Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matters of:	)	
	)	
Petition of Free Press et al. for Declaratory	)	
Ruling that Degrading an Internet	)	
Application Violates the FCC's Internet	)	
Policy Statement and Does Not Meet an	)	
Exception for "Reasonable Network	)	
Management"	)	WC Docket No. 07-52
	)	
Vuze, Inc. Petition to Establish Rules	)	
Governing Network Management Practices	)	
by Broadband Network Operators	)	
	)	
Broadband Industry Practices	)	
	)	

COMMENTS OF ROBERT M. TOPOLSKI

Robert M. Topolski
As a private individual and
customer of Comcast Corporation
2345 SE 55th Avenue
Hillsboro, Oregon 97123-8145
(503) 407-4499
robb@funchords.com

February 28, 2008

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matters of:	)	
	)	
Petition of Free Press et al. for Declaratory	)	
Ruling that Degrading an Internet	)	
Application Violates the FCC's Internet	)	
Policy Statement and Does Not Meet an	)	
Exception for "Reasonable Network	)	
Management"	)	WC Docket No. 07-52
	)	
Vuze, Inc. Petition to Establish Rules	)	
Governing Network Management Practices	)	
by Broadband Network Operators	)	
	)	
Broadband Industry Practices	)	
	)	

COMMENTS OF ROBERT M. TOPOLSKI

I am a customer of Comcast Corporation, subscribing to both their High-Speed Internet service as well as a mid-level television package. I am one of the Comcast customers whose testimony appears attached on the original Free Press petition as I directly observed, researched, and documented the Comcast interference with Peer-to-Peer (P2P) File-Sharing protocols.

The Petitioners in this case have laid out excellent reasons why the FCC should reject Comcast's claims that its method of "Network Management" is reasonable. Should you still have any doubts, one need only reexamine their Petition[1] and their pre-hearing Comments[2] to be reminded of them.

As a Comcast customer, my sense of reasonableness is violated because:

[1] http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6519825121
[2] http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6519841216

1. I was prevented (not merely ‘delayed’) by the Comcast interference from uploading unique content to the Gnutella file-sharing network. Comcast’s own statements indicate their Network Management is “reasonable” because, they say, it does not prevent the customer from uploading. Yet I was completely and constantly blocked from uploading to the Gnutella network. Those wishing to download the files I was offering were prevented as I was
2. I was authorized to distribute that content. It was not subject to copyright laws, and uploading it was not prohibited by any agreement or policy enumerated by Comcast. Indeed, Comcast still says in their public statements and FCC filings that users are free to upload and download using P2P applications and protocols. My upload speed limits were set at a low level, sufficient to prevent any interference with my neighbors sharing our pool of upload bandwidth. Performing authorized communications over a network in a manner that does not impact others should not be prevented by any Network Management that is “Reasonable.”
3. The Comcast interference prevented me from uploading that content 100 percent of the time, 24 hours a day, 7 days a week each and every time I attempted to do so. Comcast says that one reason its network management is “reasonable” is because it only happens in specific geographical areas during periods of high network congestion. The interference did not appear, disappear, or adjust in response to changing network conditions which, one should presume, would normally occur throughout the course of days and weeks. By their own standards, therefore, the interference was not “Reasonable.”

4. The Comcast interference involved forged packets making it appear as if the prevention involved either a network or programming error being detected by my distant peer, when in fact no such error existed. This forgery misled me to initially assume other factors were at fault, such as my own configuration settings, a coding error in my P2P software application, or my residential router. Indeed, the use of the TCP abort (RST) flag by something other than an endpoint is so unusual, that it took me several additional weeks to zero in on the real culprit: a Sandvine device installed on Comcast's network. One should be highly skeptical of any claim of "Reasonableness" that involves outright forgery of packets that deflect responsibility onto someone else.
5. The use of the Sandvine device was so secret, that Comcast's own end-user customer support personnel knew nothing about it until after the story broke in the press. As nobody in Customer Support knew about this device, it was impossible for an end-user like myself to call in and get Technical Support to deal with the issue of not being able to upload. Comcast's back-end technical staff still refuses to talk about it except through the use of pseudonyms and private messages, and the company has imposed gag orders on all of its personnel except for authorized spokespersons and executives. Even Sandvine Corporation itself refused to confirm or deny that Comcast was a customer, despite already existing PR and Marketing material touting the fact. Measures that are "reasonable" should not require such a degree of secrecy.
6. In response to the nearly universal condemnation of Comcast's actions, as well as the upcoming FCC hearings, Comcast did change its Terms of Service documents

