



sandvine[®]

Intelligent Broadband Networks

GLOBAL INTERNET PHENOMENA REPORT

1H 2014

Executive Summary

The Global Internet Phenomena Report: 1H 2014 shines a light on fixed and mobile data networks around the world, identifying facts, fads, and the future trends that will shape the Internet's future. In this report, we present a mix of high-level observations, regional-focused analysis, deep-dives into specific subjects, and educational tidbits. Communications service providers (CSPs) in particular are in the position to act on this information, but we believe that the findings will be of interest to a wide range of readers.

As with previous reports, Real-Time Entertainment (comprised of streaming video and audio) continues to be the largest traffic category on virtually every network we examined, and we expect its continued growth to lead to the emergence of longer form video on mobile networks globally through 2014.

In North America, the dominance of Real-Time Entertainment is due in large part to the continued market leadership of Netflix which saw growth in share thanks to the continued rollout of high bitrate Super HD content. In the United Kingdom and Ireland Netflix has also established itself as the second largest source of network traffic during peak evening hours. In other regions, YouTube continues to be the largest single source of Real-Time Entertainment traffic on both fixed and mobile access networks, which makes it the leading source of Internet traffic in the entire world.

Twitch.TV and Snapchat have emerged and are now top-ranked applications in many regions across the globe. Twitch.TV is a service that allows subscribers to watch people play video games and the service now generates more traffic than HBO GO in the US. Snapchat on the other hand has seen high traffic volumes on many mobile networks due to the fact it only allows subscribers to send picture messages, while competing services such as WhatsApp allow users to send plain text.

In North America, Subscribers who exhibit "cord cutting" behavior (the top 15th-percentile of Real-Time Entertainment users) consume on average 212GB a month, more than seven times the usage of a typical subscriber. These "cord cutters" consume an average of 100 hours of video a month and account for 54% of total traffic consumed each month.

Thanks to significant customer wins in the region, Sandvine is able to once again shine a light on mobile and fixed usage in Africa. Usage on the continent is drastically different than what is observed in other regions with Real-Time Entertainment accounting for less than 6% of total mobile traffic and on one mobile network WhatsApp accounted for over 24% of traffic thanks to innovative service plans being offered.

In addition to detailed analysis of global networks, this report includes focused spotlights that examine a particular emerging trend or observation. Interspersed among regional summaries, readers will find sections that tackle numerous topics including:

- An examination of the impact the 2014 Winter Olympics had on networks, and what operators should expect for the World Cup
- An explanation on why it is important to measure peak usage when forecasting network growth
- An overview of what happens on fixed and mobile networks during major holidays such as Christmas and New Year's Eve

This 1H 2014 Global Internet Phenomena Report includes summaries of findings from 9 regional snapshots, all of which are available on www.sandvine.com:

- North America, Fixed Access
- North America, Mobile Access
- Europe, Fixed Access
- Europe, Mobile Access
- Asia-Pacific, Fixed Access
- Asia-Pacific, Mobile Access
- Latin America, Fixed Access
- Latin America, Mobile Access
- Africa, Mobile Access
- Africa, Fixed Access

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North America, Fixed Access

For 1H 2014, mean usage was 51.4 GB, which represents a slight increase from the 44.5 GB observed in our 2H 2013 report. Over the same period, median monthly usage also saw a small increase moving from 17.6 GB to 19.4 GB. This growth falls broadly in line with the 30-40% annual growth rate that many of our ISP customers are forecasting for 2014. It is important however to understand there is more to network use than monthly usage. On page 26, of this report we examine why it is actually more important for operators to understand the growth of network usage during the peak evening hours.

Monthly Consumption - North America, Fixed Access		
	Median	Mean
Upstream	1.4 GB	7.6 GB
Downstream	17.4 GB	43.8 GB
Aggregate	19.4 GB	51.4 GB



Table 1 - Monthly Consumption Figures - North America, Fixed Access

As with previous reports, Real-Time Entertainment maintains its status as the dominant traffic category in the region and likely the key driver of network growth. Real-Time Entertainment is responsible for over 63% of downstream bytes during peak period.

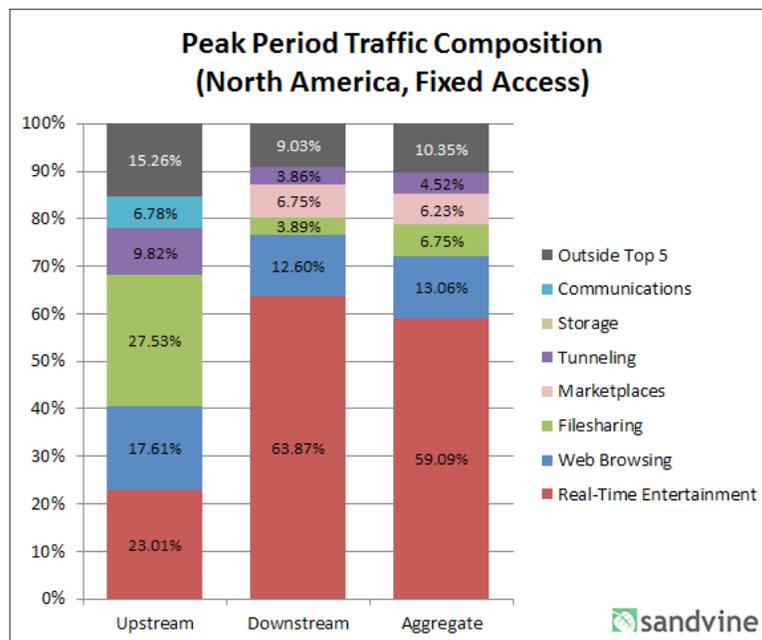


Figure 1 - Peak Period Aggregate Traffic Composition - North America, Fixed Access

Netflix continues to be the leader in peak period traffic, accounting for 34.2% of downstream traffic during that time. This is actually an increase from the 31.6% measured in 2H 2013, and is likely driven by the availability of higher bitrate Super HD content to all subscribers, while in our 2H 2013 report it was only available to subscribers on networks where Netflix's OpenConnect CDN appliance had been installed. In our previous study we highlighted how Super HD content was up to 50% larger than the previous 1080p content and during its first week of availability caused a 10-15% increase in Netflix traffic and a 5% increase in peak traffic to one North American operator.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	24.53%	Netflix	34.21%	Netflix	31.09%
2	HTTP	14.27%	YouTube	13.19%	YouTube	12.28%
3	SSL	6.54%	HTTP	11.65%	HTTP	11.84%
4	Netflix	6.44%	iTunes	3.64%	BitTorrent	5.96%
5	YouTube	5.52%	SSL	3.42%	SSL	3.80%
6	Skype	2.23%	BitTorrent	3.40%	iTunes	3.33%
7	Facebook	2.17%	MPEG	2.85%	MPEG	2.62%
8	FaceTime	1.50%	Facebook	1.99%	Facebook	1.83%
9	Dropbox	1.20%	Amazon Video	1.90%	Amazon Video	1.82%
10	iTunes	1.15%	Hulu	1.74%	Hulu	1.58%
		64.40%		76.24%		74.58%



Table 2 - Top 10 Peak Period Applications - North America, Fixed Access

As observed in previous reports, BitTorrent continues to lose share and now accounts for just 6.0% of traffic during peak period. In our last report, we revealed that for the first time Filesharing as a whole accounted for less than 10% of total daily traffic, and that trend continues with Filesharing now responsible for just 8.3% of daily network traffic. This demonstrates a sharp decline in share from the 31% of total traffic we had revealed in our 2008 report. Another Application of note is the video game live streaming service Twitch.TV (1.35%) which is now a top-15 application on many networks around the globe and now accounts for more traffic in the US than HBO GO (1.24%).

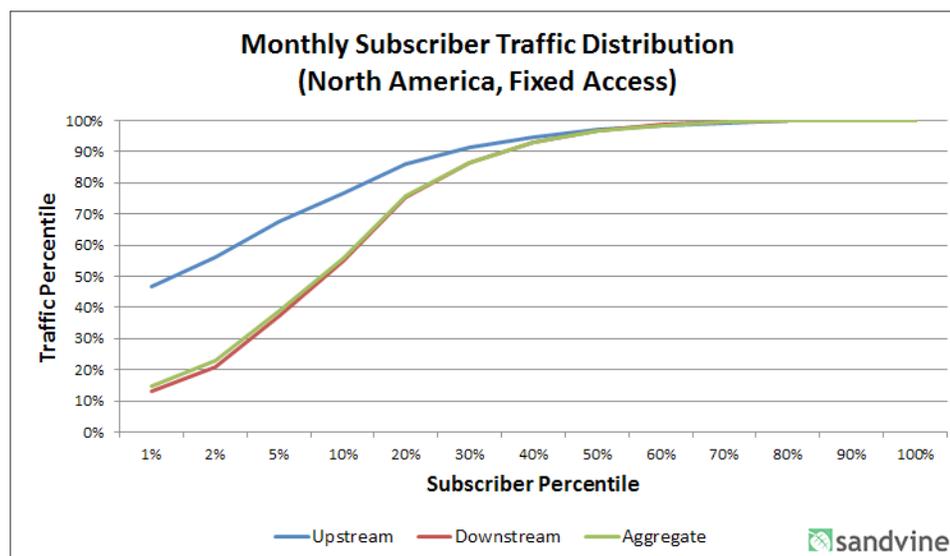


Figure 2 - Monthly Subscriber Traffic Distribution - North America, Fixed Access

With many cable and DSL providers considering implementing usage based billing, an examination of usage distribution is of interest to many. In North America, the top 1% of subscribers who make the heaviest use of the network's upstream resources account for 47% of total upstream traffic. The comparable downstream users account for 12% of downstream bytes. At the opposite end of the usage spectrum, the network's lightest 50% of users account for only 7% of total monthly traffic.

Cord Cutters Taking Control

Since the inception of this report, Sandvine has reported on median and mean usage as a way to provide insight on the usage habits of subscribers. For this report however we wanted to dig deeper to better understand the impact that heavy users of Real-Time Entertainment have on networks.

We examined several US networks and by examining both total overall and total streaming usage and were able to assign three types of personas to subscribers.

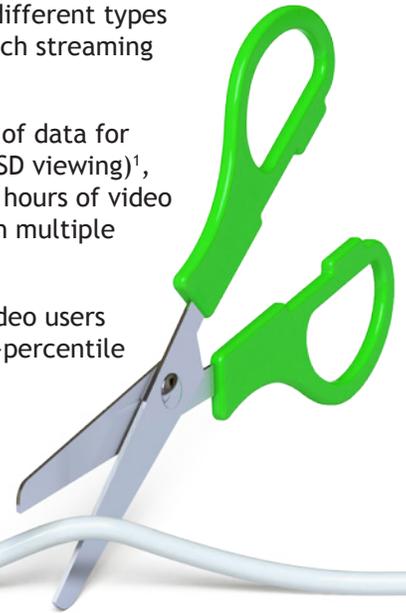
1. **Cord Cutters** - These users are in the top 15th-percentile of streaming audio and video usage. While we are unable to resolve if these subscribers have “cut the cord”, their usage profile indicates that they are likely using streaming as a primary form of entertainment.
2. **Typical Subscribers** - The 15th-85th-percentile of subscribers who are likely streaming on a regular basis, but their total volume is significantly lower than the subscribers with the “cord cutter” behavior.
3. **Non-Streamers** - The bottom 15th-percentile of streamers who stream typically less than 100MB of audio or video each month.

	“Cord Cutter”	Typical Subscriber	“Non-Streamer”
Mean Monthly Usage	212 GB	29 GB	4.5 GB
Mean Real-Time Entertainment Usage	153 GB	13 GB	40 MB
Streaming Share	72%	45%	1%
Average Hours of Streaming	100	9	<1
Share of Total Traffic	53.9%	45.7%	0.5%

The above table attempts to show just how drastic the usage patterns between the different types of subscribers are. Subscribers with “cord cutter” behavior consumes 11-times as much streaming content, and over seven-times as much total data as a typical subscriber.

If converting that usage to actual hours of video, and assuming approximately 1.5GB of data for each hour viewed (Using Netflix’s usage levels and assuming relatively equal HD and SD viewing)¹, subscribers with “cord cutting” behavior could be consuming on average roughly 100 hours of video each month. That may seem like a shockingly high number to some, but in home with multiple individuals, and multiple screens, it is a number that is quite easily achievable.

The most striking fact of all may be the revelation that the top 15th-percentile of video users actually consume the majority of monthly network traffic, and that the bottom 15th-percentile of users consume only 0.5%.



