

2016

Global Internet Phenomena

LATIN AMERICA & NORTH AMERICA

Executive Summary

The Global Internet Phenomena Report: Latin America and North America shines a light on fixed and mobile data networks in those regions, 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.

For 2016, Sandvine will continue to issue three publications of this report, with each focusing on distinct regions around the globe.¹ By focusing on distinct regions, we are able to explore the unique traits of different markets across the globe in greater depth, while also providing more up to date data for interested readers.

As with all reports in recent years, 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 all networks examined in 2016.

In North America, the dominance of Real-Time Entertainment on fixed networks is due in large part to the continued market leadership of Netflix which saw its share decrease slightly to 35.2%. Sandvine believes this decline is not related to decreased viewing, but due to an initiative by Netflix to better optimize their video library for more efficient delivery. The full impact of this bitrate optimization initiative will likely be visible in our updated North American report later this year. Amazon Video at 4.3% of peak downstream traffic, who also have recently launched some video optimizations, continues to grow on networks in the United States, and have clearly established them as the leading paid OTT alternative video service in North America, without having a presence in Canada.

On North American mobile networks, music services as a whole are increasing in traffic share, yet no single service is among the top 10 applications. Pandora, Spotify, SoundCloud, Apple Music, and Google Music all continue to fight for subscribers and traffic share.

In Latin American mobile networks, the control Facebook and Google have over networks has grown, with the two companies accounting for 70% of total traffic in the region. This dominance is driven by the popularity of Android smartphones in the region as well as Facebook's decision to embrace social networking and messaging through their acquisitions of Instagram and WhatsApp. With such concentration, corporate decisions by these major players, like Facebook's decision to auto-play videos uploaded to its site, can instantly and dramatically impact subscribers and network operators.

This report also updates Sandvine's encryption figures for both Latin America and North America for 2016. Using this data, Sandvine forecasts that 70% of global Internet traffic will be encrypted in 2016, with many networks expected to exceed 80%.

1. Due to the level of interest, we will still continue to publish North American data twice a year. The second set of data is expected to be published in fall 2016.

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North America, Fixed Access

As with previous reports, Real-Time Entertainment maintains its status as the dominant traffic category in the region and the key driver of network growth. Real-Time Entertainment is responsible for over 71% of downstream bytes during peak period, a modest increase over the 70% we reported in 2015. As streaming audio and video adoption continues to expand, and emerging video technologies such as 4K, High-dynamic-range (HDR) video, and virtual reality increase in adoption, Sandvine expects North America will be the first region to surpass the 80% of downstream traffic streaming threshold, which should occur by the end of 2020.

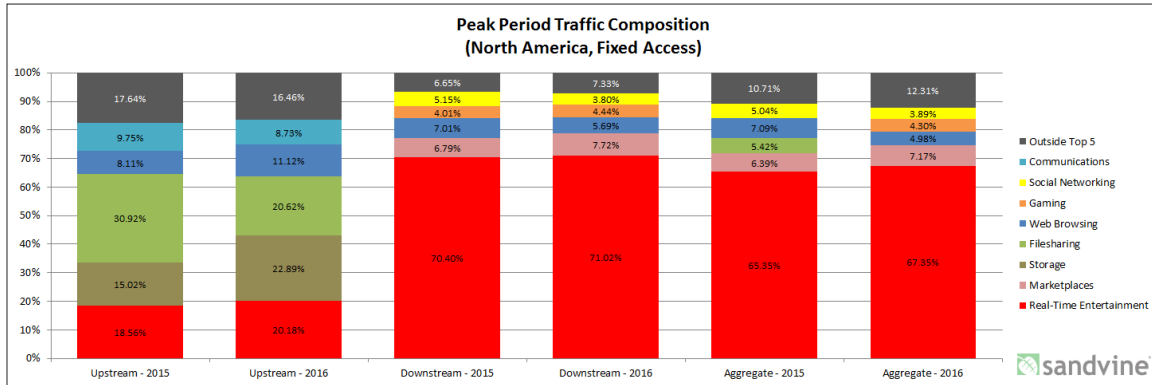


Figure 1 - Peak Period Traffic Composition - North America, Fixed Access

Netflix continues to be the leader in peak period traffic, accounting for 35.2% of downstream traffic during this study. This is a small decrease from the figure published by Sandvine in late 2015. Frequent readers of this report should however not interpret this decline as a signal of “peak Netflix”. Earlier in the year, Netflix began implementing “Per-Title Encode Optimization”² which saw Netflix re-encode their entire library with a focus on being more efficient in order to deliver what they claim is a “same or better experience while using less bandwidth”. Sandvine believes Netflix’s bandwidth share decline is tied to the new encoding techniques, and that this implementation is a tremendous win for subscribers and operators since Netflix video will now use fewer network resources, resulting in an overall better experience. It should be noted that at the time of collection, it was unclear if Netflix had re-encoded their entire library, so an update in the second half of this year may better reveal the impact Encode Optimization may have had on networks in the region.

