Q1 [2013 Report] Volume 6 / Number 1

akamai's [state of the internet]

Akamai FASTER FORWARD

Letter From the Editor

Over the last several years, Akamai has worked to provide additional insight, beyond the *State of the Internet Report*, into what is happening on our Intelligent Platform through data visualization tools. The tools available at *www.akamai.com/stateoftheinternet* endeavor to provide users with customized views of current and historical data from the report, while others at *www.akamai.com/ipv6* and *www.akamai.com/html/technology/visualizing_akamai.html* provide a much broader perspective.

A year ago, we also launched Akamai IO, with the intention of providing actionable data on mobile browser usage as seen across a sample of Akamai traffic. We have referenced updates to the data sets powering Akamai IO in last quarter's and this quarter's reports, and we expect that an updated interface will also be available by the end of August. With the new interface, available at *www.akamai.com/io*, users can filter and group the data across multiple categories including device OS, browser, device type, network type, continent, and country, enabling unique and customized views of the data.

In addition, we have also recently released a Web version of our "Akamai in 60 Seconds" visualization at *www.akamai.com/60seconds*. In addition to serving some two trillion content requests a day, there's even more happening on the Akamai Intelligent Platform at any given time: video streaming, route optimization calculations, DNS lookups, and content purges, just to name just a few. With so much taking place, "Akamai in 60 Seconds" presents a snapshot of the broad range of activity occurring on the platform. The data points shown in the visualization represent peak values for the given metrics as measured across the Akamai Intelligent Platform during a 60-second time period, and are collected from several internal Akamai systems and databases, normalized to one minute. Because the graphic is showing peak values over time, the numbers shown will change when new peaks are reached, and it is likely that event-related activity will drive updates to some metrics.

We plan to continue to evolve and enhance both Akamai IO and Akamai in 60 Seconds throughout 2013, as well as improve the *State of the Internet Report* with additional and better information in areas like attack traffic, mobile connectivity, and IPv6, as well as updating design elements of the report. We've started with this quarter's report, adding an "Americas" section, highlighting connectivity metrics in countries across the North and South America continents.

As always, if you have questions, comments, or suggestions about the *State of the Internet Report*, connect with us via e-mail at *stateoftheinternet@akamai.com*, or on Twitter at *@akamai_soti*.

–David Belson

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Executive Summary

Akamai's globally-distributed Intelligent Platform allows us to gather massive amounts of information on many metrics, including connection speeds, attack traffic, network connectivity/availability/latency problems, and IPv6 growth/transition progress, as well as traffic patterns across leading Web sites and digital media providers. Each quarter, Akamai publishes the *State of the Internet Report.*

This quarter's report includes data gathered from across the Akamai Intelligent Platform in the first quarter of 2013 about attack traffic, broadband adoption, and mobile connectivity, as well as trends seen in this data over time. In addition, this edition of the report includes insight into so-called "account checker" attacks that targeted e-commerce sites, the states of IPv4 exhaustion and IPv6 adoption, Internet "events" and disruptions that occurred during the quarter, and observations from Akamai partner Ericsson on data and voice traffic growth on mobile networks.

Security

During the first quarter of 2013, Akamai observed attack traffic originating from source IP addresses in 177 unique countries/regions. Note that our methodology captures the source IP address of an observed attack, and cannot determine attribution of an attacker. China's share of attack traffic fell to 34% during the quarter, while Indonesia's grew from near zero to over 20%. Attack traffic from the United States fell from 10% to just over 8%. Attack traffic concentration grew significantly from the fourth quarter of 2012, with the top 10 ports seeing 80% of observed attacks. Significant growth was seen in attacks targeting Ports 80 (HTTP) and 443 (SSL), most of which came from Indonesia. During the first quarter of 2013, Akamai's customers reported being targeted by 208 DDoS attacks, up 4% from the prior quarter. Enterprise customers were most frequently targeted, hit by 35% of the attacks. In addition, during the first quarter Akamai observed attempted account takeover behavior for a number of merchants resulting from reuse of credentials obtained from other sites.

Internet and Broadband Adoption

Akamai observed a 3.1% increase in the number of unique IPv4 addresses connecting to the Akamai platform, growing to nearly 734 million, or approximately 34 million more than were seen in the fourth quarter of 2012. Looking at connection speeds, the global average connection speed climbed 4.0% to 3.1 Mbps, and the global average peak connection speed increased 9.2% to 18.4 Mbps. At a country level, South Korea had the highest average connection speed at 14.2 Mbps, while Hong Kong once again had the highest average peak connection speed at 63.6 Mbps. Globally, high broadband (>10 Mbps) adoption grew 10% quarter-over-quarter to 13%, and South Korea remained the country with the highest level of high broadband adoption, growing to 50%. Global broadband (>4 Mbps) adoption grew 5.8% to 46%, with Switzerland taking the top spot with 88% broadband adoption.

