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ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Notice of *Ex Parte* Meetings, GN Docket No. 09-191, GN Docket No. 14-28

Dear Ms. Dortch:

On February 27, 2010, I, Barbara van Schewick, had several meetings at the FCC.

GROUP MEETING

I met with Carol Simpson, Wireline Competition Bureau (WCB); Claude Aiken, Office of General Counsel (OGC); Henning Schulzrinne, Chief Technology Officer; Jonathan Sallet, Acting General Counsel; Mark Stone, Consumer and Government Affairs Bureau (CBG); Matthew DelNero, WCB; Rosemary McEnery, Enforcement Bureau (EB); Stephanie Weiner, OGC; Thomas Spavins, EB; Tim Brennan, Chief Economist; Aaron Garza, CGB and Peter Trachtenberg, Wireless Telecommunications Bureau.

The discussion covered the following topics.

Evidence of Blocking or Discrimination

Opponents of network neutrality rules in the US often claim that network neutrality rules are a solution in search of a problem. If network providers really do have an incentive to block or discriminate against applications, content or services ("applications"), they argue, there would have been a lot more instances of discrimination in the US.

This argument neglects that since the early 2000s, Internet service providers in the US have been on notice that the FCC would intervene if they violated certain principles related to network neutrality, and the FCC intervened (in Madison River and in the Comcast case) when instances of blocking or discrimination occurred. Until 2005, many telephony network providers were subject to non-discrimination requirements under Title II of the

Communications Act. AT&T and Verizon were subject to merger conditions related to network neutrality. As Alissa Cooper shows in her recent PhD thesis, this regulatory context led the providers of US telephony networks to establish organizational structures and processes that ensured that technical decisions did not expose the companies to the risk of regulatory enforcement of network neutrality principles.[1] After the FCC's Order against Comcast, US cable operators adopted similar approaches.[2]

Thus, instances of blocking and discrimination in the US market for wireline broadband Internet access occurred in the presence of strong regulatory policies supporting network neutrality. They do not tell us what happens in the absence of network neutrality rules.

In this respect, the experience of Europe and Canada (before 2009), which do not have similar network neutrality policies, is much more relevant.

Evidence of Blocking or Discrimination in Europe

The European legal framework for network neutrality does not prohibit restrictions on the end users' use of applications or services, but requires Internet access service providers to disclose them. Still, many Internet service customers in the European Union are subject to restrictions on their fixed or mobile Internet services. During the meeting, I summarized and discussed evidence of blocking and discrimination contained in the following documents, which are attached to this ex parte letter:

- The results of a survey of European Internet service providers by the Body of European Regulators BEREC:
  Body of European Regulators for Electronic Communications. 2012. *A View of Traffic Management and Other Practices Resulting in Restrictions to the Open Internet in Europe*. Body of European Regulators for Electronic Communications. BoR (12) 30.
- A Paper by Alissa Cooper that contains detailed descriptions of discriminatory broadband traffic management practices in the UK, based on interviews with the providers:
  Cooper, Alissa. 2013. "How Competition Drives Discrimination: An Analysis of Broadband Traffic Management in the UK." Paper presented at 41st Research Conference on Communication, Information and Internet Policy (TPRC 41). Arlington, Virginia, USA.
- A non-exhaustive identification of restriction on Internet access by mobile networks by the Voice on the Net (VON) Coalition Europe, mainly based on the operators' terms and conditions, dated February 23, 2012
  Voice on the Net (VON) Coalition Europe. 2012. *Non-exhaustive Identification of Restrictions on Internet Access by Mobile Operators*

We also discussed the experience of the Netherlands and the blocking of ads by Free, the second largest French ISP.

[1] Cooper (2013b), Chapter 5, pp. 118-129.
[2] Cooper (2013b), Chapter 5, pp. 123-129.

