

# **Issues and Policies for Universal Service and Net Neutrality in a Broadband Environment**

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## **Issues and Policies for Universal Service and Net Neutrality in a Broadband Environment**

### **I. Introduction**

The purpose of this paper is to identify the key issues surrounding ubiquity, or universal service, and equity, or net neutrality, in telecommunications. While the conference will include keynote addresses on both universal service and net neutrality, as well as contributed papers on various aspects of these topics, this paper will provide a higher level overview of the issues and will identify key questions that must be answered when developing policies regarding universal service and net neutrality. With the understanding that policies must recognize differences among countries, yet can still benefit from international experience, the paper will then, based on the conference addresses and papers, offer some analysis and policy recommendations to assist New Zealand in making informed policy choices.

Not too long ago one might have thought that universal service in more developed countries was pretty much settled. Nearly all households have voice telephone service, and those that do not are often so remote that providing traditional wireline service is inordinately costly. Such households could, if policies permit, sometimes be reached instead by fixed-base wireless service or, less frequently, by mobile wireless service. Often, though, universal service policies do not consider that a household has voice service if the voice service is not delivered over the traditional wired network. Along with the fact that all or nearly all households have voice service in these countries, it is also the case that universal service funding mechanisms, where required, are in place. While not all parties might agree as to whether or not universal service objectives have been fully met or as to the desirability of the funding mechanism, it was generally the case that universal service was no longer a pressing policy issue.

This situation changed, however, with the advent of broadband Internet service. Dial-up Internet service was generally available over the voice network, but broadband service required something more, usually DSL provided by the telephone company or cable modem service from

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cable companies. Just as voice telephone service moved fairly quickly after it was introduced from being a luxury or novelty to something generally considered to be an essential service, broadband Internet access service is following this same path, although not with universal agreement. Nevertheless, policy makers in many countries are under pressure to include broadband service as part of any universal service obligation.

At the same time that universal service has moved back onto the policy agenda, net neutrality has recently become a major policy issues, particularly in the United States, although it is beginning to emerge as an important policy issue in other countries as well. As the Internet has expanded and matured, and become more essential to a growing number of people, the cost of providing Internet service has increased. This has led to concerns on the part of Internet service Providers (ISPs) as to how they will cover their costs and to related concerns about the equal treatment of all traffic on the Internet.

As background, it is useful to see how New Zealand compares to other OECD countries in terms of income. An indication of this is in Table 1. New Zealand's relatively low income as compared to other OECD countries may be an important consideration in developing policy towards universal service and net neutrality. Of course, New Zealand's small size and extensive rural and remote areas, for example, are also important considerations.

Table 1

<u>Country</u>	<u>GDP Per Capita, PPP, US \$, 2008</u>
New Zealand	26,700
Australia	37,400
United States	46,500
Canada	39,400
United Kingdom	36,300
France	33,400
Germany	35,600
Japan	34,100
Euro Area	33,600
OECD Average	33,400

Source: OECD in Figures, 2009

When Telecom New Zealand was privatized, as was happening with other government-owned telecommunications companies around the world at the time, New Zealand was notable for its light-handed regulation and Kiwi Share. The light-handed regulation relied primarily on competition law to regulate Telecom New Zealand, and the Kiwi Share gave the government the power to insure universal service and to accomplish other key policy objectives such as uniform national pricing. The light-handed relation, however, has since been superseded by a dedicated telecommunication regulator in the Commerce Commission, bringing New Zealand in line with most other developed countries with privately-owned telecommunications companies.

## **II. Universal Service**

Universal Service for Broadband. In more developed countries, universal service for narrowband voice communications has generally been achieved. The remaining issues usually

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concern funding. These should not be downplayed, however, as funding issues can be contentious and financially significant both for incumbents who have a universal service obligation and for entrants who may pay for part of the cost of the obligation. This has certainly been the case recently in New Zealand, for example, with on-going controversy over the Telecommunications Service Obligations (TSO) funding. This controversy includes a court review of past TSO payments to Telecom New Zealand<sup>1</sup> and reforms to the TSO in connection with New Zealand's rural broadband initiative,<sup>2</sup> with adverse consequences on revenues for Telecom New Zealand. There seems to be a never-ending review of universal service funding in the United States and controversy over the size of the fund and which companies are eligible for support. New Zealand and the U. S. are not alone in these policy disputes.

