

# NET NEUTRALITY: IMPACT ON THE CONSUMER AND ECONOMIC GROWTH



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**NET NEUTRALITY:  
IMPACT ON THE CONSUMER AND ECONOMIC GROWTH**

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## **NET NEUTRALITY: IMPACT ON THE CONSUMER AND ECONOMIC GROWTH**

### **EXECUTIVE SUMMARY**

Net neutrality has the potential to distort the parameters built into operator business cases in such a way as to increase the expected risk. And because it distorts the operator investment business decision, net neutrality has the potential to significantly discourage infrastructure investment. This is due to the fact that investments in infrastructure are highly sensitive to expected subscriber revenue. Anything that reduces the expectation of such revenue streams can either delay or curtail such investments.

Broadband has been described as the new infrastructure on which the economy of the 21<sup>st</sup> century is being built. As such, its ubiquity, ease of access and cost to consumers are all of great concern to public policy and regulation. In particular, regulators and legislators have expressed concern that operators may be tempted to discriminate in favor of their own services or those of third party partners to the detriment of competitive offerings.

As a result of questions from Stratecast's subscribers concerning the impact of possible net neutrality regulation or legislation, Stratecast launched a project to explore the dynamics of net neutrality insofar as they affect the business of network operators and service providers. The objective was to ultimately estimate the effects that such principles would have on consumers and the economy generally.

To this end, we adopted what we believe is a novel approach to assessing net neutrality impacts: we have chosen to assess net neutrality from the perspective of decision makers in the network operators who must determine if making investments to expand network capacity are justified from a business sense. Such a process typically involves assessing risk and projecting revenues and expenses. As a consequence, the exercise is one of attempting to look at the world through the eyes of the CFO who is charged, both from a legal as well as a business perspective, to invest the funds of the company wisely.

However, an important caveat to the results we obtain is in order. There are those who would view subjects such as net neutrality as inherently simple with obvious answers. Our modeling suggests that net neutrality is, in fact, fairly complex. In an effort to reduce the analytical complexity, our model assesses the view that a business analyst at a network operator would have when presented with the implications of net neutrality.

The model indicates that operators, in the presence of net neutrality, would likely reduce investment due to the increased risk. However, what if the operators maintained

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investment and simply recovered the costs associated with doing so from another source? To the degree that operator costs are increased due to net neutrality, the model indicates those costs are ultimately borne by the consumer. An operator denied the opportunity to generate service revenue would be forced to adopt other methods for covering deployment costs: These could include simply passing along the costs to the consumer; creating service bundles that limit consumer choice; or passing the cost along to content providers. In the case of cost allocation to the consumer, these costs could be substantial: net neutrality could impose anywhere from \$10 to as much as \$55 each month on top of an average broadband access charge of \$30.00. To the extent that consumers were unwilling or unable to incur such costs, net neutrality could, ironically, have the effect of actually reducing broadband penetration.

Of course, an operator doesn't necessarily have to deploy broadband infrastructure. If the operator were unwilling or unable to recover the costs from the subscriber base, then the model predicts that the operator would simply reduce or curtail network investment. This would not only lead to an eroding infrastructure, but will lead to the erosion of jobs and overall economic growth. Even assuming a best case scenario in terms of the amount of GDP impact and job growth, the Stratecast model still predicts that in 2011 alone, net neutrality could impose a seven billion dollar a year overhead on the economy with a commensurate job impact of up to 70,000 jobs.

In fact, the model indicates that net neutrality acts like a tax on the Internet. It imposes overheads on network operators which, in turn, decrease network investments, providing less opportunity, not only for the operators, but for those that use the operators' networks as well.

Indications are that, if net neutrality must be adopted, options which impose the lightest load on operator decision making should be considered. Based upon this analysis, a narrow interpretation of net neutrality would seem to minimize the financial impact on both the consumer and the economy.

In any case, this report provides evidence to support the notion that net neutrality is much more complex than simply encouraging a level playing field. Policy which seeks to manage competition by influencing the investment decisions of operators could have a significantly negative impact on consumers, job growth and the economy generally.

This report will be of special interest to public policy makers, legislators, service providers and network operators.

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## INTRODUCTION<sup>1</sup>

Network neutrality, the idea that the Internet should be content agnostic, is a concept that has generally represented business as usual (what we refer to as the status quo). This has largely been due to the fact that any ability to identify one bit stream from another was difficult to do at network speeds. Now, however, network operators have the tools to potentially discriminate in the delivery of particular bit streams.

This, of course, makes logical sense when the content in question involves sensitivity to such things as latency and jitter. Some content, by its nature, requires a different class of delivery. However, what if the network operator is providing some of the broadband delivered content: voice or video services, as an example? Would the operator have an incentive to provide better delivery service to itself than to its competitors, many if not all of whom have no networks of their own? Further, might an operator offer different classes of delivery to different content providers or be tempted to charge certain content providers more to deliver their content; especially if the operator had business dealings with other content providers or had content of its own?

These concerns, that operators will discriminate in favor of their own services and that they will favor certain content providers, have prompted a deeper look at net neutrality by regulators and legislators. With the recent court ruling in the case of Comcast versus the FCC, the U.S. Court of Appeals for the District of Columbia ruled that the FCC's attempts to enforce net neutrality principles were procedurally unsupported, essentially sending the FCC back to try and craft regulation that could be enforced. But the FCC has indicated that its commitment to net neutrality remains intact and it will look for other means to achieve its goals. Some members of Congress, too, may move ahead to draft legislation that would impose net neutrality through the force of law, although, given its full calendar, it is uncertain when it would do so. In any case, net neutrality is not dead and will, in fact, continue to occupy the minds of regulators and legislators.

These efforts are predicated on enlightened objectives: since there is general agreement on the idea that the Internet is fundamental to the conduct of business, the effective delivery of government services and the health of the economy generally, public policy is evolving to attempt to protect this space as a level playing field for competition. A major question, however, has been whether the broadband landscape is in need of such regulatory or legal protections. As the operators have noted, net neutrality principles have essentially been common business practice to date. However, the question remains: what impact would net neutrality rules have on network operators, consumers and the economy if imposed as specified by some of the proponents?

This paper attempts to take an objective look at the likely impacts of such regulation, with an eye towards quantifying the impact on carrier investment, general economic impact and the consumer. While such a modeling exercise is somewhat akin to attempting to predict the weather, the basics can be captured and, within an acceptable

<sup>1</sup> Please note that the insights and opinions expressed in this assessment are those of Stratecast and have been developed through the Stratecast research and analysis process. These expressed insights and opinions do not necessarily reflect the views of the company executives interviewed.

amount of estimation error, are reasonable to simulate. This paper seeks to estimate the effects of net neutrality regulation, not in the form of some absolute pronouncement, but in the form of likely envelopes of effect. Public policy makers can determine if they agree with the assumptions that make up the model and accept or reject the outcomes.

