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Intelligent Broadband Networks

Global Internet Phenomena

Latin America & North America

MAY 2015

Executive Summary

The Global Internet Phenomena Report: North America and Latin 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 2015, Sandvine will be overhauling the structure of the Global Internet Phenomena Reports, in order to provide more granular detail on Internet usage. Sandvine's plan is to issue three publications of the report, each of which will focus on distinct regions we previously reported on biannually[1]. This change will allow us to explore on 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 to lead all networks examined in 2015.

In North America, the dominance of Real-Time Entertainment is due in large part to the continued market leadership of Netflix which saw its share continue to grow, now accounting for 36.5%. Amazon Video Instant Video at 1.97% of peak downstream traffic they established themselves as the leading paid OTT alternative video service in North America, without yet having a presence in Canada. As 2015 progresses, it will be interesting to observe how the OTT video market changes as standalone streaming options from premium networks such as HBO and Showtime are made available to the public.

In Latin American mobile networks, two companies, Facebook and Google, now control over 60% of total traffic in the region. This dominance is driven by the popularity of low cost 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.

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

- An Investigation into the adoption rate of encrypted Internet traffic and prediction for its growth in 2016
- An examination of the impact the season premieres of House of Cards and Game of Thrones had on North American networks
- An exploration of the growth of streaming music services on North American mobile networks
- An overview of what impact the digital download of video game launches has on some networks

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 2015.

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 almost 69% of downstream bytes during peak period, a notable increase over the 64% we reported in our 1H 2014 report from a year ago.

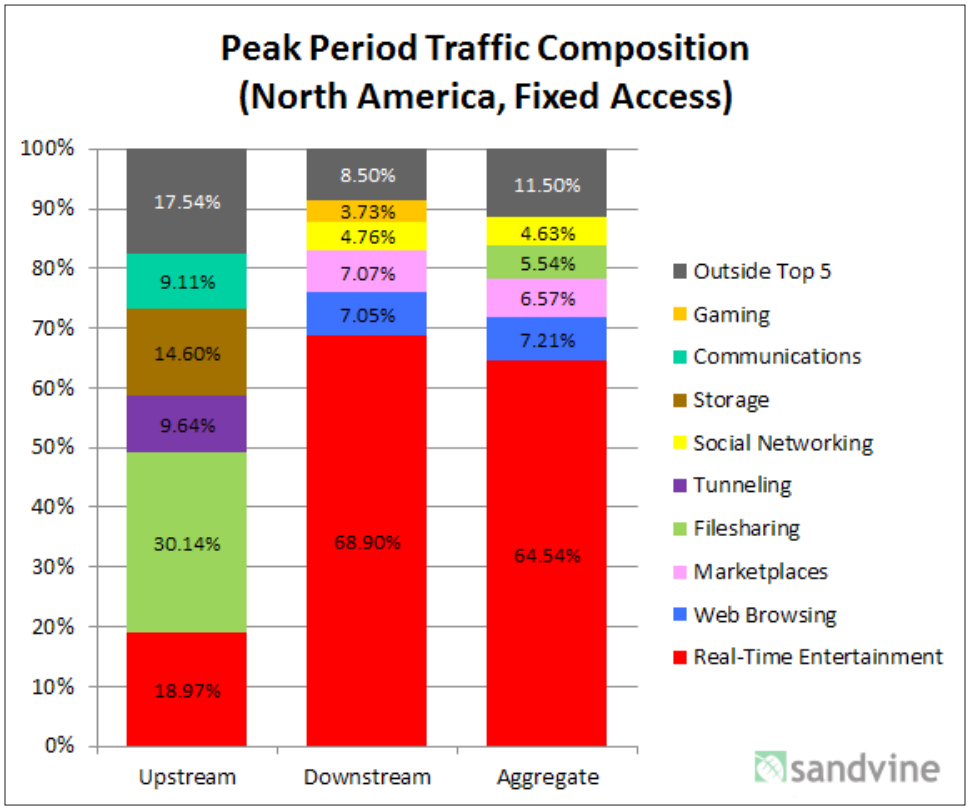

Figure 1 - Peak Period Traffic Composition - North America, Fixed Access

Netflix continues to be the leader in peak period traffic, accounting for 36.5% of downstream traffic during that our study. This is a small, but noticeable increase over the 34.9% figure published in 2H 2014 report released six months ago.

