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## Usage Costs, Interconnection, and Regulation: remarks from Bill Lehr

Blog Editor



*William Lehr, Research Associate in the Computer Science and Artificial Intelligence Laboratory (CSAIL) at the MIT provides a summary of points made during his participation in the [Interconnection Workshop hosted by the LSE Network Economy Forum on 11 January 2013](#). The remarks review preliminary conclusions from [earlier joint work](#) with MIT colleagues David Clark and Steve Bauer [\[1\]](#).*

Since 2005, it has been clear that continued investment in broadband Internet capacity might be challenged by a potential threat to ISP profit margins posed by the confluence of two trends: the slowing growth in subscription revenues as broadband reached saturation levels in many OECD markets, especially when the prevailing pricing model was based on flat-rate per month subscriptions (as in the US); coupled to the continued growth in aggregate and per subscriber traffic volumes and the associated usage-related costs. For the benefit of the entire Internet value chain, it is important that ISPs continue to invest in expanding capacity less the rise in traffic growth be choked off prematurely. More recently, the (faster-than-expected) growth in over-the-top video services like Netflix and the accelerating growth in mobile broadband traffic are continuing to add to the traffic burden and the need for investment to expand capacity in access and backbone networks.

At the same time, policymakers have been grappling with how to transition legacy PSTN regulation to the emerging world in which the broadband Internet is the “new PSTN.” In managing this transition, policymakers need to figure out what of the old model is worth recasting into the new world. The Network Neutrality (NN) wars are an example of this policy challenge. The legacy PSTN model was characterized by strong access and interconnection regulation of telephone service providers, while the Internet model was significantly less regulated. An obvious question to ask is whether Internet interconnection needs to be regulated. On the one hand, because the Internet is now viewed as essential basic infrastructure (like roads, electricity, and water), there is an enduring public interest in ensuring its health and accessibility to all segments of the economy and society; and, there remain significant questions as to whether last-mile or other bottlenecks may continue to exist. To the extent there are bottleneck facilities that are deemed to provide sources of market power, policymakers will need to craft open access frameworks to ensure competitive access to such bottlenecks as may exist. On the other hand, the Internet has grown and adapted substantially without significant regulation and regulation imposes its own substantial costs.



In late 2010/early 2011, these issues came to a head in the United States, [when the FCC issued its NN ruling in December 2010](#), while at the same time, Level 3 and Comcast where embroiled in a dispute over whether it was appropriate for Comcast to seek payment from Level 3 associated with expanding the peering links between the two ISP's networks to handle the expected surge in Netflix traffic from Level 3 (Netflix's new CDN provider) to Comcast's access customers. Level 3 complained to the FCC that Comcast was seeking to extract payments in violation of the FCC's recent NN order. The FCC side-stepped the issue by concluding this was an Internet interconnection dispute and so not covered by the FCC's recent NN order. However, the fact that [NN regulations and interconnection disputes would collide was predictable](#) and the need to address the fundamental question of whether (and if so, how) to regulate Internet interconnection remains.

[Clark, Lehr, and Bauer \(2011\)](#) looked at the question of how markets for Internet interconnection were changing, at the implications of continued traffic growth and the challenges posed for recovering usage-related network costs, and what this might imply for changing business and revenue models. On one side, some folks argued that any attempt by access ISPs to extract payment from CDNs could only be explained as an abuse of monopoly power; while folks on the other side argued that such payments were motivated by the need to recover the usage costs of growing traffic. However, in these debates there was a noteworthy dearth of empirical evidence to substantiate the usage cost burden. In our look at the problem, we concluded:

1. CDN payments to ISPs do not, in themselves, imply an abuse of market power and may be consistent with efficiency. We remained skeptical of NN rules that prohibit such payments, doubting their economic efficiency. Moreover, certain structural features of current markets, including the existence of a robust market for Internet transit services and diverse routing/interconnection options provided constraints on anticompetitive abuses of interconnection terms. On the other hand, we noted that the risk that such payments or interconnection terms *might* represent an abuse of monopoly power remains, and hence, suggests a regulatory need for continued monitoring.

2. Although reliable empirical data is scarce, it appears that usage costs are likely significant but remain the lesser component of total network costs and are not so substantial as to pose an immediate prospect for disruption of Internet interconnection markets. However, because the costs are significant and likely growing, it is reasonable to expect ISPs to seek adjustments to ensure adequate cost recovery (which includes a risk-adjusted return on invested capital). The adjustments are likely to include changes in network architectures (e.g., caching), network management practices (e.g., traffic shaping), and pricing models. An obvious candidate for such changes in pricing models would be a shift toward usage-based pricing. While such pricing may be justified, it could also be abused by an ISP with market power to extract monopoly profits and raise rivals' costs (e.g., for unaffiliated CAPs).

In summary, therefore, we concluded that there did not appear to be a pressing need for regulation of Internet interconnection, or strong restrictions against CAP payments to ISPs or against usage-based pricing. However, we also concluded that the incentive to abuse market power exists and so there is an on-going need for regulatory vigilance. In this environment, we tentatively concluded that the best regulatory approach was to continue to rely as much as possible on markets and market-based competition; and to address problems that arise on a case-by-case basis. We did not preclude the option of more aggressive ex ante regulation in the future, but did not feel current market conditions warranted such measures. The subsequent analysis by BERC of market conditions in interconnection and [access markets in the EU and other markets](#) bolsters our earlier conclusion.

*This article gives the views of the author, and not the position of LSE Network Economy Blog nor of the London School of Economics.*

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Notes: [1] See [Clark, David D., Lehr, William and Bauer, Steven. Interconnection in the Internet: The Policy Challenge \(August 9, 2011\). TPRC 2011](#). Although my comments here are based on joint work with my co-authors, these remarks should be regarded as my opinions alone as my co-authors did not have the benefit of an opportunity to offer comments.

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#### About the author



[Dr. William Lehr](#) is an economist and industry consultant. He is a research associate in the Computer Science and Artificial Intelligence Laboratory (CSAIL) at the Massachusetts Institute of Technology, currently working with the [Communications Futures Program](#), which is an industry-academic multidisciplinary research effort focused on road mapping the communications value chain. Dr. Lehr's research focuses on the economics and regulatory policy of the Internet infrastructure industries. Dr. Lehr holds a PhD in Economics from Stanford (1992), an MBA from the Wharton Graduate School (1985), and MSE (1984), BS (1979) and BA (1979) degrees from the University of Pennsylvania.

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