## MODELING NET NEUTRALITY

There have been many modeling efforts conducted to assess the impact of net neutrality. Most of these seek to assess the impact on the economy and, from there, attempt to spread that impact to the individual consumer. Stratecast is not an economic analysis firm and generally does not do large scale economic analyses. Instead, Stratecast focuses on improving the business success of our clients.

Consequently, when attempting to model net neutrality, we first begin with the impact it will have on the business of network operators and service providers. Starting from this perspective has many virtues, not the least of which is that we can focus on the ways in which net neutrality will likely impact the basic decision to deploy network infrastructure.

Such decisions are made all the time, typically lead actual deployment by two to three years and ultimately determine the extent to which infrastructure is available to deliver services, by both the operator and third party network users, to the consumer.

Integrated tightly with the business case development process is the estimation of opportunity and risk. Operators evaluate whether a given stream of revenue is likely or risky and make their decisions on that basis. To the extent that they determine an investment worthwhile, they make investments in the network. These network investments then drive the amount of network capability that is available to deliver services to end users, both by the operator as well as third party service providers who use the network. If network deployments are limited by the operators' perception of risk, then services are denied consumers and businesses and the revenues of such services are denied to the operators and service providers. Ultimately, the revenues of the operators and service providers drive employment, which creates jobs and increases GDP. First and foremost, though, network operators must deploy networks and must maintain and improve them over time. Otherwise, there is no point in discussing societal benefits.

It is important to note and to emphasize that this exercise is not one of certainty. In fact, it mirrors what operators do routinely: estimate risk, possible revenues and potential costs. Ultimately, the exercise is one of perceptions: what do the decision makers think when they authorize investments? It also bears noting that this exercise does not imply that there is sufficient risk asserted in this study that would justify completely curtailing network investment. Network operators are, after all, involved in deploying and maintaining networks. The question, though, is to what extent operators will invest in cutting edge technologies to increase bandwidth or improve the quality of service: there is a wide gap between merely growing access and growing improved access.

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In this section, we will discuss the modeling process beginning with our attempts to characterize net neutrality, proceeding with the models for network operator and service provider investment, and finishing with a discussion of the modeling done to assess consumer and economic impact.

## Characterizing Net Neutrality in Business Impact Terms

Our modeling effort begins with net neutrality itself. Net neutrality probably has an infinite number of permutations and combinations and it is likely that a great deal of the complexity associated with the various discussions on net neutrality come from the simple fact that there doesn't seem to be a common definition. We can, of course, start with the FCC's proposed six principles (the original four, plus the most recently suggested additional two). The existing four rules, which the FCC proposes to modify somewhat are:<sup>2</sup>

- “To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, *consumers are entitled to access the lawful Internet content of their choice.*”
- To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, *consumers are entitled to run applications and use services of their choice, subject to the needs of law enforcement.*
- To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, *consumers are entitled to connect their choice of legal devices that do not harm the network.*
- To encourage broadband deployment and preserve and promote the open and interconnected nature of the public Internet, *consumers are entitled to competition among network providers, application and service providers, and content providers.”*

In addition, the FCC has added the notion that Internet service providers must “treat lawful content, applications and services in a nondiscriminatory manner” and that they will disclose their management practices to third parties. And, although not a principle, the FCC has also proposed to restrict the operators' ability to charge content providers for any incremental cost increase to do quality of service management.

While illuminating, these principles do not provide any guidance in terms of how they would be articulated or implemented in practice. Ambiguity leads to concern and contention and does not lend itself to accurate assessment or modeling.

In order for Stratecast to model net neutrality's impact on business investment decisions, it was first necessary to build a common framework for expressing net neutrality in terms of the impact on business decisions and then define a series of net neutrality options that could constrain the analysis. These are not intended to be exhaustive or predictive, rather they are meant to define a spectrum of possibility for the purpose of

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<sup>2</sup> See FCC 01-151, September 23, 2005: [http://fallfoss.fcc.gov/edocs\\_public/attachmatch/FCC-05-151A1.pdf](http://fallfoss.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf)

economic impact analysis. The intent is to avoid contention over the conclusions while allowing for alternative points of view.

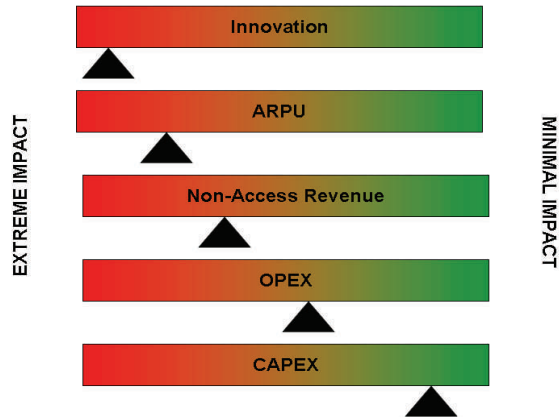
The framework we chose was to model net neutrality in terms of its likely impact on operator network investment decisions. After interviews with several carriers as well as several consumer advocacy organizations, we determined that net neutrality was likely to impact the following variables:

- **Innovation:** Net neutrality impacts operator innovation by either providing incentives to develop products and services or to discourage those activities. Based on primary research conducted by this author, the assumption is that the more confusion or restrictions that are placed on an organization, the less likely it is to be creative and, by extension, innovative.<sup>3</sup>
- **Prospective ARPU:** Average revenue per user is a statement of the expectation that particular consumers, both individuals and commercial users, will generate a particular amount of revenue over time. The important point here is not whether the average user will actually generate such revenue, but whether the operator expects the user to do so. It is the expectation of return that motivates an investor to invest.
- **Non-access Service Revenue:** Anything likely to discourage consumers or commercial entities, such as content providers, to subscribe to an operator's **service offerings** is likely to decrease the total amount of non-access related revenue that can be generated.
- **OPEX:** Operational expense is the overhead required to deploy, manage and maintain networks. Net neutrality, by potentially increasing the overhead associated with ensuring regulatory compliance or by reducing the efficiency of managing networks could increase OPEX.
- **CAPEX:** Capital expense is the direct cost of deploying networks. In an environment where the revenues associated with services are denied or reduced for operators, CAPEX could be expected to decrease. Contrariwise, if QoS approaches are denied operators, CAPEX could increase as operators overbuild to address traffic growth.

Figure 1 below illustrates how these variables can be visualized as a series of equalizer bars. Armed with this model, we can now proceed to the definition of a series of net neutrality options.