	Upstream		Downstream		Aggregate	
Rank	Application	Share	Application	Share	Application	Share
1	BitTorrent	26.83%	Netflix	36.48%	Netflix	33.81%
2	SSL - OTHER	7.11%	YouTube	15.56%	YouTube	14.63%
3	HTTP	6.74%	HTTP	6.02%	HTTP	6.08%
4	Netflix	6.00%	iTunes	3.36%	BitTorrent	4.85%
5	iCloud	5.16%	BitTorrent	2.76%	iTunes	3.12%
6	YouTube	4.72%	Facebook	2.65%	Facebook	2.60%
7	Skype	3.45%	MPEG - OTHER	2.07%	SSL - OTHER	2.30%
8	FaceTime	2.22%	Amazon Video	1.97%	MPEG - OTHER	1.92%
9	Facebook	2.02%	Hulu	1.91%	Amazon Video	1.82%
10	Dropbox	1.83%	SSL - OTHER	1.91%	Hulu	1.77%
		66.07%		74.68%		72.89%

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

As observed in previous reports, BitTorrent continues to decline in traffic share and now accounts for less than 5% of total traffic during peak period, and only 6.3% of total traffic during the day. This demonstrates a sharp decline in share from the 31% of total traffic we had revealed in our 2008 report.

While Amazon Instant Video still holds only a fraction of the bandwidth share when compared to Netflix, we actually observed a modest increase in traffic share from 1.90% of peak downstream traffic a year ago, although down from the 2.60% from Sandvine 2H2014 report. 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 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. The service launched only a month before data for this report was collected, so it will be interesting to track its growth in a future report.

Digital Downloads: Call of Duty: Advanced Warfare

In examining the data for this Global Internet Phenomena Report, it was observed that a number of gaming-related applications have begun to creep up the top applications charts.

This gaming traffic is driven primarily by the digital marketplaces offered by XBOX, Playstation, and Steam, a digital store for PC games, all of which are responsible for between 1-2% of downstream traffic most evenings.

During Steam's popular sales which occur semi-annually (typically in the summer and winter), operators from around the world frequently report significant spikes in Steam traffic, and while no Steam sale occurred during the data collection period for this report, Sandvine was able to track the impact of another major gaming release.

On March 31, 2015, Call of Duty: Advanced Warfare released a downloadable content pack (DLC) for the Xbox. This particular DLC offers users additional maps and features to the Call of Duty: Advanced Warfare, and is only available via download.

The chart below comes from a North American, fixed access service, and it shows when the digital content was made available at 12:00AM. Demand to download the new content as soon as it was released caused XBOX usage to immediately account to 12% of the network and remained at that level for approximately three hours.

The software release driving usage spikes phenomena has previously been observed by Sandvine during the annual launch of Apple's major iOS software releases. For games though, as more and more consoles rely on digital downloads and major game launches are more frequent, it may benefit the industry to explore a better system for distribution. If a system could be devised to allow subscribers to download content in advance (like some PC games do), not only would it save the network from being congested, but it would also result in a better experience for gamers who could begin playing the game immediately when it is released, rather than having to wait hours for the game to download.