1. <https://help.netflix.com/en/node/87>

North America, Mobile Access

Much like our examination of fixed access networks in North America, mobile networks have also seen only minor shifts in traffic composition in the past six months. Since our last report, mean monthly usage has made an 8% jump, increasing from 443 MB to 465 MB. This increase is partially due to organic growth on the network, as well as the continued rollout of LTE by some participants in the study. Median usage, a figure we feel is more indicative of a “typical user”, grew at an even faster pace by over 20% from 84 MB to 102 MB. This significant increase in median usage is a phenomenon we have been tracking over the past several years and believe the rate at which it is increasing is no longer tied to first-time adoption of smartphones by subscribers. Instead, we suspect it is driven by increasing individual usage, as first time smartphone adopters are now comfortable and unleashing the full power of their devices’ technology.

Monthly Consumption - North America, Mobile Access		
	Median	Mean
Upstream	15.7 MB	60.9 MB
Downstream	84.1 MB	404.3 MB
Aggregate	101.7 MB	465.2 MB



Table 3 - Monthly Consumption Figures - North America, Mobile Access

During peak period, Real-Time Entertainment traffic is by far the most dominant traffic category, accounting for over 40% of the downstream bytes on the network. As observed in past reports, Social Networking applications continue to be very well represented on the mobile network. This speaks to their popularity with subscribers as these applications typically generate far less traffic than those that stream audio and video.

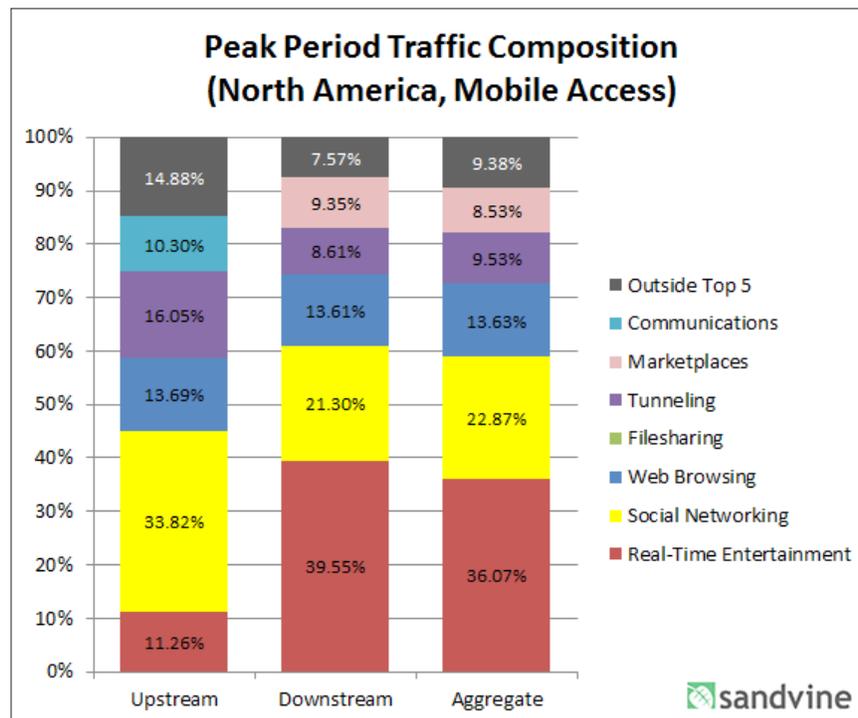


Figure 3 - Peak Period Aggregate Traffic Composition - North America, Mobile Access

In our 2H 2013 study, YouTube accounted for 17.7% of peak downstream traffic and for 1H 2014 that figure remains essentially unchanged at 17.6%. The other major video player, Netflix, also saw its downstream traffic share essentially unchanged at 5.1%. This figure has still more than doubled from 2.2% just 12 months ago. We believe that this number will continue to increase as longer form video becomes more commonplace on mobile networks in North America.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	Facebook	26.95%	YouTube	17.61%	YouTube	17.26%
2	SSL	12.49%	Facebook	14.03%	Facebook	14.76%
3	HTTP	11.80%	HTTP	12.70%	HTTP	12.59%
4	YouTube	3.77%	MPEG	8.64%	MPEG	7.77%
5	Instagram	3.47%	SSL	6.52%	SSL	7.25%
6	BitTorrent	2.09%	Google Market	5.27%	Google Market	4.78%
7	MPEG	1.70%	Pandora Radio	5.15%	Pandora Radio	4.72%
8	Pandora Radio	1.61%	Netflix	5.05%	Netflix	4.55%
9	Gmail	1.61%	Instagram	3.49%	Instagram	3.49%
10	iCloud	1.56%	iTunes	3.10%	iTunes	2.84%
		65.50%		78.46%		77.17%



Table 4 - Top 10 Peak Period Applications - North America, Mobile Access

As for streaming audio, Pandora Radio continues to lead with 5.2% of downstream traffic during peak, and 5.9% of downstream traffic during the entire day. This phenomenon is likely due to subscribers using the service consistently throughout the day, while some other applications may have their usage concentrated during peak period. One participant network who offers their own music service saw the traffic levels are broadly in-line with Pandora, demonstrating the power operators have to not offer innovative service plans, but revenue generating ones as well.

While not cracking the top-10 applications, Snapchat has become the leading third-party messaging service by volume, generating more traffic each day than competing services such as WhatsApp. More details of Snapchat’s dominance can be found on page 16 of this report.

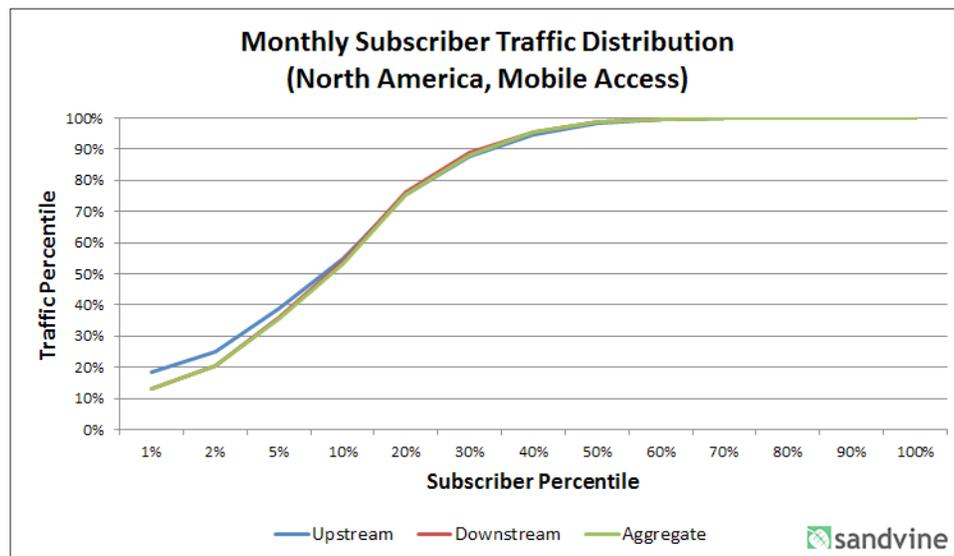


Figure 4 - Monthly Subscriber Traffic Distribution - North America, Mobile Access

From a traffic distribution standpoint, the top 1% of subscribers who make the heaviest use of the network’s upstream resources account for 19% of total upstream traffic. The comparable downstream users account for 12% of downstream bytes. At the opposite end of the usage spectrum, the network’s lightest 50% of users account for only 2% of total traffic in large part due to the number of feature phones still in use by subscribers.

Sponsored Connectivity Revisited

Recently AT&T made some pretty big waves at the Consumer Electronics Show (CES) by announcing their intention to offer sponsored data to their subscribers².

At Sandvine, we've been talking about ways operators could offer innovative service plan for a number of years, in fact we first talked about it in our 1H 2012 Global Internet Phenomena Report.

Realizing there is little point in rewriting what we correctly predicted would happen almost two years ago, we thought it would be beneficial to republish an excerpt from that report.

“What if there was a way for subscribers to get free access to the mobile apps they want, while operators still get paid for the bandwidth? This isn't a hypothetical scenario from the land of make-believe, it's part of a valid model that is already emerging thanks to sponsored connectivity.

In the current pay-it-yourself model, for a subscriber to use mobile data on their smartphone or tablet, he or she must pay the carrier directly either before use (prepaid) or after (postpaid). With sponsored connectivity, instead of the subscriber paying for the data associated with a certain application, website, or device, a third-party does so. In this sponsored model, such data usage does not count against existing usage-based billing quotas, so subscribers with a subscription plan get free usage, and subscribers who lack even a basic subscription can gain completely free access if they purchase a sponsored device.

Sponsored data apps have the potential to create a win-win-win scenario for subscribers, operators, and content providers alike:

- subscribers benefit from free data access
- mobile operators still get paid for the bandwidth they deliver
- the sponsor (app or device developer) gets increased traffic, impressions, and users

Who stands to gain from sponsoring such connectivity? E-commerce sites like Amazon are obvious candidates. In fact, this is precisely the model that Amazon is using for their e-readers. The subscriber buys an e-reader and Amazon pays for mobile coverage based on the assumption that content sales through the device will more than cover the sponsorship cost. General Motors' OnStar capability is another example, although you aren't (yet) buying apps through your car's dashboard. Lest you think the idea of a connected car is far-fetched, Fierce Wireless recently posted an article that said, “The connection fee could be included in the price of the car...In many respects, the old Kindle model is applicable, where the consumer never knowingly paid for the cellular connection, even though they used it.”³

Of course, sponsorships aren't limited to companies selling hardware. Retailers have much to gain if subscribers can browse their websites free of data charges. Nor is the use case limited to traditional retailers - game developers can sponsor the data for game connectivity in order to improve adoption rates and increase the revenue they make off both advertising and in-game purchases. This model is especially attractive for freemium games like Temple Run.

In the near future, at least, sponsored connectivity is not going to replace the traditional model in which a subscriber pays the network operator directly, but it is definitely a growing trend that already has some major players onboard.

As we predicted, it now looks like the near future is here, and 2014 will see the beginning of sponsored connectivity roll-out globally. This new model represents a complete new revenue stream for operators and great potential benefit for subscribers as well.

2. <http://www.att.com/att/sponsoreddata/en/index.html#fbid=2V4K6duTatf>

3. <http://www.fiercewireless.com/story/hold-auto-makers-still-test-driving-broadband-connections-cars/2012-04-20>

Europe, Fixed Access

Europe presents a mix of mature and emerging markets, with cultural, economic, technological, and linguistic diversities that combine to create traffic patterns that can prove to be interesting to roll-up. Regional analysis is intricate, as different applications can vary in penetration and availability depending on the country.

Sandvine first reported on European monthly usage in our 1H 2013 report, so this is our first opportunity to present year-over-year figures (YoY). Europe's mean monthly usage of 20.4 GB and median monthly usage of 8.2 GB is significantly lower than that observed in North America. The growth of these figures, especially the comparison of the usage growth rate to other regions around the world, will be interesting to analyze in future reports.

Monthly Consumption - Europe, Fixed Access		
	Median	Mean
Upstream	984 MB	3.6 GB
Downstream	6.9 GB	16.8 GB
Aggregate	8.2 GB	20.4 GB



Table 5 - Monthly Consumption Figures - Europe, Fixed Access

Thanks to recent success in the past year, Sandvine has been able to add multiple new participant networks to increase our European sample size. Once again Real-Time Entertainment is the top traffic category, responsible for 43.3% of peak downstream traffic. Depending on the specific country however, this percentage ranges anywhere from 22% to over 65% of downstream traffic. This fluctuation in share is due in large part to the availability of over-the-top (OTT) video services in varying countries. Based on our observations in this report and previous ones, countries with access to paid services like Netflix or BBC iPlayer typically had a higher share of Real-Time Entertainment traffic on their network.