<sup>3</sup> See Jude, Michael R., Hidden Impacts: The Influence of Regulation on the Creative Individual, UMI, 2000

**Figure 1 – Net Neutrality Impacts**



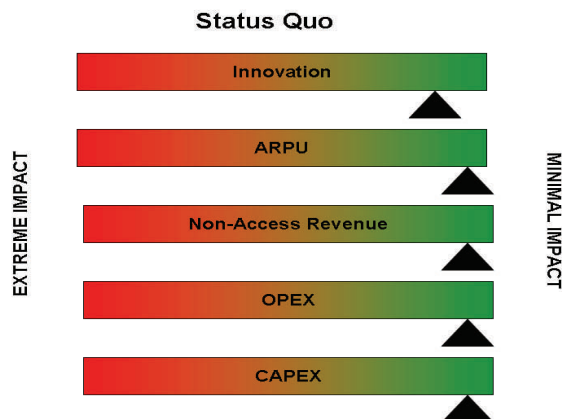
Source: *Stratecast*

As noted above, net neutrality is actually a continuum, however, there are several options that have been described in the literature and which Stratecast presented to a number of operators to assess their likely impact on investment decisions. These options are: Status Quo, Narrow Non-discrimination, and Strict Non-discrimination. Each of these will be discussed in some detail in this section

### Status Quo

This option is the current state of affairs, where the FCC’s four principles for non-discrimination are essentially the way that most carriers and operators do business. While there have been very few instances where such principles have allegedly been violated, the industry as a whole understands them and also understands that any violation will be publicly disclosed and debated within regulatory or judicial proceedings. In this net neutrality option, the general principles of net neutrality would continue to serve as a basis for broadband access, regardless of connection modality, and would guide rather than mandate the conduct of network operators.

**Figure 2 – Status Quo**



Source: *Stratecast*

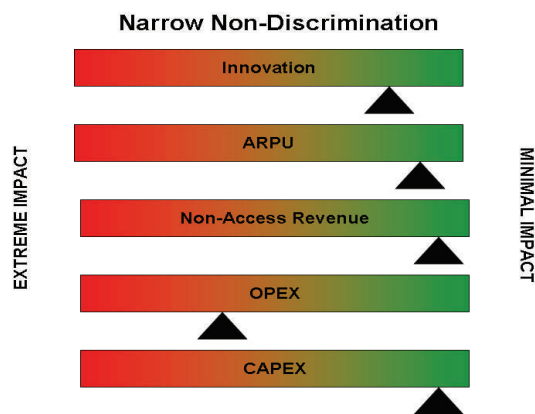
As can be seen from Figure 2, the status quo has proven to be relatively benign in terms of impact on the deployment of capital, the imposition of additional operating expenses and in terms of impacting the ability of network operators to build non access revenue streams. The one area in which the status quo is likely to impact the operators is in terms of innovation. Any impact that tends to make uncertain the outcome of creative exercises will tend to stifle them.

Since the status quo merely defines a set of principles rather than articulating rigid constraints, it is likely that there exists some uncertainty in the mind of the operator as to which activities it pursues will lead to successful outcomes. This uncertainty is expressed as an estimation of risk. Based on this, it is highly likely that the status quo is suppressing some innovative activity currently, although assessing the degree to which it is doing so would be difficult.

### Narrow Non-discrimination

This option, shown in Figure 3 below, essentially would involve instantiating existing four net neutrality principles as regulations. Unlike the status quo, this approach would formalize a new process for oversight and would almost certainly involve the imposition of new regulations which would be more far reaching than simply assessing operator compliance through their actions in the market place. The primary effect of such an approach would be the impact on operational costs; either through the cost of litigation or in the decreased efficiency associated with engineering inefficiency. There would also be some impact on innovation since ideas that strayed outside the regulatory box would be prohibited.

**Figure 3 – Narrow Non-discrimination**



Source: *Stratecast*

A narrow interpretation of net neutrality would, however, tend to preserve an operator’s ability to introduce new services since net neutrality would essentially maintain the status quo for the development and delivery of such services. And such services, to the extent that they appeared similar to existing services, such as voice and

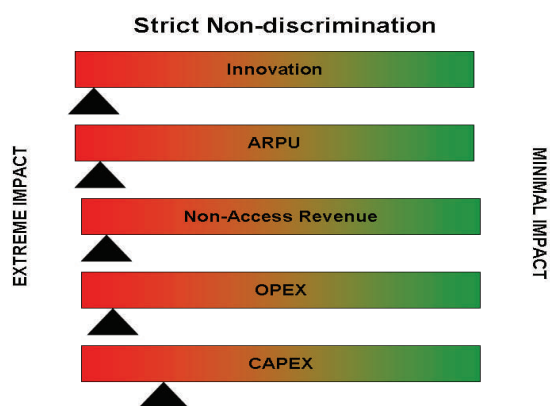
video, would likely be treated in a similar fashion to those existing services under Title I and III of the Telecommunications Act. Consequently, such an approach would tend to minimize the impact on the operator’s ability to generate service revenue and would allow it to plan for an increasing subscriber ARPU.

### Strict Non-discrimination

This option, shown in Figure 4 below, is the most extreme form of net neutrality contemplated, including the four original FCC principles plus the two new ones, and would involve a completely bit-agnostic approach to network design and management. It would, for example, prohibit treating one form of content delivered over the network differently from other forms of content. As a result, network operators would be forced to over-build networks to take care of congestion. Rather than utilizing routing schema and content-aware management technology to accommodate peak network loading, the operator would be required to simply deliver data using a best effort approach.

Additionally, since any form of operator discrimination would be prohibited, the operator would not be allowed to develop services which relied on its ownership of the network. This would tend to deny any fruits of innovation, would deny the operator any sustainable service advantage, and would seriously jeopardize any assumption of increasing ARPU.

**Figure 4 – Strict Non-discrimination**



Source: *Stratecast*

Finally, such a strict interpretation of net neutrality would tend to limit operator revenues over time to simple access. Assuming that such an interpretation of the impact was incorporated into business planning models, the result would be to significantly increase the estimation of risk in such calculations. Would such an estimation curtail investment? Probably not: but it would limit such investments to areas where there would be a likelihood of significant subscription for expensive access plans. Even though net neutrality likely had no impact on Verizon’s recent decision to conclude its deployment of FiOS, it is still true that Verizon made that decision on the basis of expected revenue. By impacting that expectation, strict net neutrality would likely

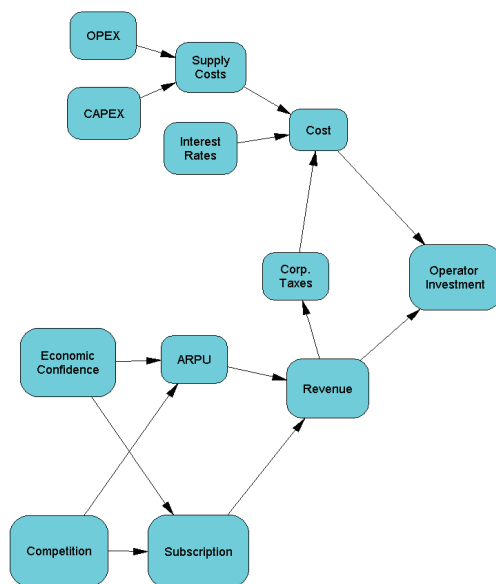
ensure that other carriers contemplating highly capable broadband networks would make similar choices to curtail or limit such investments.