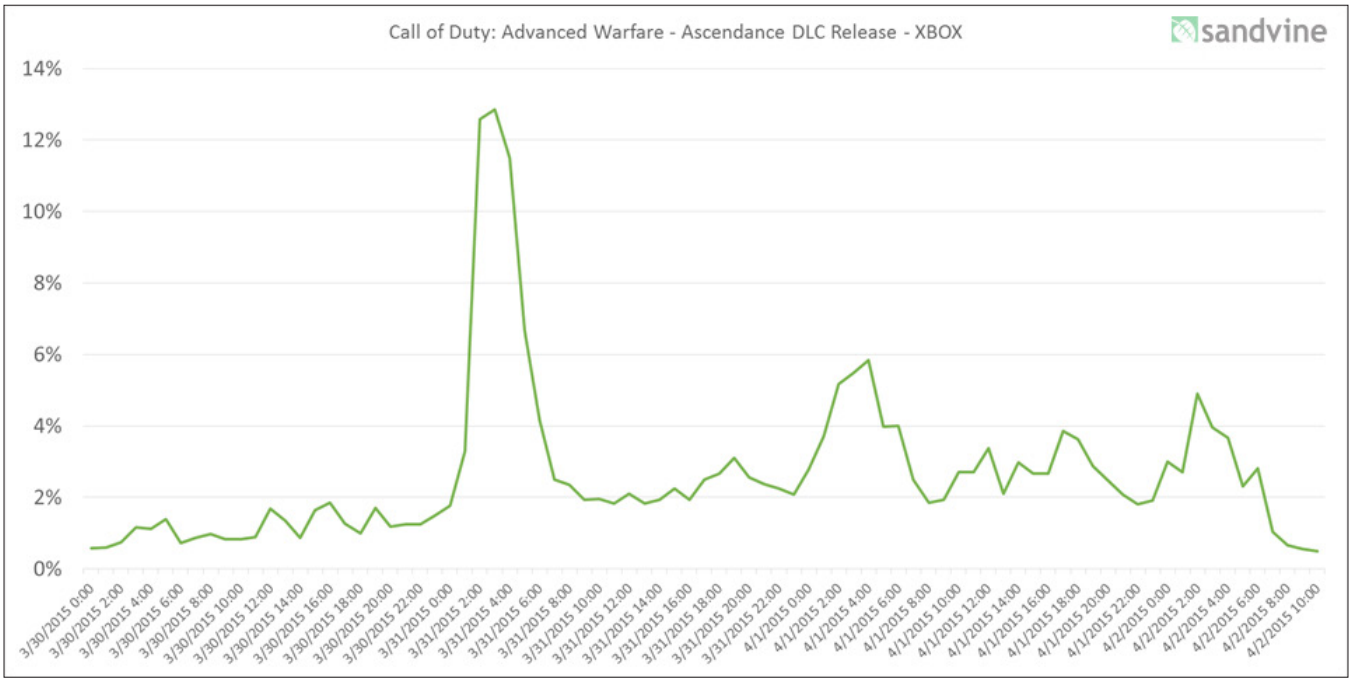

Figure 2 - Call of Duty Advanced Warfare – Ascendance DLC Impact

Mobile Access

During peak period, Real-Time Entertainment traffic is by far the most dominant traffic category, accounting for 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 social applications typically generate far less traffic than those that stream audio and video.

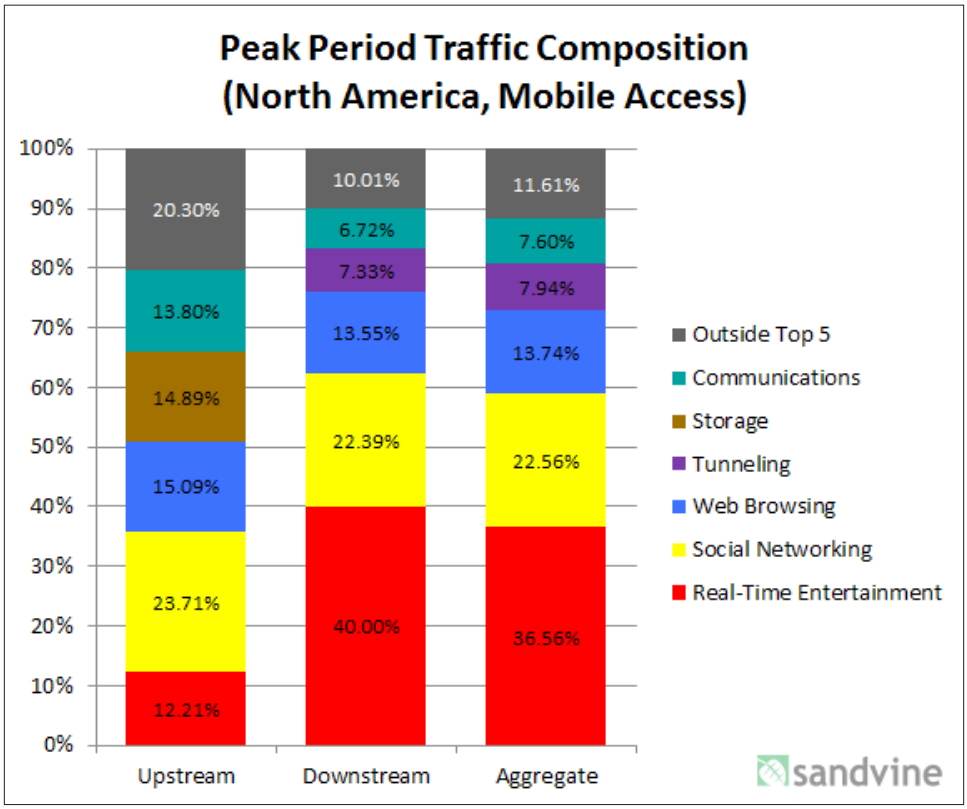

Figure 3 - Peak Period Traffic Composition - North America, Mobile Access

In Sandvine's 1H2014 study, YouTube accounted for 17.7% of peak downstream traffic and year later that figure saw a significant increase to 21.2%. While not typically associated with video, over the past 18 months, Facebook saw a notable increase in its traffic share. In our previous report, we examined how this growth is directly attributable to the addition of autoplaying videos to the service which on one network caused an average of 60% more Facebook consumption per user.