to – very generally – acknowledge that it discriminates against P2P protocols. However, that dramatic modification to the Terms of Service – supposedly documenting a usage agreement between Comcast and its customers – was done without any notification to the customers. A company acting in a "Reasonable" manner would have the decency (if not the duty) to point out significant changes that it is making to its Terms of Service.

7. Comcast still has not revealed exactly what it is doing, leaving it to the customers, media, and the FCC to make its own conclusions based on outside discoveries. For example, we still do not know:
    a. How many periods of congestion have been encountered that required the use of their technology to "delay" P2P connections?
    b. How long have these periods of congestion lasted?
    c. How many connections were interrupted?
    d. When did Comcast begin using this device to manage P2P connections?
    e. What exactly should P2P enthusiasts do to lessen the impact on the Comcast network and avoid interference from Comcast to uploads?
    f. Aside from certain P2P protocols, what other protocols are affected?
    g. If a user cannot upload at all, when Comcast's own statements indicate that uploading is merely limited, then what is the pathway to technical support and what service should the user expect in terms of Comcast investigating the problem and providing a resolution?

    It is not "Reasonable" for Comcast to expect customers to figure out this information for themselves. Indeed, a key element to Comcast's approach to

managing P2P was to do everything possible to prevent customers from figuring out that their P2P performance problems were being caused by Comcast.

8. And, finally, Comcast has (belatedly, but still incorrectly) explained that their congestion management is "Reasonable" as it allows uploading to occur, but simply on a limited basis. The evidence, however, is that Sandvine Corporation recommends settings that allows each user an average of <u>less than one</u> uploading connection when BitTorrent, acting normally, usually uses four. Sandvine Corporation gives its ISP customers the following instruction:

> *Limits set to zero have a more noticeable effect than do limits of 100 connections (which will allow a few unidirectional uploads to occur). Zero limited also make achieving the desired "etiquette" ratio nearly impossible, but save the most upload bandwidth, while limits of 100 allow the ratio to be slowly achieved, at the expense of some upload bandwidth. Choosing a specific limit is difficult with BitTorrent because it uses bandwidth very aggressively. For example, limiting the average number of unidirectional uploads per host from four to one will not save any bandwidth because the single remaining flow will use just as much total bandwidth as the four original flows. In general, to achieve any savings, the limit must be selected such that there is on average less than one unidirectional upload per seed.*[3]

A real user does not establish fractions of connections or fractions of uploading flows, they have a count that can only be expressed in integers. The impact on an end user of the above advice is that each customer's participation in uploading to a P2P swarm must be reduced from an average of four flows constantly uploading to very occasionally allowing one flow to upload a little. Otherwise, as Sandvine correctly observes, no bandwidth is saved. And how much bandwidth should the

[3] Sandvine Corporation Application Note entitled Session Management: BitTorrent Protocol - Managing the Impact on Subscriber Experience, December 2004, Page 2 (entire file Attached in FCC Commenting System)

ISP be expected to save by such interference? Again, Sandvine provides the answer in a Case Study[4] (one that is not available to the public on its website except by request):

