



**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)
Protecting and Promoting the Open Internet) GN Docket No. 14-28
)
)

To: The Commission

**COMMENTS OF
SANDVINE INCORPORATED**



July 14, 2014

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Sandvine makes network policy control equipment and software that:

- Lets service providers understand the traffic on their networks;
- Manages traffic when the network is congested;
- Creates innovative new services tiers and guarantees that you are charged properly for them, according to the Internet traffic you use.

In 2013, over half of our software order value related to this last category – creating and implementing innovative new service tiers in the network. We are therefore very well placed to discuss service innovation globally, and very interested in ensuring that the FCC promotes such innovation in determining its rules, particularly with the proposed “commercially reasonable” standard.

Sandvine has over 250 Internet service provider customers in roughly 90 countries around the world. The traffic of hundreds of millions of internet subscribers flows through our solutions every day.

“Commercially Reasonable” Service Tiers

When you think about it, there are really two components to Net Neutrality: how traffic is treated in the network and how traffic is charged. The former was addressed well in 2010 by Reasonable Traffic Management, but the latter was not. Under the 2010 rules, it was very unclear to Sandvine what sorts of service plans may be acceptable. With its proposed “commercially reasonable” standard, is the new NPRM any clearer? According to paragraph 116:

*Accordingly, we tentatively conclude that the Commission should adopt a rule requiring broadband providers to use “commercially reasonable” practices in the provision of broadband Internet access service. Our proposed approach is both more focused and more flexible than the vacated 2010 non-discrimination rule. **It would prohibit as commercially unreasonable those broadband providers’ practices that, based on the totality of the circumstances, threaten to harm Internet openness and all that it protects. At the same time, it could permit broadband providers to serve customers and carry traffic on an individually negotiated basis, “without having to hold themselves out to serve all comers indiscriminately on the same or standardized terms,” so long as such conduct is commercially reasonable.***

Also, you ask in paragraph 128:

How can the Commission ensure that parties are acting in a commercially reasonable manner without foreclosing the creation of pro-competitive opportunities through certain forms of price discrimination or exclusivity agreements?

In a fixed and mobile broadband market that is as penetrated as the U.S., competition will increasingly be based on the strength of an operator’s ability to offer compelling service plans to subscribers, so it is important that the rules create an environment that encourages such competition. Sandvine has seen firsthand how innovative service plans have increased adoption of the Internet around the world, enhanced competition, and given consumers more (and more affordable) choice.

In paragraph 116 above, the FCC is very focused to “permit broadband providers to serve customers and carry traffic *on an individually negotiated basis.*” Interestingly, though, to the best of our knowledge, none of the innovative service plans that Sandvine has helped implement across our customer base have involved payments between operators and edge providers for traffic priority – so-called Pay for Priority. Nor in these cases (again to the best of our knowledge) have *any negotiations or direct arrangements* between the operator and an edge provider occurred. We are concerned that the FCC is too focused on Pay for Priority arrangements when many other commercially reasonable service plans need to be considered and protected by the rules.

We agree with the FCC that what is “commercially reasonable” needs to be assessed on a case-by-case basis. In looking at innovative service plans and business models, the FCC should take into account:

1. Whether they enhance competition in the market for Internet access
2. Whether there is any material anti-competitive impact in the market for related applications or content
3. Whether they are consistent with promoting consumer choice
4. Whether they could increase adoption of the Internet
5. The network architecture and technology of the underlying broadband Internet access service, as well as prevailing market factors for broadband Internet access service specific to each such access architecture and technology.

To give some perspective, Sandvine believes that it would be helpful to review some of the innovative plans that it has helped deploy worldwide. We submit that these plans would meet the five factors above. We also submit that they would not, if implemented in the U.S., *based on the totality of the circumstances, threaten to harm Internet openness and all that it protects*, as the FCC requires in paragraph 116 of the NPRM. In fact, in the regions where they have been deployed they have had a positive impact on Internet adoption, competition, and consumer choice. Any new Open Internet rules implemented by the FCC need to clearly protect the opportunity for such service plans in the U.S.