Upstream		Downstream		Aggregate	
BitTorrent	18.37%	Netflix	35.15%	Netflix	32.72%
YouTube	13.13%	YouTube	17.53%	YouTube	17.31%
Netflix	10.33%	Amazon Video	4.26%	HTTP - OTHER	4.14%
SSL - OTHER	8.55%	HTTP - OTHER	4.19%	Amazon Video	3.96%
Google Cloud	6.98%	iTunes	2.91%	SSL - OTHER	3.12%
iCloud	5.98%	Hulu	2.68%	BitTorrent	2.85%
HTTP - OTHER	3.70%	SSL - OTHER	2.53%	iTunes	2.67%
Facebook	3.04%	Xbox One Games Download	2.18%	Hulu	2.47%
FaceTime	2.50%	Facebook	1.89%	Xbox One Games Download	2.15%
Skype	1.75%	BitTorrent	1.73%	Facebook	2.01%
	69.32%		74.33%		72.72%

Table 1 - Top 10 Peak Period Applications - North America, Fixed Access

2. Per-Title Encode Optimization Blog: <http://techblog.netflix.com/2015/12/per-title-encode-optimization.html>

As observed in previous reports, BitTorrent continues to decline in traffic share and now accounts for less than 3% of total traffic during peak period, and only 5% of total traffic during the day. This demonstrates a sharp decline in share from the 31% of total traffic we revealed in our 2008 report and even a marked decrease over what we observed in 2015. With this decline in Filesharing, Storage applications (e.g. iCloud, Dropbox, Google's Cloud) have surpassed Filesharing as the leading upstream traffic category on fixed networks.

While Amazon Video still holds only a fraction of the bandwidth share when compared to Netflix, Sandvine observed another increase, with the service now accounting for 4.3% of peak downstream traffic, making it the third ranked downstream application in the region. Like Netflix, Amazon Video made optimizations in early 2016 with the goal of delivering to deliver better visual quality using less data.

The data from this report, and all previous 1H reports, is based on data collected in March. Many of the video services observed in our report do experience some seasonal changes in their share based upon the availability of new content on those platforms. Hulu and HBO (HBOGO/HBONOW) are both especially susceptible to these fluctuations because much of their content is made available only after being broadcast on television and the variability of when new programming is available.

Sling TV, a US only service that allows users to stream some cable channels online without the need for a traditional cable subscription accounted for less than 1% of peak downstream traffic, but for the first time was among the top 20 applications on most networks.