	Upstream		Downstream		Aggregate	
Rank	Application	Share	Application	Share	Application	Share
1	Facebook	18.78%	YouTube	21.18%	YouTube	19.22%
2	HTTP	11.35%	Facebook	15.81%	Facebook	16.18%
3	SSL - OTHER	10.36%	HTTP	10.79%	HTTP	10.73%
4	Google Cloud	10.31%	MPEG - OTHER	4.53%	SSL	5.61%
5	YouTube	5.34%	Snapchat	4.48%	Snapchat	4.27%
6	BitTorrent	3.16%	Instagram	4.39%	Google Cloud	4.20%
7	Snapchat	2.76%	SSL - OTHER	4.33%	Instagram	4.15%
8	Instagram	2.39%	Netflix	4.08%	Netflix	3.89%
9	Skype	1.49%	Pandora Radio	3.33%	MPEG - OTHER	3.76%
10	Pandora Radio	1.23%	Google Cloud	2.19%	Pandora Radio	1.99%
		67.16%		75.12%		74.00%

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

As for streaming audio, in our 1H 2014 report Pandora Radio was the leading music application during peak hours. In this report, while Pandora is still the top music application, its share dropped somewhat because of the inclusion of additional data from Canada where the service is not currently available.

As first reported in our 1H 2014 report, Snapchat continues to be the leading third-party messaging service by data volume, generating more traffic each day than competing services such as WhatsApp, and it has now surpassed Instagram, a social network dedicated to sharing images.

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. Because cloud syncing requires both upstream and downstream communication, it is a significant contributor of bandwidth in both the upstream and downstream direction.

Sunday Night Streams

For years subscribers have asked HBO provide a service that they could subscribe to without having a traditional cable or satellite television subscription.

In April 2015, HBO finally made their dreams come true, and launched a standalone streaming service known as HBONOW. The service is distinct from HBO's other streaming platform HBOGO in the sense that you can purchase an HBONOW subscription without the aforementioned television package.

Even though the service went live just days before the launch of season five of Game of Thrones, Sandvine was able to provide our customers with a software update in a matter of days that allowed them to not only measure the service, but more importantly be able to do so in time for the launch.

So what impact did Game of Thrones and HBO NOW have? Below is a snapshot of traffic mix from one fixed network located in the eastern United States taken at 9:30PM on Sunday, April 12.

Downstream Peak Period Traffic Share – Sunday, April 12, 2015	
Netflix	33.5%
YouTube	15.7%
HBOGO	3.4%
Amazon Instant Video	1.9%
HBONOW	0.7%

NOTE: This is one network, on one day, and Internet traffic does fluctuate, so it is important to not take these figures to be representative of North America. The data contained in this report was collected in March 2015, and it is Sandvine's hope to provide a full update on HBONOW in a report later in the year when the service has expanded to additional platforms.

That being said, these figures don't show a huge change in some of the numbers we reported in this report. Netflix and YouTube still combine for almost half of all network traffic, while Amazon continues to hover around 2%.

HBO GO at 3.4% is much higher than our last report, but that is due to the fact we average an entire month of usage in those figures. HBOGO has historically had much higher usage on Sunday nights (and to some extent Mondays) than other days of the week due to the fact that many of HBO's programs (Game of Thrones, True Detective, etc.) release new episodes on Sunday nights.

So what can be made of HBO NOW accounting for 0.7% of traffic? In Sandvine's opinion?…Nothing, at this point.

HBONOW's lack of impact (in my opinion) can be explained for a few reasons:

- **Recent launch** – HBO Now launched less than a week before the launch of Game of Thrones, not giving tons of time for people to subscribe
- **Limited access** – Subscribers can only purchase via an Apple product or Cablevision account
- **HBOGO** – Why would a subscriber borrowing HBO GO credentials for free, a practice HBO has admitted is common, pay for this new service?

Even with its minimal impact today. HBONOW will be interesting to track in the coming months to see how much (and how fast it grows). Is it going to be the next Netflix in terms of traffic generation? Maybe. Maybe Not.

What HBO NOW does do however is crack the door open further for more OTT video options for subscribers and that is something that could have a significant impact on network operators. Stay tuned.

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 revelaed the monthly data usage is lower that 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; continuing to account for over 46% of downstream bytes during peak period, while Web Browsing and Filesharing round out the top three traffic categories.