Volume-based Charging

Even in 2010 the FCC seemed to conclude that there is no reason why someone that uses the Internet more should not pay more than someone that uses it less. This still seems reasonable today. Sandvine has helped implement many volume-based service tiers, and there is still much more innovation that can happen, such as quota-carry-forward plans (unused quota can accumulate to future periods), time-of-day quotas (unlimited usage between 1:00 a.m. and 5:00 a.m.), shared quotas, etc. With volume-based plans, all traffic is being charged for equally and as such would largely be viewed as commercially reasonable by most.

Application, Content or Device-based Charging

Net Neutrality seems to be raised as a concern more typically when there is differentiated pricing between applications, content, services, or for different devices.

Zero-rated applications, or “unlimited application bundles”

Econet Wireless in Zimbabwe is helping people that otherwise could not afford to access the Internet use their favourite application for as little as \$0.30 per day. Zimbabweans can buy unlimited access to either WhatsApp, the popular messaging app, or Facebook, for \$0.30 a day, \$0.95 a week or \$3 a month. Recently, competitors in Zimbabwe have started to launch similar plans, giving even wider access to the Internet on an affordable basis. Could such low cost plans be attractive to certain demographic groups in the United States?



In the Philippines, Sandvine is helping Smart Communications offer “bite-sized”, application-specific, mobile service plans to fit users’ particular preferences and needs. Smart is offering Email, Chat, Photo and Social packages, in 15-minute, 3-hour or per-day unlimited access, depending on the particular application and plan, for a low fixed price. The packages provide “always-on” access to the apps anywhere, without the need for a Wi-Fi connection or any other data plan. Again, this is making the Internet affordable to people who otherwise could not afford an all-you-can eat plan, and to vacationers without an access plan in-country. Are there users in the U.S. – visitors, students or lower-income users – that that would like an opportunity to buy access to just those parts of the Internet that they most enjoy in 15-minute increments?



In the Middle East, Etisalat has put together pre-paid and post-paid plans that bundle Facebook, WhatsApp and Twitter for a fixed fee, up to a 500MB quota. Outside of the quota such traffic is still permitted, but is throttled. Additional quota can be purchased.

Price Plan				
Monthly Tariffs (Pre-paid & Post-paid) – Connect unlimited				
Usage Type	Fees	Quota	Usage out of quota	Extra Mega Bytes (reset maximum speed)
Regular (Facebook, WhatsApp & Twitter)	10 EGP/Month	500 MBs with the maximum speed (Facebook, WhatsApp & Twitter)	Throttles for (Facebook, WhatsApp & Twitter) 25 Pts /MB for other usage	5 EGP for 250 MBs 10 EGP for 500 MBs

Here in the U.S. [Cricket's Muve Music rate plan](#) included unlimited music downloads from the Muve Music site, plus text, talk, data, video and picture messaging. There were no download fees and no monthly cost for music subscriptions. Cricket Wireless was the first U.S. wireless carrier to offer consumers unlimited music (full track downloads, ringtones and ringback tones) as part of any wireless rate plan.

Some may suggest that such plans give unfair advantage to the “bundled” applications – that it creates an unfair barrier to success for competing or start-up services. Sandvine disagrees. For the past decade, Sandvine has published [Global Internet Phenomena reports](#) that describe the latest Internet traffic trends, based on real data from Sandvine’s global customer base. Over that time, Sandvine has seen peer-to-peer filesharing, once the most popular way of consuming movies and music online, shrink in total bandwidth share from 60% to 9% in North America, despite the fact that it offers *completely free access* to such entertainment. Despite the added cost, users found Netflix and iTunes to be better options. As with all markets, innovation prevails.

Zero-rated application classes, or “unlimited application class bundles”

In some cases, rather than bundling individual applications, service providers have bundled a number of the most popular applications from a category. For example, in roughly a dozen of Telefonica’s Movistar mobile properties in Latin America, users have been able to buy bolt-ons to their mobile data packages that allows unlimited use of Chat, Email (or the two combined), Social Networking and other packages.