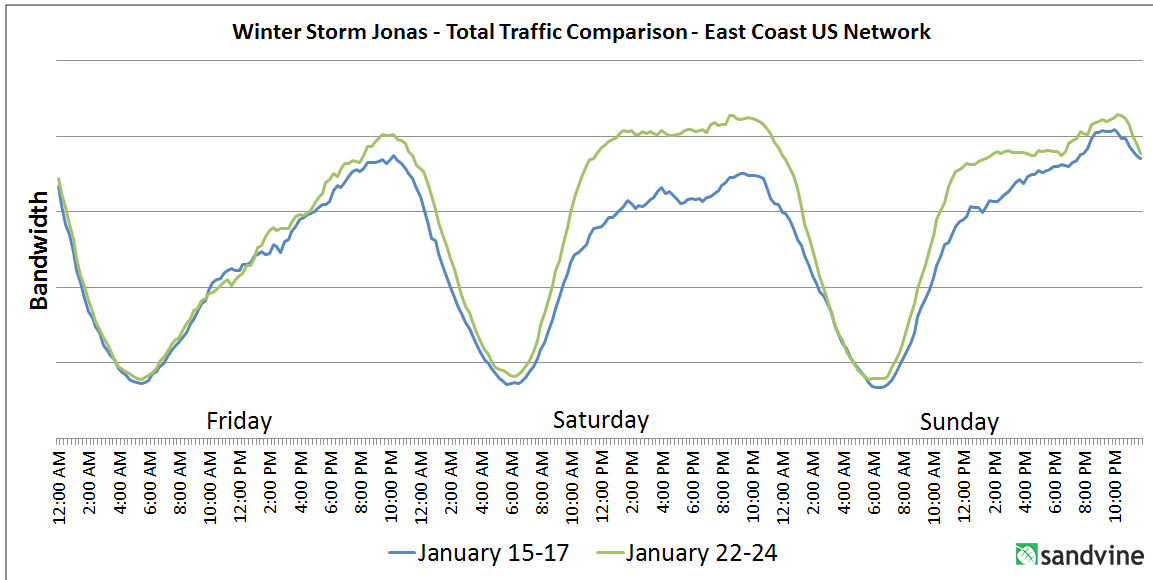
Traffic Spotlight: Winter Storm Jonas

A few years ago Sandvine covered the impact Hurricane Sandy had on one major city on the east coast of the US.

With Winter Storm Jonas hitting the same city earlier this year, we thought we would take a look at the impact the storm had on fixed Internet traffic once again.

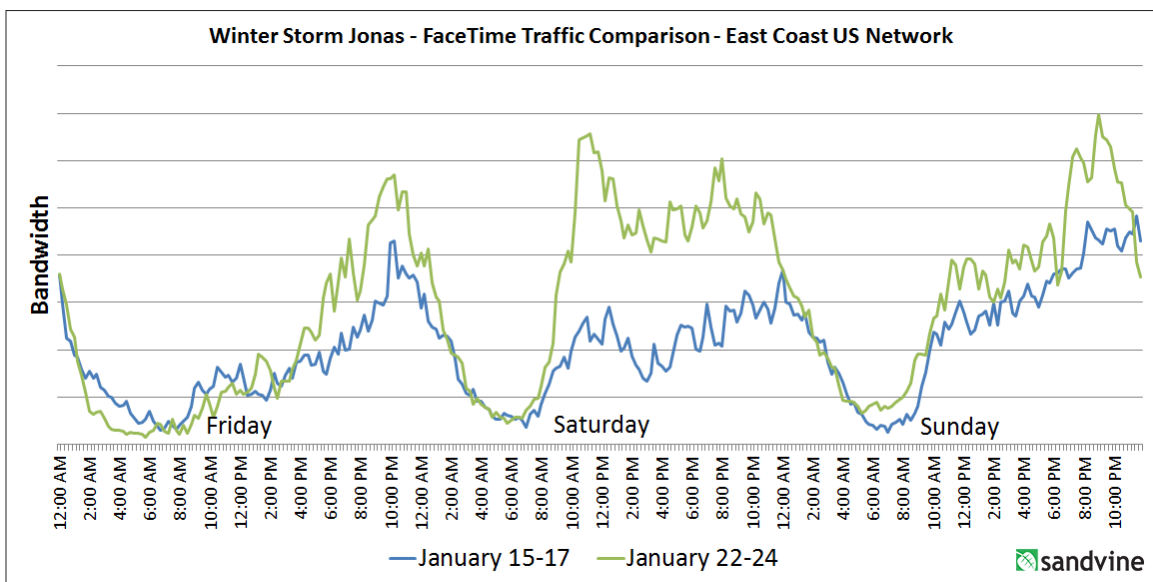
What did we observe? On Saturday, the day the storm hit, Internet traffic throughout the day was 35% higher than the previous Saturday.

The chart below shows the increase in traffic, and how the network actually saw a sustained peak throughout the entire day.



For the most part, traffic composition remained the same, with streaming video apps like Netflix, YouTube, and Amazon all having the consistent share of traffic that they had the previous weekend.

One traffic category that did see some significant gains was communications apps. For example, FaceTime traffic throughout Saturday was consistently more than double that of the previous weekend, and at times even tripling its typical traffic levels.



North America, Mobile Access

During peak period, Real-Time Entertainment traffic continues to be by far the most dominant traffic category, accounting for almost 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.

While Real-Time Entertainment saw a slight decline over figures observed last year, Communications and Social Networking applications have seen modest increases. The main reason for this is likely driven by both categories of applications increasingly adding video components to their services. Over time mobile messaging apps have evolved from text messaging, to include audio calls, and now video calls, while at the same time traditional social networks have integrated autoplaying video, and even live-casting to help drive engagement and increase advertising revenue.