Possible extensions of universal service support to broadband only exacerbate the funding concerns. In the U. S., for example, the FCC's national broadband initiative estimates that extending 4 megabit download broadband service to the 7 million (6%) of households that do not currently have the service would cost as much as \$23.5 billion, the difference between anticipated revenues and costs.<sup>3</sup>

Broadband Internet access service has become more important as an ever-larger proportion of the population relies more and more on the Internet on a day-to-day basis. Paralleling the development of voice service, many people have come to regard broadband Internet access as an essential service, much like voice telephone service. Policy makers are increasingly taking actions to include broadband access as part of universal service. For example, the European Union is considering adding broadband access to European Union citizens' rights to fixed-line and basic Internet access regardless of their geographic location.<sup>4</sup> At

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<sup>1</sup> The National Business Review, "180m in Telecom fees at stake as ComCom told to redo its sums," 09/04/2010, [www.nbr.co.nz/article/180m-telecom-fees-stake-comcom-told-redo-its-sums-121214](http://www.nbr.co.nz/article/180m-telecom-fees-stake-comcom-told-redo-its-sums-121214).

<sup>2</sup> "Telecom NZ hits out at proposals," *TeleGeography*, Monday, 2 November 2009, on-line at [www.telegeography.com](http://www.telegeography.com), and "New Zealand's RBI finalized," *TeleGeography*, Tuesday, 16 March 2010, on-line at [www.telegeography.com](http://www.telegeography.com).

<sup>3</sup> Lynn Stanton, "Broadband 'Gap' Paper Assumes Market-Based Subsidies," *TR Daily*, May 6, 2010.

<sup>4</sup> Peppi Kiviniemi, "EU Wants Universal Broadband Access," *The Wall Street Journal*, March 2, 2010, on-line at [www.wsj.com](http://www.wsj.com).

the same time, the European Commission has approved state aid for a number of broadband expansion projects in many member countries.<sup>5</sup> Australia and New Zealand are both undertaking government-funded broadband network projects.

While countries have made their broadband universal service objectives clear – generally a certain percentage of households connected at a certain minimum speed, but see below for a source of confusion – the rationale for this policy is usually less than clear. To date, the connection between broadband penetration and economic growth is not well documented, and the causality may run from economic growth to broadband penetration and not the other way as broadband policy advocates might wish. If economic justifications for universal service for broadband are not always robust, it may be that countries will articulate a social justification, although this has generally not been the case. There is certainly a great deal of enthusiasm around the world in more developed countries for increasing broadband penetration and for increasing broadband speeds, but this enthusiasm has not been matched with cogent and convincing rationales.

A Key Distinction – Availability and Use.<sup>6</sup> As policy makers and others discuss broadband, they are not always clear whether the issue is the availability of broadband to subscribers – the percentage of households, for example, that have access to broadband – or the actual use, or percentage of households that subscribe to the service. This is an important distinction, and policies to address availability are different from those to address use.

With voice telephone service, this distinction was blurred because service was both universally available and universally purchased. In developed countries, service was available to almost every household, and there were few households that did not purchase voice telephone service when it was available. With broadband, though, the distinction is important. The U. S.,

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<sup>5</sup> Brian Hammond, “EC Clears State Aid for Broadband Projects in Italy, Germany,” *TR Daily*, February 8, 2010.

<sup>6</sup> This ideas in this section are taken from Stanford L. Levin, “Universal Service and Targeted Support in a Competitive Telecommunications Environment,” *Telecommunications Policy*, Vol. 34, Issues 1-2, February-March, 2010, pp. 92-97.