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<p>Paquete Mail</p> <p>Lleve su correo a todas partes con su celular.</p> <p>Incluye todos tus correos</p> <p>Por sólo \$10.300 mensuales.</p> <p>Comprar</p>	<p>Paquete Chat</p> <p>Comuníquese en tiempo real con tu empresa</p> <p>Incluye todos tus chats</p> <p>Por sólo \$10.300 mensuales.</p> <p>Comprar</p>	<p>Paquete Mail+Chat</p> <p>Use sus cuentas de correo y chat cuando las necesite.</p> <p>Incluye todos tus correos y chats</p> <p>Por sólo \$16.500 mensuales.</p> <p>Comprar</p>	<p>Paquete Redes Sociales</p> <p>Mantenga la comunicación todo el día, todos los días.</p> <p>Incluye todas tus redes sociales</p> <p>Por sólo \$20.700 mensuales.</p> <p>Comprar</p>	<p>Paquete Navegación</p> <p>Navegue sin límites en cualquier lugar.</p> <p>Incluye todos tus sitios favoritos</p> <p>Por sólo \$25.900 mensuales.</p> <p>Comprar</p>
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Before these tiers were introduced, subscribers purchased data in 200 MB blocks, and all data usage counted against this pre-paid quota. In practice, subscribers were fearful of rapidly consuming the data block, and were not adopting the data plans. The tiers introduced the peace of mind that comes with unlimited usage and subscriber adoption soared.

In another excellent example of how such bundles don't impede innovation, the first version of Movistar's bundles did not include WhatsApp, yet the service grew dramatically in popularity so Movistar added it to its plans (see  logo in image below). WhatsApp is now the most popular third-party messaging client in the region, overtaking applications in the same bundle from Google, Yahoo and other massive companies. The result: innovation won – in both applications and Internet access service plans.



Recently, in the U.S., [T-Mobile announced](#) plans that have bundled popular music services such as Pandora and Rhapsody and iTunes Radio. This innovation needs to be encouraged!

Stop burning data when you stream music.

Stream all the music you want on your phone or tablet from the top music services including Pandora, iHeartRadio, iTunes Radio, Rhapsody, Spotify, Slacker, and Milk Music without using your 4G LTE data. Plus, we're adding more services all the time, so check back to see if your favorite service is included.

- No overages
- No data caps
- Unlimited streaming

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It would also be technically feasible to bundle *all* applications within a category into a service plan, such as Music or Video Streaming, Social Networking, etc. to avoid any concerns about competitive impacts within a category. It would also be feasible to make an application-based plan time-specific as well, so as to shift network usage to off-peak hours. For example, a plan that offered free peer-to-peer file sharing or cloud storage/backups between 1:00 a.m. and 5:00 a.m. would make sense for the user as these activities takes place unattended by the user and are not time sensitive. Any plan that moves traffic outside of peak hours benefits all users and network operators.

Promotions

Returning to Africa, Vox Telecommunication offers a low-latency “Wildfire” service tier that is ideal for online gamers. Gaming traffic is not prioritized under the tier, but the network characteristics of the tier provide an ideal gaming experience. Sandvine supported a “Try-before-you-buy” promotion that

allowed anyone who purchased Call of Duty Black Ops II from a Vox retail partner to get provisioned with an extra 40 GB of data for a trial period for Wildfire. Subscribers who purchased the game received a unique code that they could enter into their Vox self-service portal for the automatic quota upgrade for the trial period. As we understand it, between 2% and 3% of subscribers adopted the premium tier as a result of the promotion – a win for all, certainly the hard-core gamer who waited months for the release.



Temporary event passes

Sandvine has had several discussions with customers about implementing temporary passes to watch streamed live events, such as the World Cup, Wimbledon, the Olympics – by event or match, or for the entire event period. These events may otherwise only be available through a full TV subscription, which users may not be willing to pay for. Making them available in bite-sized chunks online gives users the freedom to pick and choose specific events in a more affordable way.