Mobile Connectivity

In the first quarter of 2013, average connection speeds on surveyed mobile network providers ranged from a high of 8.6 Mbps down to a low of 0.4 Mbps. Average peak connection speeds ranged from 45.6 Mbps down to 2.8 Mbps. Based on traffic data collected by Ericsson, the volume of mobile data traffic increased 19% between the fourth quarter of 2012 and the first quarter of 2013, while doubling year-over-year. In contrast, mobile voice traffic grew only 4% during that same year-over-year period.

Analysis of Akamai IO data collected across the first quarter from a sample of requests to the Akamai Intelligent Platform indicates that for users of devices on cellular networks, the largest percentage of requests came from Android Webkit (41-44%), ahead of Apple Mobile Safari (30-38%). However, for users of mobile devices across all networks (not just cellular), Apple Mobile Safari accounted for approximately 60%, with Android Webkit responsible for 20-33% of requests. (The ranges are related to updates made to the back-end data source in the middle of the quarter.)

SECTION 1:
Security

Akamai maintains a distributed set of agents deployed across the Internet that monitor attack traffic. Based on data collected by these agents, Akamai is able to identify the top countries from which attack traffic originates, as well as the top ports targeted by these attacks. Note that the originating country as identified by the source IP address is not attribution—for example, a criminal in Russia may be launching attacks from compromised systems in China. This section provides insight into port-level attack traffic, as observed and measured by Akamai, during the first quarter of 2013. It also includes insight into DDoS attacks that targeted Akamai customers during the first quarter of 2013, as well as insight into "account checker"-related attacks.

1.1 Attack Traffic, Top Originating Countries

During the first quarter of 2013, Akamai observed attack traffic originating from 177 unique countries/regions, consistent with the count in the prior quarter. As shown in Figure 1, China remained the top source of observed attack traffic, though its percentage declined by nearly a fifth from the prior quarter. This decline is likely related to Indonesia making a sudden appearance in the second place slot, after a 30x increase quarter-over-quarter. The vast majority (94%) of the attacks from Indonesia targeted Ports 80 (WWW/HTTP) and 443 (HTTPS/SSL), potentially indicating aggressive botnet activity. Hong Kong and India were the only two other countries/regions among the top 10 that also saw quarterly increases in observed attack traffic volume—the remaining countries/regions saw nominal declines, in general. Attack traffic concentration also increased in the first quarter, again owing to the significant volume of attack traffic observed from Indonesia. The makeup of the top 10 list remained largely consistent with the previous quarter, with Italy and Hungary dropping off, and Indonesia and Hong Kong joining.

In examining the regional distribution of observed attack traffic in the first quarter, we find that nearly 68% originated in the Asia Pacific/Oceania region, up from 56% in the fourth quarter of 2012, likely due to the massive increase seen in Indonesia. Europe accounted for just under 19%, while North and South America originated just over 13% combined. Africa's contribution dropped as compared to prior quarters, as it was responsible for a mere half a percent.

	Country	Q1 '13 % Traffic	Q4 '12 %
1	China	34%	41%
2	Indonesia	21%	0.7%
3	United States	8.3%	10%
4	Turkey	4.5%	4.7%
5	Russia	2.7%	4.3%
6	India	2.6%	2.3%
7	Taiwan	2.5%	3.7%
8	Brazil	2.2%	3.3%
9	Romania	2.0%	2.8%
10	Hong Kong	1.6%	1.2%
–	Other	18%	25%

Figure 1: Attack Traffic, Top Originating Countries (by source IP address, not attribution)

1.2 Attack Traffic, Top Ports

As shown in Figure 2, the concentration of attack traffic among the top 10 targeted ports increased significantly during the first quarter of 2013, driven primarily by significant increases in attack volume targeting Ports 80 (WWW/HTTP) and 443 (SSL/HTTPS). In fact, nearly 80% of the attacks targeting these ports were observed to be originating in Indonesia, as referenced in Section 1.1. Despite these increases, Port 445 (Microsoft-DS) remained the most targeted port, though the percentage of attacks targeting it continued to decline, which is an encouraging trend. Of the top 10 targeted ports, Port 3389 (Microsoft Terminal Services) was the only other one to see a decline quarter-over-quarter. Within the list, Port 8080 (HTTP Alternate) was supplanted by Port 6882, used unofficially by BitTorrent. All of the observed attacks targeting Port 6882 were observed to be originating in China. Data from the Internet Storm Center[1] shows a large spike in attacks targeting this port late in the quarter; unfortunately, however, there is no information provided on the source of the attacks.