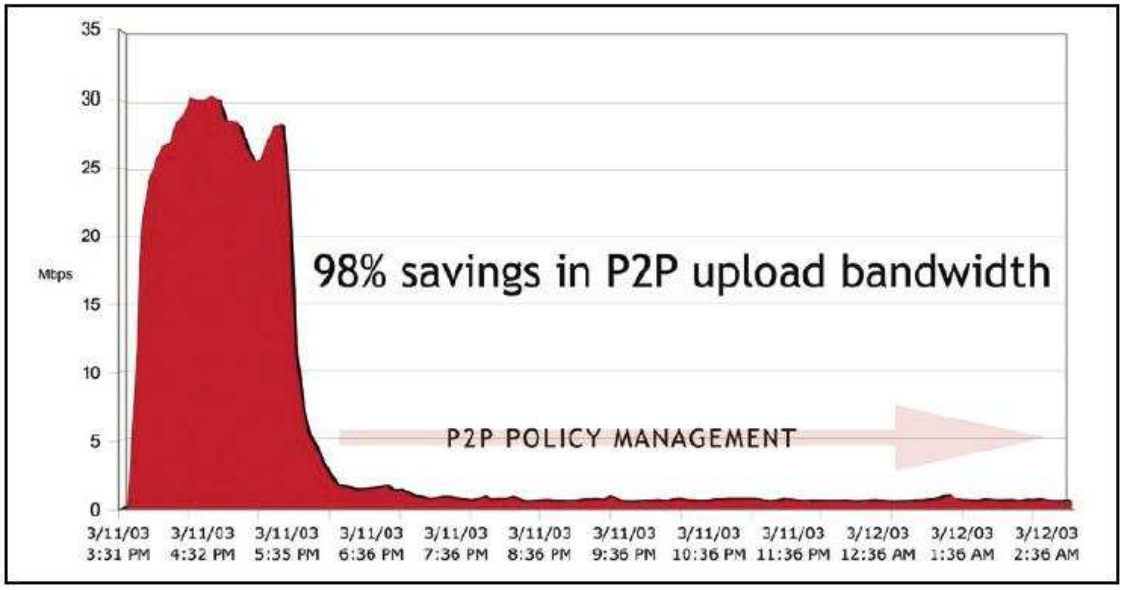


Figure 1: Improved bandwidth utilization with P2P Policy Management (1 uBR)

These final points explain the reason for Comcast's secrecy – entirely blocking or blocking 98 percent of customer uploads is so severe that nobody would consider it "Reasonable."

IN SUMMARY, the Petitioners and those providing comments have proven that Comcast's attacks on P2P applications, protocols, and upon the free speech and artistic expressions of its users are not "Reasonable Network Management" and do not comply with the 2005 FCC Policy Statement on Network Neutrality. Therefore, the FCC should act immediately to stop the ongoing damage by enjoining Comcast from interfering with any customer communication except as expressly permitted by IETF documents that are

[4] Sandvine Corporation Case Study- MSO Success Story: Reducing the impact of file-sharing traffic with Sandvine P2P Policy Management, Page 3, with PDF modification date of 5/12/2003. (entire file Attached in FCC Commenting System)

recognized with the “Internet Standard” qualification, except as permitted in advance by the FCC following a period of public disclosure and comment. The FCC should additionally move forward toward enacting the other reliefs requested and demanded in the Petitions of Free Press et.al. and Vuze without delay.