As can be seen, each of these options impacts the variables associated with investment to differing degrees. While the degree to which each influences decision making is subject to interpretation, it can be seen that this approach to modeling net neutrality lends itself to alternative opinions. For example, if an interested party to the net neutrality debate decides that the model is inappropriately adjusted, it is possible to select whatever settings are desired. The consequence of doing so, however, comes with the concurrent responsibility to articulate why the bias needs to be changed and to explain why the biasing is reasonable given a presumably objective operator investment analysis.

### NETWORK OPERATOR INVESTMENT MODEL

Armed with a description of net neutrality from an investment standpoint as well as the larger framework for assessing impact, we can proceed to talk about the operator investment model. As can be seen in Figure 5, the operator decision to invest in broadband is a rather straight forward one.

**Figure 5 – Operator Network Investment Model**



Source: *Stratecast*

Without dwelling on the particulars, the decision to invest is essentially a cost/benefit assessment made on the basis of long term return. On the cost side, cost is made up OPEX and CAPEX, which are, in turn, influenced by such things as the prevailing interest and taxation rates.

Revenue is a function of the service revenue, the access revenue and the ARPU that they generate. Additionally, the general economic conditions and the actions of competition

influence the subscription revenue as well as the ARPU that can be generated. One way to look at this is that, to the degree that a consumer can afford services and to the extent that competitive forces influence either non-access service subscriptions or consumer buy rate, revenue is either maximized or minimized.

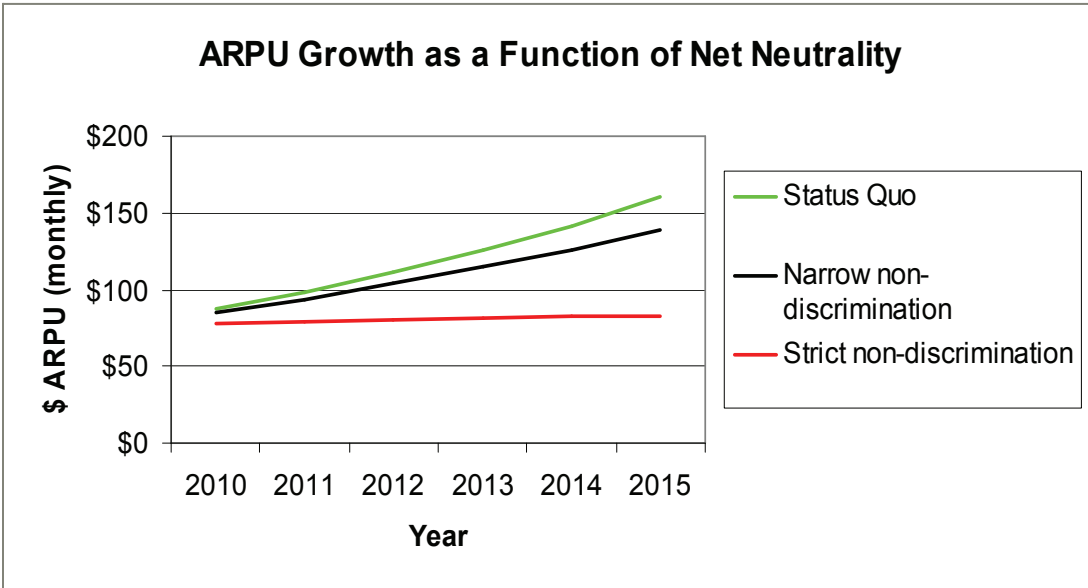
Several implications of this model are important for the evaluation which follows. First, operators, in order to assess a network investment, must predict not only the actions of the market generally, but more particularly, the impact the market will have on the expected revenue per subscriber. Additionally, it should be apparent that anything that impacts significantly these estimates of market, competitive and consumer behavior can have a profound impact on the viability of an investment.

One simplistic way to characterize the decision to invest is in terms of a discounted cash flow or net present value (NPV). In terms of NPV, the current value of future returns and costs should be positive to provide an incentive to invest in network infrastructure. This implies that investments taking place today were justified in the past with a particular expectation of market dynamics which would make such investments attractive.

The FCC has estimated that a total build out for broadband would require up to \$350 billion over the next several years. In order to properly bias this model, Stratecast assumed that such a figure was correct and added it to the traditional amounts spent on maintenance of the network infrastructure. Consequently, the model assumes that under the status quo such an investment would be made over the next five years and assumes that the costs associated with the investment would be recovered by the network operator, either through access charges or from revenue associated with new service offerings.

When this model is constructed as a numerical simulation of the broadband market as a whole and the various net neutrality options mapped to it, several things become apparent very quickly. It turns out that this model is extremely sensitive to expected ARPU. ARPU growth, as indicated in the net neutrality model section, is impacted by net neutrality. The model predicts that such erosion can be significant. As Figure 6 below shows, ARPU, which is the amount that an operator can generate per subscriber, in the presence of net neutrality can be as much as \$80 per month less at the limits of projection. Since this amount is almost exclusively derived from premium services, above the access rate, the impact on the operator is obvious.

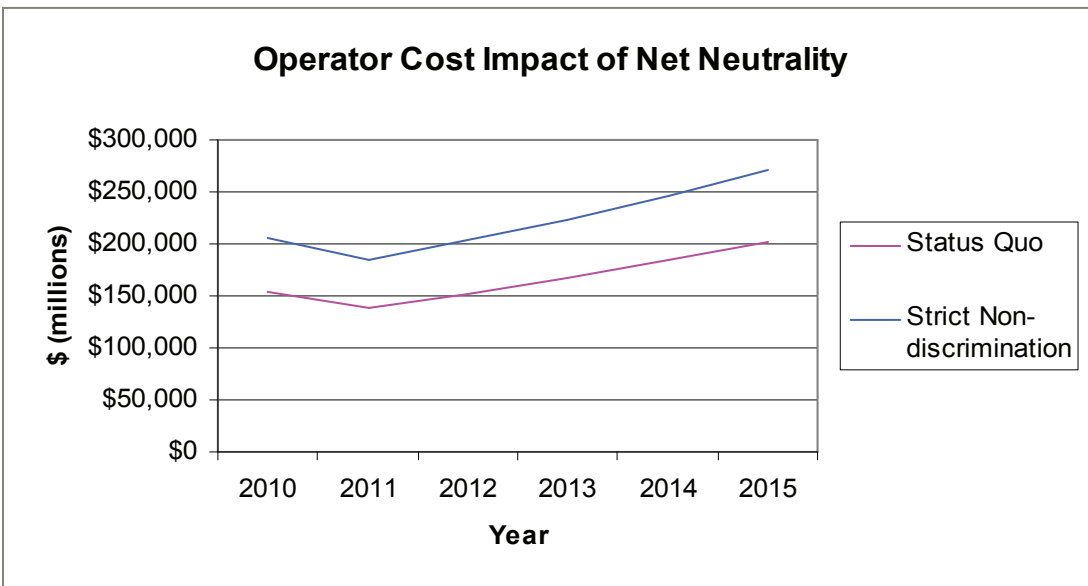
**Figure 6 – ARPU growth as a Function of Net Neutrality**



Source: *Stratecast*

Another major impact of net neutrality, as Figure 7 shows, is that it generally increases operator costs, assuming that the operator continues to invest in network infrastructure rather than simply reducing such investments. As the chart indicates, the most negatively impactful of net neutrality options, strict non-discrimination, would tend to increase operators' costs by anywhere from \$20 billion to \$40 billion dollars annually. These costs would come from increased CAPEX to overbuild the network to accommodate increased demand without the benefits of QoS technologies.