Port	Port Use	Q1 '13 % Traffic	Q4 '12 %
445	Microsoft-DS	23%	29%
80	WWW (HTTP)	14%	2.8%
443	SSL (HTTPS)	11%	2.1%
23	Telnet	9.3%	7.2%
1433	Microsoft SQL Server	8.3%	5.3%
3389	Microsoft Terminal Services	5.4%	5.7%
3306	MySQL	2.7%	1.6%
22	SSH	2.6%	2.5%
135	Microsoft-RPC	2.2%	2.2%
6882	BitTorrent (unofficial)	1.5%	–
Various	Other	20%	40%

Figure 2: Attack Traffic, Top Ports

Port 445 remained the most targeted port in six of the top 10 countries and accounted for 70 times as much traffic as the second most targeted port (135) in Romania—ratios in the other countries ranged between 2 to 10 times as much. In Turkey and Hong Kong, the largest number of attacks targeted Port 23 (Telnet)—in previous quarters, this was the case in Taiwan as well; however, in the first quarter, Port 445 was targeted by approximately 5x as many attacks from Taiwan as Port 23. (Interestingly, in the fourth quarter of 2012, Port 445 was not even among the top 10 ports targeted by attacks originating in Taiwan.) The distribution of second-most targeted ports was a bit broader in the first quarter, with Port 23 coming in second in Russia, Taiwan, and Brazil, and Port 1433 coming in second in India and Hong Kong. In the remaining countries, the second spot was held by Port 3389 (China), Port 443 (Indonesia), Port 80 (United States), Port 445 (Turkey), and Port 135 (Romania).

1.3 Observations on DDoS Attacks

With the *4th Quarter, 2012 State of the Internet Report*, Akamai began analyzing the number of Distributed Denial of Service (DDoS) attacks reported by our customers. Due to the nature of the Akamai platform, it can be difficult to distinguish the difference between a spike in the traffic a site might encounter due to a specific event (such as being mentioned on a popular live television program) and a malicious attack such as a DDoS, without extensive review by an analyst. Therefore, Akamai relies on customers to report DDoS attacks, which is what this analysis is based upon. Additionally, attacks that target lower level network layers, such as SYN floods, UDP floods and similar types of volumetric attacks are not tracked by Akamai, as they are automatically mitigated with minimal human involvement under most circumstances. Higher level attacks that target the application and logical layers, such as HTTP GET floods or attacks that repeatedly download large files, are mitigated using Akamai's KONA Web Application Firewall solution, and require the intervention of Akamai analysts to create, implement and disseminate the rules to stop these attacks.

Across the full year 2012, 768 attacks were reported to Akamai, and this shows little to no sign of abating in 2013. The fourth quarter of 2012 saw 200 reported attacks, while 208 attacks were reported in the first quarter of 2013, representing a slight (4%) increase in the number of attacks reported. In the third and fourth quarters of 2012, a significant number (72) of DDoS attacks were attributed to the Izz ad-Dim al-Qassam Cyber Fighters (aka QCF) and Operation Ababil. In the first quarter of 2013, the tactics of these attacks changed, with the QCF no longer announcing their targets prior to the attacks. Additionally, the attacks ceased as of March 5, in theory to support a planned operation known as "OpUSA" originating from members of the group "Anonymous". However it is unknown if this was truly the case, or if the forces behind the QCF were merely pausing to regroup for future attacks.

As illustrated in Figure 3, enterprise clients received a substantially greater percentage of attacks in the first quarter of 2013, accounting for 35% of all attacks (67 total), up 14% quarter over quarter. The commerce and media verticals stayed relatively

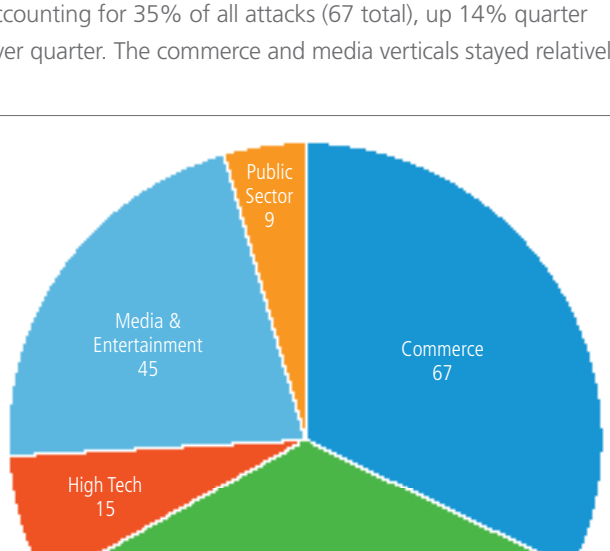

Figure 3: Q1 2013 DDoS Attacks by Sector

close to their 2012 percentages, at 32% vs. 34% for commerce and 22% for media. At the same time, high tech and public sector customers were targeted by substantially fewer attacks as a percentage, at 7% and 4% of total attacks respectively. It is interesting to note that the attacks in the first quarter were more distributed (organizationally) than the attacks reported in 2012. There were 154 unique organizations that reported DDoS attacks in the first quarter, in contrast to 413 in all of 2012. This means that nearly half (350) of the attacks in 2012 were against organizations that had already been attacked at least once, while this number fell to 27% of attacks (54) in the first quarter of 2013. The decline in the number of repeat targets may account for the change in distribution of attacks.