In 2011, the dominant provider of wireline and wireless Internet services in the Netherlands KPN announced plans to introduce packets for wireless Internet service that blocked the use of Internet telephony and instant messaging applications like WhatsApp in KPN's basic Internet service offerings, but allowed users to pay an extra fee to KPN to be able to use these applications. These plans led to a public outcry and motivated the Netherlands to adopt the first network neutrality law in Europe.[3]

In January 2013, the second largest French Internet service provider Free introduced a software update to its router that automatically blocked ads in Internet traffic delivered to the subscriber. While the motivations are unclear, press reports indicated that the move was intended to put pressure on Google to compensate Free for the traffic created by YouTube. Free removed the block after the French minister for the digital economy intervened.[4]

Evidence of Blocking or Discrimination in Canada

In Canada, the 2009 investigation of the Canadian Regulatory Agency CRTC into Internet service providers' network management practices showed that at the time, many Canadian providers were singling out peer-to-peer file-sharing applications for special treatment, throttling the bandwidth available to them or interfering with these applications in other ways.[5]

As part of its proceeding regarding Internet traffic management practices, CRTC required all providers to answer a detailed set of questions regarding their traffic management practices. The filings are all part of the public record on the CRTC website. The attached document by Christopher Parsons, a PhD student at the time, summarizes the filings.

- Parsons, Christopher. 2009. *Summary of January 13, 2009 CRTC Filings by Major ISPs in Response to Interrogatory PN 2008-19 with February 9, 2009 Updates.*

Evidence of Blocking or Discrimination in the US

We also discussed the practice of search query hijacking in the US, a practice that was discovered and investigated by a group of researchers from the International Computer Science Institute in Berkeley, California, together with Peter Eckersley from the Electronic Frontier Foundation in 2011.[6] In August 2011, the practice was described in a press report as follows:[7]

"Searches made by millions of internet users are being hijacked and redirected by some internet service providers in the US. […] The hijacking seems to target searches for certain well-known brand names only. Users entering the term "apple" into their browser's search bar, for

[3] See, e.g., Sterling (2011).
[4] See, e.g., Farivar (2013); Pfanner (2013).
[5] For an overview of Canadian providers network management practices as disclosed during the proceeding, see Parsons (2009). Since then, most of the larger Canadian Internet service providers, most recently Bell Canada and Bell Aliant, have changed their practices in response to the regulations regarding network management that the CRTC adopted following its investigation. In January 2012, Rogers remained the only larger Canadian provider that was still engaging in discriminatory network management. Schmidt (2012); Geist (2011).
[6] Kreibich, et al. (2011b); Kreibich, et al. (2011a).
[7] Giles (2011).

example, would normally get a page of results from their search engine of choice. The ISPs involved in the scheme intercept such requests before they reach a search engine, however. They pass the search to an online marketing company, which directs the user straight to Apple's online retail website.

More than 10 ISPs in the US, which together have several million subscribers, are redirecting queries in this way (see below for a complete list)."

The practice was designed to increase Internet service providers' revenue by allowing them to collect referral fees.[8]

Impact of Application-Specific Traffic Management on Application Providers

Alissa Cooper's PhD thesis provides interesting data regarding the impact of application-specific traffic management on application providers, which I summarized in the meeting.[9] In the UK, application-specific traffic management not only negatively affected targeted applications, but often adversely affected applications (e.g., gaming applications) that the Internet service providers did not intend to target. This created considerable performance problems for affected applications. In response, application developers and network operators often had to expend significant resources to address these problems, and had to do so on an ongoing basis.

The limits of Section 706 as a basis for network neutrality rules

We also discussed the limits of Section 706 as a basis for network neutrality rules.

Rules Focusing on Anticompetitive Blocking or Discrimination

Network neutrality proponents often think of discriminatory conduct that favors an application over others as a distortion of competition and, therefore, as "anticompetitive," and assume such behavior would be captured by an antitrust framework. This assumption is not correct. As I discuss in detail elsewhere, the term "anticompetitive" has a much narrower scope in antitrust law than an intuitive interpretation of the term would suggest:[10]

First, US antitrust law only condemns a network provider's discriminatory behavior that affects the market for a specific application, content, or service, if the network provider participates in that market or is affiliated with a participant in that market. By contrast, network neutrality proponents are also concerned about discrimination in application markets in which the network provider does not participate.