Device-specific Plans

Sandvine has supported some device-specific promotions and plans that bundle Internet access into the purchase of particular device brands. Some devices are engineered to use significantly less data than others. Device-specific plans allow service providers to charge accordingly. With the Internet of Things (and consequently a proliferation of IP-enabled devices) just around the corner, innovation will occur if service providers are encouraged to create simple, device-specific tiers that enable seamless connectivity at a commercially viable price for all.

Sponsored data

Sponsored data is the notion that some third party pays for the cost of the bandwidth to deliver content or applications to the end user. For an operator in Mexico, Sandvine supported a trial promotion whereby Coca-Cola would sponsor a fixed amount of data for anyone buying their drinks within the promotion period.



Sandvine has been working with telematics and car companies whereby the car manufacturer would sponsor the cost of sending diagnostic information over the network. In addition, the user could opt to pay for certain in-car-only applications and could also subscribe to full Internet access in the car.

While Sandvine is not involved, in the U.S. and [elsewhere](#), Tesla has been sponsoring [Remote Diagnostics](#) for its car owners on an opt-in basis for some time. GM OnStar has been doing this for many more years. For years, Amazon has been offering free 3G wireless connectivity by sponsoring the data charges for users' downloads of its book library to the [Amazon Kindle](#). Amazon pays the operator for the bandwidth, not you or me.

One argument against Sponsored Data is that the small edge providers could not afford it as much as the big guys, which is universally true across *every aspect of business*. The big guys can afford more advertising, a better technological infrastructure (including co-locating servers) to deliver their content and applications with better performance, and they can negotiate better deals with suppliers to name just a few advantages. Size is a benefit of success in all free markets, which doesn't make it wrong, as long as there is no structural barrier for the little guy to become big. Sponsored data does not represent a structural barrier. In fact, adoption to date of AT&T's Sponsored Data plan would seem to suggest the opposite – that smaller application providers, like [Syntonic](#) and [Aquto](#) (hardly household names), are the first to see the benefit. According to the well-read industry publication GigaOm:

“So far we haven't seen any big internet companies like Netflix, Amazon or Google rise to the bait, but we have seen a few examples of smaller companies exploring new business models with sponsored data at their center.”

While there is no requirement in any business to make it easy for someone small to over-compete against someone large (they normally have to have some sustainable disruptive advantage), with offerings like AT&T's where sponsored data is easily and rapidly available (like a 1-800 number), it may accelerate such a disruption if the value proposition of the new app/content/service supports it.

With sponsored data, small edge providers could participate to the extent they can afford. As long as the terms, such as the price per MB, for sponsored data are not unduly discriminatory against small edge providers, everyone can participate to the extent they deem commercially sensible. Wouldn't a new game developer be interested to pay for some of the cost of its new game downloads? Any application that includes advertising as part of the business model would have an incentive to get that app into users' hands as quickly as possible – and sponsored data could be one strategy for that.

Pay for Priority: Nobody has Priority when Everybody has Priority

In the NPRM, the FCC has put tremendous focus on Pay for Priority. We're not quite sure why. Sandvine has over 250 customers around the world. Despite the large customer base, we have not deployed any Pay for Priority plans¹, nor have our operator customers expressed significant interest in them.

¹ (Note: Despite many poorly informed news articles and some confusing PR on the topic, the [deal between Comcast and Netflix](#) was not about Netflix paying for priority (or to avoid de-prioritization). It was an interconnection agreement. Instead of Netflix paying transit providers for interconnection to Comcast's network, Comcast and Netflix interconnected directly. Quite simply, Netflix changed interconnect suppliers. What they pay to Comcast they no longer pay to their previous suppliers. Both parties presumably saw a commercial benefit in doing so. We believe that the FCC understands this point as you have engaged in a separate study of interconnection agreements outside of this NPRM.)

Furthermore, technically speaking we don't believe that Pay for Priority would work. At a moment in time, there is a fixed amount of bandwidth available to all applications, content, etc. on a given network. If one application has paid for more of that bandwidth (and this is how the priority is achieved) then there is less "best efforts" bandwidth remaining for all other applications and content. It's a zero-sum game. Other applications and content providers will start paying for priority as well. It is not hard to imagine the best efforts bandwidth shrinking quickly and those who paid for priority not receiving it because the prioritized section of the pie has been sliced too many times. If everybody has priority, nobody has priority.