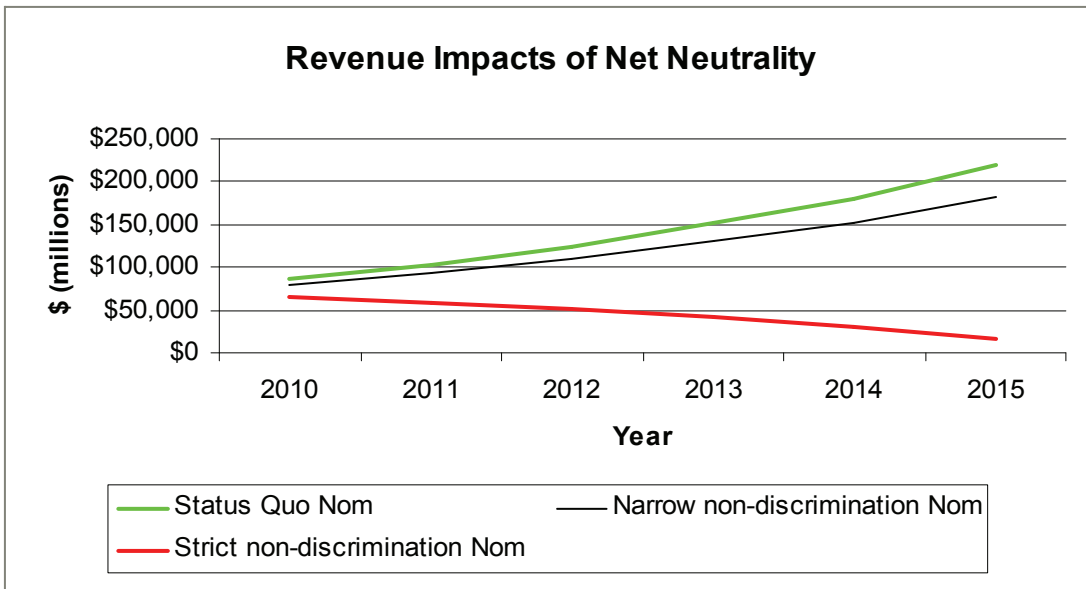
**Figure 7 – Operator Cost Increases with net Neutrality**



Source: *Stratecast*

If it were simply a matter of an extra \$20 billion a year in overhead, operators could reasonably be expected to absorb the increases and might not pass them on to the consumer. However, as noted earlier, the investment decision is a combination of cost and revenue assessment. Figure 8 shows the impact of net neutrality on operator revenue. As can be seen, the influence of net neutrality also has significant impacts on expected revenue. Displaying best case projections for each of the net neutrality options, the loss of operator revenue could still be anywhere from four to five billion dollars as soon as 2011, even assuming that net neutrality conforms to a narrow non discrimination interpretation. Strict non-discrimination would be far worse.

**Figure 8 - Operator Revenues are Reduced with Net Neutrality**



Source: Stratecast

It is the combination of these influences, on cost and revenue, which begin to distort the investment decision. Note, it is not a measure of actual impacts (since such impacts have yet to be experienced); it is the expectation of such impacts that drive the decision to invest.

Yet, this construction assumes that the operator only has the choice to recover investment through the delivery of services that are built on access. In fact, operators can recover their costs through access. As we shall see in the consumer section, this means increasing what is paid for access. There are several ways this could manifest; the operator could simply increase access charges proportional to the lost revenue; it could bundle service offering creatively to increase the contribution to infrastructure recovery (likely reducing the choice offered to subscribers); or it could institute some form of tiered pricing schema that increases the access rates charged to heavy users. In any event, the choice to the operator is simple: either recover the costs associated with building networks or reduce the investment in network infrastructure.

Note, it is not a measure of actual impacts (since such impacts have yet to be experienced); it is the expectation of such impacts that drive the decision to invest.

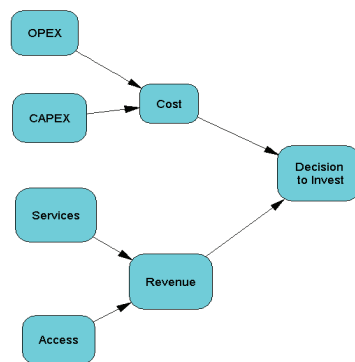
## NON-NETWORK SERVICE PROVIDER INVESTMENT MODEL

Non-network service providers (hereafter, simply, service providers), are those companies which provide network enabled broadband services, but which do not actually build or maintain the distribution networks which they use. Major players in this contingent include Google, Amazon, Yahoo, and other providers of everything from social networking sites to on-line commerce sites. This market, which has been increasing over time, is projected by Stratecast to grow significantly into the future. Stratecast tracking projects that provider revenue can be expected to increase at least 71% by 2015.

However, service provider revenue is not independent: it depends, at least partially, on network operator investment for its growth. After all, there can be no growth in revenue if operators do not enable more subscribers to access services with an acceptable level of service.

Assuming that operators are influenced in such a way as to delay or curtail network investment, it is possible to simulate the service providers' business model in such a way that it includes the influence of network operators. As Figure 9 illustrates, access influences the degree to which service providers can generate revenue. Access is simply the number of accessible subscribers, both consumers and businesses, which have sufficiently high bandwidth and quality of service to make use of the proposed services.

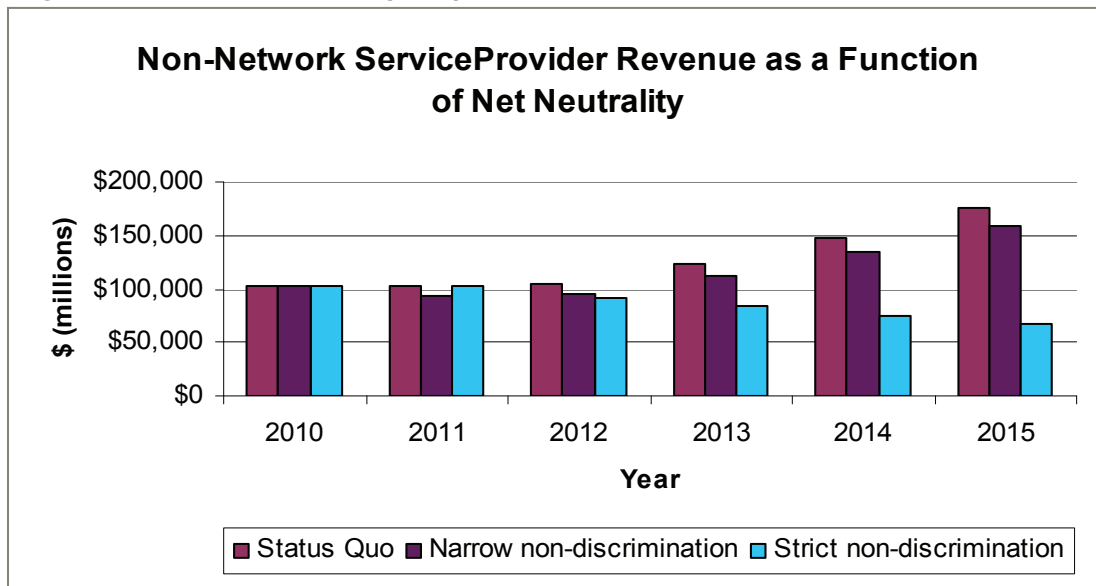
**Figure 9 - Service Provider Business Model**



Source: Stratecast

When the model is used to project the impact to service providers of net neutrality regulations, the following Figure 10 results. As can be seen, net neutrality could represent anywhere from a \$20 billion to \$100 billion dollar reduction in revenue to the networked services market by 2015.