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for example, is typical of more developed countries. The Federal Communications Commission has recently estimated that 94% of U. S. households have access to broadband service at 4 megabits or more per second downstream,<sup>7</sup> and, of course, most of the other 6% have either slower broadband service or dial-up service available. By contrast, though, broadband is used by somewhere between 66%<sup>8</sup> and 71%<sup>9</sup> of U. S. households.

Subsidy programs to extend broadband service can increase availability or speed, but they may not do anything to increase use, if that is the objective. Policies to increase use will be different and may, for example, involve reducing monthly usage charges or subsidizing the cost of a computer necessary to access the Internet, while at the same time educating individuals as to the value of using the Internet. It is important to be clear as to whether the objective for broadband access is availability or use and to adopt policies that will meet that objective, something that has not always been the case.

To the extent that objectives are for use, rather than availability, it is likely that lowering the cost of broadband access alone will not meet aggressive adoption targets. For example, in the U. S., the FCC has concluded that broadband access price subsidies and other programs to make broadband affordable will not be sufficient for the FCC to reach its goal of 90% of households using broadband by 2020.<sup>10</sup> On the other hand, broadband is often priced at a flat rate, regardless of use. Some form of tiered pricing, where the price of broadband access is related to the amount of use, would lower the price for customers who use broadband the least and likely value it the least. Such tiered pricing could boost adoption.<sup>11</sup>

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<sup>7</sup> Stanton, Lynn, “Broadband ‘Gap’ Paper Assumes Market-Based Subsidies,” *TR Daily*, May 6, 2010.

<sup>8</sup> Stanton, Lynn, “36% of U. S. Broadband Connections are for ‘Premium’ Service, Pew Report Says,” *TR Daily*, August 11, 2010.

<sup>9</sup> Hazlett, Thomas, “The Broadband Numbers Racket,” *Financial Times*, on-line at [www.ft.com](http://www.ft.com), September 17, 2009.

<sup>10</sup> Stanton, Lynn, “Low-Priced Broadband Alone Won’t Boost Adoption to Target set in ‘100-Squared’ Proposal,” *Telecommunications Reports*, 03/01/10.

<sup>11</sup> John Curran, “Study: Tiered Broadband Pricing Will Spur Network Buildout,” *TR Daily*, June 22, 2010. For a New Zealand perspective on this issue, see Bronwyn Howell, “The Role of Price Structure in Telecommunications Technology Diffusion,” presented at the International Telecommunications Society European Regional Conference, LUISS Guido Carli University, Rome, Italy, September 17-20, 2008, available at [www.iscr.org.nz](http://www.iscr.org.nz).

It is peculiar that while there is extensive discussion about universal service and broadband availability and use, mobile communications, and, in particular, mobile broadband, are more or less ignored.<sup>12</sup> Certainly there are a number of individuals who use mobile services to access broadband, either with a mobile modem attached to a computer or over a mobile telephone. Ignoring these users must unavoidably distort the data.

Other Issues. Often broadband policies are driven by international comparisons. For example, a country may undertake to expand broadband availability or to increase broadband speeds out of a belief that it is performing badly compared to other countries. In such instances, it is important that any international data be as accurate as possible, even while recognizing that any international comparison will be problematical.

OECD data have posed a particular problem in this regard. OECD data are widely circulated and are often quoted by policy makers around the world. At the same time, it is clear that the underlying data, because they rely on non-standardized voluntary submissions and because of the way in which they are collected, are not accurate. Furthermore, the most-publicized OECD data on broadband penetration are the number of broadband connections per capita, when what is important is the percentage of households that have broadband service. Because household size varies significantly across countries, lines per capita can be extremely misleading when used to make international comparisons of broadband penetration.<sup>13</sup>

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<sup>12</sup> For a discussion of mobile communications and universal service, see, for example, Steve G. Parsons and James Bixby, "Universal Service in the United States: A Focus on Mobile Communications," *Federal Communications Law Journal*, Vol. 62, No. 1, January 2010, pp. 119-152.

