

Network Neutrality and “Discrimination Shifting”

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¹ Waterman & Choi (2011) sketches the economic model of this paper in narrative form.

Abstract

An important aspect of the network neutrality debate is whether government should regulate only Internet service provider (ISP) transactions with upstream content providers, or to also regulate transactions with consumers. A simple model shows that a non-discrimination access rule, applied only to discrimination by an ISP among competing upstream content providers, may have the effect of shifting similar ISP behavior downstream to the consumer retail level, unless discrimination in that market is also controlled. The Federal Communication Commission's final 2010 rules attempt to control discrimination both at the access and the retail level, which our analysis suggests to be a necessary condition for them to be effective.

I. Introduction and background

The Federal Communication Commission’s “Open Internet Rules,” proposed in 2009, and adopted in modified form in 2010, were motivated by the concern that broadband Internet Service Providers might discriminate among content or other upstream suppliers—by charging higher prices for priority delivery, or otherwise advantaging one provider over another, such as by “blocking” the latter from any access to consumers (FCC, 2009, 2010). For example, in Australia, where network neutrality regulations essentially do not exist in the same form as in the U.S., large ISPs have favored “content partners” by only counting downloads from non-partner sites in usage quotas imposed on subscribers (Anderson, 2010). There have been at least 2 well-known examples of alleged “blocking” of upstream providers by ISPs in the US, one a VOIP provider (Madison River), the other a file sharing website (BitTorrent) (FCC, 2009).

Among the set of “network neutrality” rules that the Commission formally adopted in December, 2010 was one which essentially prohibits any “blocking” by ISPs of lawful content or other upstream services. Central among the new regulations was a “no unreasonable discrimination” rule stating that an ISP “shall not unreasonably discriminate in transmitting lawful network traffic over a consumer’s broadband Internet access service.” (§ 68).

An important element of the network neutrality debate, however, was whether--and if so how--that an ISP’s downstream transactions with subscribers should also be regulated. The Commission’s 2009 Notice of Proposed Rulemaking proposed no regulation of this market except in the case of “reasonable network management,” which might include charging higher prices to consumers who have higher video usage to relieve congestion. Otherwise, the 2009 NPRM’s proposed rules focused almost entirely on prohibiting “pay-for-priority” or similar ISP discrimination in the upstream access market.

The adopted FCC rules included the network management exception, stating that “reasonable network management shall not constitute unreasonable discrimination” (§ 68). This rule stops short of explicitly requiring that no prices be charged to upstream content suppliers (although that may be the practical implication). The adopted regulations went further, however, more explicitly protecting “end-user control” by generally prohibiting ISP pricing behavior that favors one comparable information service (e.g., an affiliated video service) over another in the consumer market (FCC, 2010: ¶71).

In this paper, I address the issue of joint non-discrimination regulation of the upstream and downstream ISP markets with a simple model of behavior we label as “discrimination-shifting” I show that regulations which are intended to prevent ISP discrimination in the upstream market are likely to intensify an incentive to accomplish the same purpose by discriminating in the consumer market, such as by the use of differential retail pricing or exclusion of products from the market--thus tending to defeat the rules’ purpose. The general principle underlying our model is simply that if a group of firms desires to achieve a certain objective, and has more than one route by which it can be achieved, then closing one route through regulation is likely to increase firms’ use of the other routes as a second-best practice.

An underlying premise of our model is that broadband ISPs exercise significant market power in both the upstream content supply and the downstream consumer markets. Although the intensity of local competition is hotly debated, most markets have only two wireline broadband providers, with cable-based providers typically having the higher share, suggesting a plausible argument for “bottleneck” broadband ISP market power.

Our focus is on suppliers of Internet Protocol (IP) media content, such as IP video, although our results may apply more widely to other Internet traffic. Our model also assumes that ISPs are vertically integrated into content supply. Vertical integration has been a prominent aspect of the network neutrality debate because of the concern that ISP discrimination might be driven by an incentive to favor vertically affiliated content providers, such as a video provider, over unaffiliated “rival” services, especially new entrants. (FCC, 2009, 2010).² Our results apply more widely, however, to “content partnerships” and other non-vertically integrated content suppliers.

