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HEARING ON
“THE FUTURE OF THE INTERNET”

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INTRODUCTION

Mr. Chairman, and Members of the Committee, my name is Lawrence Lessig, and I am a professor of law at Stanford Law School. For more than a decade, I have been studying the relationship between technology and Internet policy, and in particular, the relationship between the architecture of the Internet and innovation. I am honored to have the opportunity to address the question that is before this Committee — the future of the Internet.

This is the third time that I have addressed this Committee about essentially the same question. In October, 2002, I testified about “network neutrality.” That was, I believe, the first time that idea had been presented to this Committee. In February, 2006, I testified at a hearing devoted to “network neutrality” exclusively. And in my view, the question before this Committee today, “The Future of the Internet,” is directly tied to the future of network neutrality.

Yet while these questions are not new, in my view, Congress has yet to address them adequately. For the reasons I outline below, this failure to act continues to threaten the growth and economic vitality of the Internet. Thus, I would urge Congress to enact legislation that sets the basic framework for this critical economic infrastructure in a way that assures the greatest innovation and economic

growth. That framework would embed a design principle that gave birth to the Internet — network neutrality.

“NETWORK NEUTRALITY”

The term “network neutrality” was introduced into the academic debate by Professor Tim Wu in early 2003.¹ But the idea behind the term has been a central focus of network theorists since the early 1980s. “Network Neutrality” builds upon a fundamental recognition about the relationship between a certain network design (what network architects Jerome Saltzer, David Clark, and David Reed called the “end-to-end”² principle) and economic innovation. As former FCC Chief Economist, Professor Gerald R. Faulhaber, described the relationship at a Stanford conference in 2000,

“if I translate this into ... economics, [“end-to-end”] in engineering is the equivalent of ... perfect competitive market [in] economi[cs]. It’s the thing that makes it all transparent, open, [where] anybody can do anything.”³

“End-to-end” or, to update the language, “network neutrality” is the equivalent of perfect competition because it creates an environment, or platform, upon which competition among applications and content happens with minimum interference by the network or platform owner. Like a traditional marketplace, or a modern stock market, a neutral network assures that in the negotiation between buyer and seller, or innovator and consumer, the network itself plays little or no substantive role. All the power within this negotiation is shifted to the edge, to those economic actors directly responsible for innovation and growth in network applications and content — namely, consumers and innovators.

¹ Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. TELECOMM. & HIGH TECH. L. 141 (2003).

² ²⁹See J. H. Saltzer, David Clark, and David Reed, “End-to-End Arguments in System Design,” available at <<http://web.mit.edu/Saltzer/www/publications/endtoend/endtoend.pdf>>; David P. Reed et al., “Active Networking in End-to-End Arguments,” available at <<http://Web.mit.edu/Saltzer/www/publications/endtoend/ANe2ecomment.html>>.

³ Conference Proceedings, The Policy Implications of End-to-End, Stanford University, December 1, 2000, available at <<http://cyberlaw.stanford.edu/e2e/papers/e2e.panel5.pdf>>.

The original Internet achieved this architecture of competition unintentionally. The framers of the network's original design were not economists. They were not focused on building an engine of economic growth. Yet that was the consequence of a technical design intended to facilitate development flexibility. A network designed to enable anyone to develop new applications to run was also a network designed to maximize competition among applications and content.⁴

The reason for this is simple but technical: under the Internet's original design, there was no easy way within the network to discriminate among applications or content. The network was built without the knowledge to discriminate built in. Just as the Post Office can't cheaply pick and choose which letters to deliver based upon the sentiments expressed in the letters, so too the original Internet couldn't easily pick and choose which packets of data to send based on the content of those packets. It was blind to that content. That blindness encouraged a wide range of innovation.

This technical feature of the original network is now changing. Network owners increasingly have the ability to in effect open the Internet's letters — to peek inside the packets, and choose which go faster, or which get blocked. And while there are plenty of legitimate reasons why a network owner might need to “manage” network behavior, there are anti-competitive, or strategic reasons as well. Which reason motivates a network owner turns upon the business model that the network owner has adopted — either a business model of abundance and neutrality, serving whatever legal applications and content users and innovators want, or a business model of scarcity and control, leveraging financial return out of the scarcity their gate-keeping role allows them to create or maintain. If policymakers were confident network owners were following a model of abundance, there would be less reason to be concerned about how they manage the packets on their network. But because policymakers are uncertain about the ultimate motive for this “management,” extensive inquiry into the technical questions of network management become important.