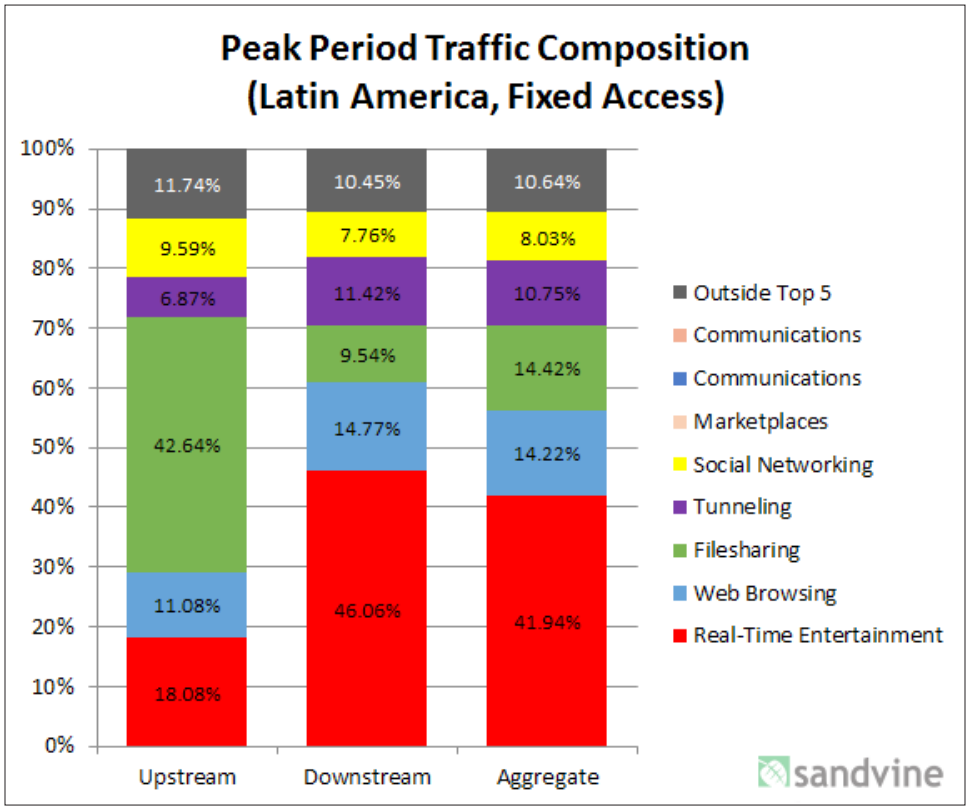

Figure 4 - Peak Period Traffic Composition – Latin America, Fixed Access

Looking at the top applications, YouTube at 33% 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 6.6% of peak downstream traffic. In 2H 2013, Netflix accounted for only 2.2% of peak downstream traffic which means in just 18 months the service's share has more than tripled. While not yet at the levels observed on North American networks, Netflix continues to be the clear bandwidth share leader in paid-streaming video market in Latin America.

	Upstream		Downstream		Aggregate	
Rank	Application	Share	Application	Share	Application	Share
1	BitTorrent	31.72%	YouTube	32.99%	YouTube	30.11%
2	YouTube	10.47%	HTTP	12.84%	HTTP	12.18%
3	HTTP	8.39%	SSL - SSL OTHER	11.07%	BitTorrent	11.65%
4	Facebook	7.40%	BitTorrent	8.18%	SSL - OTHER	10.31%
5	SSL - OTHER	5.94%	Netflix	6.57%	Facebook	5.66%
6	Ares	5.59%	Facebook	5.36%	Netflix	5.91%
7	Skype	2.21%	MPEG - OTHER	2.31%	MPEG - OTHER	2.14%
8	Netflix	1.50%	RTMP	1.98%	RTMP	1.82%
9	MPEG - OTHER	1.12%	Google Market	1.88%	Flash Video	1.70%
10	Dropbox	0.77%	Flash Video	1.87%	Google Market	1.68%
		75.10%		85.04%		83.16%

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

Current State of Encryption Adoption

Sandvine worked with a North American fixed access network in April 2015 with the goal to demonstrate just how much traffic is encrypted currently.

One common misinterpretation from previous Global Internet Phenomena Reports 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 in a direct output 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 SSL-based 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.

Figure 1 below shows a breakdown of our research and how 29.1% of total downstream traffic is now encrypted, with 65% remaining unencrypted.