/s/ Robert M. Topolski

_____

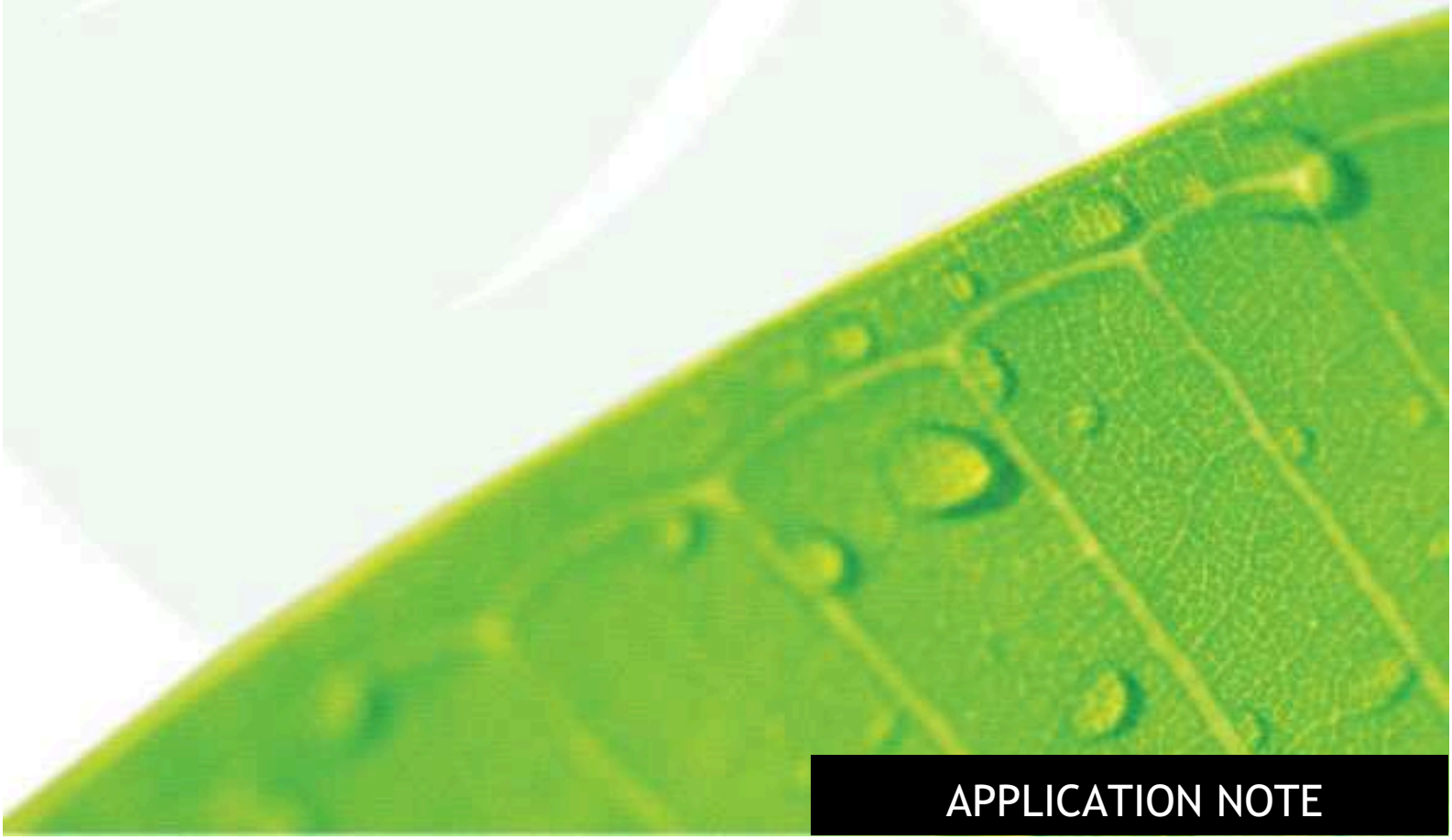
Robert M. Topolski
As a private individual and customer of Comcast Corporation
2345 SE 55th Avenue
Hillsboro, Oregon 97123-8145
(503) 407-4499
robb@funchords.com

February 28, 2008

sandvine
Intelligent Broadband Networks

Session Management: BitTorrent Protocol

Managing the Impact on Subscriber Experience



APPLICATION NOTE

The BitTorrent Protocol

Developed by programmer Bram Cohen, BitTorrent is an increasingly popular peer-to-peer file distribution protocol that is designed to encourage users to upload content while they are downloading. This ensures that there are always sources of content, allowing the network to flourish.

To encourage users to upload, BitTorrent rewards uploaders with an enhanced download performance, while it penalizes users who do not upload by limiting their download rate.

BitTorrent users find sources of content through the use of "trackers". Trackers allow the BitTorrent user to locate sources of content on the network. Upon connection to another BitTorrent user, a bitfield exchange occurs indicating which "pieces" of the file each host has available. The bitfield identifies each client as one of the following types:

- *Leecher* – a client has not downloaded the entire file and is downloading and uploading simultaneously
- *Seed* – a client who has already downloaded the entire file and is uploading only; there is no need for this client to download additional content.

Leecher-to-leecher transfers are bi-directional (upload and download); leecher-to-seed connections are unidirectional (upload or download, not both).