In my view, Congress could substantially simplify this area by setting a strong policy in favor of networks with a business model of

⁴ See Barbara van Schewick, *ARCHITECTURE AND INNOVATION* (forthcoming MIT Press, 2008). See also Lessig, *THE FUTURE OF IDEAS* 34–35 (2001).

abundance and neutrality. A clear set of network neutrality principles would do just that. If Congress made it perfectly clear that the FCC had the charge and authority to assure that the providers of this critical economic infrastructure were deploying this infrastructure with abundance in view, businesses would conform to that requirement. The economic question here is much more important than the financial returns to one particular industry. A powerful and vibrant broadband infrastructure is crucial to the economic growth of the Nation generally.

In addressing the question before this Committee, I would offer four points to consider.

1. *The question of effective regulation for critical economic infrastructure did not begin with the Internet.*

Though the Internet is certainly “new” within the history of critical economic infrastructures, the regulatory questions it raises are as old as the Republic. Throughout our history, policymakers have weighed how best to encourage the spread of critical economic infrastructure, recognizing that sometimes subsidy is required, and at other times, simple regulation is sufficient. The Post Office, for example, was perhaps this Nation’s first communication infrastructure, and as many have noted, the federal government played a critical role in assuring that that infrastructure supported the rapid growth of commercial newspaper and periodical publications, both for economic and political reasons.⁵ Likewise with the telegraph, railroads, electricity, the national highway system, and telephones: In each case, the policy question was how best to encourage broad scale, and relatively inexpensive infrastructure to support critical economic growth. How, in other words, to encourage an infrastructure of abundance rather than an infrastructure of scarcity.

Throughout this history, to achieve abundance it has sometimes been necessary to limit the freedom of infrastructure providers. Common carrier regulation did that substantially. But even without common carrier regulation, some limits have been essential to assuring that the interests of those who build this economic infrastructure are aligned with the interests of the Nation that depends upon it.

One critical limitation has been upon the ability of infrastructure owners to discriminate. Consider, for example, the infrastructure for

⁵ See, e.g., Paul Starr, *THE CREATION OF THE MEDIA* 83-113 (2004).

electricity. As I have testified before, the electricity grid is a fundamentally neutral network. Innovators (like Sony, or Panasonic) are invited to develop applications (televisions, and radios) that use that network. They don't need permission from the network owners (PG&E, Commonwealth Edison) to deploy those innovations. When you plug your television set into an outlet, the network doesn't ask (as it well could, given modern technology) whether the television set is made by Sony or Panasonic. It doesn't ask whether the function of the appliance is to provide television or radio service. Instead, so long as application developers develop appliances that comply with the protocols of the network, the electricity grid will provide service to those appliances neutrally. That doesn't mean for free — for obviously, we all pay for the electricity we consume. It doesn't mean unmetered — obviously, we pay more if we use more. But it does mean that Sony doesn't need to pay a special tax to PG&E for the right to develop Sony television sets, or digital music players. Sony, in this model, is free to innovate without permission from the infrastructure owners — the electricity network.

We could of course imagine a different system. And indeed, we could well build that different system into our electricity grid right now. The electricity grid could be architected to ask the application who made it, or what its function is. The network could then decide whether or how to serve electricity depending upon the answer to that question. Providers of appliances could then be taxed depending upon the elasticity of demand for their products. Electricity providers could then enjoy greater revenue for their product from this tax.

I take it there are few who believe that this alternative electricity system would be better than the system we have today — even though economists could well describe the conditions under which this alternative may well be more “efficient.”

My point, however, is not about whether those conditions obtain, either for the electricity grid, or the Internet. It is instead to emphasize the value of being conservative in policymaking in both contexts. Anyone arguing that the electricity network should be rebuilt to permit PG&E to discriminate among applications using its network should bear a significant burden before that change was allowed. And likewise for anyone arguing that the core competitive feature of the original Internet should be altered: he or she too should bear a significant burden before that change is allowed to alter the critical competitive environment that the Internet presents.