As a percentage, first quarter attacks targeting the commerce sector remained relatively stable in comparison to the attacks reported in 2012. While the distribution of the attacks remained nearly the same, the actual targets were more varied, again following the overall trend of spreading the targets of attacks across multiple sites. As highlighted in Figure 4, retail organizations continue to be tempting targets, primarily because they rely so heavily on the Internet for sales and marketing and can be severely impacted if their customers cannot reach their sites.

As shown in Figure 5, at the beginning of 2013, financial services customers continued to bear the brunt of the attacks against the enterprise vertical, suffering from 50% of all attacks in this vertical. This is directly related to the attacks performed by the QCF, as it was in 2012. What is not apparent from the number of attacks is the fact that a number of shorter, less impactful attacks were performed in the first quarter, comprised of probes, rather than full-on DDoS attacks. For victims (sites) that were affected by the attacks, the aggressors would return at a later date to have a greater, longer lasting impact on the target. These probes are often not apparent until the full attack commences and are usually considered to be part of the main attack for the purposes of this report, rather than being recorded separately.

The media and entertainment sector continues to be a tempting target, and was essentially unchanged (22%) as an overall percentage of DDoS attacks. Public sector customers suffered from statistically fewer attacks during the first quarter of the year, although preliminary numbers for the second quarter of 2013 indicate that this may be a temporary change to the state of affairs.

The number of DDoS attacks Akamai encounters shows every indication of continuing to grow, with nearly 5% more attacks being reported in the first quarter of 2013 as compared to the fourth quarter of 2012. It remains difficult to determine the nature of the attackers because botnets are necessary to create the attacks and the command and control (C&C) infrastructures of these botnets are designed to protect their owners. Another interesting development is a return to the use of DNS reflection attacks. This attack methodology allows attackers to make a relatively