Second, US antitrust law only condemns vertical leveraging or vertical foreclosure as monopolization or attempted monopolization under Section 2 of the Sherman Act, if they are reasonably capable of monopolizing the primary market or the secondary market. Thus, to be classified as socially harmful under an antitrust framework, a network provider's discriminatory

[8] Giles (2011).
[9] Cooper (2013b), chapter 7, pp. 197-210.
[10] For a detailed analysis with references to the literature, see van Schewick (2012b), Section "Ban Discrimination that Violates an Antitrust Framework," pp. 17-22.

behavior in the market for a specific application must be reasonably capable of creating, increasing or maintaining monopoly power in the market for that application or in the market for Internet access services. By contrast, network neutrality proponents may classify discriminatory behavior as socially harmful even if the behavior is unlikely to monopolize the application market or the market for Internet access services.

Third, US antitrust law usually has very stringent requirements about the degree of market power in the primary market that is required for vertical exclusionary conduct to be considered problematic. By contrast, network neutrality proponents are also concerned about a network provider's discriminatory behavior if that network provider does not have a dominant position in the local or nationwide market for Internet services.

Fourth, under an antitrust framework, discriminatory conduct that is justified by a legitimate business purpose would be classified as socially beneficial. By contrast, network neutrality proponents often classify discriminatory behavior as socially harmful even if it is motivated by the network provider's desire to increase its own efficiency.

More generally, while an antitrust framework focuses on a narrow set of economic harms, the theoretical framework underlying calls for network neutrality regulation addresses a broader range of economic and non-economic harms. As a result, rules that ban behavior that is anticompetitive or violates an antitrust framework would often classify differential treatment as socially beneficial that network neutrality proponents would consider socially harmful, making it impossible to successfully challenge behavior that network neutrality are concerned about.

The Open Internet Order embraced these arguments. Like most network neutrality proposals, the FCC's Open Internet rules are based on the broader theoretical framework that considers a broad range of economic and non-economic harms.[11] During the Open Internet Proceeding, some commenters had supported using an antitrust framework to distinguish socially beneficial from socially harmful discrimination. The order explicitly rejected the view that the non-discrimination rule should only prohibit discrimination that is "anticompetitive."[12]

Problems with Case-by-Case Adjudication

We discussed the merits of adopting standards that specify criteria that will be used to judge discrimination in the future. Whether certain discriminatory conduct meets these criteria would be determined by the agency in future case-by-case adjudications.

[11]Federal Communications Commission (2010), pp. 4-11, paras 11-19, pp. 45-46, para 78 and 47 C.F.R. §8.1.

[12]Federal Communications Commission (2010), pp. 45-46, para 78: "We also reject the argument that only "anticompetitive" discrimination yielding "substantial consumer harm" should be prohibited by our rules. We are persuaded those proposed limiting terms are unduly narrow and could allow discriminatory conduct that is contrary to the public interest. The broad purposes of this rule—to encourage competition and remove impediments to infrastructure investment while protecting consumer choice, free expression, end-user control, and the ability to innovate without permission—cannot be achieved by preventing only those practices that are demonstrably anticompetitive or harmful to consumers. Rather, the rule rests on the general proposition that broadband providers should not pick winners and losers on the Internet—even for reasons that may be independent of providers' competitive interests or that may not immediately or demonstrably cause substantial consumer harm." (references omitted)

As I have explained elsewhere,[13] such approaches leave all decisions over the legality of specific discriminatory conduct to future adjudications. This creates considerable social costs. Case-by-case approaches fail to provide much-needed certainty to industry participants. Network providers will not know which forms of network management are acceptable, which constrains the evolution of the network more than necessary. Application developers will not know in advance against which discriminatory conduct they are protected. This decision will only be made after they have been discriminated against and gone through a long and expensive process. The resulting uncertainty reduces their incentives to innovate and their ability to get funding. Moreover, case-by-case approaches create high costs of regulation and tilt the playing field against those –end users, low-cost application developers and start-ups – who do not have the resources to engage in extended fights over the legality of specific discriminations in the future. Finally, deciding the legality of specific discriminatory conduct in individual adjudications is unlikely to lead to decisions that adequately protect the values network neutrality rules are intended to protect.

The Role of Competition in the Market for Internet Services

We discussed how competition in the market for Internet services affects the need for network neutrality rules.

Commenters often assume that competition in the market for Internet services will remove any incentives to engage in blocking or discrimination.[14,15] If there is competition and a network provider discriminates against an application that users would like to use, they argue, users can switch to another network provider that does not discriminate against the application, and this threat of switching will discipline providers.