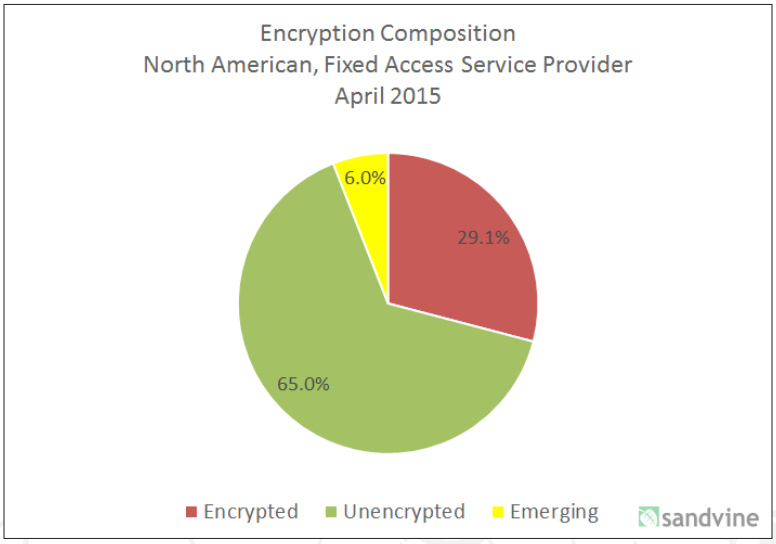

Figure 5 - Encryption Composition - North America, Fixed Access - April 2015

The 6% emerging traffic refers to traffic yet to be classified by Sandvine, so a determination of whether it is encrypted or unencrypted was not possible. Sandvine's philosophy towards traffic identification is to focus on accuracy first, and completeness second. That is, we will not sacrifice accuracy (i.e., we will not accept false positives) to reduce the amount of traffic that is unrecognized. Simply put, false positives are unacceptable, as they can have a disastrous impact across a range of use cases for both subscriber (e.g., billed incorrectly) and operator (e.g., harm to reputation from mismanaging or incorrectly charging for certain traffic). That said, we routinely see traffic recognition rates upward of 95%.

In April 2015, Netflix's CEO revealed plans over the next year to move to using HTTPS)an encrypted protocol) 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."

So what will this mean for traffic composition in North America, where Netflix is the largest source of traffic?

On the network examined for this study, Netflix accounted for 35.7% (slightly below our published North American average) of total daily downstream traffic. Ignoring the potential for Netflix traffic share to grow or decline, Figure 2 shows that in 2016, almost two-thirds of traffic on North American fixed access networks will be encrypted, and the reality is it will likely be over two-thirds as additional applications make the switch to HTTPS via programs such as the Electronic Frontier Foundation's "Let's Encrypt" program.

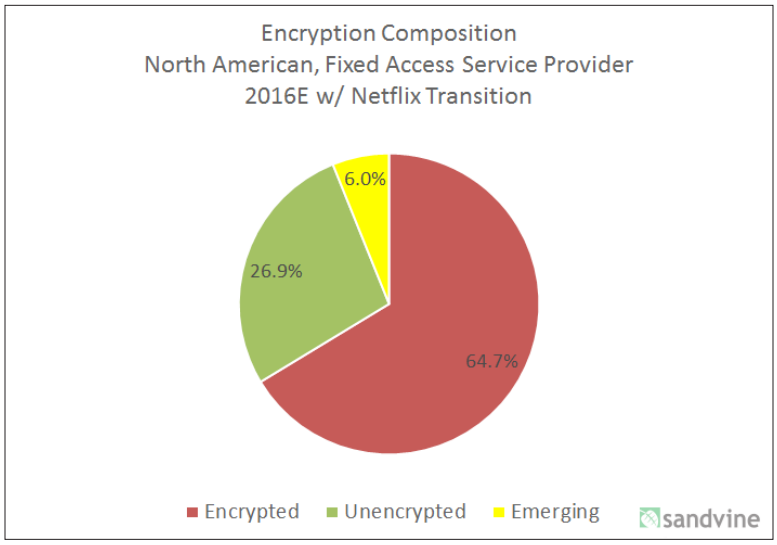

Figure 6 - Encryption Composition - North America, Fixed Access - 2016 Estimate

Based on spot checks with our existing customers around the world, Sandvine predicts that by the end of 2015, the majority of the world's markets will see Internet traffic that is more than 50% encrypted, and that by the end of 2016 65-70% of traffic will be encrypted in most markets.

Want to learn more about encrypted traffic?

For those interested in learning more on the topic of encryption, Sandvine has also published a Technology Showcase entitled "Traffic Classification: Identifying and Measuring Internet Traffic" which provides additional real-world examples on how to identify encrypted and obfuscated Internet traffic with the flexibility and versatility of SandScript, Sandvine's unique policy definition language.