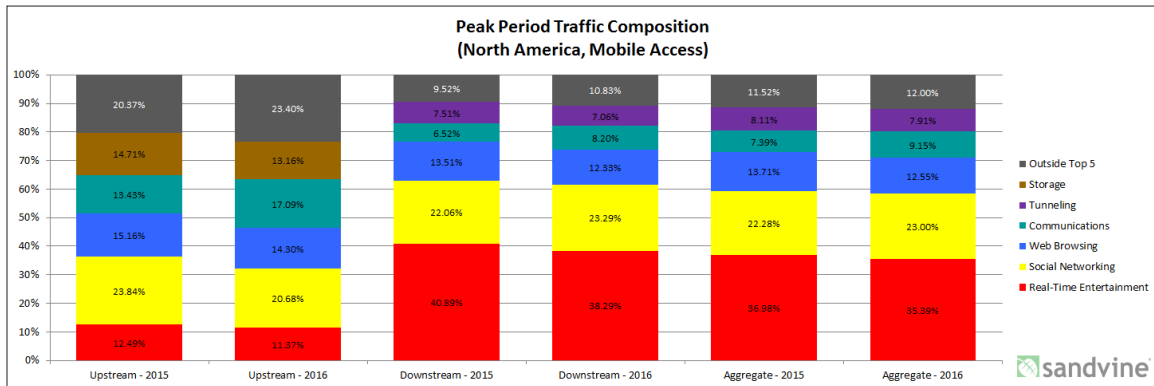


Figure 2 - Peak Period Traffic Composition - North America, Mobile Access

In Sandvine's study issued in 2015, YouTube accounted for 19.8% of peak downstream traffic and over the past year saw that increase to 20.9%. Facebook and HTTP Web Browsing round out the top three applications, with Facebook actually observing a slight year-over-year decrease in share, now accounting for 14% of traffic.

Rank	Upstream	2016	Downstream		Aggregate	Share
1	Facebook	14.85%	YouTube	20.87%	YouTube	19.16%
2	SSL - OTHER	14.02%	Facebook	13.97%	Facebook	14.07%
3	Google Cloud	9.28%	HTTP - OTHER	9.36%	HTTP - OTHER	9.32%
4	HTTP - OTHER	8.92%	SSL - OTHER	6.85%	SSL - OTHER	7.62%
5	YouTube	5.01%	Instagram	6.66%	Instagram	6.31%
6	Snapchat	4.36%	Snapchat	5.17%	Snapchat	5.09%
7	Instagram	3.35%	Netflix	3.72%	Google Cloud	3.56%
8	BitTorrent	2.16%	iTunes	3.02%	Netflix	3.41%
9	FaceTime	1.97%	Google Cloud	2.87%	iTunes	2.86%
10	iCloud	1.82%	MPEG - OTHER	2.37%	MPEG - OTHER	2.17%
		65.76%		74.87%		73.57%




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

Snapchat which relies on images and videos for messaging continues to be the leading third-party messaging service by volume, generating more traffic each day than competing services such as WhatsApp and kik an application growing rapidly on some networks in the United States.

Instagram also makes significant gains, leapfrogging Snapchat, and now accounting for 6.7% of downstream traffic. Combining all Facebook properties (Instagram, WhatsApp, and Facebook) their traffic now accounts for over 22% of total traffic in the region.

On the music front, Pandora slips out of the top 10 for the first time. While still continuing to be the leading music application (2.18%), there are several music applications just behind them. Spotify (1.8%), SoundCloud (0.91%), Apple Music (0.77%), and Google Music (0.57%) round out the top-five music applications.

Making an appearance once again is Google Cloud which is a combination of the various services used by Google's Android operating system to keep devices constantly in sync, as well as some Google services such as Google Photos. Because cloud syncing requires both upstream and downstream communication, it is a significant contributor of bandwidth in both the upstream and downstream direction.

State of Encryption Adoption in 2016

Sandvine worked with several operators globally in January 2016 with the goal to measure the amount of encrypted traffic on fixed and mobile networks across the globe.

