

# Keeping the internet open: A crucial balancing act

There is nothing neutral about “net neutrality.” It is one side of a conflict of business interests.

**Regulation must balance** the needs of the internet with the needs of the network, keeping the internet free from harmful dominance at any level – not just access. To do this, understanding the importance of **network management** is crucial.

## Closed applications a growing problem

► The internet is open because it consists of interoperable packet switched networks. But the openness of the internet can be limited by the use of internet-based applications that lack interoperability.

Net neutrality policies do not foster the openness of the internet in the actual moment when internet applications are being used. Internet-based communication applications such as VoIP calls lack interoperability, restricting them to a specific internet application provider.

A dominant position at application level without interoperability results in closed environments and enables the provider to leverage its dominance. This is because end users using a “closed” application cannot interconnect with another user using a competing provider’s VoIP service. To connect, one of these users must change their application provider, in the long term reducing the number of providers in the market to just one.

► **THE INTERNET** was created in an academic environment where basic knowledge transfer was the “killer app,” and not in a dynamic commercial world where real-time video and gaming are highly valued. Given its genesis, it is not surprising that the system was designed without any guarantees that data is delivered or that a user is given a guaranteed quality of service or a certain priority. This type of treatment is referred to as “best-effort” delivery and means that when there is congestion in the network some packets are randomly queued or dropped; the importance of any one packet is irrelevant. The fact that packet importance is never considered is often touted as the crucial virtue of the internet. It appeals to the egalitarian credo on which the best-effort paradigm is based. To date, the best-effort paradigm has been good enough for most purposes, especially where capacity has been plentiful.

However, network operators have long struggled with delivering a certain quality of service (QoS) in a best-effort environment. Operators have implemented numerous work-arounds such as over-provisioning capacity or establishing tunneled Virtual Private Networks (VPNs) for corporate networks to avoid the negative effects of queuing. These work-arounds are not a sustainable solution. As internet usage increases and time-sensitive content such as music and video proliferate, the shortcomings of the best-effort paradigm are becoming increasingly apparent. Operators seek to avoid queuing and dropped packets – the more obvious symptoms of degraded service for time-sensitive applications – but they are not always successful, nor are their efforts sustainable.

Operators are also feeling competitive pressures to meet the QoS requirements of advanced applications, as well as to set aside capacity in networks for themselves so they can differentiate their own services from best-effort delivery mechanisms. Moreover, as capacity pressure grows on the best-effort internet, ISPs,

network operators and policy makers are looking for a way to ensure that poor service quality does not become the norm.

The net neutrality debate in general encompasses two schools of thought, with one side focused on preserving the way things have been, and the other looking towards how things could be.

Those focused on preservation say that the current best-effort-based character of the internet is critical to maintaining openness and to ensuring that consumers have access to the content they desire. They also assert that any change to the status quo will thwart continued innovation and creativity in the market.

Meanwhile, those looking ahead want to mitigate what they perceive as an increasing imbalance in the risk/reward ratio, which they say undermines network modernization and capacity expansion projects. They argue that the best-effort paradigm must change for two reasons. First, not all data packets are created equally – some applications, such as telemedicine, should be given priority over others. Second, not all bandwidth users are created equally. Ten percent of consumers use 90 percent of network capacity<sup>3</sup>, which means that low and moderate users effectively subsidize high-capacity users.

The central consideration should be how to balance the needs of the internet with those of the network so that both can adapt and grow to meet the increasing demands of consumers. Policies that permit operators to employ reasonable network management practices – including competitively neutral discrimination of packets – ensure openness and fairness and will support the growth of networks for the benefit of all.

## NETWORKS MUST BE MANAGED

Bandwidth is not an infinite resource. To provide quality services, operators must take steps to allocate it among users. This process is referred to as traffic manage-



ment, and it is not a new concept. Operators have various sophisticated tools at their disposal to manage usage and to combat congestion in the network. These tools include prioritization of data packets in the interest of better overall flow. Traffic management is essential to resolve issues such as:

- ▶ **Packet loss** – which occurs when oversaturated network elements drop packets, causing the receiver to request retransmission and contributing to congestion
- ▶ **Latency** – which refers to delays in packet delivery due to distance and queuing
- ▶ **Jitter** – which refers to variable latency caused by congestion.

All of these issues detract from the user experience. As networks become more

congested, reliance on tools that can deal with them will be even more necessary.