<sup>13</sup> The most comprehensive and careful critiques of the OECD data have been undertaken by Scott Wallsten. See, for example, "The Good News about U. S. Broadband," PowerPoint presentation at Broadband Policy Summit IV, Technology Policy Institute, Washington, D. C., June 12, 2008; "Understanding International Broadband Comparisons," Technology Policy Institute, Washington, D. C., unpublished manuscript, May, 2008, and "Understanding International Broadband Comparisons 2009 Update," Technology Policy Institute, Washington, D. C., unpublished manuscript, June, 2009.

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Another issue is the effect of mandatory unbundling of local loops on investment.<sup>14</sup> Most importantly, there is no evidence that unbundling stimulates investment in telecommunications infrastructure. Indeed, the evidence suggests that unbundling reduces investment, with consequent negative effects on broadband availability and, especially, on high speed broadband availability. A typical, though authoritative, study is by Wallsten and Hausladen.<sup>15</sup> They show that in Europe more local loop unbundling has resulted in less fiber investment by both incumbents and entrants. Furthermore, they show that more unbundling has resulted in fewer broadband connections over cable and wireless loops, as well as fewer loops provided by entrants over their own facilities. There are other studies that come to similar conclusions. One is by Ware and Dippon.<sup>16</sup> They find that “mandatory unbundling can delay facilities-based entry and reduce network investment,” particularly if input prices are set too low. They also find no statistically significant relationship between mandatory unbundling and broadband penetration.

The consequence of unbundling, therefore, is likely to be a less-rapid deployment of broadband, and high-speed broadband, when mandatory unbundling depresses investment. Mandatory unbundling of fiber next generation networks will only exacerbate this problem. It is not clear what it means to unbundle a loop over a fiber network, as there is no equivalent to a copper loop. What is clear, however, is that attempting to make some type of unbundled loop available over a next-generation fiber network will remove any incentive for entrants to make their own local loop investments and it will make investment by incumbents much less attractive as they will be forced to share their new fiber networks. This will remove any advantage from making the investment, relative to the incumbent’s competitors, and they have a significant risk of making an expensive investment, and incurring the costs of unbundling, without adequate compensation as regulators price loops so that entrants can be successful and not so that incumbents recover their costs.

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<sup>14</sup> For a more detailed discussion of this issue, see Stanford L. Levin, “A U. S. Perspective on the Future of Unbundling in the Context of Next Generation Fiber Networks,” unpublished manuscript.

<sup>15</sup>S. Wallsten and S. Hausladen, “Net Neutrality, Unbundling and Their Effects on International Investment in Next Generation Networks,” *Review of Network Economics*, Vol. 8, Issue 1, 2009, pp. 90-112.

<sup>16</sup> Howard Ware and Christian Dippon, “Wholesale Unbundling and Intermodal Competition,” *Telecommunications Policy*, Vol. 34, Issues 1-2, February-March 2010, pp. 54-64.

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Finally, there is the issue of government investment in broadband networks or government-owned broadband networks. There are two aspects of such policies that require attention. First, government investment is likely to crowd out private investment. This will make the government intervention more expensive, and the reduction in competition will remove the competitive pressure and market validation for broadband service improvements. Second, it is not clear what happens after the initial government subsidy or government construction of a broadband network. In a dynamic industry such as telecommunications, networks are obsolete almost as soon as they are constructed. With private ownership and competition, market forces force service providers to continually update their offerings – such as the speed of broadband – but with a government subsidy or government ownership, the investment is generally treated as a one-time event. Unless some provision is made for investment upgrades as are undertaken by a competitive private market, the government network will be quickly out of date.

Questions for Universal Service in a Broadband Context. Based on the prior discussion, it is clear that several questions must be considered and answered in order to understand the issues surrounding universal service, broadband, and the design of effective policies.