**Figure 10 - Net Neutrality Impact on Service Provider Revenues**



Source: Stratecast

However, the effect of net neutrality is not only to reduce operator revenue, but service provider revenue as well. This is due to the effect that reduced network investment would have on all users of the Internet. As operators delay or curtail infrastructure extensions or upgrades, service providers would also see a more limited market for their offerings.

This, of course, begs the question of why the service providers would advocate a regulatory approach that would ultimately impact their revenues negatively. The answer can be seen in the chart above. In the short term, operator revenues would rise under net neutrality since they would be able to utilize existing networks to deploy additional services. Yet, over time, this is self defeating because it can be expected that service providers will develop services that, ultimately, will be unsupportable on existing networks. Without investment in more capable networks this is likely, eventually.

## ECONOMIC IMPACT MODEL

Perhaps a more important question, however, than the impact of net neutrality on operators and service providers, is the effect it will have on the economy, generally. This is the level of most debate on the subject of net neutrality and frequently is the point where most arguments begin. The idea seems to be that if the overall impact on the economy is positive then it doesn't really matter, in the short term, what the impact will be on operators' revenue and equity.

While the Stratecast model is in no way an economic model<sup>4</sup> it is nevertheless an

<sup>4</sup> It bears noting that a true economic model would be extraordinarily complex and would have to take into account a myriad of variables that this model does not. Such a model, if in fact actually doable, would still be a forecast based on best estimates. This model is, rather, an extension of tracking data collected by Frost & Sullivan and is based on the best estimates provided by network operators under confidentiality agreements.

informed estimation of how operator investments and service provider offerings impact the economy generally. Others have attempted to estimate the economic impact in terms of the number of people directly or indirectly employed by the broadband market. We feel that this is a fair way to approach this question, however, our approach is somewhat different.

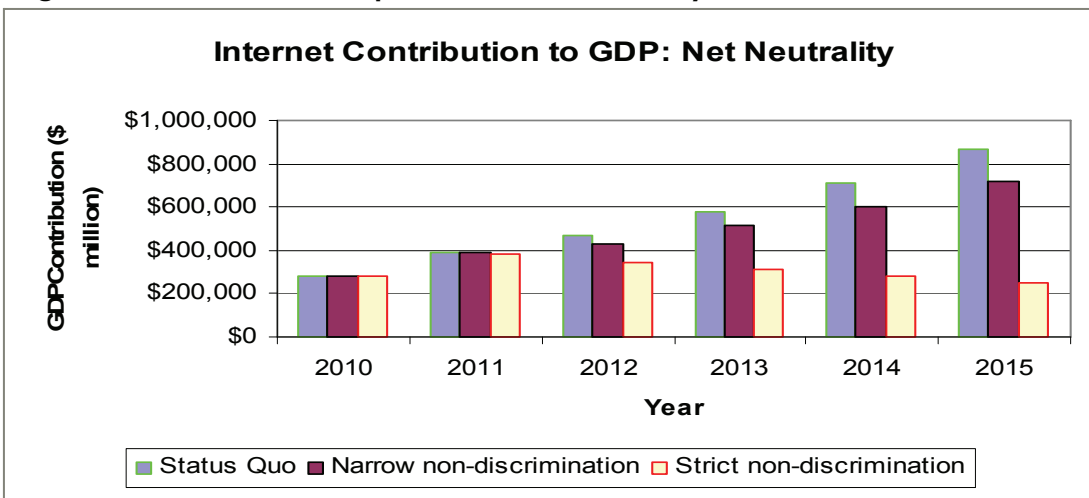
While others have tried to estimate the number of employees for operators and service providers on the basis of the amount of CAPEX deployed by the market, this is not typically how a business thinks in terms of employment. Most businesses tend to look at the amount of revenue generated by an employee and try to scale their work force on that basis. This is the approach we have taken.

When the relative revenues of service providers and network operators are examined, we find that the revenue per employee generated by service providers, who have no networks to support, is sixteen times greater than for network operators. This is not due to any inefficiency on the part of the operator; it is simply that networks are high maintenance operations which require many more employees to maintain service per unit of revenue generated.

Armed with this estimate of revenue generation per employee, it is possible to estimate the number of employees as somewhere between 1.1 and 1.4 million for all service providers and network operators. Using an estimate, commissioned by the Interactive Advertising Bureau<sup>5</sup>, that each Internet job drives at least 1.54 additional jobs within the economy, we can estimate that a total of anywhere from 2.8 to 3.7 million jobs are dependent on the Internet currently. This drives direct and indirect salaries and wages of approximately \$285 to \$370 billion.

When net neutrality is factored in and assuming that the operators choose to decrease investment rather than recover investment from consumers, jobs and the Internet contribution to GDP decline as a result. Assuming a best case with respect to net neutrality's impact on Internet contribution, Figure 11 below is the result.

**Figure 11 - Economic Impact of Net Neutrality**



Source: *Stratecast*

<sup>5</sup> IAB, June, 2009: [http://www.iab.net/about\\_the\\_iab/recent\\_press\\_releases/press\\_release\\_archive/press\\_release/pr-061009-value](http://www.iab.net/about_the_iab/recent_press_releases/press_release_archive/press_release/pr-061009-value)

As can be seen, relative economic contribution of the Internet declines as net neutrality becomes more acute. In 2011 alone, net neutrality could cost the economy anywhere from \$2 billion to over \$7 billion. When expressed as jobs, this translates to as many as 70,000 jobs. As the chart indicates, things get worse from there, although the resolution of model degrades as well. The indication, though, is that as investment slows, the networks necessary to support additional job creation aren't deployed or are deployed more slowly. This leads to a reduction in the number of people needed to deploy them or to develop services to utilize them. It also leads to the reduction of subsidiary job positions that support each of these industries.