The Technology Showcase can be downloaded here: https://www.sandvine.com/trends/encryption.html

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 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.

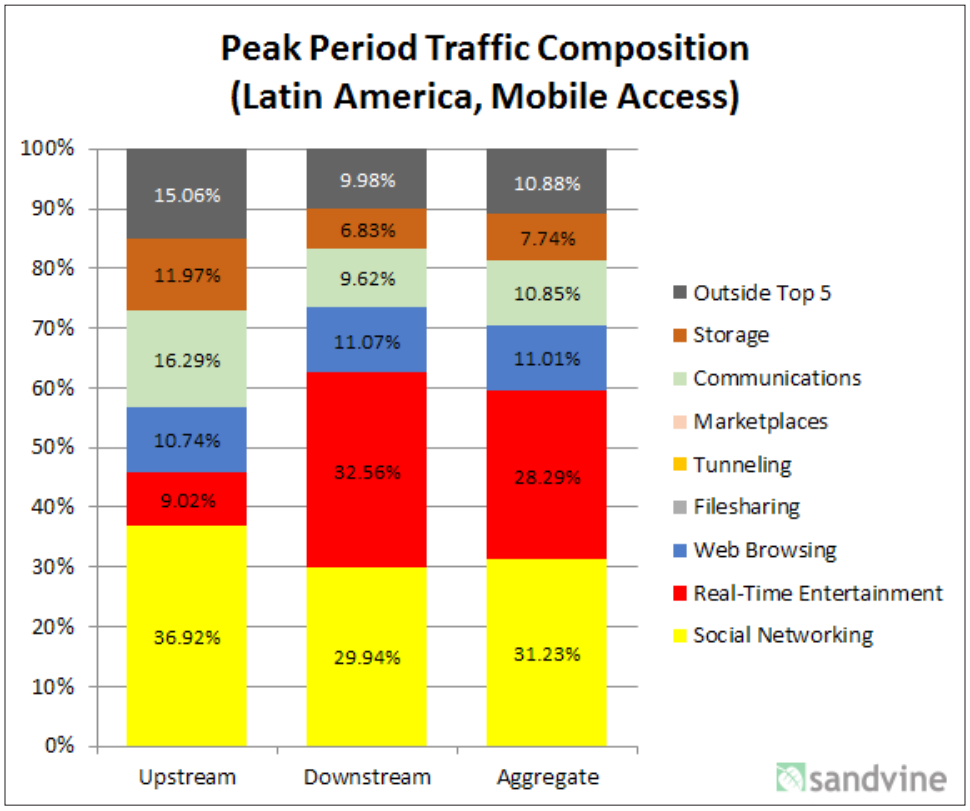

Figure 7 - Peak Period Traffic Composition – Latin America, Mobile Access

In Latin America, Real-Time Entertainment is the largest driver of downstream mobile usage, accounting for 32.6% of peak downstream traffic. The growth of this traffic category is driven by YouTube, as well the appearance of Netflix in the top 10 mobile charts, which now accounts for 1.9% of peak downstream traffic.

Social Networking still generates significant amount of traffic in the region. One reason in particular for its high share is the popularity of low-cost, all-you-can use social networking plans that Sandvine has helped operators in the region to implement.

	Upstream		Downstream		Aggregate	
Rank	Application	Share	Application	Share	Application	Share
1	Facebook	31.33%	Facebook	24.63%	Facebook	25.86%
2	WhatsApp	10.97%	YouTube	22.82%	YouTube	19.68%
3	HTTP	8.23%	HTTP	9.57%	HTTP	9.33%
4	Google	8.16%	WhatsApp	7.10%	WhatsApp	7.81%
5	YouTube	5.42%	Google Cloud	3.73%	Google	4.53%
6	SSL - OTHER	5.25%	MPEG - OTHER	3.60%	SSL - OTHER	3.73%
7	Instagram	1.63%	Instagram	3.42%	Instagram	3.10%
8	iCloud	1.03%	SSL - OTHER	3.40%	MPEG - OTHER	3.06%
9	Skype	0.97%	Google Market	2.42%	Google Market	2.07%
10	BitTorrent	0.57%	Netflix	1.89%	Netflix	1.67%
		73.54%		82.58%		80.83%

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

One application that has made significant gains over the past year is WhatsApp, which now accounts for 7.8% of total traffic during peak period, and is now the second ranked upstream application overall. During the same period a year ago, Whatsapp accounted for only 2.3%.

Significantly, just two companies dominate traffic in Latin American mobile networks. Combined Google (YouTube, Google Cloud, Google Market) and Facebook (Facebook, WhatsApp, Instagram) now generate over 60% of total traffic on the network. 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.