Giving up on network neutrality would be like permitting PG&E to tax appliance manufacturers for the privilege of using electricity on its network: No doubt, that would be a boon for PG&E, and its shareholders. It would not be a boon for the economy.

2. *Policymakers should adopt policies that drive network providers towards business models of broadband abundance rather than business models that exploit scarcity.*

There are at least two clear business models for broadband deployment — one that drives to broadband abundance, the other that leverages broadband scarcity to maximize network provider returns. There is a critical economic justification for government to try to tilt broadband providers towards the model of abundance.

Again, the broadband Internet is infrastructure. Like electricity grids, and national highways, it supports a wide range of economic and social activity. As scholars have demonstrated, private actors providing public infrastructure but focused on private gain alone would rationally maximize their own return at the expense of this broader public gain.⁶ Interventions that create the incentive among infrastructure providers to support these broader interests produce real economic return to the economy, even if they mean less financial return to the infrastructure providers.

For example, consider by contrast policy decisions affecting the growth of cable. Though cable television obviously provides valuable free speech opportunities and economic return through the incentives it creates to produce new content, it is plausible that cable television is not a core infrastructure technology, since it does not generate a diverse range of technology and applications building upon the cable platform. For this reason, it may well have been sensible for Congress to grant to cable owners an almost unlimited range of freedom to structure production decisions as they want, and develop cable offerings and prices as the market will bear. The product of these policy decisions is obviously not uncontested — families continue to resist the bundling of cable providers, making it hard, for example, for parents to select a mix of content that minimizes ad-

⁶ See, e.g., Brett M. Frischmann and Barbara van Schewick, *Network Neutrality and the Economics of an Information Superhighway: A Reply to Professor Yoo*, 47 JURIMETRICS J. 383–428 (2007); Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917, 1007 (2005).

vertising; consumers generally resist significant price increases; developers of independently produced content point to the radical drop in independently produced television content after the relaxation of government ownership regulations. All of these “problems” are the predictable result of allowing cable owners the degree of economic freedom the law now permits them. And while I share with many the wish that things were different, I can well understand that there are limited public policy reasons for regulatory intervention.

But when the platform is not just a video delivery system, but instead, a general purpose digital innovation platform, the justification for regulatory intervention changes dramatically. In the world of entertainment, cable TV is just one option. But in the world of digital communication infrastructures, the Internet is everything. And assuring that this infrastructure gets built with maximum capacity at the lowest cost, and with minimal burdens on application and content developers, is a critical public policy objective.

3. *Investment decisions by venture capitalists are driven by expectations of future, not present, behavior*

In both of the earlier hearings at which I was invited to testify about network neutrality issues, critics of regulation argued that there was no reason to intervene, because there was no actual evidence of discrimination. In the two years since my last testimony, however, network owners have provided this Congress with a significant number of examples of exactly the kind of harmful discrimination that network theorists have long predicted. In 2005, the FCC was forced to intervene to stop a DSL provider from blocking voice-over-IP technologies. In 2007, AT&T technologists acted to block the audio of Pearl Jam performer as he criticized the President in a webcast carried by AT&T. Verizon has been accused of blocking text messages that it found too controversial. And most recently, Comcast has been shown to be blocking particular Internet applications that might compete with its video service, using network management practices not approved by any independent standards body. If “network neutrality” was “a solution in search of a problem” in 2002, and 2006, the network owners have been very kind to network neutrality advocates by now providing plenty of examples of the problem to which network neutrality rules would be a solution.

But there is one very practical point that this debate about whether there is significant current discrimination misses. Venture capitalists don’t chose whether to invest in new innovation based upon what is happening on the Internet *today*. They base their deci-

sions upon what they expect behavior on the Internet will be *tomorrow*. They decide, for example, whether to fund a new Internet application today based upon whether they believe the entrepreneur will be able to deploy that application profitably in 2 or 5 years. That question in turn will depend upon whether network owners will be free to discriminate against that application in the future. Or more generally, whether network owners will be free to tax that application, to extract some portion of that application's profit. If venture capitalists believe that network owners will have that freedom tomorrow, then for a certain range of innovations, they will choose not to invest in that innovation today.

It is for this reason that I and others have consistently argued that Congress could well be slowing the growth of the Internet economy by not setting today a clear principle about the rules that will govern Internet innovation tomorrow. This "wait and see" attitude ignores that sector of the economy that can't afford to wait and see: investors. The "wait and see" argument is thus oblivious to the real economic costs that uncertainty here creates.