As I have explained elsewhere, these arguments fail to recognize that the market for Internet service is characterized by incomplete customer information, product differentiation in the market for Internet access and for wireless and wireline bundles, switching costs, and, in some countries, a concentrated market structure in the market for Internet services. These factors limit the effectiveness of competition, even in markets with several competing Internet service providers, and reduce consumers' willingness to switch Internet service providers in response to discriminatory conduct, giving network providers a degree of market power that enables them to impose restrictions on their Internet service customers that they would not be able to impose in a perfectly competitive market.

[13] van Schewick (2012b), Section "Problems with Case-by-Case Approaches," pp. 25-32.

[14] See, e.g., Litan & Singer (2007), pp. 552-554; Yoo (2007), pp. 504, 506, 511-515; Becker, Carlton & Sider (2010). p. 505; Cave, et al. (2009), pp. 1-2.

[15] The following two paragraphs are adopted from van Schewick (2012b), pp. 32-38. For a full discussion with detailed references to the literature, see ibid., pp. 20, 32-38. For an earlier discussion, see van Schewick (2010a), pp. 259-264.

In addition, relative to markets in which Internet service providers do not face any competitors, competition in the market for Internet services may even increase Internet service providers' incentives to block or discriminate.[16]

In line with these theoretical arguments, network providers in markets that are more competitive than the market for wireline, fixed Internet service in the US have engaged in blocking or discrimination.[17] This evidence suggests that at least in the market for wireline Internet service in Europe and Canada and in the market for mobile Internet service in the US, competition does not prevent Internet service providers from interfering with applications, content or services on their networks, even if, as in the US and in the European Union, network providers are required to disclose any discriminatory conduct that occurs.[18]

Alissa Cooper's recent PhD thesis provides additional insights into the limited ability of competition to discipline Internet service providers.[19] *First*, she explains how competition in the market for Internet services actually increased incentives to engage in discriminatory network management among Internet service providers in the UK.[20] *Second*, the thesis highlights the limited effectiveness of disclosure rules in educating consumers about traffic management practices. In particular, although disclosures related to traffic management had been standardized and Internet service providers expended considerable efforts to translate traffic management measures into a language that consumers can understand, most subscribers did not understand traffic management disclosures.[21] *Third*, the economic literature on switching costs often assumes that sophisticated consumers who switch in response to discriminatory conduct will protect unsophisticated consumers. Cooper shows that in the context of traffic management practices, this assumption is not correct.[22] *Fourth*, she summarizes a large number of studies by OFCOM that explored barriers to switching Internet service providers.[23]

MEETING WITH COMMISSIONER CLYBURN AND STAFF

I also met with Commissioner Mignon Clyburn, Rebekah Goodheart, Legal Advisor – Wireline, and Stefanie Frank, Intern.

[16] See generally van Schewick (2010a), pp. 255-259 and, regarding incentives to engage in discriminatory traffic management, Cooper (2013a) (based on a case study of broadband traffic management in the UK).
[17] See, e.g., Cooper (2013a) (wireline Internet services in the UK); Body of European Regulators for Electronic Communications (2012); Kroes (2012) (Europe) (European wireline and mobile Internet services); Parsons (2009) (wireline Internet services in Canada); van Schewick (2011b) (Verizon Wireless/tethering applications); van Schewick (2011a) (AT&T, Verizon Wireless, T-Mobile/Google Wallet); Ziegler (2012); Kang (2012) (AT&T/Apple Facetime). See also van Schewick (2012a), pp. 21-22 (summarizing the evidence). On the amount of competition in the market for Internet services in the US and Europe, see van Schewick (2012b), p. 34.
[18] For the EU, see Articles 20 and 21 Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002, as amended by Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 (Universal Service Directive). For the US, see 47 C.F.R. §8.3. On the effect of disclosure rules on network providers' incentives to discriminate, see van Schewick (2012b), pp. 32-38.
[19] Cooper (2013b), Chapter 6, pp. 131-170; Chapter 7, pp. 184-196.
[20] Cooper (2013b), Chapter 6, pp. 131-170.
[21] Cooper (2013b), Chapter 7, pp. 186-190.
[22] Cooper (2013b), Chapter 7, pp. 191-194.
[23] Cooper (2013b), Chapter 7, pp. 194-195.