- What is the objective – availability of broadband or use?
- What is the rationale for broadband universal service, economic or social?
- Are policies matched to the objectives and rationales?
- What services are included – what broadband speed is necessary?
- Are accurate data available?
- How is broadband universal service to be funded?
- What is the interaction between unbundling, investment, and broadband universal service?
- Will government policies crowd out private investment?
- In the case of government networks, what is the mechanism for keeping them up to date?
- What role does mobile broadband play in providing universal service?

### **III. Net Neutrality**

The first issue regarding net neutrality is to determine what, exactly, it is. Net neutrality is, in general, the idea that all information flowing over the Internet should be treated equally, with no particular type of information or application receiving priority. Of course, to put this in some context, the Internet has never been completely neutral. Service providers routinely attempt to screen out harmful data, such as viruses, and attempt to screen out unwanted e-mail (spam). Most Internet users, and proponents of net neutrality, would not want these non-neutral activities to cease. Once net neutrality has been defined, the second step is to determine if there are actually violations of net neutrality or if there is just speculation about net neutrality violations. Then it is possible to determine if any action should be taken. Even if net neutrality is violated, it does not automatically follow that this is a situation that requires rectifying. Discrimination among content providers can advantage customers and ISPs.

More controversially, internet service providers (ISPs) engage in traffic management practices to preserve the integrity of their service. This may involve delaying data from certain types of applications, such as file sharing, or from certain specific services, such as bit torrent. ISPs argued that a small number of services had the potential to denigrate service for everyone and that some form of traffic management was essential to keep the network functioning for all customers. The controversy has arisen, for the most part, because such traffic management was undertaken in secret, without informing end users and because sometimes an individual service was singled out rather than a group of similar services. Customers objected to secret traffic management and to discrimination by singling out a specific service to be delayed.

ISPs, on the other hand, have emphasized the need for traffic management and have floated the idea of charging more, either to content providers or to end users, for priority service for designated data, in contrast to the best efforts service of the Internet. Not surprisingly, most content providers and end users have objected, often quite vehemently.

To understand net neutrality more clearly, it is helpful to consider the following diagram.