If Congress were clear in its direction to the FCC about the policy the FCC is required to implement, then any uncertainty about network owner behavior could be eliminated. And any costs from that uncertainty could also be eliminated. So long as a simple and clear rule signaled to the markets that network owners would be in the business of producing abundant broadband by encouraging innovation rather than leveraging value from scarcity, markets would react to that signal in a way that encouraged greater investment in new innovation.

4. *Congress should direct the FCC to implement, with the minimal regulatory intervention necessary, a policy that drives network providers to a business model of abundance.*

It has been my view for the past decade that Congress needs to signal a clear policy supporting neutral and abundant broadband growth. Without doubt, however, such a policy can go too far. The objective of regulators must be the minimum intervention necessary to steer broadband providers to a business model of abundance rather than scarcity, while recognizing the limited competence of regulators in any field of new technological innovation. That limited competence means regulators should focus on the behavior that they can monitor well, using the levers they have over that regulable behavior, so that they can have confidence about behavior at the layers of the network that they can't regulate as well.

Congress can achieve that end by setting out clear neutrality principles in legislation, while charging the FCC with the responsibility for carrying those principles into effect. Congress' principle, again, should be to encourage broadband abundance, by steering providers away from a business model that leverages scarcity. But in pursuing that clear legislative objective, the FCC should proceed in a careful and limited way, escalating regulatory intervention only when existing strategies have been proven to fail. Put differently, if a clear objective has been set by Congress, then an FCC strategy of "shock and awe" is both unnecessary and counter productive. Instead, the interventions by the FCC should be directed to the end of convincing broadband providers that the legislative policy choice of Congress will be achieved. A consistent regulatory practice to that end will convince investors of the only profitable broadband investment strategy. That will drive providers to the economically optimal broadband strategy.

As I testified in 2006, in my view that minimal strategy right now marries the basic principles of "Internet Freedom" first outlined by Chairman Michael Powell, and modified more recently by the FCC, to one additional requirement — a ban on discriminatory access tiering. While broadband providers should be free, in my view, to price consumer access to the Internet differently — setting a higher price, for example, for faster or greater access — they should not be free to apply discriminatory surcharges to those who make content or applications available on the Internet. As I testified, in my view, such "access tiering" risks creating a strong incentive among Internet providers to favor some companies over others; that incentive in turn tends to support business models that exploit scarcity rather than abundance. If Google, for example, knew it could buy a kind of access for its video content that iFilm couldn't, then it could exploit its advantage to create an even greater disadvantage for its competitors; network providers in turn could deliver on that disadvantage only if the non-privileged service was inferior to the privileged service.

Put differently, "fast lanes" on the Internet are only valuable if "slow lanes" are really slow. Depending upon the market, this fact can create a perverse incentive among network providers not to build the fastest network possible.

CONCLUSION

As I testified in 2002 and 2006, the Internet was the great economic surprise of the 20th century. No one who funded or initially developed the network imagined it would have the economic and social consequences that it has had.

But though the success of the network was a surprise, policy-makers have yet to learn just why it was a success: Built into its basic design was a guarantee of maximum competition. A free market in applications was coded into its architecture. The growth of that network followed from this basic design. The world economy benefited dramatically from this growth.

The threat facing the Internet today is that network owners will convince regulators to go back on that original design. Through regulatory policies that permit broadband providers to act however their private interests dictate, these regulatory policies would threaten the economic potential of the network generally. New innovation always comes from outsiders. If insiders are given both technical and legal control over innovation on the Internet, innovation will be stifled.

Unlike many other industrialized nations, we in the United States have failed to preserve the extraordinary competition among ISPs that characterized early Internet growth. But despite that loss in access competition, network neutrality still provided significant opportunity for application and content competition. The changes now being spoken of by the effective duopoly of broadband providers will weaken that application and content competition.

It is my view that any policy that weakens competition is a policy that will weaken the prospects for Internet and economic growth. I therefore urge this Committee to secure and supplement the work begun originally by Chairman Powell, and continued now by Chairman Martin, by enacting legislation that sets a clear policy to protect the environment for Internet innovation and competition.