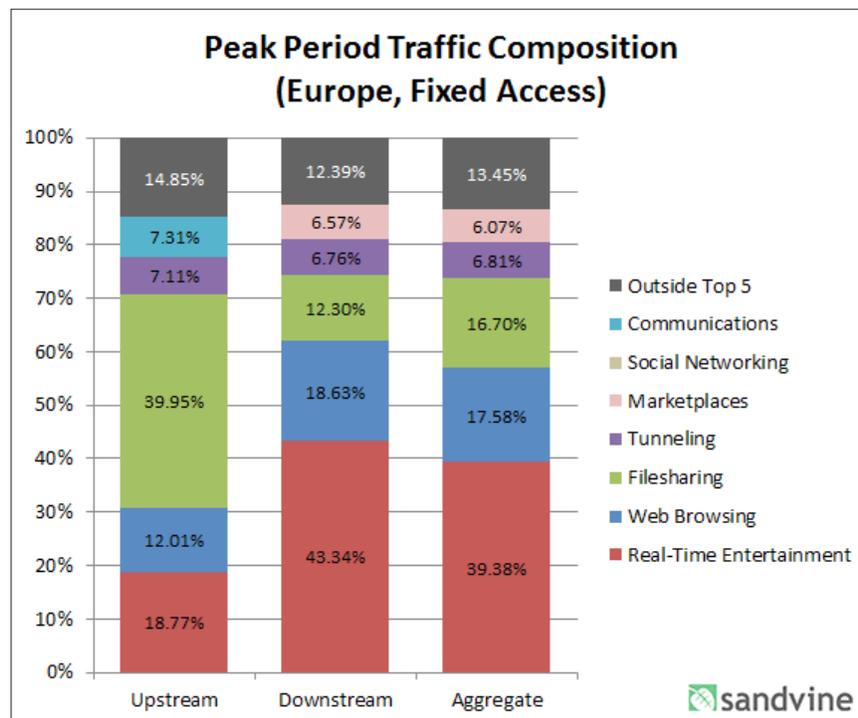


Figure 5 - Peak Period Aggregate Traffic Composition - Europe, Fixed Access

As we have discussed in previous reports, European networks have a consistent set of dominant applications and services that are available in each region, which account for 70-75% of all traffic. A set of localized websites and region-restricted applications make up the remainder of traffic. This can be seen in the list of top 10 applications for the region, all of which have availability in multiple countries.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	33.20%	YouTube	19.27%	YouTube	17.38%
2	HTTP	10.07%	HTTP	17.46%	HTTP	16.26%
3	YouTube	7.67%	BitTorrent	11.10%	BitTorrent	14.71%
4	SSL	5.63%	SSL	6.19%	SSL	6.10%
5	Skype	4.54%	Facebook	3.88%	Facebook	3.95%
6	Facebook	4.29%	RTMP	3.66%	RTMP	3.27%
7	eDonkey	3.64%	MPEG	3.54%	MPEG	3.21%
8	Dropbox	2.11%	Netflix	3.23%	Netflix	2.98%
9	MPEG	1.51%	Flash Video	2.37%	Flash Video	2.17%
10	iTunes	1.30%	iTunes	2.23%	iTunes	2.08%
		72.66%		70.69%		70.01%



Table 6 - Top 10 Peak Period Applications - Europe, Fixed Access

Of note is Netflix’s dominance on networks in the United Kingdom and Ireland. Combining traffic from these two countries, Netflix is now the second largest source of downstream traffic during the peak evening hours accounting for 17.8% of traffic. Netflix now trails only YouTube (19.9%), and based on current growth rates, we would expect the video service to be the leading source of network traffic within the next year. Other video streaming services from providers such as the BBC, RTE, and Amazon, account for 1-3% individually, well back of Netflix and YouTube.

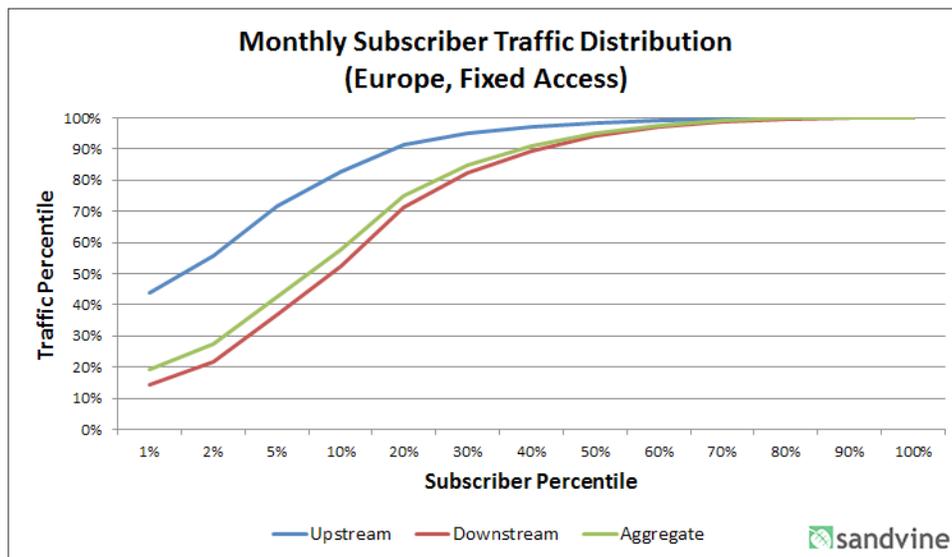


Figure 6 - Monthly Subscriber Traffic Distribution - Europe, Fixed Access

From a traffic distribution standpoint, the top 1% of subscribers in Europe who make the heaviest use of the network’s upstream resources account for 44% of total upstream traffic. The comparable downstream users account for 19% of downstream bytes.

Traffic Spotlight: Holiday Highs and Lows

During the holiday season people love to catch up with their families, and spend time relaxing by watching their favorite TV show or movie.

Knowing that many subscribers would likely be streaming this content, Sandvine decided to take a look at the impact holidays had on network operators.

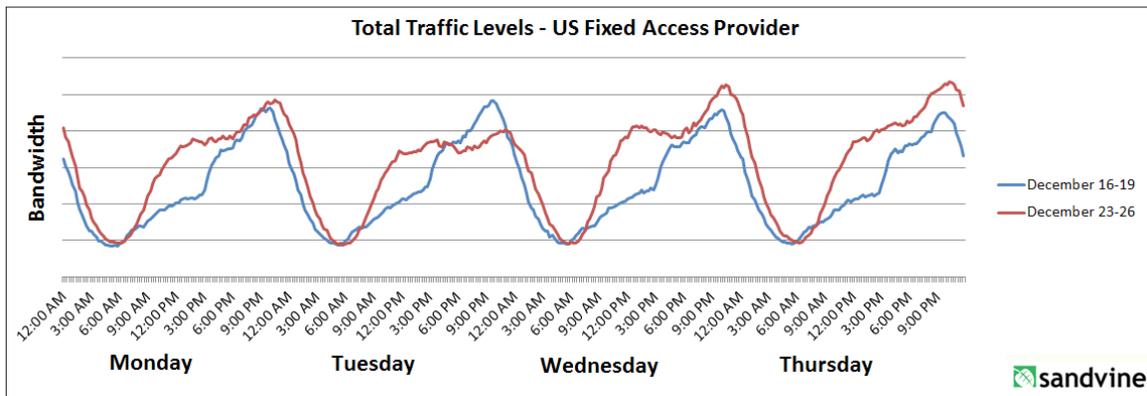
Below is a chart showing total internet usage from a single US fixed access provider that compares usage over Christmas with that of the previous week, and each day revealed something unique.

Monday, December 23 - Internet usage is noticeably higher in the morning than the previous week. This is likely driven by usage from students who are home on their winter break, and adults who have started their vacation early.

Tuesday, December 24 - Internet usage in the morning is similar to the previous day, but it does not achieve a high peak in the evening hours, likely due to people choosing to step away from their screens and spend time with family in the evening on Christmas Eve.

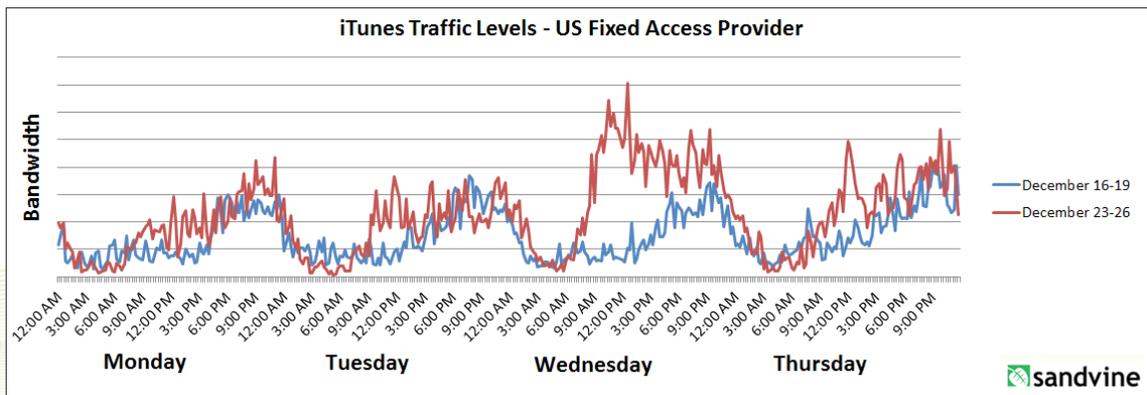
Wednesday, December 25 - Morning usage is elevated as it has been in recent days, with a slightly more pronounced dip around dinner hours, perhaps as people settle down for a Christmas dinner. Peak traffic is higher and goes on later, likely driven by people using their new “connected” Christmas devices.

Thursday, December 26 - Like the previous day, peak usage is roughly 15-20% higher than the previous week. Again, this is likely driven by new devices, and the fact that many people (children and adults) may be staying up later than usual since they may not have work or school the next day.



In the past we have also observed how Apple product releases can generate significant amount of traffic. With iPads, iPhones and iPods likely on the top of many peoples wish lists, we thought we'd take a look and see just how much additional traffic iTunes might generate due to app and media downloads .

As seen in the chart below, with the exception of Christmas Day (Wednesday, December 25), iTunes usage was broadly consistent week-over-week. On Christmas morning however, iTunes traffic was up to nine times higher than the previous week, and throughout the entire day iTunes traffic was well above typical levels.



Europe, Mobile Access

As discussed earlier, examining mobile networks in Europe provides the same set of challenges for regional analysis as fixed networks due to the diversity in each country’s culture, economy, languages, and deployed network technologies.

One metric that may not be impacted too significantly by some of these factors is monthly subscriber consumption. It’s not unreasonable to expect that subscribers will use their devices in a similar way; the only difference is that they will simply substitute the services that are most popular or only available in their country. In our analysis, subscriber usage was relatively consistent across many of the European countries who participated in this report. Mean monthly usage for Europe was observed to be 397.4 MB, an increase of over 11% from 358 MB observed six months ago. Interestingly, over that same time period, median usage saw higher gains increasing 15% from 16.9 MB to 19.4 MB.

Monthly Consumption - Europe, Mobile Access		
	Median	Mean
Upstream	3.1 MB	60.8 MB
Downstream	16.8 MB	333.6 MB
Aggregate	19.4 MB	394.4 MB



Table 7 - Monthly Consumption Figures - Europe, Mobile Access

Much like other mobile networks during peak period, Real-Time Entertainment traffic is the clear traffic category leader. Web Browsing and Social Networking, as seen commonly in other regions, round out the second- and third-most popular traffic categories. What is most noticeable in Europe (and consistent with previous reports) is the higher share of Tunneling, which accounts for 10.0% of upstream traffic and 6.2% of downstream traffic during peak period. The exact cause for the increase is uncertain, but we suspect it may be indicative of subscribers with dongles using VPNs to access regionally restricted content, as well as increased concern about privacy online.

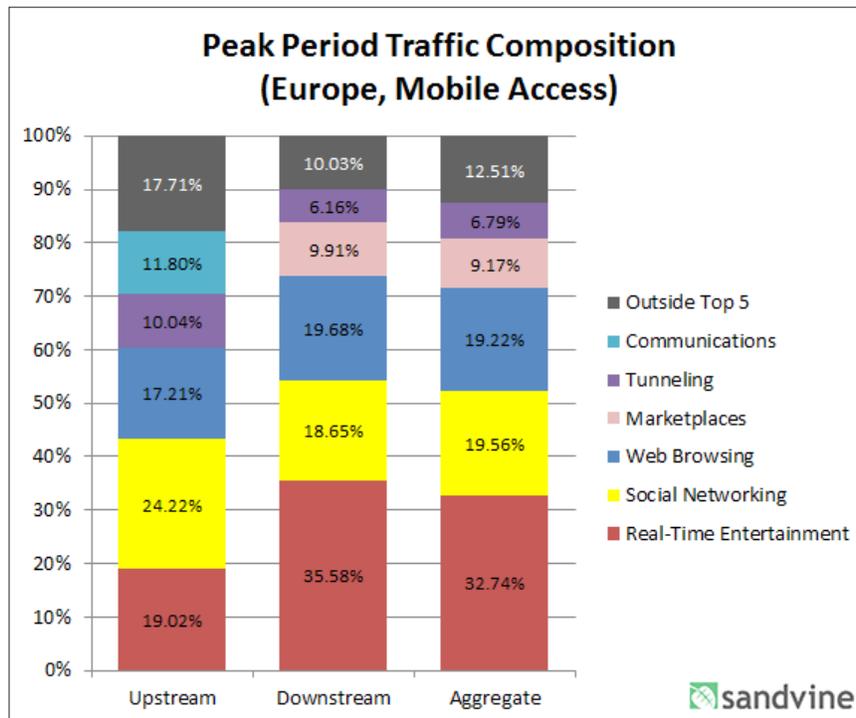


Figure 7 - Peak Period Aggregate Traffic Composition - Europe, Mobile Access

Skype is the application that continues to drive the majority of communications traffic, now accounting for almost a third of that category's traffic. The remaining top applications vary from country to country, but we have observed continued growth of over-the-top (OTT) messaging application in many European countries with WhatsApp and now Snapchat continuing to be the dominant players.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	Facebook	17.93%	HTTP	17.65%	HTTP	16.92%
2	HTTP	13.45%	YouTube	16.54%	YouTube	15.15%
3	SSL	8.63%	Facebook	12.85%	Facebook	13.72%
4	YouTube	8.25%	SSL	5.68%	SSL	6.17%
5	BitTorrent	5.00%	MPEG	4.23%	MPEG	3.85%
6	Skype	4.60%	Netflix	3.89%	Netflix	3.53%
7	iTunes	3.01%	iTunes	3.48%	iTunes	3.40%
8	Instagram	2.07%	Google Market	2.66%	BitTorrent	3.02%
9	MPEG	2.05%	BitTorrent	2.60%	Google Market	2.43%
10	Snapchat	1.86%	Instagram	1.92%	Skype	1.93%
		64.99%		69.59%		70.13%



Table 8 - Top 10 Peak Period Applications - Europe, Mobile Access

Interestingly, HTTP is the application that generates the most bandwidth both in peak period and the entire day, slightly edging out YouTube which is often the top ranked application on the mobile networks we study. The appearance of BitTorrent on the list indicates that the use of aircards or dongles is a popular practice in Europe, possibly as fixed line replacement, since running these applications on a smartphone or tablet is impractical.