One common misinterpretation from previous Global Internet Phenomena Reports made by some readers was that an application listed as “SSL” encapsulated the entirety of encrypted traffic on the Internet. The reality is that in Sandvine’s reports the data presented are direct outputs of Sandvine’s reporting products, and that the “SSL” category listing typically represents the very long tail (thousands of websites or applications, representing a fraction of Internet traffic each) of SSL traffic that Sandvine has consciously chosen not to separately classify (for example, your bank’s encrypted traffic, secure payment systems, etc.) as individual applications.

At the same time, leading encrypted applications such as Facebook, YouTube, or Twitter, have used SSL for many years and have been reported accurately and separately under their own proper names because of Sandvine’s decision to assign an application name to them in our reports. To arrive at an accurate total the traffic related to the “SSL” category and these major applications must be added together.

North America, Fixed

Figure 3 below shows a breakdown of our research from a North American fixed access network and how 37.5% of total traffic is now encrypted. This marks a moderate increase over the 29.1% traffic that was observed in the same network observed in April of last year.

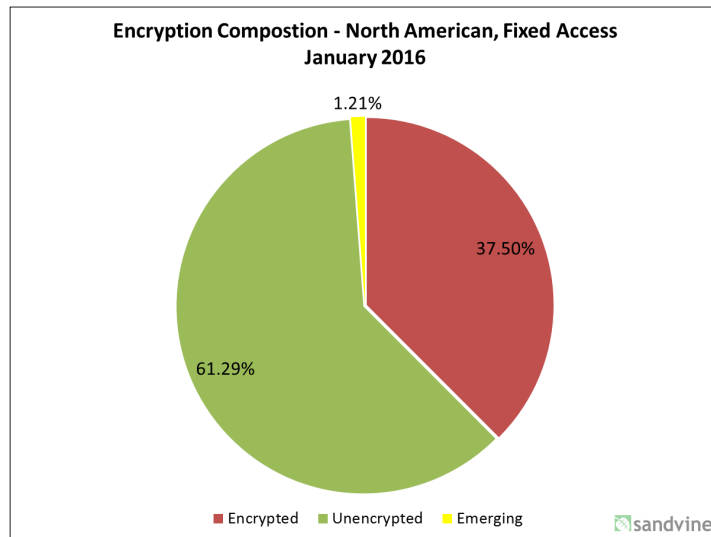


Figure 3 - Encryption Composition - North America, Fixed Access - January 2016

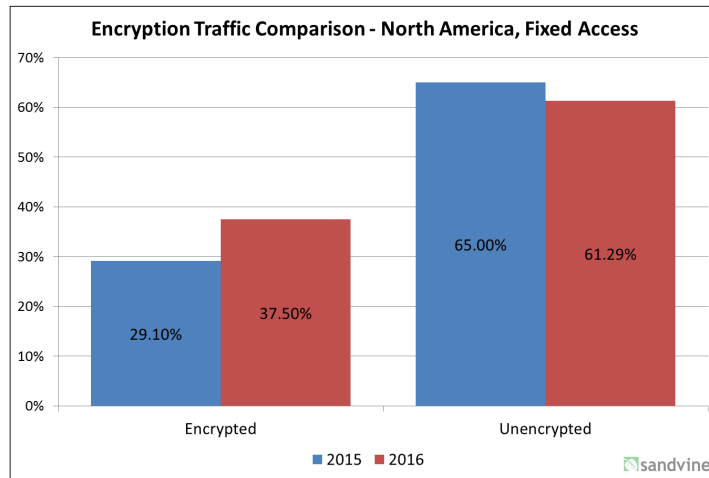


Figure 4 - Encryption Comparison - North America, Fixed Access

The biggest driver of encryption’s growth has been Netflix’s transition towards HTTPS delivery. In April 2015, Netflix’s CEO revealed plans over the next year to move to using HTTPS with the aim to “protect member privacy, particularly when the network is insecure, such as public Wi-Fi, and it helps protect members from eavesdropping by their ISP or employer, who may want to record our members’ viewing for other reasons.”³

At the time of measurement, approximately 9% of Netflix traffic was encrypted, the majority of which is from browser-based streaming. For comparison, YouTube now has 98% of its traffic encrypted making it the largest provider of encrypted video on the Internet.

North America, Mobile

Unlike fixed access networks, which are dominated by unencrypted Netflix traffic, mobile networks contain a far higher share of encrypted traffic.

Figure 5 below shows that the majority of traffic on North American mobile networks is now encrypted, with only one-third remaining unencrypted.