For more details about the BitTorrent protocol, refer to the online protocol specification found at http://bitconjurer.org/BitTorrent/protocol.html.

Session Management for BitTorrent

The primary goal in implementing Sandvine's session management policy is to decrease upstream bandwidth without impacting the subscriber's experience.

With this goal in mind, the direct relationship between upload and download makes BitTorrent particularly challenging to manage. Limiting the upload bandwidth too much has a negative effect on the subscriber's ability to download and may result in increased calls to the help center.

Session management provides the flexibility to set the number of connections that are allowed between network regions (internal vs. external for example). Setting this value to zero blocks all connections of the specified type, either unidirectional or bi-directional. The provider may choose the policy that best meets their network management objectives.

The following sections outline the options that Sandvine has available with respect to the different connection types created by BitTorrent clients and the impact of session management to the subscriber's ability to obtain content.

1. Tracker Connections

Tracker connections are not managed. Bandwidth savings are negligible and limiting these flows leads to subscriber complaints. It is rare that an attempt to connect to a tracker fails naturally, so the subscriber sees this immediately.

As these flows are not session managed, there is no impact to the subscriber.

2. Unidirectional Flows

Unidirectional flows occur when a BitTorrent client makes a complete set of data available to other BitTorrent users and has no need to download additional content. This user is referred to as a "seeder". In cases where a subscriber is a "seeder" and uploads content to an off net "leecher", session management is an effective strategy.

As there is no need for a seeder to download additional content, the subscriber may be session managed without negative impact. This is the default behaviour for Sandvine's session management policy and limits *external* leechers from connecting to *internal* seeds.

Internal leechers are allowed to connect to both *internal* and *external* seeds unhindered and therefore experience no degradation in their on-line experience.

3. Bi-directional Flows

Bi-directional flows occur when two clients connect and each requires content that the other host has available. Both clients are simultaneously uploading and downloading.

This type of connection is extremely sensitive to session management, as blocking this type of connection directly impacts the subscriber's ability to obtain content.

Although limiting bi-directional flows result in a greater reduction of bandwidth, this strategy is not recommended under most conditions. If utilized, broadband service providers should be aware that it is highly likely that subscriber downloads will be affected.

BitTorrent Etiquette

It is considered proper BitTorrent etiquette to seed until the upload-to-download ratio has reached at least 1:1 (i.e. upload as much data as you download). In some cases, this ratio may be attained before the subscriber obtains a complete set of data.

The following factors impact the subscriber's ability to maintain proper BitTorrent etiquette:

Size of Deployment/Peering Configuration

Large deployments have more internal-to-internal and internal-to-peer network connections; therefore the seeding may be done between the internal seed and internal or peer network leechers.

The Limit Policy

Limits set to zero have a more noticeable effect than do limits of 100 connections (which will allow a few unidirectional uploads to occur). Zero limited also make achieving the desired "etiquette" ratio nearly impossible, but save the most upload bandwidth, while limits of 100 allow the ratio to be slowly achieved, at the expense of some upload bandwidth. Choosing a specific limit is difficult with BitTorrent because it uses bandwidth very aggressively. For example, limiting the average number of unidirectional uploads per host from four to one will not save any bandwidth because the single remaining flow will use just as much total bandwidth as the four original flows. In general, to achieve any savings, the limit must be selected such that there is on average less than one unidirectional upload per seed.

Credit System

Some trackers employ a credit system to increase the "leech resistance" of the protocol. BitTorrent clients report their download and upload statistics when they connect to a tracker. The tracker keeps a record of each host and their overall upload to download ratio (for all files). If the ratio is poor, the tracker stops or limits advertising that host as a source to other hosts, which impacts the download performance.

Subscribers who connect to trackers that use the credit ratings may be affected if they are simply unable to share content or they share content so slowly that they do not maintain a good ratio. It is recommended that the *limit policy* be configured to allow for a balance between bandwidth savings and subscriber impact.

For the most up-to-date information on managing the effects of this and other P2P file sharing protocols on your network, visit www.sandvine.com.