We discussed evidence of blocking and discrimination outside of the US and the limits of Section 706.

MEETING WITH JONATHAN SALLET

I also met with Jonathan Sallet, Acting General Counsel. We discussed potential motivations for engaging in blocking or discrimination, the conditions under which Internet service providers have an incentive to discriminate, and the treatment of access fees in the Open Internet Order.

Motivations for Engaging in Blocking or Discrimination

First, Internet service providers may engage in blocking or discrimination to increase their profits. This includes the following practices:[24]

- Blocking or discrimination against applications that compete with the ISPs offering or with that of a partner;[25]
- Excluding applications to price discriminate among Internet service customers (e.g., allowing the use of video conferencing only for users of its premium Internet service, not for users of its basic Internet service);[26]
- Discriminating among applications by charging different Internet transport prices for different applications (e.g., charging higher Internet-service fees for an e-mail packet than for a packet of Web content of equal size);[27]
- Other forms of blocking or discrimination that increase profits (e.g., search hijacking).[28]

Second, Internet service providers may engage in blocking or discrimination to exclude unwanted content that threatens the company's interests or does not comply with the network provider's chosen content policy.[29]

Finally, Internet service providers may engage in blocking or discrimination to manage their networks.[30]

[24] For a detailed analysis of incentives to block or discriminate to increase profits, see van Schewick (2010a), pp. 222-264, 275-278.
[25] van Schewick (2010a), pp. 222-264.
[26] For a detailed analysis of network providers' incentives to engage in this strategy and of the impact on application developers and users, see van Schewick (2010a), pp. 275-278 (price discrimination). For a real-world example of this strategy, see Wu (2003), pp. 151-152, 165; van Schewick (2010a), p. 471 fn. 237 (price discrimination).
[27] For a detailed analysis of network providers' incentives to engage in this strategy and of the impact on application developers and users, see van Schewick (2010a), pp. 273-275 (application-specific pricing). Application-specific pricing may also be used to discriminate among applications or classes of applications (van Schewick (2012b), p. 12). For a real-world example of this strategy, see (Allot Communications & Openet (2010), p. 7.
[28] See footnotes 6 to 8 above and accompanying text.
[29] For a more detailed discussion, including examples, e.g., van Schewick (2010a), pp. 266-270; van Schewick (2012b), p. 18, Box 7.
[30] See, e.g., van Schewick (2010a), pp. 264-266; van Schewick (2008), pp. 5-6.

Incentives to Block or Discriminate[31]

Network providers' ability to block or discriminate against applications can only affect application innovation, if network providers have an incentive to block or discriminate.

An Internet service provider does not generally have an incentive to exclude applications. After all, more applications make the network provider's Internet service more attractive, allowing the network provider to attract more Internet service customers or charge a higher price to existing customers.[32]

There are, however, situations in which a network provider nevertheless has an incentive to block specific applications or discriminate against them – to increase its profits (e.g., by blocking applications that compete with its own offering or that of a partner, or by excluding applications to price discriminate among its Internet service customers), to manage congestion on its network, or to exclude unwanted content that threatens the company's interests or does not comply with the network provider's chosen content policy.[33]

In all of these cases, a network provider will only engage in exclusionary conduct if the benefits of exclusion exceed the costs in the market for Internet services.[34] Notably, the incentive to discriminate is often independent of whether the network provider participates in the market for the affected application and whether the exclusionary conduct is capable of monopolizing the market for that application. In other words, network providers often have an incentive to block or discriminate against an application even if they do not participate in the market for that application (e.g., when they block an application to manage congestion, block unwanted content, or price discriminate in the market for Internet services),[35] and discrimination will often be profitable even if it does not monopolize the market for the application in question.[36]

[31] The following paragraph is adopted from van Schewick (Forthcoming 2014).

[32] van Schewick (2010a), pp. 222-225. See also Whinston (1990), pp. 840, 850-852; Farrell & Katz (2000); Farrell & Weiser (2003), pp. 89, 100-105.

[33] For a detailed analysis of incentives to block, see, e.g., van Schewick (2010a), pp. 222-264, 275-278 (increase profits), pp. 266-270 (block unwanted content), pp. 264-266 (manage congestion); van Schewick (2008) , pp. 5-6 (manage congestion).