Finally, I abstract in this paper from larger aspects of the network neutrality debate that affect economic welfare. These include issues of infrastructure investment, the general effects of access pricing rules on the total supply of content, and the viability of FCC regulation vs. antitrust enforcement. Numerous authors have investigated these and related questions in the

² The Federal Communications Commission concluded, as the basis for its 2010 “network neutrality” rules that vertically integrated ISPs have plausible incentives to favor vertically affiliated video content services and to restrict entry of nascent unaffiliated “rival” video services.

academic literature or in submissions to regulatory proceedings. (See especially, Yoo (2009), Lee and Wu (2009), Hermalin and Katz (2007), Hogendorn (2007); Economides (2008), Sidak (2006). See also Atkinson (2008) and Greenstein (2007) for historically based policy analysis. For a recent survey of the economic literature on network neutrality, see Schuett (2010). Rubinfeld and Singer (2001) considered vertical foreclosure arguments in an analysis of the Federal Trade Commission's open access conditions on ISPs involved in the AOL Time Warner merger. At an early stage of broadband diffusion in the U.S., Hogendorn (2005) offered insights into ISP incentives to create vertical restrictions on content. Apart from some other discussion in Economides (2008), Sidak (2006), and Yoo (2009), however, there has been little academic attention to ISP vertical ownership issues, or to the issue of Internet video content diversity more generally. Among more recent studies, Economides and Tag (2012), Rosston, and Topper (2010), and Owen (2011) also concerned about the role of vertical integration.

The Model

To isolate the key factors, consider a local ISP that is a monopoly in the consumer market and a monopsony in the content input market. That is, the ISP has price setting power in both markets. In addition to a range of other services (shopping, VoIP, information, etc.), the ISP potentially offers only video services, V_1 and V_2 , which are partial substitutes. The ISP is vertically integrated with V_1 , while V_2 is unaffiliated. There is no advertising, and final consumer prices, P_{V1} and P_{V2} , are set by V_1 and V_2 , respectively, leading to subscriber usage rates, S_{V1} and S_{V2} . I assume for tractability that the ISP's monthly subscription price in addition to these charges is fixed at \bar{P}_S . I further assume for simplicity that $\bar{S}(\bar{P}_S)$, the total number of ISP subscribers, is unaffected by the availability or pricing of V_1 and V_2 .

As a price setter both upstream and downstream, the ISP sets W_1 and W_2 , wholesale charges to V_1 and V_2 respectively, and also sets R_1 and R_2 , which are ISP surcharges to consumers who receive V_1 and V_2 , respectively. To avoid issues of double marginalization, assume that the W s and R s are all set as optimal two-part tariffs or lump sums.

A. Benchmark initial condition: no regulation

Assume that the ISP maximizes profits by setting $R_1 = R_2 = W_1 = 0$, but $W_2^* > 0$ at a threshold level such that V_2 leaves the market. Thus:

$$(1) \text{ISP}\pi_U^* = P_{V1U}^* \cdot S_{V1U}(P_{V1U}^*) + \bar{S} \cdot \bar{P}_S - C_U(\bar{S}, S_{V1U})$$

where the U indicates the upstream exclusion strategy equilibrium and $C(\cdot)$ is a generalized cost function.

That is, exclusion of V_2 by means of upstream discrimination using $W_2 > 0$ is more profitable by assumption than any set of W s and R s that would result in having both V_1 and V_2 available to the ISPs subscribers. This foreclosure equilibrium may occur for a variety of reasons analogous to reasons that vertically integrated cable television systems tend to exclude “rival” programming services, or more generally, that multi-product retailers, such as grocery stores, that market store brands may exclude rival brand name products, or price them unfavorably. For example, this could occur if the ISP desires to facilitate market entrenchment of its similar but nascent affiliated service over the long term, because presence of the rival V_2 will cause undesirable retail price competition with V_1 , or if resulting relative prices of P_{V1}^* and P_{V2}^* , would send subscribers a negative signal about the quality of V_1 . For example, W_1 may be set below W_2 because of less risk or other contracting advantages of offering the vertically affiliated supplier. These scenarios, that is, are analogous to the standard explanations for why cable TV operators may choose to exclude rival services on cable television.