## **CONSUMER IMPACT MODEL**

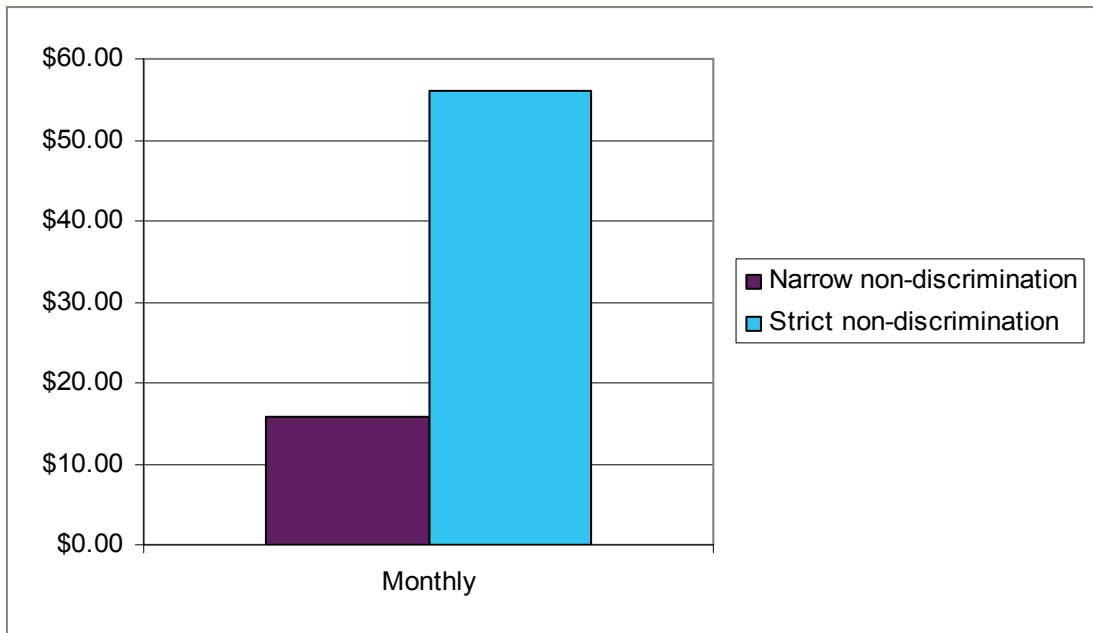
One consequence of net neutrality that is somewhat more complex to assess is the impact on the consumer. Certainly, consumers benefit when they can access a wide range of service options over their broadband connection. For this, they must pay a monthly access charge plus any additional service charges that they incur. For the operator, embedded in these charges is a certain amount of cost recovery associated with network deployments.

Consumers, however, rarely see the composition of the charges they pay. Stratecast research indicates that consumers generally rate the reasonableness of their bill based on the total package of services they receive. As a result, from an operator perspective, it is important to be able to offer a number of services and features over the broadband connection in order to ensure a positive value perception by the consumer.

When operators are denied revenue from services that are packaged with basic access, they are forced to recover their investment strictly on the basis of access. This can have a deleterious effect on consumers, as they are forced to pay more for fewer features or services. While one may argue that in the absence of the operator service package, a consumer could subscribe to similar services from non-network service providers, the model indicates that the overall impact on the consumer would be negative.

In fact, when the operator investment is recovered over a twenty year period of time, the cost to the consumer can be extreme. As Figure 12 below illustrates, the impact of net neutrality, depending on the form it takes, can vary between an extra \$10 a month to as much as \$55 a month.

**Figure 12 - Consumer Cost Impact of Net Neutrality**



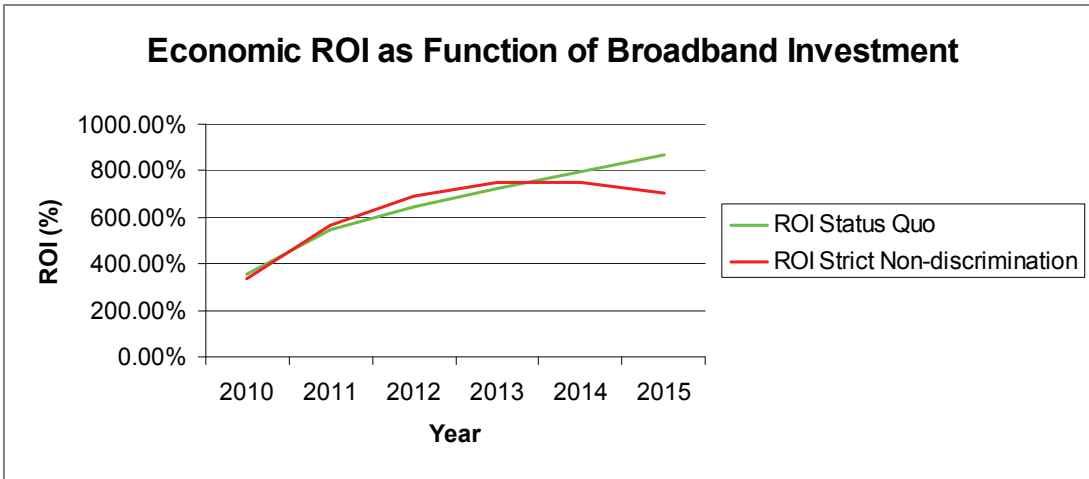
Source: *Stratecast*

Of course, this does not mean that an operator would necessarily need to pass additional costs along to the consumer; the operators could simply choose not to invest. In such a case, there would be no costs to recover since the networks would not be deployed in the first place. Another option would be to charge those consumers who use the network more, in effect implementing tiered pricing, in which case, the average consumer would not see this extreme increase in access rates. However, this does indicate that if net neutrality had the effect of denying service revenue to the operator, it is likely that some consumers would experience higher access charges as a result, assuming that the operator continued to deploy networks.

### **ASSESSING LOST OPPORTUNITY ASSOCIATED WITH NET NEUTRALITY**

Assessing lost opportunity is a difficult exercise when dealing with something as pervasive as the Internet. However, it is possible to assess the return on investment from a total economy perspective. In other words, if the economy is viewed as a business undertaking, what would the return be for the investment in broadband infrastructure under the various net neutrality scenarios? Figure 13 shows the result of plotting the return as a function of the investment. As can be seen, for the extreme case of strict non-discrimination, the return on investment tracks pretty closely to status quo for the first several years then begins to exceed status quo. This is a rational outcome since during the first few years, the networks would be sufficient to provide new services with existing capacity: additional revenue could be generated with what is available. Ultimately, though, without the infusion of additional capacity and speed necessary to support innovative new networked services, the economy begins to shrink.

**Figure 13 - Net Neutrality Impacts Operator Investment**



Source: *Stratecast*

In fact, this curve should look familiar to anyone who studies taxation. Net neutrality influences investment and economic contribution exactly like an increasing tax. And, at some point, that tax begins to destroy the ability of the broadband industry to contribute. While that exact point is less clear, this chart indicates that it could be as soon as 2013.