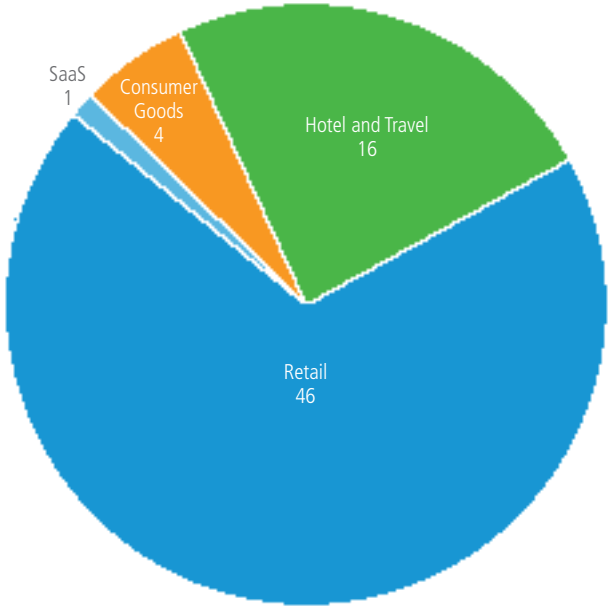

Figure 4: Q1 2013 DDoS Attacks in the Commerce Sector

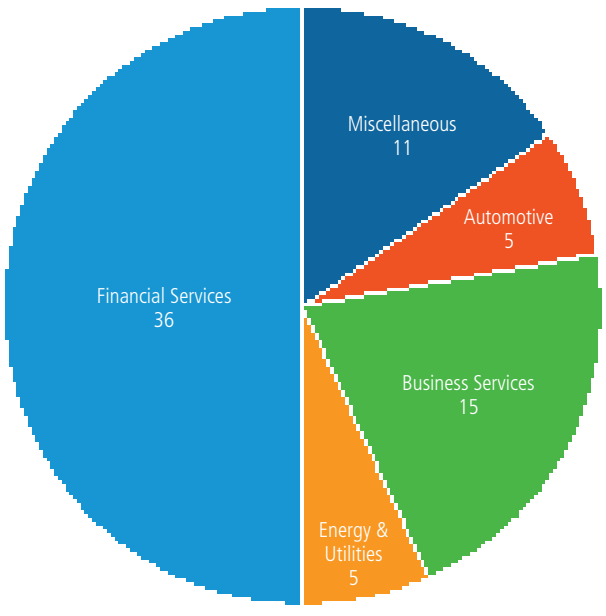

Figure 5: Q1 2013 DDoS Attacks in the Enterprise Sector

small investment in the traffic they send out while reaping a huge reward in the amount of traffic sent to their target. By sending a forged DNS request to an open, recursive DNS server, attackers can easily multiply their attack traffic up to eight fold. Due to poor Internet hygiene by many ISPs and the lack of enforcement of BCP 38,[2] forged DNS requests are allowed to continue to the name servers, rather than being filtered by the attacker's ISP as they should be. For more information on this topic, please refer to the DNS Reflection Defense blog post by Akamai CSO Andy Ellis at *https://blogs.akamai.com/2013/06/dns-reflection-defense.html.*

1.4 "Account Checker" Attacks Target E-Commerce Sites

In the first and second quarters of 2013, Akamai observed attempted account takeover behavior for a number of merchants resulting from reuse of credentials obtained from other sites. Lists of username and password combinations are available in carder forums or on pastebin, or acquired from compromised merchants. Because users often use the same username and password across multiple merchants and other non-commerce sites, this allows attackers to use the compromised credentials on a number of target merchants.

Attackers have been using automated tools—known as "account checkers"—to quickly determine valid user ID/password combinations across a large number of e-commerce sites. Using these tools, attackers can identify valid accounts rapidly and gain access to the accounts, acquiring names, addresses and credit card data from user profiles, and can also fraudulently acquire merchandise.

Attackers usually begin by compromising hosted Web servers and uploading a set of scripts to the compromised system in order to use their resources in the attacks. Several known groups also have semi-permanent or permanent domain names where they host their tools. Akamai has also seen instances of attackers using cloud and virtual private server providers to host their attack tools. These scripts make use of open proxies for the actual attack; therefore it is not helpful to block the compromised systems.

Integral to the success of the attack is the use of Web proxies. By routing traffic through open proxies, the attackers attempt to bypass IP blocks. The tools Akamai has observed allow the attackers to use a list of open proxies and cycle through them after a fixed number of attempts. The attackers need to ensure their list of proxies is both of sufficient size to disguise the attack and that it contains valid proxies, or they risk exposing their attack.

The attackers then use their list of compromised accounts with the installed tools to rapidly check the validity of the accounts. Accounts that work are marked, and the attackers log in using the credentials. Once logged in, the attackers can collect the user's personal data and credit card information to use for further fraud. Attackers then modify the shipping address of the victim and make purchases with their stored information. The merchandise is sent to an address near the attacker and picked up. In recent attacks, gift cards, both physical and electronic, have been key items for purchase as they are readily available, difficult to trace, and easy to transport.

The following are indications that an account checker has been used against an e-commerce site:

- User complains that their account mailing address has been altered
- Multiple other users altered in a similar time frame
- Many failed logins detected in a short period of time from a small number of IP addresses
- Locked accounts
- Higher than normal rate of fraud activity

There are a number of defenses that can be used by merchants to identify and stop these attacks. The tools used by the attackers are not currently capable of bypassing CAPTCHA's or other validation requiring user intervention, which makes these protections highly effective. Careful review of authentication logs can be used to identify likely proxy servers used by the attackers; a large number of sequential users from the same IP address or group of IP addresses may be an indicator of this type of an attack.

Akamai offers several tools that can used to combat this type of attacker. The Akamai User Validation Module (UVM) can be used to confirm that the login is coming from a browser and therefore a live user. Merchants whose customer base is primarily in known countries/regions can employ geo-blocking to limit logins to users from specific geographies. In addition, organizations that use Akamai's Kona Site Defender can block these attacks by using a combination of rate controls (how many connections are allowed in a given time) and IP address block lists.

SECTION 2:
Internet Penetration

2.1 Unique IPv4 Addresses

Through its globally-deployed Intelligent Platform, and by virtue of the approximately two trillion requests for Web content that it services on a daily basis, Akamai has unique visibility into levels of Internet penetration around the world. In the first quarter of 2013, over 733 million IP addresses, from 243 unique countries/regions, connected to the Akamai Intelligent Platform—over 3% more than in the fourth quarter of 2012, and 10% more than in the first quarter of 2012. Although we see over 700 million unique IPv4 addresses, Akamai believes that we see well over one billion Web users. In some cases, multiple individuals may be represented by a single IPv4 address (or a small number of IPv4 addresses), because they access the Web through a firewall or proxy server, while in other cases, individual users can have multiple IPv4 addresses associated with them due to their use of multiple connected devices. Unless otherwise specified, the use of "IP address" within Section 2.1 refers to IPv4 addresses.