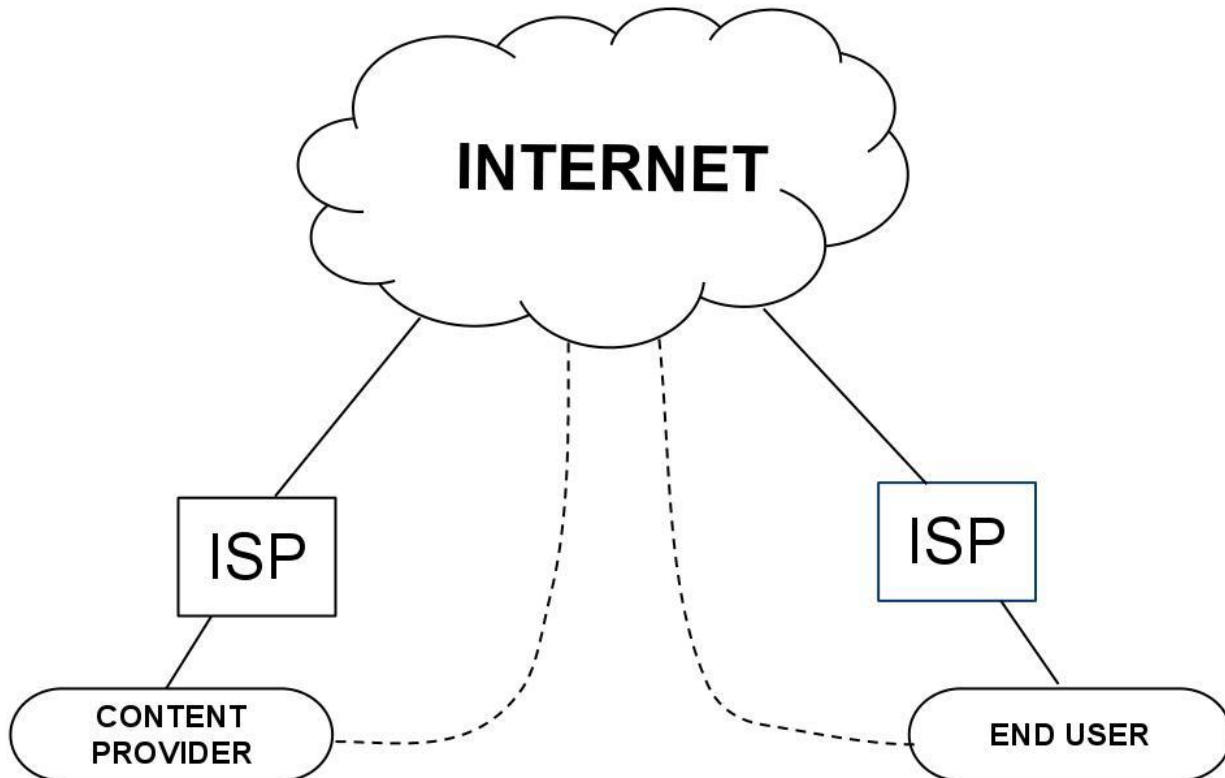


Diagram 1

Diagram 1 shows how a content provider and an end user can be connected to the Internet either directly or through an ISP. When considering net neutrality, it is important to realize that the ISP only has control over the connection from the content provider to the Internet and from the Internet to the end user. To the extent that there is any desire to provide some sort of priority service, it only affects these two links and not the Internet backbone. Furthermore, large content providers and large end users can and do connect directly to the Internet to increase the quality of their service. Content providers also have access to various services, such as those that store mirror web sites around the country or around the world, to improve the service they provide to end users. It is not by accident, nor without considerable expense, that Google searches appear

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on computer screens so quickly. This is another example of the non-neutrality of Internet service. Similarly, end users can improve the quality of their service by purchasing faster download speeds from ISPs. This can be the equivalent of priority service, although it is for all service and not for selected services.

Like so many controversies, however, net neutrality is really about money, although it masquerades as something different and more noble. ISPs are faced with large expenditures to upgrade their links to the Internet as content providers and end users send more and more data over their links. ISPs also indirectly pay for the costs of upgrading the Internet backbone, as they must pay to connect to the Internet. Network congestion problems have been addressed by expanding capacity on the Internet backbone and increasing ISP download speeds and not by differential congestion pricing or differential pricing for priority data, both of which would probably violate net neutrality. To recover this money, often substantial sums spent on increasing Internet capacity, ISPs must either charge their end users or find some other source of revenue. The net neutrality controversy began when at least one ISP in the U. S. (Southwestern Bell, now AT&T) floated the idea of charging service providers higher fees for priority service. End users objected, most strongly, because they believed that their service would deteriorate for everything except content for which a premium was paid, and content providers objected just as vocally because they did not want to pay additional fees for what they viewed as the service they were already receiving.

There has been some movement recently, as Google, one of the most vocal advocates of net neutrality, has proposed a way forward with Verizon that would permit some charges to content providers for new premium services.<sup>17</sup> This has played into the fears of net neutrality advocates who see the current Internet service deteriorating with only new premium services, for which content providers pay an additional fee, delivered with a quality comparable to today's service.

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<sup>17</sup> Stanton, Lynn, "Verizon, Google Unveil Legislative Proposal for Open Internet Principles, FCC Authority," *TR Daily*, August 9, 2010.

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It is worth noting in this regard that, contrary to the claims of some ISPs, content providers are not getting a free ride on the Internet. They either pay an ISP for a connection to the Internet or they pay for a direct connection. Large content providers who want fast service will pay for a premium connection one way or another, and they may pay for data storage on the Internet to improve service for their customers. If content providers refuse, and so far they have, to pay additional fees to ISPs, ISPs are left with only the possibility of charging end users for the cost of their service. Furthermore, if all Internet service is provided at the same standard of quality, there is continuing pressure on ISPs and on Internet backbone service providers to constantly expand the Internet so that all content can be delivered at a high quality of service.