Additional evidence that suggests the use of aircards or tethering on the participating networks is demonstrated in the distribution of monthly usage by subscribers. The top 1% of subscribers account for 42% of upstream traffic, and 31% of all traffic. At the opposite end of the usage spectrum, the network's lightest 50% of users account for only 0.84% of total traffic which, much like on North American networks, is likely caused by the number of feature phones still in use by subscribers.

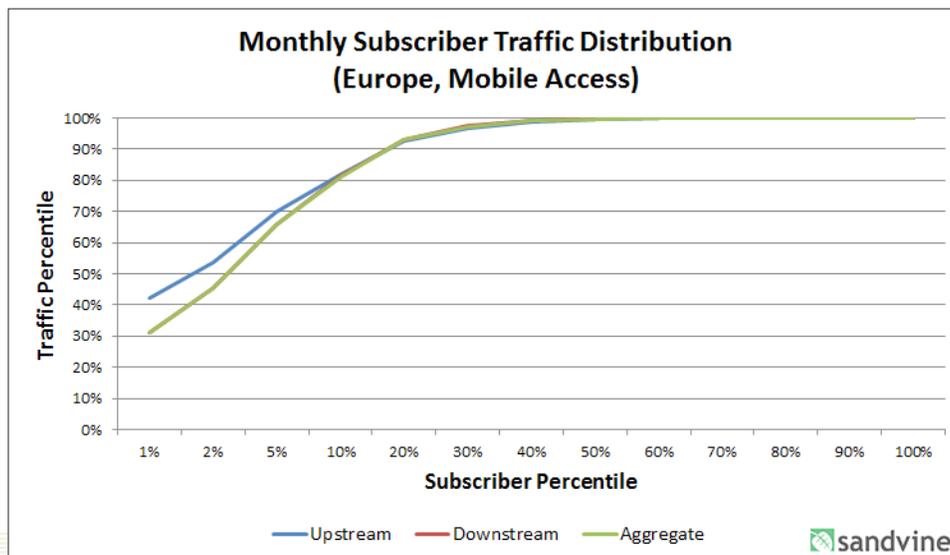


Figure 8 - Monthly Subscriber Traffic Distribution - Europe, Mobile Access

Snappy New Year

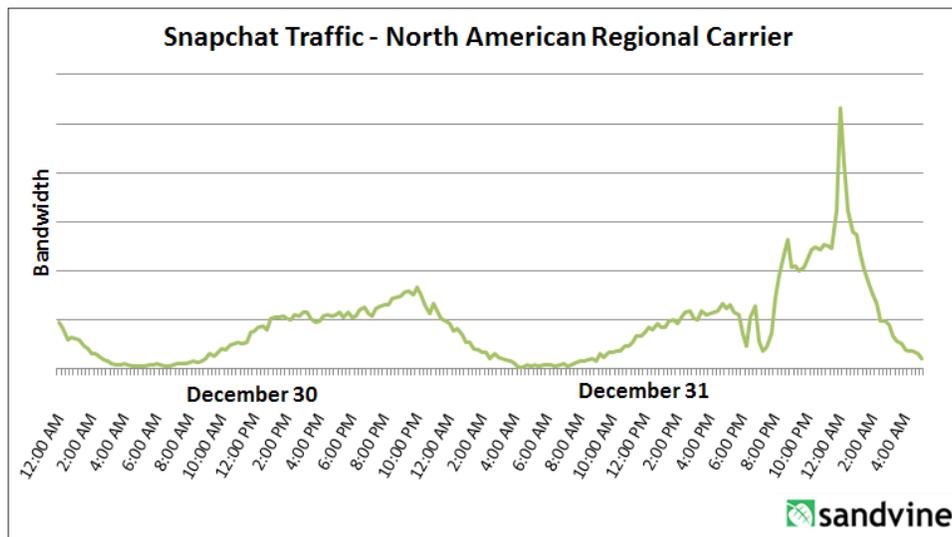
There was an article over a decade ago that talked about how mobile operators would be flooded with text messages at the stroke of midnight on New Year's Eve.⁴

Fast forward ten years, smartphones are now dominant, and SMS revenue is in decline for many operators, as subscribers are choosing to use over-the-top (OTT) messaging applications with their data connection.

When Sandvine looked at the New Year's Eve usage of some services like WhatsApp and kik that focus primarily on using text to send a messages we observed that there was a tiny spike in usage at midnight, but nothing that moved the needle that much, since plain text doesn't consume that much bandwidth.

Snapchat a service that allows users to exchange only pictures, however was a totally different story. In 2013 it saw both its user base and bandwidth share rise significantly.

Below is data from a regional mobile operator in the US that shows the surge in use that the service experienced throughout the day and particularly at midnight. In fact, at 12:00 AM Snapchat accounted for 12% of this one network's total traffic.



Snapchat's massive New Year's spike was not limited to just North American networks. Multiple Sandvine customers who operate a Tier 1 LTE network in Western Europe saw similar Snapchat usage patterns on New Year's Eve.

4. <http://www.theguardian.com/technology/2003/jan/07/newmedia.mobilephones>

Latin America, Fixed

As a market where mobile networks are subscribers' primary way of accessing the Internet, an examination of fixed access networks in Latin America reveals some interesting findings.

Monthly Consumption - Latin America, Fixed Access		
	Median	Mean
Upstream	578 MB	1.5 GB
Downstream	5.3 GB	11.7 GB
Aggregate	5.9 GB	13.2 GB



Table 9 - Monthly Consumption Figures - Latin America, Fixed Access

One of the first findings is that monthly fixed-access usage in Latin America is significantly lower than what has been observed in other regions around the globe. Mean monthly usage is 13.2 GB, and median monthly usage is 5.9 GB, figures that show an approximate 30% increase over the figures we published in 1H 2013. When comparing these numbers to North America, which has the leading consumption around the globe, subscribers on Latin America's fixed access networks continue to use only a quarter of the data per month that subscribers in North America do. A big reason for this is access speeds in Latin America are typically slower than what you will find in other regions of the world.

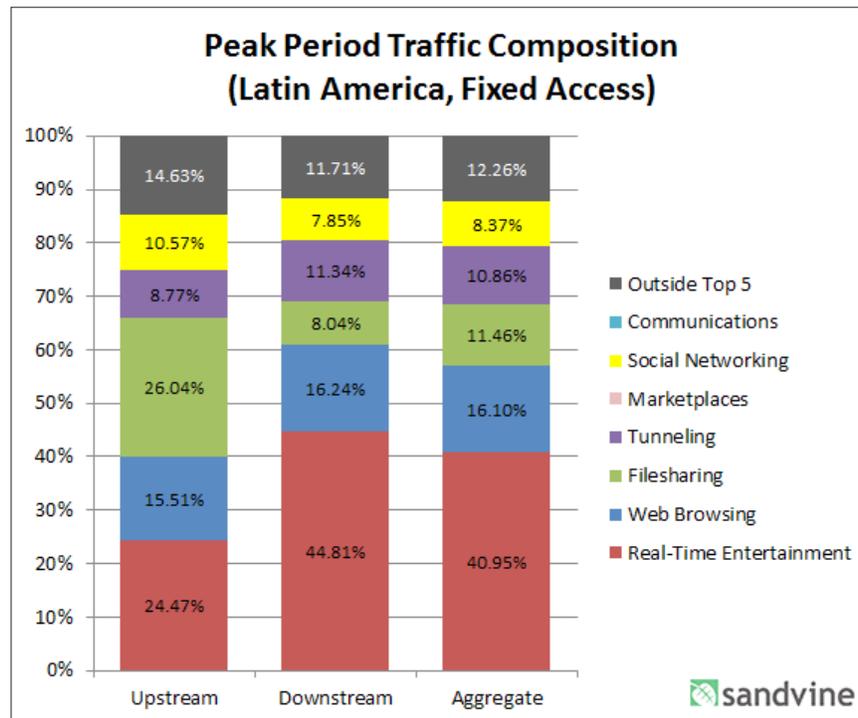


Figure 9 - Peak Period Aggregate Traffic Composition - Latin America, Fixed Access

Despite lower overall usage, the consumption habits of subscribers in the region are very similar to that observed around the globe. Unsurprisingly, Real-Time Entertainment is the leading source of traffic; continuing to account for essentially 45% of downstream bytes during peak period, while Web Browsing and Filesharing round out the top three traffic categories on the aggregate.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	19.83%	YouTube	28.94%	YouTube	26.28%
2	YouTube	14.90%	HTTP	14.27%	HTTP	13.94%
3	HTTP	12.60%	SSL	10.97%	SSL	10.37%
4	Facebook	8.34%	BitTorrent	6.89%	BitTorrent	9.35%
5	SSL	7.82%	Facebook	5.60%	Facebook	6.12%
6	Ares	3.32%	Netflix	5.09%	Netflix	4.34%
7	MPEG	2.30%	MPEG	2.91%	MPEG	2.79%
8	Skype	1.79%	Flash Video	2.16%	Flash Video	1.99%
9	Flash Video	1.28%	RTMP	1.87%	RTMP	1.68%
10	Netflix	1.16%	Google Market	1.73%	Google Market	1.64%
		72.19%		78.69%		76.88%



Table 10 - Top 10 Peak Period Applications - Latin America, Fixed Access

Looking at the top applications, YouTube at 28.9% of peak downstream traffic is the clear leader in traffic share, almost doubling the second ranked application (HTTP). Making an appearance in our top 10 applications once again is Netflix, which accounts for 5.1% of peak downstream traffic. In 1H 2013, Netflix accounted for only 1.9% of peak downstream traffic which means in just 12 months the service’s share has more than doubled. While not yet at the levels observed on North American networks, Netflix remains the clear bandwidth share leader in paid-streaming video services in Latin America.

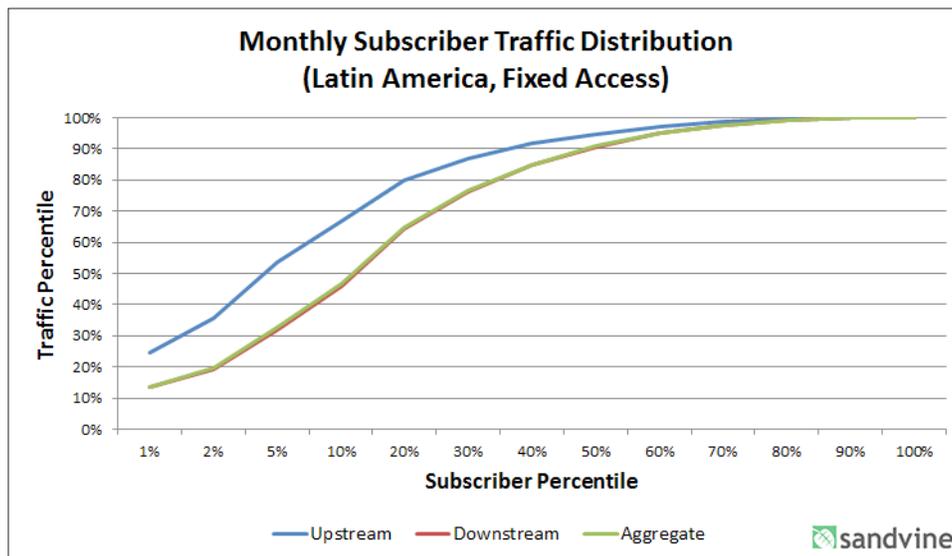


Figure 10 - Monthly Subscriber Traffic Distribution - Latin America, Fixed Access

From a traffic distribution standpoint, the top 1% of subscribers in Latin America who make the heaviest use of the network’s upstream resources account for 25% of total upstream traffic. The comparable downstream users account for 16% of downstream bytes. At the opposite end of the usage spectrum, the network’s lightest 50% of users account for only 10% of total traffic. These figures are very much in line with what has been observed on fixed networks elsewhere around the globe.