So Pay for Priority is likely both technically unsound and – so far – commercially uninteresting. Yet, all of the other innovative service plans we've discussed in these comments are actually happening somewhere globally today. How would these plans fare under the FCC's proposed rules? We ask the FCC to consider all of the usage-based billing models that exist today and that could arise tomorrow and provide clear protection for them in a framework for its "commercially reasonable" standard.

No Blocking

Sandvine concurs that the FCC should reinstate the original 2010 No Blocking rule, however believes that the rule can apply equally to fixed and mobile networks today. The reasonable network management rule already takes into account that mobile operators can treat traffic differently than fixed networks when "*it is appropriate and tailored to achieving a legitimate network management purpose,*" so why is a further exemption necessary?

Sandvine also sees it as problematic to "*allow individualized bargaining above a minimum level of access to a broadband provider's subscribers*", in two respects.

First, as mentioned above, we don't believe that Pay for Priority would technically work if it was implemented, nor has the market shown tremendous interest in going down that path on its own. Market forces should still be a primary guide. Secondly, all of the FCC's proposals for establishing a minimum level of access could be problematic.

The *Minimum Quantitative Performance* measurement method proposed by the FCC involves measurement of not just bandwidth (throughput) but also latency, jitter and packet loss, and such minimum levels vary widely by application. While this is likely the best of the FCC's recommended options and is possible today, it is also complex.

The following table provides Sandvine’s view of some representative benchmarks to achieve a minimum quality of service for certain popular applications.

Application Category	Application Class	Minimum Bandwidth	Maximum Latency	Maximum Jitter	Maximum Loss
Bulk	P2P	19Kbps	n/a		
	Web surfing	1Mbps (Web 2.0)	166ms (latency + jitter)		n/a
	Email	60Kbps	n/a		
	Usenet news	195Kbps	n/a		
	FTP file transfers	195Kbps	n/a		
Interactive	VoIP	16Kbps	300ms (latency + jitter)		< 0.5%
	Video gaming	50Kbps	75ms (latency + jitter)		< 0.5%
	Video Conferencing	250Kbps	300ms (latency + jitter)		< 0.05%
Paced (and burst-paced)	Video streaming	300Kbps, to not have much of a wait time	< 1s for “channel change”	<50ms	<0.05%
	High def video	1-3Mbps depending on quality of HD.	< 1s for “channel change”	<50ms	<0.05%
	Audio streaming	Audio: 128Kbps for CD quality. 56Kbps for radio	< 1s for “channel change”	<50ms	<0.05%

Similarly, the 3GPP standards have defined different QoS levels in LTE. The table below from [3GPP TS 23.203 V8.9.0](#) (page 30) illustrates such QoS targets for GBR (Guaranteed Bitrate x Non-Guaranteed Bit-rate). It is well known in the industry that even though this QoS model has existed within the GSMA guidelines for over 10 years it has not been extended beyond the usage of some VOIP applications (QCI 1), primarily because of the complexities involved.

QCI	Resource Type	Priority	Packet Delay Budget	Packet Error Loss Rate	Example Service
1 (Note 3)	GBR (guaranteed bitrate)	2	100ms	10 ⁻²	Conversational Voice
2 (Note 3)		4	150ms	10 ⁻³	Conversational Video (live)
3 (Note 3)		3	50ms	10 ⁻³	Real time gaming
4 (Note 3)		5	300ms	10 ⁻⁶	Non- Conversational Video (buffered)
5 (Note 3)	Non-GBR	1	100ms	10 ⁻⁶	IMS Signaling
6 (Note 4)		6	300ms	10 ⁻⁶	Video (Buffered streaming) TCP
7 (Note 3)		7	100ms	10 ⁻³	Voice, Video (Live), Interactive Gaming
8 (Note 5)		8	300ms	10 ⁻⁶	Video (buffered streaming), TCP
9 (Note 6)		9			

An industry self-regulation approach with oversight would provide a simple way to compare performance of operators across different application classes. It would further allow the FTC to ensure truth in advertising, scaling down to the smallest operators (something the FCC's current benchmarking approaches have difficulty in achieving).

