants (incumbent).
- iii) If more than one network infrastructure, then apply cost-sharing rule: each network pays an access price proportional do the investment made by the competitor.

Policy Outcome: If *Competition Policy* outcome in terms of investment is socially optimal then no need for further regulation, otherwise go to stage II.

Stage II: Net Neutrality Deregulation - if unsatisfactory investment outcome from Competition Policy under Net Neutrality.

- i) Set a minimum standard quality and measure regularly the service quality of each operator. Quality measured by the regulator is publicly available.
 - ii) Allow for price discrimination (net neutrality departure) against content providers.
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⁶ Cost-sharing rules are discussed in some papers on the telecom industry, e.g. Sauer (2010).

⁷ A damaged good is a good that has been deliberately restrained in performance, quality or utility, as part of a strategy of product differentiation. See, for example, McAfee (2007) for more on pricing damaged goods.

2. DIAL “C” FOR COMPETITION: DO WE REALLY NEED PRICE DISCRIMINATION TO FINANCE THE NEW INVESTMENTS REQUIRED BY DIGITAL CONVERGENCE?

The bottom line of this section is to show that competition policy is a long way to be explored and it can offer effective responses to raise investments,⁸ namely those required by digital convergence. Hence, price discrimination might not be necessary on the road to full digital convergence.

It is note worthy that broadband providers do not internalize the value from network effects to end-users and society. Hence, their pricing choice on contents and applications ignore its full social benefits and consequently we should expect the prices to be above the social optimal level. Allowing for price discrimination against content providers would increase additional fees, and as result it would reduce the content competition and retract the number and variety of contents and apps created. By its turn, this would reduce the value to end-users and the break the virtuous cycle of positive network effects. Bearing this in mind, the rest of this section discusses three Competition Policy Principles to raise network investment while avoiding the potential network negative effects from price discrimination against content providers.

Principles i) and ii) in stage I have been claimed by Henriques (2011) and have been employed in Sauer (2011) as a source of compatibility between dynamic (investment) and static (price) efficiency. This access price indexation on investments creates incentives for all operators to compete directly in investments while keeping significant price competition on the retail market. On the one hand, entrants would want to invest more to decrease its marginal access price, trying to enlarge the profit margin on retail sales and gain a competitive advantage over the incumbent. On the other hand, the incumbent would want to increase investments as well in order to inflate the access price with the purpose to strangle competition. Note that with a fixed access price, both the incumbent and the entrant have smaller incentives to invest due to the free riding problem.⁹ Under a fixed access price, operators would only compete on retail prices; hence the access price indexation on investments opens a new dimension of competition: the intra-network investment.

Principle iii) would be useful to encourage investments, for instance, on a market with two network physical infrastructures. Here, each operator would have to pay an access price proportional to the investment amount of the competitor, in order to access the end-users on competitor's network. The underlying rationale of this principle is such that each operator has a fraction of its investments paid by competitors, which is equivalent to say that operators are

⁸ In the US, for example, there has been empirical evidence that broadband providers invest more when regulators promote competition. Turner (2009) shows that investment in the telecoms sector was highest during the regulatory period under the 1999 Telecom Act. In fact, investments came down after the Act was suppressed.

⁹ In the absence of access price indexation to investments the entrant would free ride, i.e. not invest and use the incumbent's infrastructure. By its turn, the incumbent would have less incentive to invest since the return from it would be shared with the incumbent.

cross-subsidized. Hence, decreasing the investment cost net of subsidies would incentive operators to invest more on their networks than without this principle.

Despite these three competition policy principles, the investment levels attained may still be low relatively to the social optimal level. The following section discusses a second round of regulatory principles when competition policy is insufficient to induce the market to generate the social optimal level.

3. THE REGULATOR ALWAYS RINGS TWICE: IF COMPETITION POLICY UNDER NN DOES NOT SUFFICE, CALL FOR NET NEUTRALITY DEREGULATION

In this section we argue that if competition policy is not sufficient to induce the market outcome to reach the social optimal investment level, then regulators should give some loose to networks allowing for price discrimination among content providers.¹⁰ Price discrimination would allow networks to capture more revenues and, given the competition policy described in stage I, they would invest more.

Under price discrimination without further rules, networks could start a strategy of paid prioritization in which they offer to prioritize a provider's traffic such that it reaches end-users with higher *relative* quality or speed. Under this scheme, content providers who pay an additional fee would receive prioritized treatment relatively to others who don't pay the extra. However, higher relative speed does not mean superior speed in *absolute* terms. For example, the higher relative speed might be reached by slowing down other services in the network (i.e. damaging other services). This type of behavior would jeopardize in great extent the innovation at the content level.¹¹

Hence, in order to avoid situations of superior relative speeds without reflection in absolute real terms, the regulator should impose the *principle of a minimum standard quality*. The idea of a minimum standard quality would have two important effects.