The ISPs' financial problems have been aggravated by their flat-rate pricing model. ISPs, at least in the U. S., generally have a monthly price for unlimited use. Sometimes, there are different flat-rate prices for different speeds of service, but the price generally does not vary with data usage. This means that the only way for ISPs to recover their higher costs is to raise flat-rate prices. This does not permit them to charge more to their largest users, presumably those who value the service most highly, and it does not permit them to offer lower prices to low-use customers who presumably see less value in the service. Their only option under this pricing model is to raise prices for everyone. Moving away from a flat-rate pricing model to one that varied the price with usage would permit the ISPs more flexibility in recovering their costs and would remove some of the motivation to attempt to charge content providers for premium access.<sup>18</sup> This would diffuse the net neutrality debate, at least in the U. S. There has been only slight movement towards usage-based pricing, however.<sup>19</sup> Again, it is worth noting that the flat-rate model, to the extent that it permits end users to pay more for higher download speeds, is

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<sup>18</sup> As explained in the previous section, usage-sensitive pricing would also help spur broadband use, although it would still not provide sufficient incentives for all households to subscribe to broadband service. Nonetheless, usage-sensitive pricing would both spur broadband adoption and address the ISPs' financial problem.

<sup>19</sup> Christopher Rhoads and Niraj Sheth, "Carriers Eye Pay-As-You-Go Internet," *The Wall Street Journal*, available at [www.wsj.com](http://www.wsj.com), October 21, 2009. For a New Zealand perspective on this issue, see Bronwyn Howell, "Flat-Rate Tariffs and Competitive Entry in Telecommunications Markets," presented at the 18<sup>th</sup> Biennial Conference of the International Telecommunications Society, Tokyo, Japan, June 27-30, 2010, available at [www.iscr.org.nz](http://www.iscr.org.nz).

equivalent to some content providers paying more for priority service, although the end-user will receive better service from all of the content providers used.

Policy makers must decide, first, if there is actually a problem with net neutrality. Are net neutrality standards actually being violated on any systematic basis, or are past occurrences really just isolated aberrations? Is there any reason to mandate net neutrality at all, and, if there is, should it be done in anticipation of a problem if one does not actually exist. Second, if there is a problem with net neutrality, are there any solutions that are better than the problem? Related to this is the question of whether discrimination – providing some content providers better service at a premium price – is a better way of addressing congestion on the Internet than uniform pricing. Referring back to Diagram 1, though, because the ISPs only control their own links, it is not clear how such discriminatory pricing would address congestion on the Internet backbone. There is also the issue of trade-offs. For example, would consumers prefer better high-definition streaming video service and reliable voice service if other data services such as e-mail, and particularly capacity-intensive file sharing, were delayed a second or two?

There has been little research, and much rhetoric and acrimony, in the debate about net neutrality. One recent study, though, by Krämer and Wiewiorra<sup>20</sup> suggests that “network discrimination has overall positive effects on welfare” because of the way in which discrimination addresses network congestion. Although they find that overall welfare increases, content providers may be worse off, at least in the short run, as ISPs are able to appropriate some of the content providers’ surplus.

Questions for Net Neutrality. Based on the prior discussion, it is clear that several questions must be considered and answered in order to understand the issues surrounding net neutrality and the design of effective policies.

- What is net neutrality?
- Is there a problem with net neutrality or is there only speculation?
- How does net neutrality relate to load management?

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<sup>20</sup> Jan Krämer and Lukas Wiewiorra, “Innovation through Discrimination!? A Formal Analysis of the Net Neutrality Debate,” manuscript, January 19, 2010.

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- How does net neutrality relate to paying for the Internet?
- What is the effect of net neutrality on investment?
- What is the connection between net neutrality and pricing of Internet access service?
- Are higher download speeds a substitute for quality discrimination?
- Is there any reason to mandate net neutrality?
- What are the benefits and costs of mandating net neutrality?

### **IV. Recommendations for New Zealand**

This section will be completed after the conference based on the other keynote addresses, panel comments, the contributed papers, and the final plenary session.

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