[34] van Schewick (2010a), p. 225. For a more detailed analysis of the costs of exclusionary conduct, see van Schewick (2010a), p. 259-264; van Schewick (2012b), pp. 32-38.

[35] van Schewick (2010a), p. 273, 277; van Schewick (2012b), pp. 37-38 (discussing examples). The impact of blocking on application developers' incentives to innovate stems from the blocking as such and is independent of whether the network providers participates in the market for the application or not. By contrast, US antitrust law only condemns discriminatory conduct in the market for a specific application if the network provider participates in that market or is affiliated with a participant in that market. See van Schewick (2012b), pp. 37.

[36] See van Schewick (2010a), p. 251-255, 264-270; Frischmann & van Schewick (2007), pp. 412-416. This chapter focuses on the impact of discrimination on application developers' incentives to innovate. To reduce application developers' incentives to innovate, the exclusionary conduct does not need to drive them from the market; it suffices if it reduces their profits. By contrast, scholars who evaluate discriminatory conduct within a framework based on US antitrust law will only be concerned about discriminatory conduct if the conduct if reasonably capable of monopolizing the market for the affected application or the market for Internet services. For a detailed analysis of this difference and references to the literature, see van Schewick (2012b), pp. 38-41. See also Frischmann & van Schewick (2007), pp. 414 fn. 119, 416 fn. 128.

Access Fees

We also discussed the treatment of access fees in the Open Internet Order.

Access fees come in two variants:

In the first, a network provider charges application providers who are not its Internet service customers[37] a fee for the right to access the network providers' Internet service customers. Applications whose providers do not pay the access fee cannot be used on the network provider's access network.

In the second variant, a network provider charges application providers for prioritized or otherwise enhanced access to the network provider's Internet service customers. For example, if an application provider has paid such an access fee, the application's data packets may receive a better type of service (e.g., travel faster) on the network provider's access network or may not count against a user's monthly bandwidth cap.

The Open Internet rules themselves do not address access fees. The text of the order discusses the two types of access fees separately.

Fees for access to end users

The text of the order clearly prohibits network providers from charging application and content providers for access to the network providers' Internet service customers (i.e. from just charging for access, without offering anything in return).[38]

The order discusses this question in the context of the rule against blocking on the fixed Internet. To the extent that the rules prohibit blocking of a specific application on the mobile Internet, the no-blocking rule also prevents network providers from charging this application an access fee.[39]

Fees for prioritized or otherwise enhanced access to end users ("third-party-paid prioritization")

While the text of the order stops short of an outright ban of "third-party-paid prioritization" arrangements, it seems to get as close to explicitly banning these arrangements as one can get without explicitly banning them**.** The order explicitly endorses the concerns against these arrangements,[40] unequivocally rejects the main arguments in favor of them,[41] and concludes that "as a general matter," arrangements of this kind are "unlikely" to be considered reasonable.[42]

[37] Any Internet service provider can charge fees to customers of its Internet access service, regardless of whether these customers are providers of applications or "normal" end users. In the past, Internet users directly paid fees for Internet service only to their own Internet access provider.
[38] Federal Communications Commission (2010), para 67.
[39] See the explicit reference to para 67, which contains the access fee discussion, in the discussion of the rule against blocking on mobile networks on p. 56, note 306 of the order.
[40] Federal Communications Commission (2010), paras 76 and 24-34.
[41] Federal Communications Commission (2010), paras 40 and 28.
[42] Federal Communications Commission (2010), para 76.

The Open Internet order discusses the limits on access fees for prioritized or otherwise enhanced access to end users in the context of the non-discrimination rule. Conceptually, however, the rule as clarified by the text of the order is more accurately characterized as a limit or ban on charging. If it was a non-discrimination rule, the rule would allow Internet service providers to charge this type of access fees, but require Internet service providers to offer and charge for enhanced access in non-discriminatory ways.

In addition, limits on access fees rest on different considerations than rules against blocking or discrimination, and are therefore best treated separately – both in the text of eventual rules and in their justification.[43]

Should you have any questions, please do not hesitate to contact me.

Sincerely,

/s/ Barbara van Schewick

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[43] For an explanation of the policy concerns underlying the ban on access fees, see van Schewick (2010b); van Schewick (2010a), pp. 278-280.

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