Choices: Video Providers, CDNs, Peers, ISPs...and You

As a consumer, when an Internet application doesn't deliver to your expectations, you voice your frustration to your supplier, a consumer ISP. But it's interesting to know how that data gets to your house, and who's hands and decisions it flows through along the way.

In a simplified form, your ISP connects to a set of 'peers' (which are usually a type of 'middleman' ISP such as Level 3 or Cogent), and these peers in turn connect to the server you are accessing. The server is usually arrayed in a Content Distribution Network (CDN), such as LimeLight Networks and Akamai.

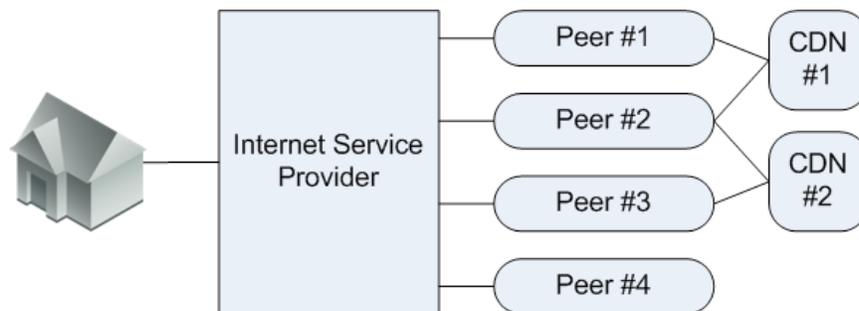
When more than one path between you and a CDN exists, as it usually does, the sender chooses which one they will use. In the diagram below, CDN1 makes two key decisions:

They have chosen to connect to Peer1 and Peer2, but not Peer3 or Peer4. This constrains their choices.

They choose whether to send traffic on Peer1 or Peer2 at any given time.

That simple example works if the content you want is served by only one CDN; you pick the content, the CDN picks the path, and we are done.

But what if the content is served by more than one CDN, as is the case for Netflix, served by LimeLight Networks and their own CDN (Open Connect)? What happens here when you open Netflix and select your House of Cards episode?



In this case, the first choice has unwittingly been made by you! Yes you. It turns out the hardware device you have bought constrains some of the choice of CDN. Netflix chooses to serve you differently depending on whether you use a Blu-ray player, tablet, PC, AppleTV, PS3, etc. This includes which content (SuperHD, HD, ...) is licensed for your device and whether it can do 1080p, but also how Netflix chooses to stream the traffic to you.

The second decision is made by Netflix for you, inside your home. The client you run to access Netflix makes a decision based on time, load, and other factors, and, based on this, selects CDN1 or CDN2 from above. Assuming they pick CDN2 which is interconnected in many cities, they also pick a city to stream from (though they may not always pick the closest).

Once the CDN is selected, the CDN operator chooses which peer to send your flow down. In the case of Netflix and Open Connect, this is also their choice. Once the data arrives inside your ISP's network, they decide how to route it to your house, and then you watch and enjoy.

But you wonder, is this all academic? Wouldn't all players always make the 'best' decision (and thus the same decision for the same inputs?). It turns out the answer is 'no' for a complex set of business and technical reasons.

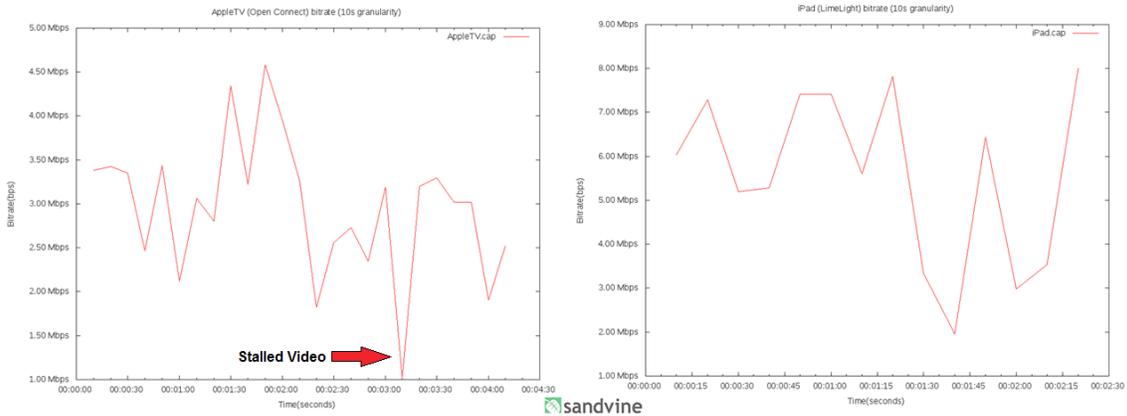
CDN1 may always prefer Peer1 because they are cheaper. But cheaper normally has some reason, such as lower quality. CDN1 may be aware of this and turn a blind eye in order to reduce costs, or may have a difficult time diagnosing this problem or knowing when it occurs.

Still not convinced this isn't all academic? Here's an example. In this case, we had a Sandvine employee take two near identical devices; an AppleTV and an Apple iPad. They then used each of them to watch the same show at the same time, and then repeated this at several peak and off-peak times of the day. Interestingly, the AppleTV always chooses Netflix's own CDN, Open Connect, at all times of day but the Apple iPad uses the LimeLight CDN at off-peak times and Open Connect during peak times.

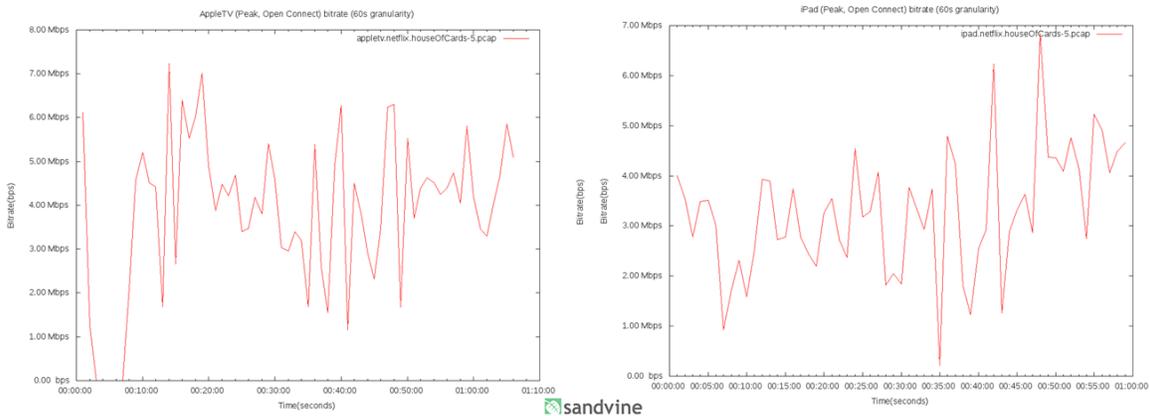
At off-peak times, the AppleTV device used 198.45.55.166, which is `ipv4_1.lagg0.c087.dfw001.ix.nflxvideo.net`. The way you read this is 'dfw' == Dallas, and 'nflxvideo.net' means it is hosted by Netflix. At off-peak time the iPad used

208.111.159.61, which is cds846.dal.llnw.net. The way you read this is 'dal' == Dallas, and llnw.net means the content is hosted by LimeLight Networks. Keep in mind this is the same content, and near identical Cupertino devices, in the same home, at the same time. Given that a network's cost is a function of peak usage, this means that there will be under-utilized capacity on LimeLight (and their Peers) at peak times, and there may be over-utilized capacity on Open Connect (and their Peers) at peak times.

So, did this matter? The Sandvine employee have an 105Mbps downstream connectionso they have the luxury of running two streams side-by-each. In each case, they were watching the same episode of House of Cards. Here, in the first two charts, we see that the iPad achieved roughly twice the quality (measured via bitrate) as the AppleTV (at the same time in the same house!). The only difference was the CDN that Netflix chose: the Netflix App chose LimeLight on the iPad, and Open Connect on the AppleTV. And could they see the difference? The most obvious difference was the stall on the AppleTV (shown roughly 3 minutes in, after which Netflix's adaptive streaming switched to a lower quality stream and the stalls disappeared).



And, to double check, they ran this again later (during peak hours) and found that the iPad and the AppleTV delivered more or less the same (when they both chose the same CDN), shown below.



So, conclusions? Choices matter. It's just not always obvious whose choice.

Latin America, Mobile

Latin America is a region that has great variation in the types of mobile networks, and because of this usage varies greatly from country to country. Most networks in the region are 2G/3G networks, however with the rollout of LTE in some countries, mobile networks have begun to offer an experience that is equivalent and in some cases even better than that of fixed access networks in the region.

Monthly Consumption - Latin America, Mobile Access		
	Median	Mean
Upstream	15.4 MB	42.3 MB
Downstream	82.1 MB	313.1 MB
Aggregate	94.1 MB	355.4 MB



Table 11 - Monthly Consumption Figures - Latin America, Mobile Access

In our analysis, we observed a mean monthly usage of 355.5 MB, virtually unchanged from what we observed six months ago. It should be made clear however, that there is wide variation in usage from country to country and network to network. For example, as discussed in a previous report, in one Latin America country we observed mean monthly usage on a 3G network to be 343 MB, while on an LTE network in the same country it was 2.7 GB. The wide disparity means that operators, particularly those in emerging markets with low fixed access penetration, should prepare themselves for drastic changes in the usage of their networks as subscribers are sure to take full advantage of LTE's speed and quality of experience (QoE) benefits.

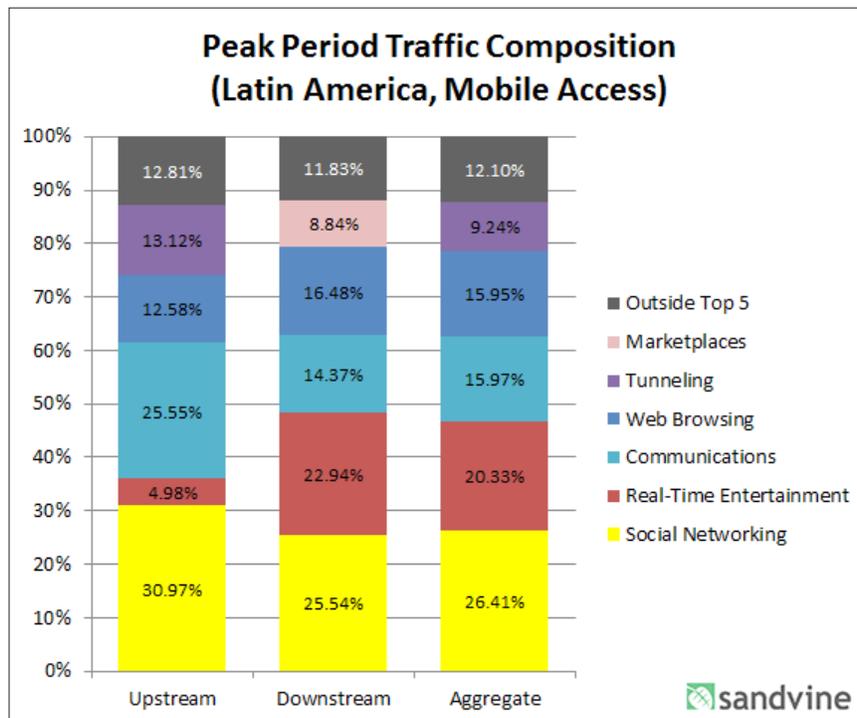


Figure 11 - Peak Period Aggregate Traffic Composition - Latin America, Mobile Access

Because fixed access network penetration is not as widespread as Europe or North America, mobile networks in Latin America offer a mix of personal handsets and air cards that serve as a household's primary Internet connection. This mix results in interesting traffic profiles. Applications and traffic categories that are usually most prominent are those that are typically popular on both mobile devices and PCs.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	Facebook	24.52%	Facebook	17.45%	Facebook	18.55%
2	SSL	12.16%	YouTube	14.73%	YouTube	13.06%
3	BlackBerry	10.80%	HTTP	13.73%	HTTP	13.04%
4	HTTP	8.75%	BlackBerry	9.12%	BlackBerry	9.37%
5	Whats App	5.71%	SSL	8.31%	SSL	8.83%
6	YouTube	3.05%	Google Market	5.25%	Google Market	4.66%
7	Gmail	2.29%	Instagram	3.57%	Instagram	3.27%
8	Twitter	2.12%	MPEG	3.26%	MPEG	2.85%
9	Ares	2.12%	Whats App	2.33%	Whats App	2.81%
10	Skype	2.04%	Twitter	2.02%	Twitter	2.12%
		71.54%		77.75%		76.43%



Table 12 - Top 10 Peak Period Applications - Latin America, Mobile Access

Unlike most regions across the world, in Latin America, Social Networking is mobile traffic's largest driver, accounting for 25.5% of peak downstream traffic. This is likely due to the popularity of low-cost, all-you-can use social networking plans Sandvine has helped operators to implement. Facebook has now surpassed YouTube as the largest source of that downstream traffic, accounting for 17.5%. Frequent readers of the Global Internet Phenomena Reports will notice that YouTube has seen a slight decline in recent reports due to the introduction of new participant networks to our study who have implemented tiered service plans, which allow lost cost access to social networking and communication sites.