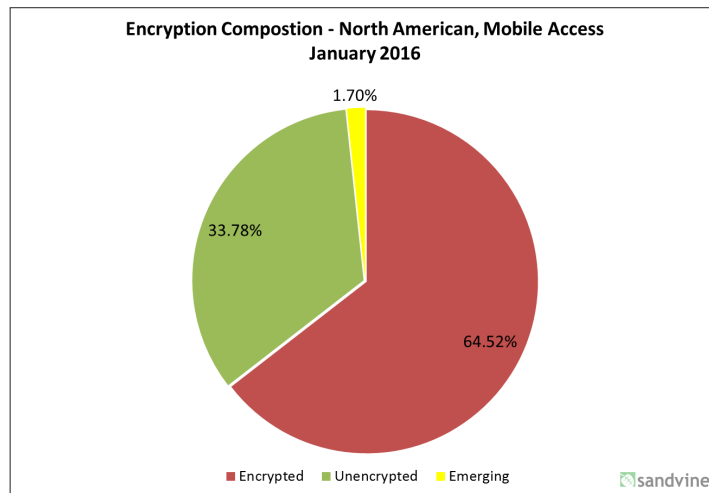


Figure 5 - Encryption Composition - North America, Mobile Access - January 2016

As with fixed networks, where Real-Time Entertainment applications such as Amazon Video and Hulu have yet to transition towards encryption, the mobile network also sees streaming applications like Pandora Radio as hold outs as well. It will be interesting to see which of these streaming applications will be the first to encrypt their traffic now that the two largest sources of traffic (Netflix and YouTube) have committed to using HTTPS.

3. More details from Netflix here: <http://www.theverge.com/2015/4/15/8422889/netflix-https-coming-within-one-year>

Latin America, Fixed

In addition to an in-depth analysis of North American networks, Sandvine also obtained data from select operators in Latin America.

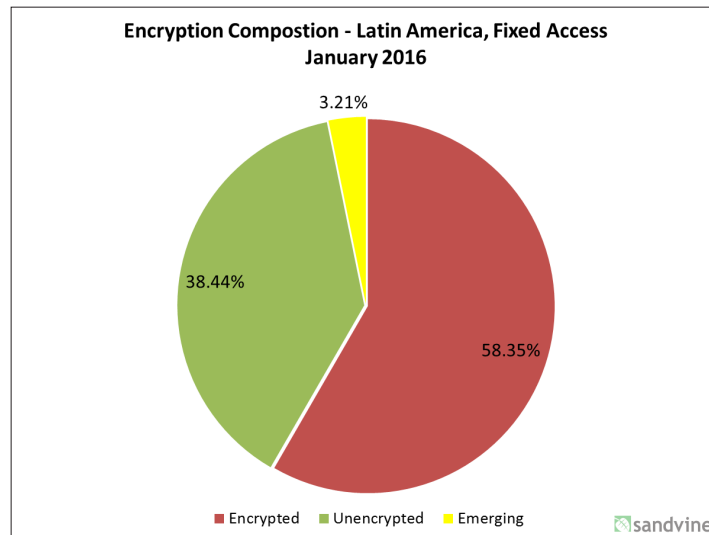


Figure 6 - Encryption Composition - Latin America, Fixed Access - January 2016

On fixed networks in Latin America, approximately two-thirds of all traffic is encrypted. These figures differ significantly from the North American fixed access figures because at the time of data collection, Netflix, the largest source of traffic in North America, had comparatively low bandwidth share in Latin America. This lower Netflix share, combined with higher shares of encrypted traffic from YouTube and BitTorrent explain the vast difference between fixed access figures. While North American fixed access networks currently have the lowest share of encrypted traffic of any around the world, we expect North America to equal and even surpass other regions once Netflix completes their HTTPS transition.