As shown in Figure 6, the global unique IPv4 address count seen by Akamai grew by over 34 million quarter-over-quarter. Quarterly growth was also seen among all of the top 10 countries, ranging from just 0.7% in Germany to 5.3% in China. Looking at the full set of countries/regions around the world, just shy of three-quarters of them saw a quarterly increase in unique IP counts, with significant levels of growth experienced in Angola, Sudan, and Kenya, which all grew in excess of 50% quarter-over-quarter. (The driver of this growth isn't immediately clear, though it could be related to improved Internet connectivity becoming available in these countries from submarine cables including EASSy[3] and ACE.[4])

	Country/Region	Q1 '13 Unique IPv4 Addresses	QoQ Change	YoY Change
–	Global	733,799,401	3.1%	10%
1	United States	147,940,918	2.9%	1.0%
2	China	110,473,009	5.3%	20%
3	Japan	42,052,616	1.6%	3.8%
4	Germany	37,840,924	0.7%	5.0%
5	United Kingdom	28,524,028	3.3%	11%
6	France	26,992,978	1.9%	5.7%
7	Brazil	26,442,198	4.8%	38%
8	South Korea	21,412,948	2.5%	8.1%
9	Italy	20,232,010	1.6%	20%
10	Russia	18,240,078	3.1%	15%

Figure 6: Unique IPv4 Addresses Seen by Akamai

Looking at year-over-year changes, it is interesting to note that China's unique IP count has grown aggressively over time, especially as compared to the United States. In January, it was reported[5] that the Internet population in China had grown to 564 million users and was projected to grow to nearly 800 million users by 2015. It is not inconceivable that over the next couple of years, this strong growth in China will enable its unique IPv4 address count to eclipse that seen from the United States. Other countries with strong year-over-year growth in the first quarter included Italy, also with a 20% increase, and Brazil, which grew at nearly double the rate of China and Italy, at 38%. On a global basis, slightly less than three-quarters of countries also had higher unique IP address counts year-over-year, with several African and Middle Eastern nations having the highest rates of growth.

2.2 IPv4 Exhaustion

As expected, the number of available IPv4 addresses continued to decline heading into 2013, as Regional Internet Registries continued to allocate/assign blocks of IPv4 address space to organizations within their respective territories.[6] Leveraging data[7] collected by Geoff Huston,[8] Chief Scientist at APNIC, the *State of the Internet Report* can now provide a perspective on the size of the available IPv4 address pool at each RIR, and how the pool sizes are shrinking over time. In addition, the report will continue to use data published by the RIRs to highlight IPv4 address assignment/allocation activity by RIR over the course of each quarter.

Figure 7 illustrates the data provided by Mr. Huston, showing how the size of the available IPv4 address pools at each of the RIRs changed over the course of the first quarter of 2013. The smallest rate of decline was seen at AFRINIC, which delegated just 0.7% of its available space, and ended the quarter with just over 62.5 million available IPv4 addresses. As they are both delegating space from their last "/8" address block, RIPE and APNIC unsurprisingly had comparatively small drawdowns, handing out 3.5% and 1.9% of their available space, respectively. ARIN delegated 12.8% of its available space, ending the quarter with just over 41.4 million available IPv4 addresses, and LACNIC delegated a surprisingly high 13.9% of available space, ending the first quarter with an available pool of more than 62.5 million IPv4 addresses.