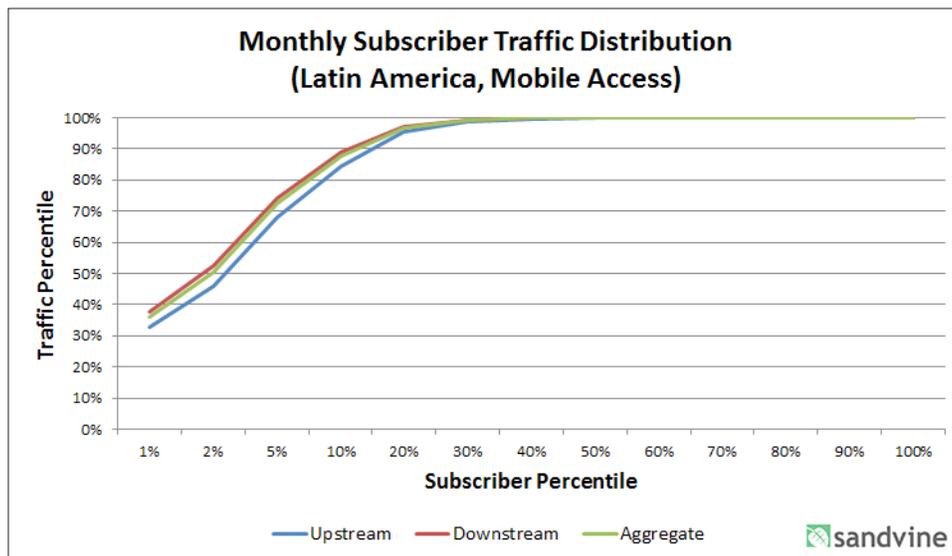


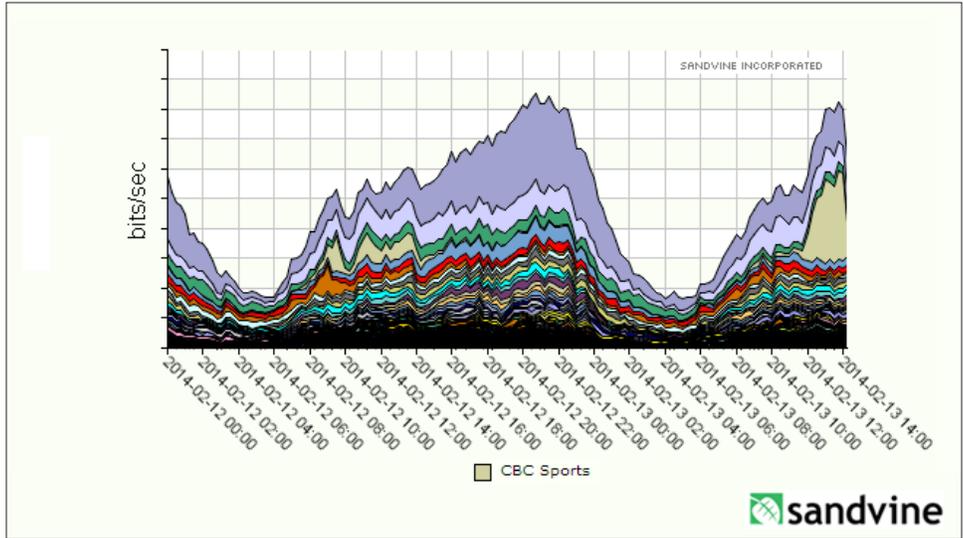
Figure 12 - Monthly Subscriber Traffic Distribution - Latin America, Mobile Access

In Latin America, the 1% of subscribers who make the heaviest use of the network's upstream resources account for 33% of upstream, 38% of downstream, and 37% of aggregate bytes each month. Much like observed in Europe and Asia-Pacific, this high concentration among the top 1% of users is likely due to the use of computers as opposed to just smartphones on the network.

Sochi Streaming

As a Canadian based company, Sandvine takes a special interest in the Winter Olympics, and especially the hockey events. For the 2014 games, the time difference between Sochi, Russia and Waterloo, Ontario the location of Sandvine headquarters is nine hours, which presents some complications since most events occur in the early morning hours when many people may be at work.

On February 13, we examined a network with a mixture of business and consumer subscribers and observed that during the third period (2pm ET) of the first men's hockey game that featured Canada, CBC Olympic streaming (the local broadcaster) accounted for over 37% of total network traffic.



Based on these observations, we predict that the 2014 World Cup will be the most livestreamed event of all-time and that regions such as Latin America where soccer is the dominant sport could see streaming of matches account for over 40% of network traffic on both fixed and mobile networks.



Asia-Pacific, Fixed

For 1H 2014, mean usage in the region was 39.6 GB. This is interesting because of the amount of Filesharing and Peercasting traffic on the network, the upstream-to-downstream ratio is among the lowest observed in this study a 2.0. When comparing mean usage to North America, it is significantly lower in Asia-Pacific, but interestingly, median monthly usage is broadly in line with usage levels observed in North America, at 18.5 GB.

Monthly Consumption - Asia-Pacific, Fixed Access		
	Median	Mean
Upstream	2.2 GB	13.2 GB
Downstream	14.4 GB	26.4 GB
Aggregate	18.5 GB	39.6 GB



Table 13 - Monthly Consumption Figures - Asia-Pacific, Fixed Access

As observed in other regions across the globe, consumption in Asia-Pacific is driven by the use of Real-Time Entertainment, which accounts for over 50% (53.6%) of total downstream traffic during peak period.

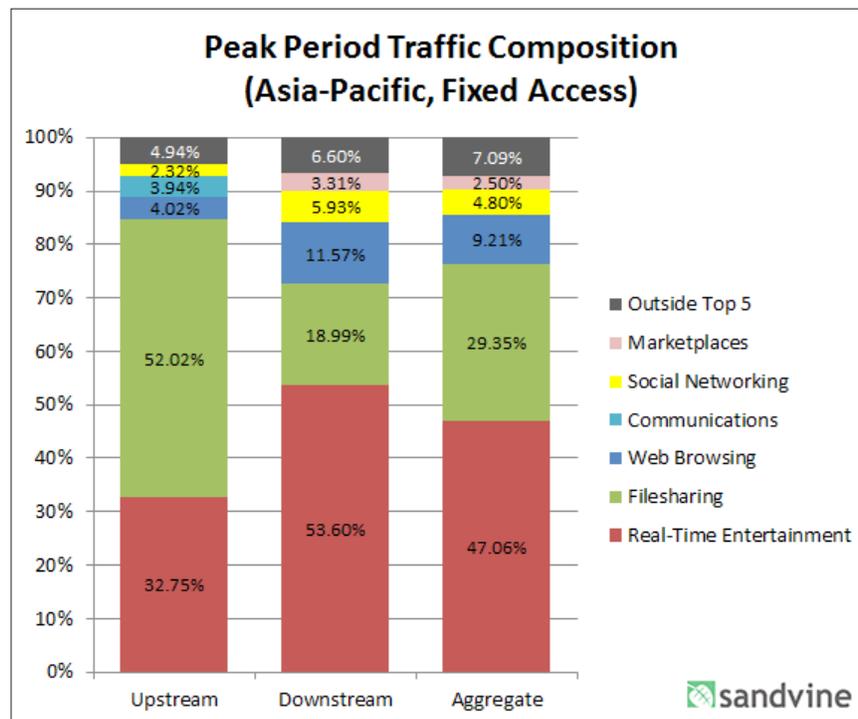


Figure 13 - Peak Period Aggregate Traffic Composition - Asia-Pacific, Fixed Access

As covered in our previous report, a unique characteristic of the Asia-Pacific region is the popularity of peercasting applications, particularly QVoD and PPStream. These applications allow users to stream live events while simultaneously helping to distribute the stream to other viewers, which drives large volumes of upstream traffic. In our 2H 2013 report, Asia-Pacific was the only region we observed where BitTorrent was the top application during peak period. In many other regions, Filesharing applications have seen a decline in share over recent reports, and that is a phenomenon we have begun to observe in Asia-Pacific as well. BitTorrent is now the second ranked downstream application during peak and while its decline in share has been somewhat less drastic than in North America we believe the rate of decline will accelerate, as more over-the-top Real-Time Entertainment sources are made available to subscribers in the region.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	45.74%	YouTube	27.01%	BitTorrent	26.95%
2	QVoD	10.98%	BitTorrent	18.80%	YouTube	20.49%
3	YouTube	5.51%	HTTP	10.22%	HTTP	7.96%
4	RTSP	3.97%	RTSP	6.56%	RTSP	5.77%
5	Thunder	3.16%	Facebook	3.49%	QVoD	5.55%
6	HTTP	2.76%	MPEG	3.31%	Facebook	2.89%
7	Skype	2.20%	QVoD	3.20%	MPEG	2.43%
8	Facebook	1.49%	RTMP	1.74%	Thunder	1.63%
9	SSL	1.12%	Flash Video	1.68%	SSL	1.36%
10	PPStream	1.02%	SSL	1.47%	RTMP	1.32%
		76.93%		76.02%		75.03%



Table 14 - Top 10 Peak Period Applications - Asia-Pacific, Fixed Access

From a traffic distribution standpoint, the top 1% of subscribers in Asia-Pacific who make the heaviest use of the network’s upstream resources account for 23% of total upstream traffic. The comparable downstream users account for 13% of downstream bytes. At the opposite end of the usage spectrum, the network’s lightest 50% of users account for only 10% of total traffic.

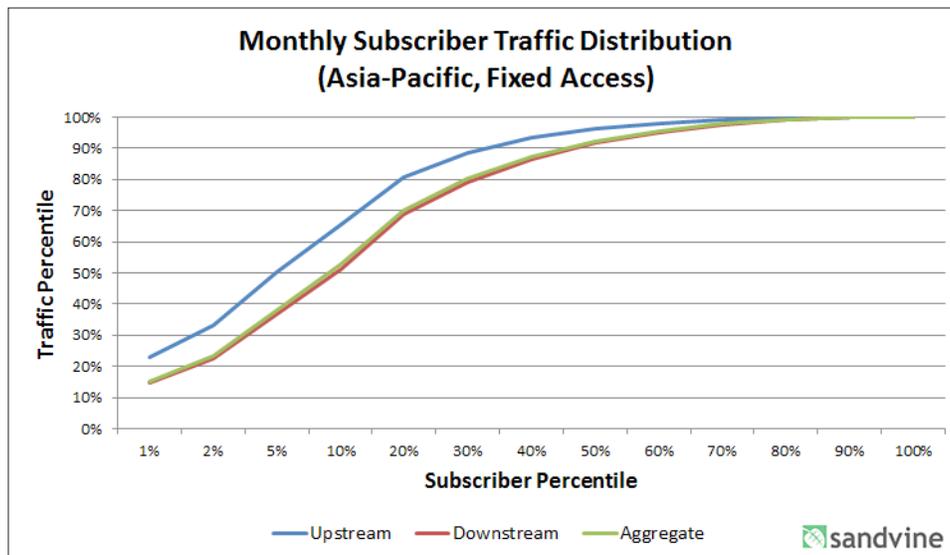


Figure 14 - Monthly Subscriber Traffic Distribution - Asia-Pacific, Fixed Access

Asia-Pacific, Mobile

Asia-Pacific mobile subscribers have traditionally shown the highest consumption numbers among users in the Global Internet Phenomena Report and that is unchanged in this edition. In our last report, Asia-Pacific was the first region to exceed 1GB a month on average. While the figures for this report are nearly the same as before, we expect Asia-Pacific’s consumption leadership to continue for the foreseeable future.

Monthly Consumption - Asia-Pacific, Mobile Access		
	Median	Mean
Upstream	48.4 MB	122.4 MB
Downstream	311.1 MB	1.0 GB
Aggregate	361.4 MB	1.1 GB



Table 15 - Monthly Consumption Figures - North America, Mobile Access

This high usage is driven by Real-Time Entertainment accounting for 46.9% of total downstream traffic during peak period. Unlike other regions where one or two applications drive much of the category, in Asia-Pacific, multiple applications including YouTube, Wowza, MPEG, PPStream, QVoD, and Dailymotion are responsible for driving traffic. The popularity of communications applications was also evident as third-party messaging applications were observed to be in use by over 4)5 of subscribers each hour on several participating networks.