Latin America, Mobile

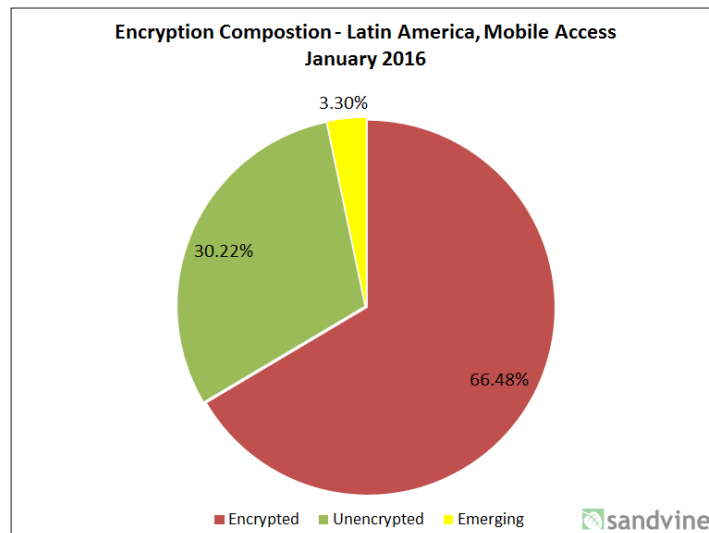


Figure 7 - Encryption Composition - Latin America, Mobile Access - January 2016

The amount of encrypted data on mobile networks in Latin America is slightly above levels observed in North America, this is likely driven by the popularity of Google and Facebook owned applications in the region.

As noted in the North American mobile section of this report, a big chunk of the unencrypted data comes from streaming audio and video applications that have yet to make the transition. The remaining traffic comes from generic HTTP browsing which Sandvine expects to gradually transition to SSL in the future.

Latin America, Fixed Access

As a market where subscribers primarily access the Internet through mobile devices, an examination of fixed access networks in Latin America reveals some interesting findings.

In previous reports Sandvine has revealed the monthly data usage is lower in many other markets, but the consumption habits of subscribers in the region are still very similar to that observed in other regions around the globe. Unsurprisingly, Real-Time Entertainment is the leading source of traffic; now accounting for the majority of downstream bytes during peak period, while Web Browsing and Filesharing round out the top three traffic categories.

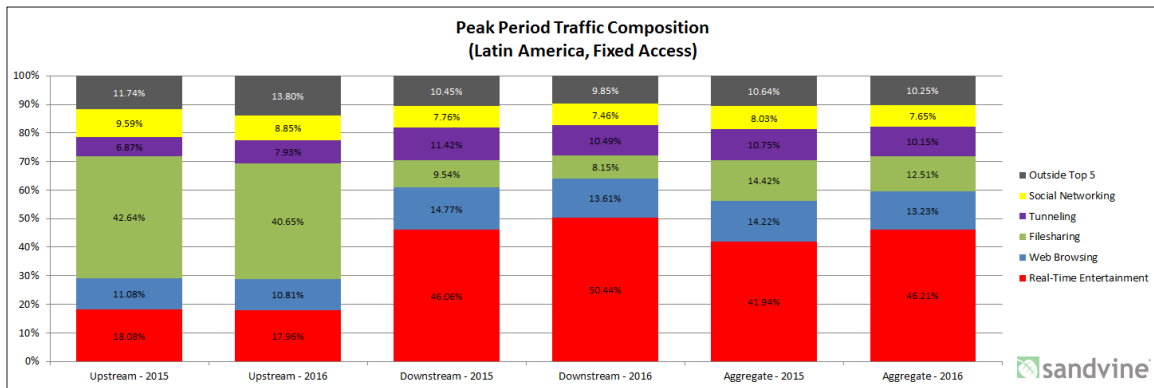


Figure 8 - Peak Period Traffic Composition - Latin America, Fixed Access

Looking at the top applications, YouTube at 28.5% of peak downstream traffic is the clear leader in traffic share, more than doubling the second ranked application (HTTP). Making an appearance in our top 10 applications once again is Netflix, which accounts for 8.31% of peak downstream traffic. In 2015, Netflix accounted for only 6.6% of peak downstream traffic which means in just 12 months the service’s share has increased by more than 25%. While not yet at the levels observed on North American networks, Netflix continues to be the clear bandwidth share leader in the paid-streaming video market in Latin America.

Upstream		Downstream		Aggregate	
BitTorrent	30.03%	YouTube	28.48%	YouTube	25.91%
YouTube	9.30%	HTTP - OTHER	11.66%	HTTP - OTHER	11.12%
HTTP - OTHER	7.59%	SSL - OTHER	9.76%	BitTorrent	10.06%
Facebook	6.72%	Netflix	8.31%	SSL - OTHER	9.28%
SSL - OTHER	6.19%	BitTorrent	6.96%	Netflix	7.45%
Ares	5.27%	Facebook	5.10%	Facebook	5.32%
Skype	2.53%	MPEG - OTHER	2.28%	MPEG - OTHER	2.10%
Netflix	1.97%	RTMP	1.79%	RTMP	1.66%
Dropbox	1.16%	Google Market	1.69%	Google Market	1.52%
MPEG - OTHER	0.92%	Flash Video	1.60%	Flash Video	1.46%
	71.69%		77.63%		75.87%

Table 3 - Top 10 Peak Period Applications - Latin America, Fixed Access

Latin America, Mobile Access

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. Some networks in the region are 2G/3G networks, however with the rollout of LTE in recent years, 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.