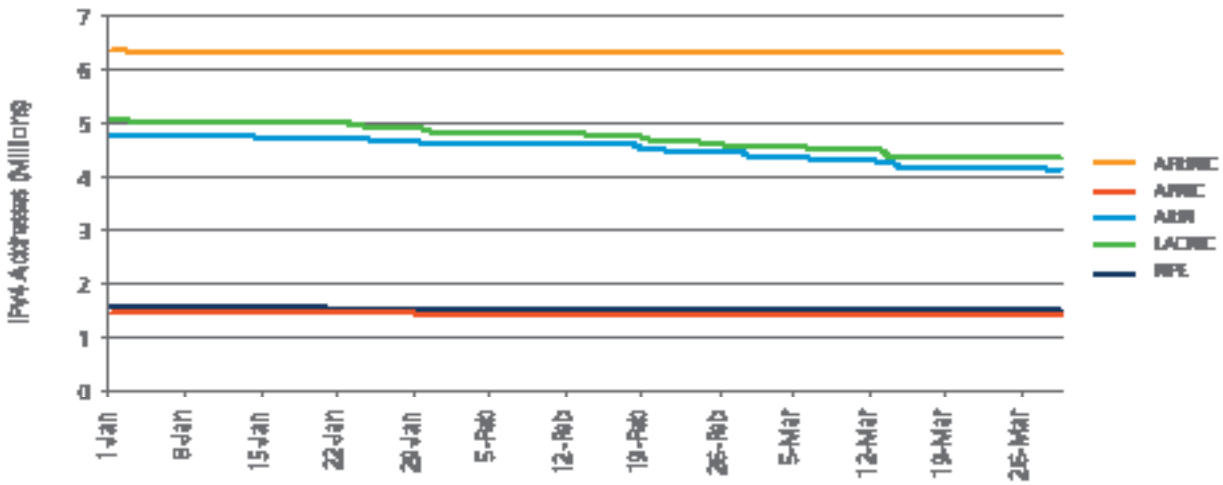

Figure 7: Available IPv4 Address Pool Size by RIR, Q1 2013

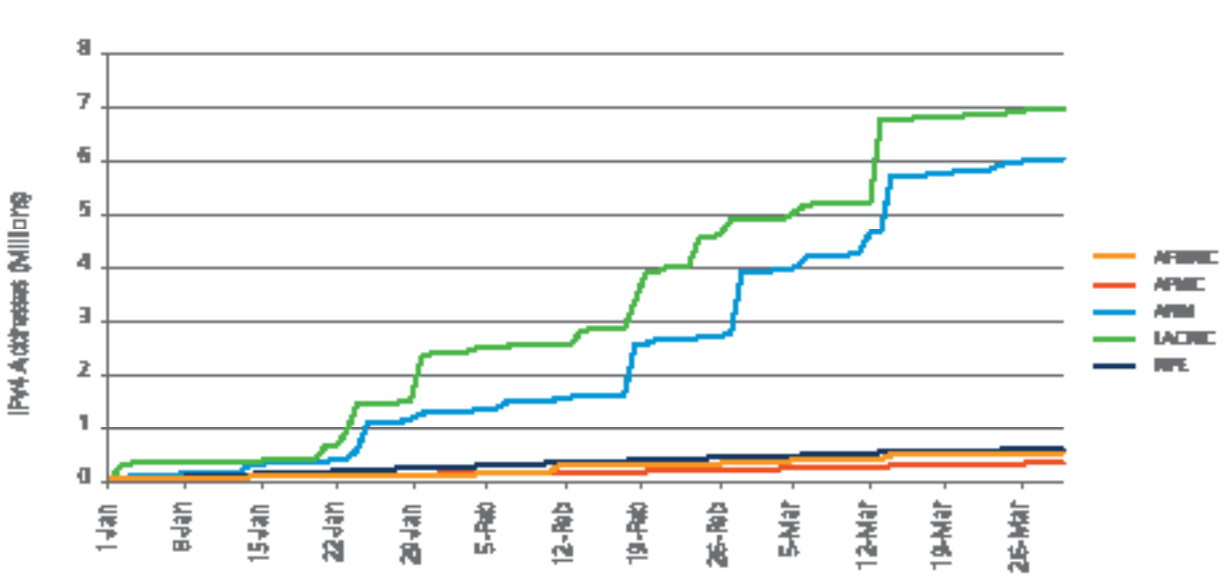

Figure 8: Total Number of IPv4 Addresses Assigned/Allocated by RIR, Q1 2013

Figure 8 illustrates the IPv4 allocation/assignment activity across each of the RIRs during the first quarter. As it shows, assignment activity across APNIC, RIPE, and AFRINIC was fairly low, with the exception of a small jump on February 12 in AFRINIC, representing the assignment of a "/15" (131,072) IPv4 addresses to Telkom Mobile,[9] a South African mobile provider. Activity at ARIN saw several significant jumps during the quarter, including over 650,000 addresses (a "/13" to Time Warner Cable Internet[10] and a "/15" to Akamai Technologies[11]) handed out on January 24 and 25, over 900,000 IPv4 addresses delegated on February 19 (apparently to Amazon.com[12]), over one million on March 1 (to AT&T Services, Inc.[13]), and another million on March 15 (also to Akamai Technologies[14]). Activity at LACNIC also saw a number of significant jumps during the quarter, including three blocks of over 262,000 addresses (a "/14" block to Brasil Telecom S/A,[15] and two to Vivo S.A,[16,17]) on January 23 and 24, three similar delegations on January 30 (all apparently to Global Village Telecom[18]), two delegations of over 524,000 IPv4 addresses (a "/13" to the Administracion Nacional de Telecomunicaciones[19] and one to Vivo S.A.[20]) on February 19 and 20, and six "/14" blocks on March 14 (two to Tim Celular S.A.,[21] and four to NET Serviços de Comunicação S.A.[22]) .