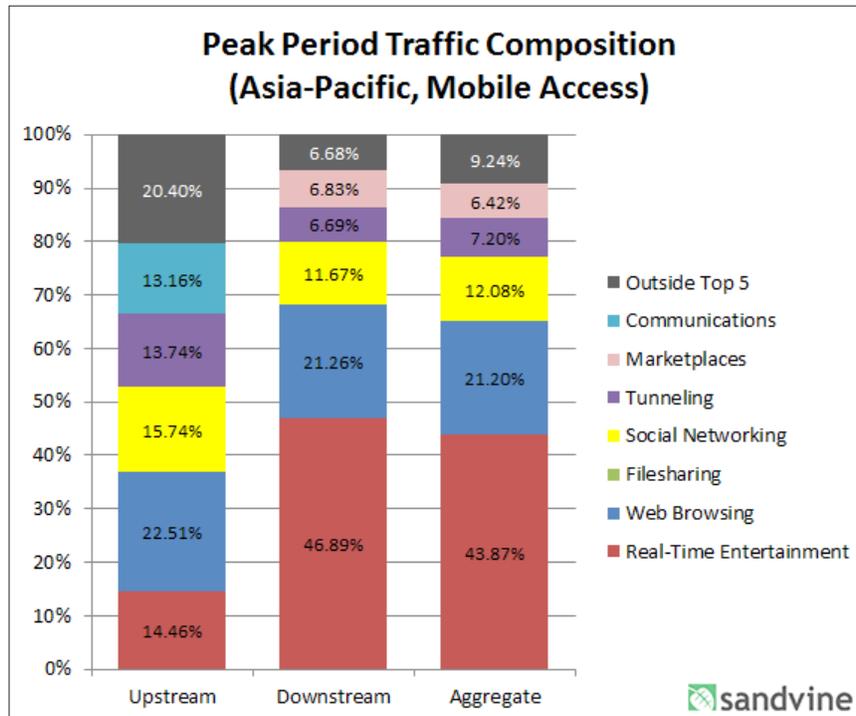


Figure 15 - Peak Period Aggregate Traffic Composition - Asia-Pacific, Mobile Access

Other than the appearance of multiple applications accounting for the high Real-Time Entertainment share, Asia-Pacific's traffic is for the most part similar in composition to that of leading networks in Europe and North America. The one difference that may be present is the popularity of marketplaces in the region which accounts for 6.8% of downstream traffic. When combining the traffic share of iTunes and Google Play, subscribers in Asia-Pacific are the highest consumers of apps, music, and movie downloads than any region in the world.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	HTTP	17.06%	HTTP	19.53%	HTTP	19.14%
2	Facebook	11.75%	YouTube	14.68%	YouTube	13.60%
3	SSL	11.38%	MPEG	11.04%	MPEG	10.15%
4	BitTorrent	5.28%	Facebook	7.73%	Facebook	8.12%
5	YouTube	3.38%	SSL	6.26%	SSL	6.60%
6	Skype	3.22%	Dailymotion	3.86%	Dailymotion	3.54%
7	MPEG	2.97%	Google Market	2.98%	Google Market	2.78%
8	Whats App	2.29%	HTTP Live Streaming	2.66%	Instagram	2.50%
9	Dropbox	1.89%	Instagram	2.60%	HTTP Live Streaming	2.49%
10	Instagram	1.89%	iTunes	2.52%	iTunes	2.39%
		59.24%		71.33%		68.91%



Table 16 - Top 10 Peak Period Applications - Asia-Pacific, Mobile Access

In Asia-Pacific, the 1% of subscribers who make the heaviest use of the network's upstream resources account for 37% of upstream, 22% of downstream, and 22% of aggregate bytes each month. As observed in Europe, this high concentration of users is likely due to the presence of laptop air cards or the use of tethering which typically allows subscribers to consume significantly more data than a smartphone. This is supported by the regional behaviors: 1 GB monthly mean usage and BitTorrent's share of 5.3% total upstream traffic during peak period which is typically an application not running on a smartphone or tablet.

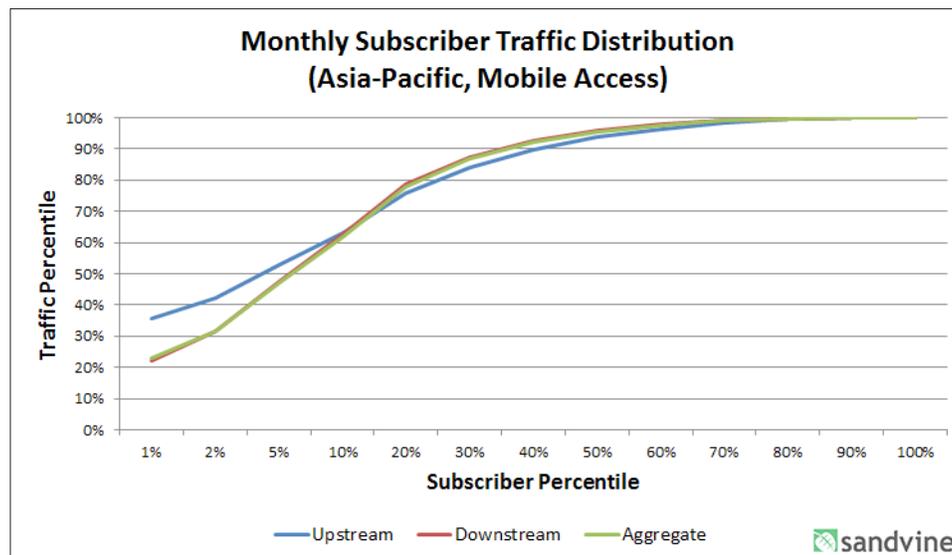


Figure 16 - Monthly Subscriber Traffic Distribution - Asia-Pacific, Mobile Access

The Importance of Measuring Peak

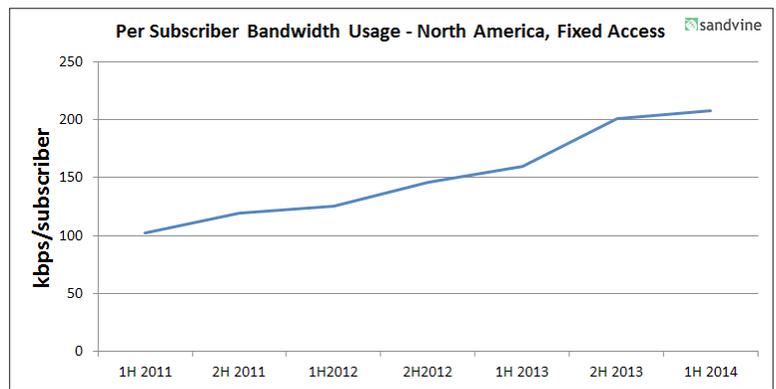
In our 2H 2013 report we observed that mean monthly usage on North American fixed access networks was virtually unchanged from our 1H 2013 report (around 44GB). At that time several readers, asked if that means we are beginning to see the slowing of network growth to which we replies - “Absolutely not”.

Since networks must spend a great deal of their capital expenditures engineering for peak demand, the most important figure operators must pay attention to is growth during peak periods, rather than the total volume of what is consumed in a month.

At this point, for those interested in the monthly total, it should be noted that we have maintained the same collection period for our report since 2009 in an attempt to ensure that we are able to provide comparable numbers period over period. It is also important to consider that there are also a number of relatively random external factors that can impact Internet usage over our month long collection period, including the weather (sunny days get people outside), content availability (Hulu is often higher in the Spring due to new TV shows being available), and major network events (iOS or Call of Duty launches).

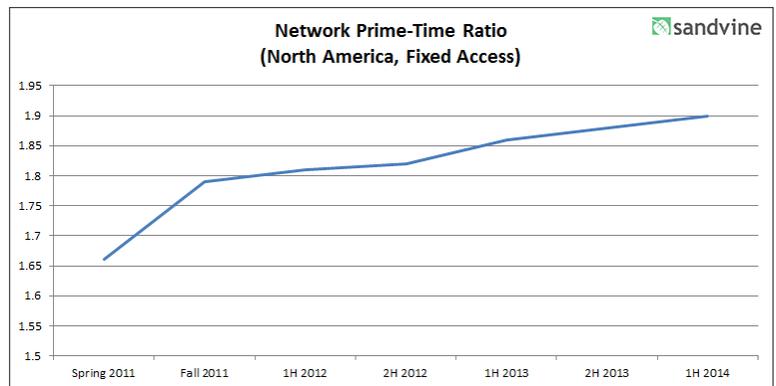
Below is a chart showing the growth of peak period (when the network is within 95% of its highest point). As you can see over the past year we have actually observed the per-subscriber average usage increasing at a steady rate. These are figures that closely match growth rates we have heard from many of our North American fixed line customers.

So what is driving this growth? As touched on in this report, we have seen a continued increase in Real-Time Entertainment share coupled with a decline in the share of P2P Filesharing traffic. Streaming audio and video is far more efficient because people only consume what they watch or listen to, while with P2P, people may download an entire season of a TV show at once and may never even watch it. Because streaming content is on-demand, and typically viewed during prime-time (while P2P could be anytime), the increasing share of Real-Time Entertainment speaks to why it is important to pay attention to peak usage figures as opposed to monthly consumption.



Another important metric to examine is Prime-Time Ratio. This compares the absolute levels of network traffic during an average peak period hour with an average off-peak hour. This metric is most helpful for capacity planning because it helps to quantify how subscribers are cramming more usage into the peak evening hours. Below is chart showing the increased concentration as measured over our past six reports.

As Real-Time Entertainment continues to dominate the network, we expect subscriber usage will continue become more and more concentrated to peak hours. This continuing phenomena means network operators need to be doing their capacity planning around peak growth rates rather than the total number of bytes their subscribers are consuming each month.



Africa, Mobile Networks

Africa is a region with tremendous potential for growth, but few understand what the traffic composition in the region is. At Sandvine, we believe that to understand Africa, you must be in Africa, and thanks to now being deployed in over 20 networks in the region, Sandvine is able to publish mobile usage statistics on a regular basis for the region

Monthly Consumption - Africa, Mobile Access		
	Median	Mean
Upstream	638 KB	8.5 MB
Downstream	952 KB	15.5 MB
Aggregate	1.8 MB	24 MB



Table 17 - Monthly Consumption Figures - Africa, Mobile Access

Consumption figures are the first thing that stand out when looking at usage in the region. Unlike more developed regions where smartphone penetration is well above 50%, Africa and particularly its west and still has a large number of subscribers using featurephones. Because of this median monthly usage is less than 1.8 MB, and mean monthly usage is just 24MB, a far cry from the 1GB mean observed in Asia-Pacific.

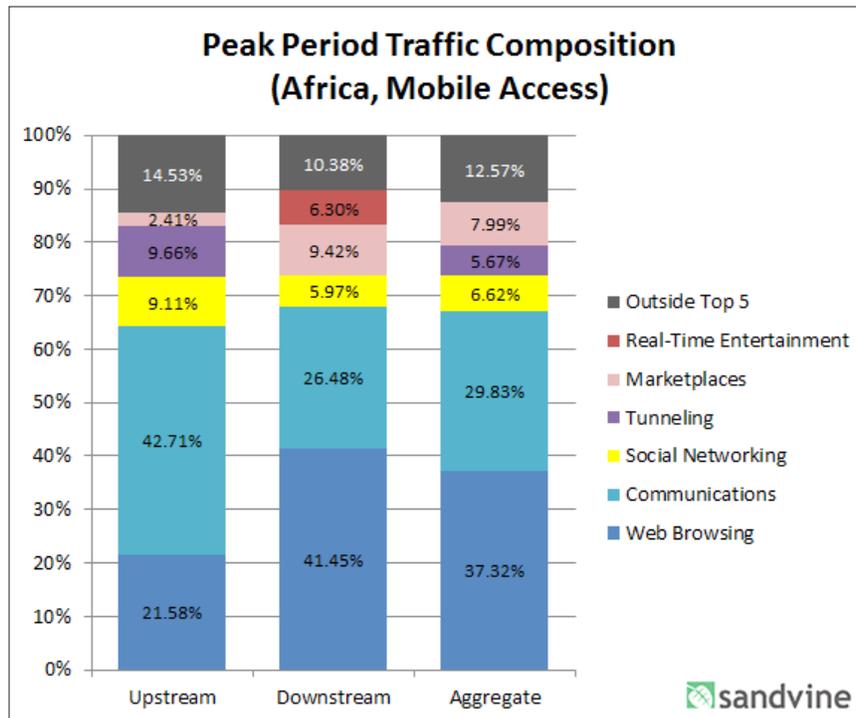


Figure 17 - Peak Period Aggregate Traffic Composition - Africa, Mobile Access

In most regions, Real-Time Entertainment is the traffic category that is the most dominant. This is not the case in Africa however. During peak period, Real-Time Entertainment accounts for only 5.7% of peak downstream traffic, which crowns Web Browsing as the dominant downstream traffic category, accounting for over 41% of total traffic. Communications is not far behind at 26.5%.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BlackBerry	17.43%	HTTP	29.79%	HTTP	26.15%
2	HTTP	12.22%	BlackBerry	13.94%	BlackBerry	14.64%
3	WAP v2	6.87%	WAP v2	6.10%	WAP v2	6.49%
4	SSL	4.76%	Opera Mini	4.44%	Opera Mini	4.93%
5	Whats App	3.54%	Whats App	3.96%	Whats App	3.95%
6	Facebook	2.62%	SSL	3.77%	SSL	3.14%
7	Opera Mini	2.07%	Google Market	3.40%	Google Market	3.12%
8	BitTorrent	1.72%	YouTube	3.22%	YouTube	2.71%
9	Skype	1.43%	Facebook	2.73%	Facebook	2.03%
10	Yahoo! Mail	1.41%	BitTorrent	1.78%	BitTorrent	1.77%
		52.66%		71.34%		67.16%



Table 18 - Top 10 Peak Period Applications - Africa, Mobile Access

In most regions, YouTube is the application responsible for generating the most bandwidth, but in Africa it accounts for just 3.2% of traffic. HTTP traffic is the leading source of traffic at 29.8% and WAP Browsing (typically web browsing on a feature phone) is also a contributor at 6.1%. Africa is also the only region where Opera Mini, a web browser focused on data efficiency, is among the top 10 applications. While BlackBerry has seen a significant decline in emerged markets, the devices are incredibly popular in emerging markets such as Africa because of their low cost and data efficiency. BlackBerry smartphones are efficient because all of their data (email, browsing, BBM) is tunneled to a network operations center (NOC), and because of this it is seen as one singular source of traffic accounting for 14.6% of total traffic.