Because fixed access network penetration is not as widespread as in 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.

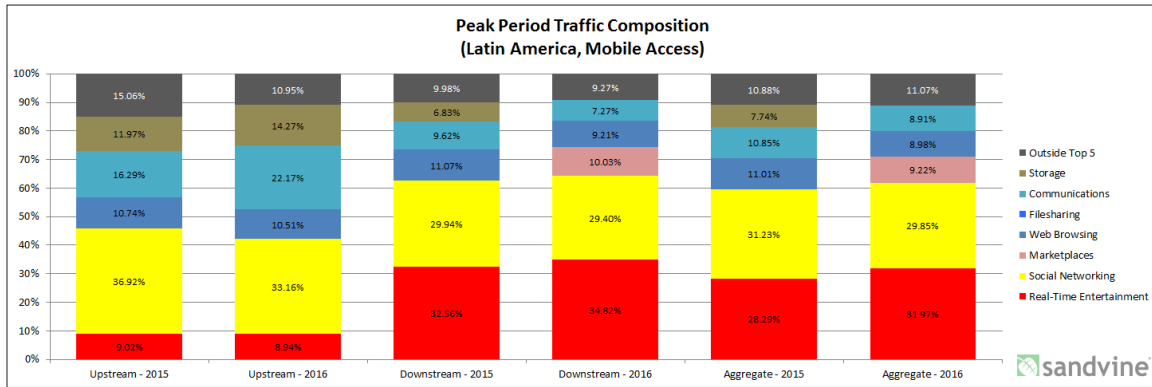


Figure 9 - Peak Period Traffic Composition - Latin America, Mobile Access

In Latin America, Real-Time Entertainment is the largest driver of downstream mobile usage, accounting for 34.8% of peak downstream traffic. The growth of this traffic category from 32.5% last year is driven by YouTube, which now accounts for 26.1%.

Upstream		Downstream		Aggregate	
Facebook	30.49%	YouTube	26.09%	YouTube	23.91%
WhatsApp	15.76%	Facebook	22.92%	Facebook	23.55%
Google Cloud	11.96%	HTTP - OTHER	8.00%	HTTP - OTHER	7.70%
YouTube	6.18%	WhatsApp	7.98%	WhatsApp	7.43%
SSL - OTHER	5.94%	Instagram	4.91%	Google Market	5.85%
HTTP - OTHER	5.26%	Google Market	4.64%	Instagram	4.65%
Instagram	2.55%	MPEG - OTHER	4.46%	Google Cloud	4.41%
Google Market	1.57%	Google	3.50%	MPEG - OTHER	4.05%
MPEG - OTHER	0.94%	SSL - OTHER	2.95%	SSL - OTHER	3.27%
Snapchat	0.79%	Snapchat	1.02%	Snapchat	0.98%
	81.44%		86.28%		85.51%

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

One application that has made significant gains over the past two years is WhatsApp, which now accounts for 7.4% of total traffic during peak period, and is now the second ranked upstream application overall. During the same period two years ago, WhatsApp accounted for only 2.3%. Part of this growth is likely driven by the addition of voice calling to the service, which was rolled out in March 2015, shortly after the conclusion of our previous study.

Significantly, just two companies continue dominate traffic in Latin American mobile networks. Combined Google (YouTube, Google Cloud, Google Market) and Facebook (Facebook, WhatsApp, Instagram) now generate over 70% of total traffic on the network, an increase from 60% last year. With such concentration, corporate decisions by these major players, like Facebook's decision to auto-play videos uploaded to its site, can instantly and dramatically impact subscribers and network operators.

Explanation of Traffic Categories

The table below describes each of the traffic categories used in the Global Internet Phenomena Report.

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	Xbox Live, Playstation 4, 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, Snapchat
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 traffic, 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.

The data gathered for these reports was collected in March 2016 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.

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.

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.