Music & Podcasts Drive Streaming Audio

Another trend observed in the North American mobile network data was the growth of music services. Not only is music streaming growing in terms of bandwidth share, there are also a growing number of services regularly appearing among top applications lists at many network operators.

In previous reports, Sandvine has observed that the downstream traffic share is actually higher in off-peak hours. This is in part driven by subscribers off-loading the data used by music services to their home Wi-Fi during peak hours.

Total Downstream Traffic Share – North America, Mobile	
Pandora Radio	3.47%
Spotify	1.03%
SoundCloud	0.76%
iHeartRadio	0.68%
Deezer	0.58%

In the North American market, Pandora Radio is still the leader in bandwidth share, but Spotify[2], Deezer and iHeartRadio have all seen growth in bandwidth share because of the availability of free music streaming options on their platforms.

Another key driver in the growth of streaming audio has been the rise in popularity of podcasts. While there is a diverse number of podcast-playing apps, SoundCloud, a service used to share any type of audio file also serves as a popular filehost for many podcasts due to the free hosting provided by the service. This podcast hosting, combined with streaming of music files, result in SoundCloud accounting for 0.76% of total downstream traffic.

2. Pandora's blog on free tier: http://www.spotifyartists.com/spotify-launches-free-mobile-tier/

House of Cards Season 3 Premiere Weekend

House of Cards is a big deal for Netflix, but what does a new season mean for network operators?

Using data from one North American fixed network operator, a comparison of the House of Cards Season 3 launch weekend traffic levels (red line), to the traffic levels of the previous weekend (blue line) shows a marked increase in traffic.

On this one network, Friday and Saturday evenings saw a 10%-15% increase in Netflix traffic over the previous week, while Sunday evening saw an increase between 30-35%.

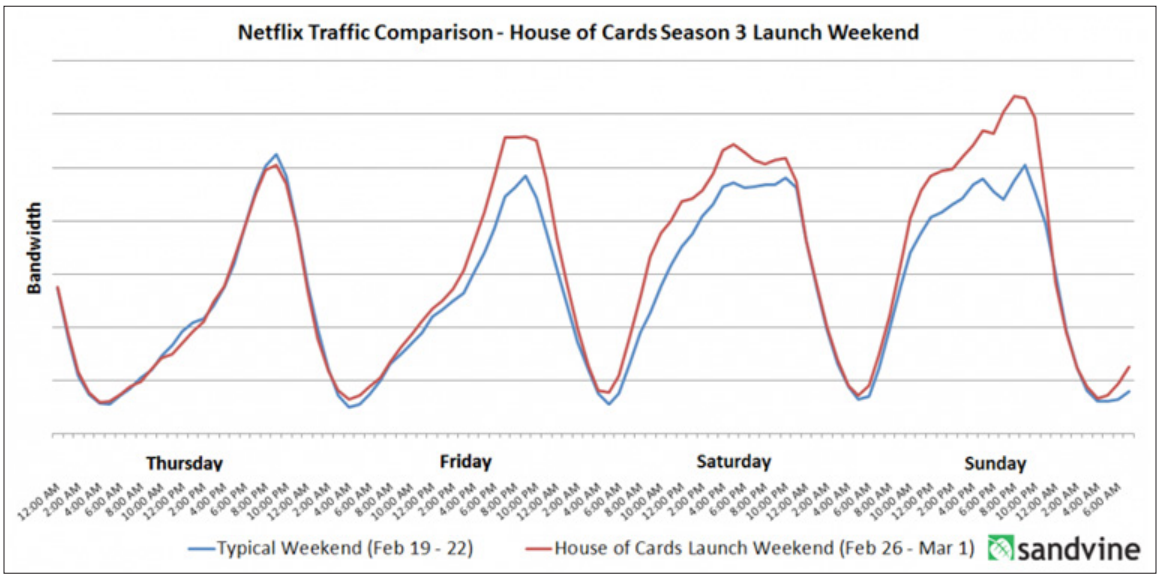

Figure 8 - Netflix Traffic Comparison – House of Cards Season 3 Launch

Sundays are typically the day that generates the most network traffic, so it shouldn't come as a surprise to see Sunday evening with the highest spike. Subscribers can only stream when they have free time, and for many households Sunday evening is far less busy than Friday or Saturday evening.

Explanation of Traffic Categories

The table below describes each of the traffic categories used in the Global Internet Phenomena Report: 2H 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.

The data gathered for these reports was collected in March 2015 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 sources and to identify the original creator of referenced material.

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