Opponents to traffic management techniques ignore the fact that traffic management is a widely accepted tool for allocating resources in other contexts. Transportation systems are prime examples of where traffic management is deployed for the common good and accepted by all. To manage road traffic, societies have devised explicit rules of use that prevent misuse, confusion and collapse of the roadways. Traffic lights, stop signs, dedicated lanes for public transportation services, and special rules for emergency vehicles ensure that traffic runs smoothly and more important uses are prioritized.

The internet is not so different. Like roadways, the internet is a system of transport that allows information to travel from one destination to another. There should ▶

“Regulation should not be developed to prospectively address hypotheticals. The discriminatory practices alleged [by net neutrality proponents] are not occurring in the market, but if or when they do, we [regulators] already have the tools to address them quickly and decisively.”

DOUGAL SCOTT, DIRECTOR OF POLICY DEVELOPMENT, OFCOM, UK, MAY 2006



► be – indeed, must be – rules of the road that allow for this resource to be accessible, prevent it from being misused, and permit operators to use network management techniques to prevent system overload and congestion. Network management should be reasonable, permit prioritization, and preserve the internet’s openness.

Traffic management must be rational, reasonable and transparent. Internet users are skeptical, and rightly so, of network management schemes that appear to be arbitrary or heavy-handed.

**REASONABLE TRAFFIC MANAGEMENT IS CHARACTERIZED BY:**

- **TRANSPARENCY** Consumers must be adequately advised about the products and services they purchase so that they can make the choice most appropriate to them. They must be advised about elements such as relevant rates, terms and conditions, or any limitations that apply.
- **CONSUMER CHOICE** Consumers should be able to access the legal content and applications of their choosing so long as doing so does not harm the networks they are using. In addition, management policies that allow for tiers of service enable consumers to purchase according to their priorities. For instance, a consumer that has no use whatsoever for real-time video might prefer a lower priced service offering in which no priority is given to video conferencing streams or over-the-top video.
- **COMPETITIVELY NEUTRAL BEHAVIOR** Service providers and others in the internet value chain must act responsibly and not abuse their market dominance. One way to do this is to prohibit anti-competitive discrimination of traffic. Governments have various tools at their disposal to redress instances of anti-competitive or in other ways harmful behavior. These tools include, but are not limited to, consumer protection laws, anti-trust laws, and case-specific enforcement by regulatory and competition authorities. Other than a blanket ban on anti-com-

petitive discrimination, policy makers should not seek to impose a system of controls prior to any demonstrated abuses because, in the absence of a specific harm, they are likely to get it wrong.

**PRIORITIZATION IS NOT THE ENEMY**

Traffic management should also permit prioritization. Packets can be divided into degrees of importance based on the source, content, and purpose of the information being transmitted. A system of prioritization that addresses these needs is in the best interest of consumers.

For example, certain types of applications benefit from prioritization. The prioritization of voice, video conferencing, and IPTV services to eliminate packet loss, latency, and jitter enable operators to maintain the quality of these services. This is why these applications are designed for an end-to-end managed environment, i.e. packets created by these applications obtain specified bit rate and delivery time, independent of the current traffic load in the best-effort internet delivery mechanism. Not all services are as sensitive and can be assigned different classes of prioritization.

Similarly, information from certain sources may be of higher value than other information. Emergency call services and remote health monitoring can generate packets that are a matter of life and death.

There may also be legitimate commercial reasons to justify managing traffic according to a specific priority paradigm. For example, managing traffic to optimize high-definition videoconferencing has distinct commercial uses and advantages. The commercial freedom to deliver the best service possible is a cornerstone of competition. A prohibition of all traffic management at the access level is arguably an expropriation of network assets: investors in network infrastructure and capabilities cannot differentiate their service quality beyond best effort so they cannot maximize the value of the time, money, and effort they have invested in their networks. By ensuring that operators have the incen-

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tive to invest in their networks, prioritization will continue to promote competition and innovation.

#### WHAT OPENNESS CAN'T MEAN

Like the term net neutrality, the term "openness" is used in various ways by various advocacy groups. Some argue that the openness of the internet, i.e. the non-discriminatory internet architecture, has been the fundamental driver of innovation, creativity, and communication and that appropriate legal, regulatory, and/or market mechanisms must be crafted to keep it this way.