Sandvine's award-winning network equipment helps broadband service providers better understand subscriber behavior, recognize and address network threats, classify applications, guarantee service levels and create profitable tiers for multiple broadband services - without a forklift upgrade to current infrastructure. To find out more, visit Sandvine online at www.sandvine.com.

Sandvine Incorporated
Waterloo, Ontario, Canada
Phone: +1 519 880 2600
Fax: +1 519 884 9892

Sandvine Limited
Basingstoke, U.K.
Phone: +44 (0) 1256 698021
Fax: +44 (0) 1256 698245

http://www.sandvine.com • email: info@sandvine.com

sandvine™
Powering IP Services

MSO Success Story

Reducing the impact of file-sharing traffic with Sandvine P2P Policy Management

CASE STUDY

Escalating bandwidth suction

The exploding popularity of peer-to-peer (P2P) file sharing has dramatically increased the amount of data transferred between broadband subscribers. In fact, P2P is now the single largest consumer of residential bandwidth, accounting for up to 70% of the IP traffic on any given MSO network.

Executive Summary

Background

Our customer, a major-brand cable MSO, faced massive bandwidth depletions and clogging of its upstream channel due to surging P2P traffic.

Though the cost and QoS impact of this traffic was considerable, the available solutions were not attractive. Competitive threats made bandwidth pricing tiers a risky proposition. Node-splitting the network would require a massive CAPEX investment and OPEX expenditure.

The Challenge

Dramatically reduce upload traffic on the network -- without the forklift upgrade of backbone infrastructure node splitting would require, or the risk of aggravating churn by penalizing P2P users with additional fees.

The solution

Sandvine deployed its Peer-To-Peer Element (PPE 8200) on the provider's network, a solution that allowed the MSO to impose administrative controls on P2P traffic and re-direct it down the least-cost network path.

Results

Bandwidth savings from the PPE's intelligent routing capability are saving this operator close to $5 million per annum in deferred CAPEX and reduced Internet transit fees.

That means a portion of the broadband user base is consuming a disproportionate share of bandwidth – much more than the per-user amounts provisioned by service providers.

While asymmetric bandwidth consumption is a legitimate concern on its own, the ad-hoc nature of P2P communication also means that large amounts of data traffic get pushed off-network (P2P clients don't care where other P2P clients are located). This is driving up Internet transit fees.

No one could sensibly argue that service providers continue to offer up expensive network capacity for free, or allow low-bandwidth subscribers to forever subsidize heavy P2P users. But the fact remains that subscribers in-general place strong value on the ability to utilize file-sharing technology. Subscriber-friendly ways to manage P2P's impact have to be found.

Clogging the upstream pipe

The impact of P2P on bandwidth utilization and traffic flows has taken a special toll on Cable MSOs. While all service providers are attempting to manage the negative effects of P2P activity, many MSOs also have to deal with an acute threat specific to cable broadband networks: QoS degradation on the upstream channel.

Cable networks weren't built to accommodate a flood of file uploads. This was certainly true for our customer, an MSO with several million homes passed in one of the world's largest and most technologically sophisticated urban markets.

This operator had built its network based on an average bitrate of 10kbps per sub (peak utilization). While this was more than sufficient for normal Web and Internet traffic, the sudden growth of peer-to-peer had driven up average bitrate by more than 30%, and was threatening to push beyond.

In order to preserve QoS and reduce the cost of surging P2P traffic, the choice of responses available to the MSO seemed limited to two.

The first was to implement an expansive node-splitting build out across a significant, and geographically dispersed, portion of the network, which would mean a sharp spike in OPEX from truck rolls and new CAPEX totaling in the millions.

The second was to move from a flat-rate to a tiered pricing structure based on monthly bandwidth consumption – a fair-but-risky approach that raised serious concerns about churn and fears of a mass customer defection.

A different kind of plumber

Sandvine's suggestion was to set both of these options aside and consider a third way that eliminated the need for a forklift upgrade of network infrastructure and also avoided penalizing the 30-35% of the subscriber base using P2P technology on a regular basis.