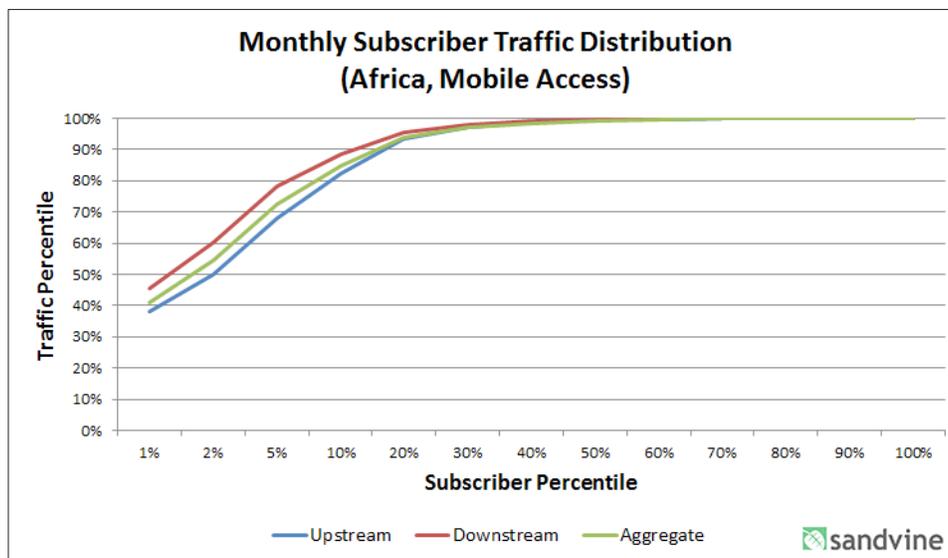


Figure 18 - Monthly Subscriber Traffic Distribution - Africa, Mobile Access

In Africa, the 1% of subscribers who make the heaviest use of the network's upstream resources account for 39% of upstream, 46% of downstream, and 40% of aggregate bytes each month. This concentration is among the highest observed, which we believe due to the disparity in usage between those subscribers with higher consuming smartphones or aircards, and those who are using traditional feature phones.

Africa, Fixed

As a market where mobile networks are many subscribers’ primary way of accessing the Internet, an examination of fixed access networks in Africa reveals some interesting findings.

Unsurprisingly, Real-Time Entertainment is the leading source of traffic; accounting for only just over a quarter of peak downstream traffic which is a far cry from regions who see streaming audio and video account for 50-60% of peak traffic.

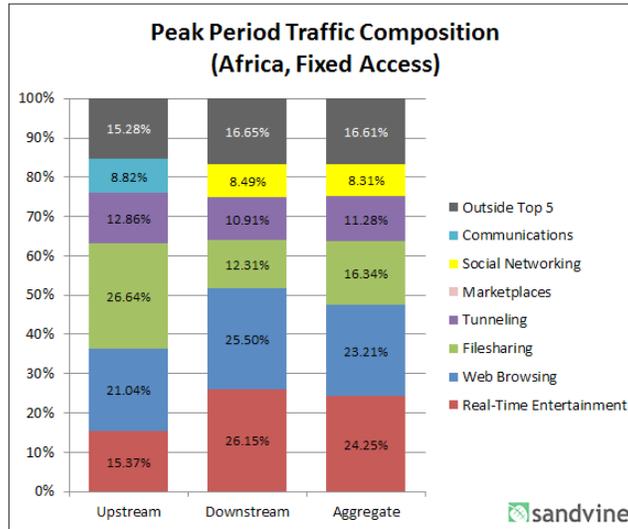


Figure 19 - Peak Period Aggregate Traffic Composition - Africa, Fixed Access

Looking at the top applications, HTTP at 22.9% of peak downstream traffic is the clear leader in share, well ahead of YouTube which is typically the leader on many networks. The reason for video accounting for a lower share could have to do with fixed networks in the region providing slower speeds than what is seen in parts of Europe or North America. These slower speed could in part also be an explanation for BitTorrent being the second ranked application on the aggregate, since downloading and watching content later may prove to offer a superior experience to on-demand video options available in the region.

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	23.02%	HTTP	22.93%	HTTP	21.58%
2	HTTP	18.04%	YouTube	14.18%	BitTorrent	14.51%
3	YouTube	8.24%	BitTorrent	11.10%	YouTube	12.47%
4	SSL	7.83%	Facebook	6.82%	Facebook	6.78%
5	Facebook	6.58%	SSL	6.49%	SSL	6.77%
6	Skype	5.26%	MPEG	3.82%	MPEG	3.29%
7	MPEG	1.77%	Flash Video	2.91%	Skype	3.11%
8	Flash Video	1.25%	Skype	2.40%	Flash Video	2.46%
9	iTunes	0.93%	iTunes	2.36%	iTunes	2.07%
10	Dropbox	0.85%	Google Market	1.19%	Windows Update	1.85%
		72.91%		73.01%		73.04%

Table 19 - Top 10 Peak Period Applications - Africa, Mobile Access

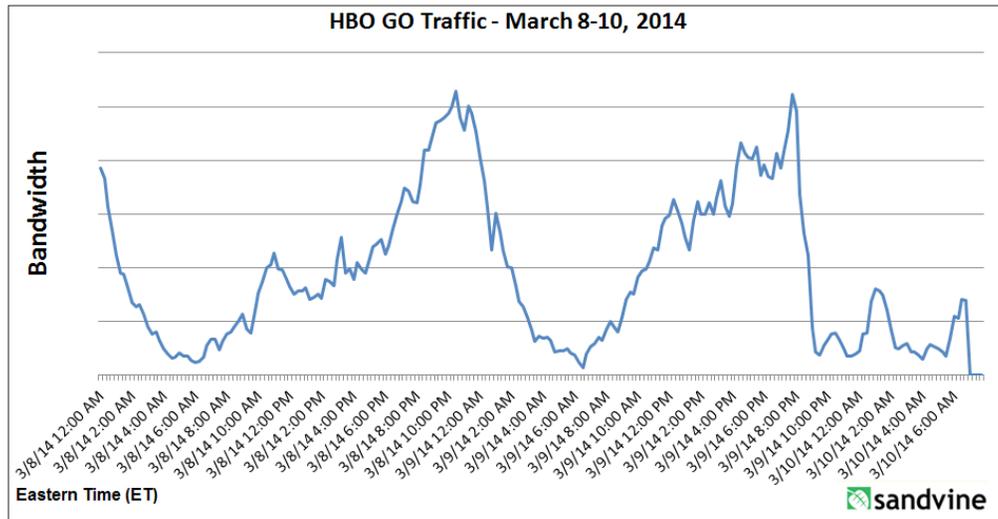
This is the first time Sandvine has covered fixed access networks in our Global Internet Phenomena Report, and we look forward to expanding our coverage of the region in the future.

HBO GOes Down

Alright, Alright, Alright is something HBO GO users weren't saying in March.

HBO GO was offering subscribers (and perhaps a few of their friends)⁵ the ability to not only stream True Detective's finale on demand after airing, but to also watch it live as it was being broadcast. Unfortunately it appears there were issues.

Below is data from a US fixed access network. The chart shows that traffic levels were broadly consistent throughout the day. At 9pm on Sunday, Just as True Detective began; HBO GO suffered a significant and prolonged outage.



When the service came back online between 12:30 AM and 12:45 AM Monday morning, it experienced a spike in usage for about an hour (the exact length of the episode itself) before dropping off, likely as exhausted subscribers went to bed.

So what impact does HBO GO typically have on operators? Not much. Based on data collected for this report, the service accounted for 1.24% of peak downstream traffic. Now had the service been working that night, it likely could have doubled or even tripped that share figure for an evening, but it still would only be a fraction of the 34.2% downstream share Netflix typically experiences.



5. <http://techcrunch.com/2014/01/20/hbo-doesnt-care-if-you-share-your-hbo-go-account-for-now/>

Explanation of Traffic Categories

The table below describes each of the traffic categories used in the Global Internet Phenomena Report: 1H 2014

Traffic Category	Description	Examples
Storage	Large data transfers using the File Transfer Protocol or its derivatives. Services that provide file-hosting, network back-up, and one-click downloads	FTP, Rapidshare, Mozy, zShare, Carbonite, Dropbox
Gaming	Console and PC gaming, console download traffic, game updates	Nintendo Wii, Xbox Live, Playstation 2, Playstation 3, PC games
Marketplaces	Marketplaces where subscribers can purchase and download media including applications, music, movies, books, and software updates	Google Android Marketplace, Apple iTunes, Windows Update
Administration	Applications and services used to administer the network	DNS, ICMP, NTP, SNMP
Filesharing	Filesharing applications that use a peer-to-peer or Newsgroups as a distribution models	BitTorrent, eDonkey, Gnutella, Ares, Newsgroups
Communications	Applications, services and protocols that allow email, chat, voice, and video communications; information sharing (photos, status, etc) between users	Skype, WhatsApp, iMessage, FaceTime
Real-Time Entertainment	Applications and protocols that allow “on-demand” entertainment that is consumed (viewed or heard) as it arrives	Streamed or buffered audio and video (RTSP, RTP, RTMP, Flash, MPEG), peercasting (PPStream, Octoshape), specific streaming sites and services (Netflix, Hulu, YouTube, Spotify,)
Social Networking	Websites and services focused on enabling interaction (chat, communication) and information sharing (photos, status, etc) between users	Facebook, Twitter, LinkedIn, Instagram
Tunneling	Protocols and services that allow remote access to network resources or mask application identity.	Remote Desktop, VNC, PC Anywhere, SSL, SSH,
Web Browsing	Web protocols and specific websites	HTTP, WAP browsing

Study Details

Sandvine's Global Internet Phenomena Reports examine a representative cross-section of the world's leading fixed and mobile communications service providers (CSPs) and are made possible by the voluntary participation of our customers. Collectively, Sandvine's customers provide Internet and data service to hundreds of millions of subscribers worldwide.

In the Global Internet Phenomena Report: 1H 2014, we examined five regions:

- Africa
- Asia-Pacific
- Europe
- Latin America
- North America

The data gathered for these reports was collected in March 2014 and is completely subscriber-anonymous. No information regarding specific content or personally-identifiable information (including, but not limited to, IP or MAC addresses and subscriber IDs) was collected during this study.

This study reflects the traffic profiles of real service providers, including the impact of any network management (for instance, congestion management and traffic optimization) policies that may be in place.

The data collected includes the bandwidth per second per protocol and the number of active hosts per protocol on the network at each hour. Data also includes the total transmitted (upstream) and received (downstream) bytes, from the subscriber's perspective, attributable to each subscriber for a period of 30 days.

The datasets were used to create a 24-hour profile of each network, normalized by the number of active subscribers at each hour in the day. These profiles were then aggregated hierarchically for each region with weightings based on subscriber counts and access technology market share.

The transmitted and received bytes per subscriber data sets were used to create ordinal rankings of all subscribers on a network based on a combination of data direction (upstream, downstream, aggregate) and data period (day, week, month), for a total of nine ranked lists ordered by total byte usage. These lists enabled consumption analysis based on percentile ranking and cast light on the widely varying data needs of individual subscribers.

In parts of the report we reference industry publications, analyst studies, media articles and other sources. As such, we are indebted to the collective work and wisdom of a large number of individuals and organizations and have endeavored to correctly cite all sources and to identify the original creator of referenced material.

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