The *Reasonable Person* alternative that the FCC proposes for measuring a minimum level of access is troublesome, as it assumes that the Internet access provider is **solely** responsible for the end user experience:

*For example, a typical end user may reasonably expect the ability to access streaming video from any provider, place and receive telephone calls using the VoIP service of the end user's choosing, and access any lawful web content. **Under this approach, a broadband provider that satisfies these and other reasonable expectations would be in compliance with the no-blocking rule.***

As Sandvine wrote about extensively in its September 2013 Global Internet Phenomena Spotlight, [Exposing the Technical and Commercial Factors Underlying Internet Quality of Experience](#), the user experience is influenced by *many more players* than just the Internet access provider. The Internet is, amongst many things, a transport mechanism for an end-to-end ecosystem of content delivery amongst a number of players. Competing interests must co-operate to deliver acceptable quality. At each interchange between players there is a set of selfish interests and actions which may optimize for one player at the expense of another, and may sometimes jeopardize the entire chain. Quality is affected by a chain of players, based on factors both technical and economic. The location of a quality impairment introduced in the chain is often poorly understood and difficult to measure, and many commonly assume it can only be the access network, which is patently incorrect.

The *Best Effort* alternative that the FCC proposes for measuring the minimum access level is also difficult as there is no absolute performance standard for *best effort* – it varies by access technology and within

access technology by individual network characteristics. So, as the FCC suggested the performance would absolutely need to be measured against the technical capacity of a *particular broadband provider's* network capacity and characteristics, which would be extremely cumbersome for operators and the FCC.

Reasonable Network Management is Still Reasonable

Sandvine concurs with the FCC's conclusion that it should continue with the same approach to reasonable network management as it implemented in its 2010 Order. When it comes to traffic management, what was reasonable in 2010 is still reasonable today. When a network was congested in 2010, it was important that your VoIP call remained clear, that your video didn't pause. It still is today. It's not neutral to let applications that are designed to automatically consume any unused bandwidth do so at the expense of other applications. Without traffic management that has happened. Similarly, it is not neutral to let humans that are designed to consume any unused bandwidth do so at the expense of other humans. Again, without traffic management that has happened.

You've asked whether there have been any big technological changes in how service providers can manage traffic since 2010? The answer: No.

You asked specifically about whether location could be used as a parameter in traffic management. The answer: Yes.

We were able to use location as one factor in traffic management in 2010 and we still can (and absolutely should) – *with subscriber anonymity*. Imagine that you're walking along the street surfing your iPhone in a really congested cell sector. Your traffic needs to be managed to make sure that your Tinder swipes are registered with utmost immediacy. If you walk around the corner (quite literally) you may end up in a non-congested cell sector. Your traffic should stop being managed. With utmost immediacy. You need location awareness to make this happen, and the technology today enables it and should be used to ensure that traffic management is applied only when required.

Reasonable Network Management, or some facsimile thereof, has become a tenet of Net Neutrality in virtually every manifestation of the concept in law, regulations or proposals for the same, globally. The 2010 Order in the United States is largely responsible for that. Please don't change it.

An Overriding Concern

In 2010, the FCC already arrived at a set of rules that, in its earnest determination, believed was best for the Internet based on a very thorough NPRM process. The Commission is changing those rules today because the courts determined that the FCC did not have jurisdiction to implement them. Shouldn't the FCC's natural response be to maintain the rules it considered best for the Internet and work with those that have jurisdiction to implement them, say the U.S. Congress? Changing the rules simply to fit the FCC's jurisdiction seems...backwards.

Let's get the rules right then figure out who should implement them and how.

Thank you for the opportunity to comment. The internet is the industrial magic of our time. Sandvine's goal is to make the Internet better by increasing the utility and quality for subscribers and developing new and sustainable business models for the folks who invest in the infrastructure to deliver it. Please don't hesitate to reach out if you think we can help this process in any other way.