Sandvine recommended Peer-To-Peer Policy Management, a network hardware & software bundle that allowed the MSO to impose policies on file-sharing traffic, controlling which portions of the network it was directed to – and through – based on the service provider's unique definition of least-cost network path.

It is enabled by the Sandvine Peer-To-Peer Policy Element (PPE 8200), a carrier-grade 1RU that reduces the cost of file sharing using three distinct strategies: the logical reorganization of network topology, the redirection of search queries and the reduction of P2P protocol "chatter." Sandvine's patented technology allows the PPE to statefully inspect and redirect. Subscribers experience zero degradation of their online experience. Service providers experience a sharp improvement in bandwidth utilization and associated costs.

Deploying in-line on the MSO's network edge, Sandvine began with a limited installation, placing three PPE units to manage file sharing traffic for six Cisco Universal Broadband Routers (uBRs). The results were immediate, and notable.

For example: just prior to flicking the switch, P2P upload traffic was consuming approximately 150 out of 160 MB of provisioned upload bandwidth – a full 94% of the MSO's available upstream capacity. Once Sandvine Peer-To-Peer Policy Management was enabled, bandwidth utilization by P2P traffic fell to less than eight per cent (8%) without impacting subscriber peer to peer sessions (see Fig.1)

The result?

Our customer estimates that Sandvine Peer-To-Peer Policy Management will deliver close to $5 million in deferred CAPEX savings and annual bandwidth cost reductions. The PPE's statistical reporting functionality has also enhanced the operators ability to control network activity, allowing managers to monitor and measure P2P traffic in real time.

By deploying easily with current infrastructure and billing systems, Sandvine's P2P solution is proving to be an organic network extension that improves the performance and value of the MSO's existing backbone. This has been achieved without degrading the online experience for subscribers, or interfering with their freedom to utilize personal technology.

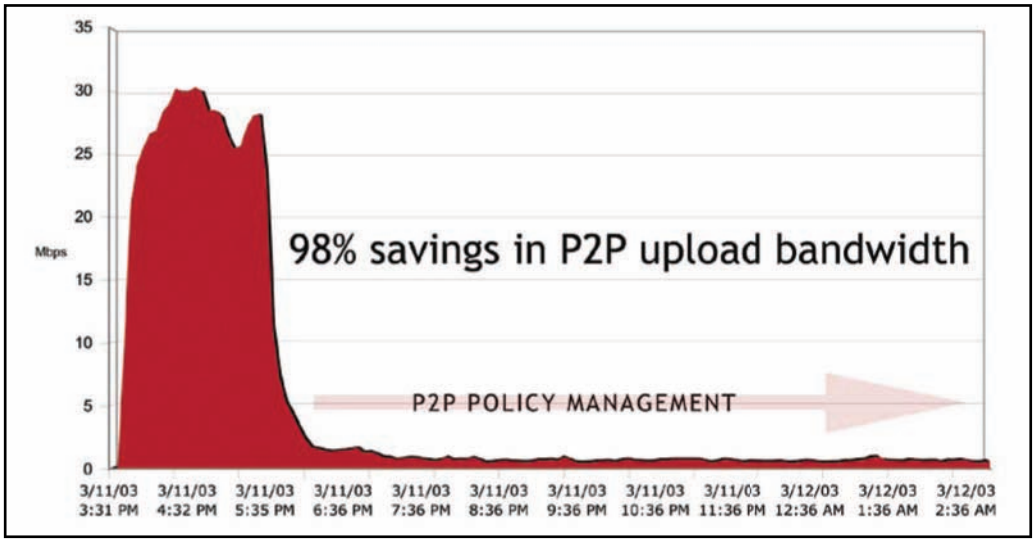


Figure 1: Improved bandwidth utilization with P2P Policy Management (1 uBR)

Sandvine Incorporated
Waterloo, Ontario, Canada
Phone: +1 519 880 2600
Fax: +1 519 884 9892

EMEA Sales
Basingstoke, U.K.
Phone: +44 (0) 1256 698021
Fax: +44 (0) 1256 698245

http://www.sandvine.com • email: info@sandvine.com

sandvine™
Powering IP Services