First, every content provider would have the guarantee to see their packets delivered at a reasonable speed regardless the payment of an extra fee. This would mean that even a start-up company, bringing innovation to the sector, would still reach the end-users of the network at a reasonable speed and quality. Ultimately, the minimum standard assures that competition at the content provider level would be strongly kept alive, leaving the door open even to garage companies to become the "new Googles and YouTubes" in the future.

¹⁰ It might be the case that networks already have the sufficient incentives to invest more due to the competition policy defined in stage I, the only problem might be the lack of sufficient funds.

¹¹ Big content providers would keep the prioritized way (the "fast lane" of the network) for themselves raising high barriers to start-up firms, who bring innovation to the sector, in reaching the end-users.

Second, the minimum standard would force networks to improve significantly their services in real absolute terms; otherwise they wouldn't be able to differentiate services and practice price discrimination.

A minimum quality standard jointly together with the competition policy described in stage I would make sure that content discrimination is reflected on real network evolution and not just "spurious" discrimination with a "damaged" service whose purpose is solely increase profits.

Note that competition policy defined in stage I plays a vital role when price discrimination is allowed, in the sense that puts pressure on networks to invest the additional revenue obtained from the price discrimination. Otherwise, networks that chose to retain the extra revenue (due to price discrimination) would have to pay much larger access prices, and thus would perform worse than those who had decided to invest.¹²

We note yet that publish on a regular basis the networks quality of service may encourage them to become more competitive on the quality front. This would only let reasonable discrimination levels to survive.

4. DISCUSSION AND CONCLUSIONS

Before the Era of Digital Convergence there was no net neutrality issue. Telephone, TV and internet services were born as separate services and separate markets. Network capacity and congestion were not issues before the Age of Digital Convergence; hence, the need for further investments on network expansion was not crucial. However, over time, monopolist networks have been encouraged to penetrate their "neighbour" markets. Additionally, new content providers, such as Google and YouTube, have contributed to the increase of networks transport of more data and information. For all this, networks' facilities have been taken to their limits. The Age of Digital Convergence is intimately connected to the need to finance network investments, and the possibility to break the net neutrality paradigm to finance those investments.

This paper explores the concept and process of convergence and investigates the challenges that it poses to policy makers. We propose a regulatory guide on what extent networks should be allowed to departure from the NN paradigm, in particular to practice price and quality discrimination. The paper argues that there are mainly two policy options to deal with digital convergence which are Competition Policy and Net Neutrality regulation.

Competition policy is always necessary to exist. First, because in network industries at least some market power is present. Second, net neutrality violations fall straight in the grounds of competition policy, since the negative impacts of such violations, such as price or quality

¹² Stage I of regulation induces network operators to have as dominant strategy "to invest".

discrimination, may be curbed in great extent by competition policy, namely under the first three principles discussed in section 2.

Net neutrality poses a fairly complex issue about its imposition or liberalization and that it is quite difficult to evaluate *ex-ante*. Imposing net neutrality is hardly so good that we should prescribe it under all circumstances. In fact, in section 3 the paper proposes that the net neutrality imposition *ex-ante* should be reviewed *ex-post* if network investment reveals to be below the socially optimal level. If that is the case, then it is better to deregulate net neutrality but under some quality conditions, and let networks be differentiated and practice discrimination. The rationale for net neutrality deregulation is to allow networks to increase revenues with the final purpose to increase investments (and not be fully retained in networks' profits). This extra investment would be assured by the incentives created on networks by the competition policy principles described in section 2.

However, note that if quality and price discrimination are allowed, then there should be imposed transparency requirements for quality of service. To be more exact, it should be enforceable that networks satisfy a minimum quality standard of their services and, the service quality should be measured and its results posted publicly by the regulator. This principle would avoid a specific hazard that is, by providing a superior service, networks have incentives to damage the standard service, so as to make it less attractive and push consumers to choose the superior service.

We conclude by mentioning some limitations in our argumentation and discuss potential future research paths. The argumentation in this paper assumes implicitly that regulators are able to quantify the social optimal investment level and compare it to the market outcome. Despite the market investment outcome may be unproblematic to observe, the hypothetical social optimal investment may be hard to quantify, thus would be interesting as future research work to develop techniques that allow its estimation. Those techniques would help policy makers to set more explicit goals in terms of investment levels to reach and also to evaluate the market performance.

Another drawback in our stage I of regulation is that the regulator would have to choose the optimal parameters and the functional form of the access prices such that in equilibrium the operators would end-up choosing the social optimal investment level. All this requires the regulator to have information about networks, namely their cost structures, which may be hard to obtain accurately in reality. So, we highlight a potential research topic also on estimation of network cost structures. Obtaining information is indeed a big issue for regulators. In stage II of our guide, the regulator would have to define a minimum quality standard. In particular, one important question here would be at which level the regulator should fix that minimum quality standard.

Regardless the drawbacks pointed out in the argumentation, we believe that the regulatory principles presented and discussed in this paper should be able to promote more competition and innovation on the telecoms and related sectors.

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