Openness should refer to freedom from anti-competitive behavior (where dominance exists) throughout the internet, including the content, application, search engine, operating system, and access levels. Individuals should have transparent access to the lawful content and applications of their choosing.

Openness, however, should not be interpreted to mean that a best-effort over-the-top casual media viewing experience should be afforded the same priority as an e-health video session with a doctor when those two experiences share bandwidth supplied by the same operator.

By the same logic, non-discrimination would imply, for example, that all internet search results should be returned and represented in a neutral ranking order without the commercial freedom to assign priority or higher ranking to advertising-sponsored results. Net neutrality policies such as these do not guarantee openness to content.

So, what about the risk of stifling innovation? Information access on the internet is an amazing innovation, but the full breadth and depth of the digital information revolution goes far beyond just web surfing. To view the information revolution as principally about the ability to access text or video information more easily is to only see the tip of the iceberg. Innovation beyond the internet itself is a different and more wide-ranging challenge, in part because the scale of the problem

and the resources needed for progress are so much larger.

#### KEEP INCENTIVES TO FUND THE FUTURE

Both the way the internet is used and the content it communicates have changed dramatically since its creation. It is now much more about media content than simply peer-to-peer communication. However, the rules governing the internet have not kept pace. It can no longer be viewed as an academic innovation. Going forward, the internet must, among other things, adapt to accommodate the predicted growth in consumer demand spurred by an appetite for more video-based applications.

Cisco's Global IP forecast (June 2009) has produced some interesting statistics:

- ▶ Global IP traffic will quintuple from 2008 to 2013.
- ▶ Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 40 percent.
- ▶ Global internet usage in 2013 will be nearly four times larger than in 2009.
- ▶ By the end of 2013, the video content equivalent of 10 billion DVDs will cross the internet each month.
- ▶ Internet video, excluding video files exchanged through P2P file sharing, now equals one-third of all consumer internet traffic.
- ▶ The sum of all forms of video (TV, video on demand, internet and P2P) will account for more than 91 percent of global consumer internet traffic by 2013.
- ▶ Internet video alone will account for more than 60 percent of all consumer internet traffic in 2013.

By 2020, Ericsson expects to see 50 billion connected wireless devices.

To cope with this growth in traffic, large-scale upfront investments are unavoidable. This challenge must be faced in many ways: by device vendors, by those working with services and network components, and in the highly competitive and innovative global R&D process (undertaken



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► by various market players, such as the chip, software and hardware players).  
 However it does not stop there. The next vital step is putting these networks and devices in place and operating them on a daily basis, thereby making them available to end users. The first question is not who will do that – but rather what are the investment conditions under which any organization is willing to commit to these expenditures?

This is what the net neutrality debate is really about: the conflict of business interests that arises from prevailing business models in content, internet applications and network operator markets. Net neutrality, as it turns out, is not so neutral after all. From this perspective, the fundamental question is how to solve the equation of supply of capacity (investments in networks) with demand for capacity (e.g. video).

**THE DANGER OF RESTRICTIVE RULES**

The internet has changed dramatically since its inception. It is no longer an academic tool for sharing basic information files among a select group of users. Today, it is so much more dynamic – and, yes, open. It allows more than 1 billion people from around the world to make and sustain multimedia-based social and commercial connections. If growth is to continue, however, tremendous investment in network capacity, network modernization and network intelligence is crucial.

Network investments require a policy environment that fosters innovation both as it exists today and in future, yet unimaginable, ways. For this reason, policy makers must be receptive to innovations in their policies. After all, what worked in the past, may not work in the future. Policy makers need to adopt policies that support a competitive and dynamic environment for content, applications, search engines and networks.

Moreover, policy makers should accept traffic management practices that are reasonable, transparent, and that permit competitively neutral prioritization of content

according to a system of classification. A one-dimensional view of the internet – one that holds that all network management is bad and that the idea that prioritization is synonymous with anti-competitive and anti-consumer intentions – is simply wrong. To ensure that network operators have the incentive to continually upgrade network capacity, those operators need to be certain that investments can achieve their highest value. Overly restrictive rules regarding network management can thwart operators' willingness to put money into network expansion.

Net neutrality is about traffic management and not about the openness of the internet, which is what basically guarantees an internet free of harmful dominance at any level: content, applications, search engines and operating systems, as well as access. ●

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