## Stratecast

### The Last Word

**Network neutrality is a phrase that sounds good on the surface.** In fact, the basic concept may be a good idea. It is the interpretation of the concept into rules and regulations that causes problems. **As this paper shows, if net neutrality is interpreted in such a way as to provide disincentives to operators to invest in network infrastructure, the result could be a significant impact on the economy over time.**

**Such an economic impact would be felt primarily as a decrease in the jobs that are supported by a robust Internet infrastructure.** Assuming a best case scenario, with minimal regulatory impact, net neutrality could still impose a seven billion dollar a year overhead on the economy by 2011, with a commensurate loss in jobs of up to 70,000.

**Ironically, the purpose of net neutrality regulation, to ensure a level playing field, would largely be trumped by the fact that both network operators and service providers would be harmed by such regulation.** Network operators would be harmed directly and immediately as their opportunities to generate increased revenues from subscribers became attenuated. In fact, operators would be given the choice of recovering costs from consumers, either by increasing access charges, bundling services in such a way as to force contribution or by adopting tiered access rates, depending on consumption. In the absence of cost recovery operators could simply refuse to invest or slow their investment in improved or more extensive infrastructure. This would harm service providers who depend on the network to deliver their services. **Most analysis that shows positive benefits to the service providers simply assume that operators will continue to invest; an outcome that Stratecast models throw into doubt.**

**Ultimately, though, it is the consumer that would be most harmed by net neutrality regulation.** Decreased network capability, over time, would deny consumers new bandwidth intensive services, both from operators and those who provide services over the operators' networks. Additionally, as operators increasingly turn to access charges to support network deployment and management, the charges for that access could increase anywhere from \$10 to \$55 a month for the average consumer. The price of access would increase to the point where consumers might be unwilling or unable to pay it. This could have the effect of discouraging consumers to connect – an ironic turn of events when the objective is universal broadband access.

Although, this study is based on a model of future behavior, it would not be wise to discount its implications. **Net neutrality regulation that is constructed in a way that ignores the fact that broadband investment is highly sensitive to uncertainty and risk, could easily curtail or greatly slow the deployment of improved infrastructure necessary to support ubiquitous broadband.**

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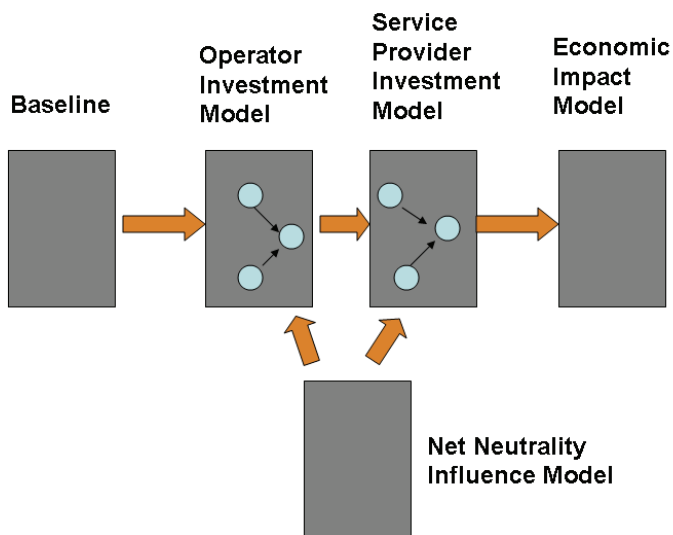
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## APPENDIX: NET NEUTRALITY MODEL

In order to assess net neutrality impacts, we must model the financial behavior of both the operators and service providers. These models must start from real market data, and for that we utilized Frost & Sullivan market tracking data. As Figure 14 illustrates, this model is composed of several discrete sub-models, each of which defines a discrete decision space.

Each of the sub-models depends on projecting behavior into the future, which can be uncertain. In every case where this was done, uncertainty was built into the projections in terms of a confidence interval. In most cases, an attempt was made to reduce uncertainty to less than plus or minus 10%. There were, however, several instances where such certainty could not be achieved and as a result that uncertainty interval was necessarily wider.<sup>6</sup>

**Figure 14 - Model for Assessing Net Neutrality**



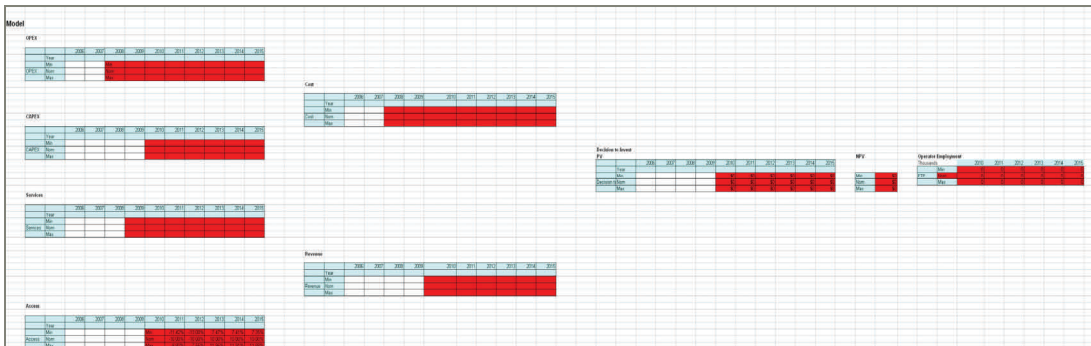
Source: Stratecast

In general terms, the Frost & Sullivan tracking data, along with telemetry collected from the network operator community over several years establishes a baseline that can be used to project a status quo behavior pattern. Armed with this baseline, it is possible to build influences onto those curves using standard business case metrics. In the case of the operator model and the service provider model, conventional business cases were built with net neutrality influences added as scalar values within the appropriate variables.

<sup>6</sup> In most cases where graphs are shown, the uncertainty band has been removed for clarity and only the nominal or average value has been displayed. This is why most values cited in the text are in terms of maximum differentials.



**Figure 16 - Service Provider (non network) Financial Model**



Source: Stratecast (Values excised due to non-disclosure agreements)

Finally, the operator and service provider models provide input to an economic model, which also includes consumer impacts. In this case, rather than trying to model to any great depth, we focused instead on the direct impact of wages and salaries that result from the Internet and those service providers that use it. We also looked at the impact of incurred costs on consumers.

The result is a set of interconnected numerical models that seeks to project investment decisions and their implications five years into the future. The level of uncertainty at that range is rather high and so exact numbers are avoided in this paper. However, the level of confidence is sufficient to support binary assessments: that is, will an outcome be generally higher or lower, better or worse, than another outcome. This model's resolution is sufficient to make those assessments. It is not, however, sufficient to compute exact dollar differentials. Trying to do so for a market as diverse and dynamic as telecommunications, is probably not a reasonable expectation in any case, since the market depends so heavily on technology, which can achieve unpredictable quantum jumps.

The important point here is that the model attempts to assess the sensitivity of the market to one particular externality: net neutrality regulation. There are many others and consequently a great deal of noise to try and exclude. However, within the limits this exercise imposes on confidence, Stratecast believes that it provides a reasonable insight into the thinking processes of network operator business analysts who are charged with making investments that are in the best interests of their shareholders.

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