B. Non-discrimination access (upstream) regulation

Now let there be a non-discrimination regulation requiring that $W_1 = W_2 = 0$, but no control is set over R_1 or R_2 . A plausible equilibrium given this regulation is that the ISP chooses a second best strategy of discriminating in the downstream market, such that $W_1 = W_2 = R_1 = 0$; and $R_2^* > 0$, set at a threshold level that causes V_2 to leave the market

$$(2) \text{ISP}\pi_D^* = P_{VID}^* \cdot S_{VID}(P_{VID}^*) + \bar{S} \cdot \bar{P}_S - C_D(\bar{S}, S_{VID})$$

where the subscript D indicates the downstream discrimination equilibrium. Although this strategy results in the same basic outcome as the upstream foreclosure strategy, the downstream foreclosure may be less profitable because $R_2^* > 0$ is more difficult to administer, leading to higher costs, has unpredictable or less desirable effects on final prices, or is not as easily explicable to subscribers, etc.

C. Non-discrimination access and consumer market (upstream and downstream) regulation

If the regulator now requires that $W_1 = W_2 = R_1 = R_2$, it follows that:

$$(3) \text{ISP}\pi_U^* > \text{ISP}\pi_D^* > \text{ISP}\pi_{RDU}^*$$

where RDU indicates the upstream and downstream zero pricing rule. In this model, successful non-discrimination regulation thus requires the regulator to set all W 's and R 's = zero or the ISP will engage in “discrimination-shifting” from the upstream to the downstream market.

A basic assumption driving these results is that ISPs are price setters in *both* the upstream and downstream markets. If their market power either upstream or downstream is limited, or non-existent, discrimination shifting may not occur. This occurs because if $R > 0$, a competing ISP will force R to zero. Similarly with retail prices

Another assumption is that subscriber demand for the ISP's broadband service is unaffected by availability or pricing of V_1 and V_2 . This demand interaction is an important feature of 2-sided models of media industries (e.g., Economides, 2008). In effect, I assume in the above model that this demand interaction is arbitrarily small. A change in this assumption, however, may lead to substantively different results.

Finally, the presented results are based on vertical integration between the ISP and a content provider. However, a contractual relationship between V_1 and the ISP, such as a “content partnership,” will obviously lead to the same result. Thus, our results demonstrate the familiar conclusion that vertical integration does not itself motivate anticompetitive behavior. Rather, vertical contracting can produce the same outcome. In either case, the competitive significance

of the vertical control depends on horizontal concentration at the local and national levels. If those assumptions do not apply.

D. Common carriage

An interesting extension of the model is to the effects of a common carriage rule. As a result of court decisions, ISPs are considered to be “information services” and thus not subject to common carriage regulation. In its deliberations, however, the FCC considered a challenge to court decision, and the common carriage issue is at the heart of the regulatory controversy.

At its most basic level, a common carriage regime requires that $W_1 = W_2$ and $R_1 = R_2$, but the W s and R s are permitted to be non-zero. Under these circumstances, a non-discrimination outcome will be achieved only if the W s and R s are set by the regulator at true marginal cost (in the model above, at 0). Otherwise, an integrated ISP can set either the W s or R s at equal levels, but above marginal cost, and earn excess profits by means of an accounting transfer between its ISP and content divisions.

This common carriage result has a potentially practical application to vertically integrated ISPs. As noted above, the adopted FCC rules do not explicitly prohibit access prices, so that charging positive but equal access prices to an affiliated and an unaffiliated content provider could be permissible under the “reasonable network management” provision. Say, for example, that an affiliated and an unaffiliated network are comparably bandwidth guzzling video services. In such circumstances, favoring of the vertically affiliated service might be accomplished by means of an accounting transfer if those equal access rates are set above cost.

IV. Conclusion

I developed a simple “discrimination shifting” model, to show that a non-discrimination access rule applied only to ISP discrimination among competing upstream content providers, may by itself simply may have the effect of shifting similar ISP behavior downstream to the consumer retail level unless discrimination in that market is also regulated. It is difficult to predict whether integrated ISPs will be able to evade the FCC’s “no unreasonable discrimination” rule that was adopted in December, 2010. The rules do, however, attempt to control

discrimination both at the access and the retail level, which our analysis suggests to be a necessary condition for them to be effective.

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