2.3 IPv6 Adoption

As Akamai continues to roll out IPv6 support across its solution portfolio, we will endeavor to include data in the *State of the Internet Report* on IPv6 adoption based on the analysis of IPv6 requests to, and traffic delivered by, the Akamai Intelligent Platform. However, until such time as we can include comprehensive Akamai data on IPv6 adoption, we continue to supplement with third-party data.

One such data source is network service provider Hurricane Electric, which claims that it is "considered the largest IPv6 backbone in the world as measured by number of networks connected."[23] A white paper[24] available from Hurricane Electric highlights more than a decade of experience in working with IPv6, and they also publish the "Global IPv6 Deployment Progress Report", available at *http://bgp.he.net/ipv6-progress-report.cgi*.

As is evident in Figure 9, the rate of growth in the first quarter of 2013 was significantly lower than that seen in the previous four years—in fact, the 5.0% increase was half as much as in 2012, and a quarter of that seen in 2011. Just 333 Autonomous Systems (ASes) were added to the IPv6 routing table in the first quarter of 2013, as compared to 489 in 2012 and 589 in 2011. However, 2013's figure was larger than the number added in both 2010 and 2009. While this metric provides some perspective around global IPv6 adoption, it is also important to recognize that not all ASes are equivalent—ASes associated with large numbers of users/subscribers are ultimately more meaningful for measuring the success of IPv6 adoption than ASes not directly associated with end user connectivity/traffic. Data collected by Akamai and others indicates that ASes used for end user traffic are starting to see meaningful levels of IPv6 adoption.[25]

Since mid-2012, we have been tracking IPv6 traffic to the Akamai Intelligent Platform. The graph in Figure 10 is based on data taken from *http://www.akamai.com/IPv6*, which provides both rolling 24-hour and historical views of IPv6 request volume seen by Akamai (in hits/second), and shows peak traffic volume on a daily basis across the first quarter of 2013. IPv6 traffic continues to exhibit a somewhat cyclical weekly pattern, as was noted last quarter as well. Absolute volume grew from almost 92,000 hits/second at the start of 2013 to just over 115,000 hits/second at the end of the first quarter. There is a very interesting shift in the peaks and troughs of the weekly cycle that is observable starting in early March as well, with differences of 20,000 hits/second or more evident during several weeks—it is not clear exactly what drove this change.

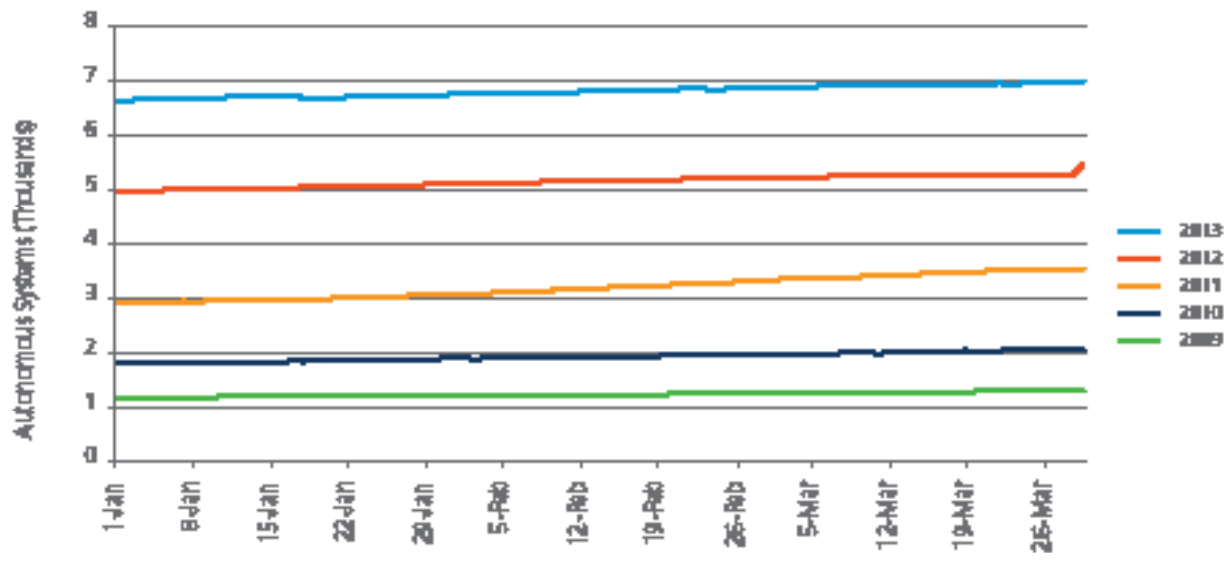

Figure 9: Total Number of Autonomous Systems in the IPv6 Routing Table

Geography – Global

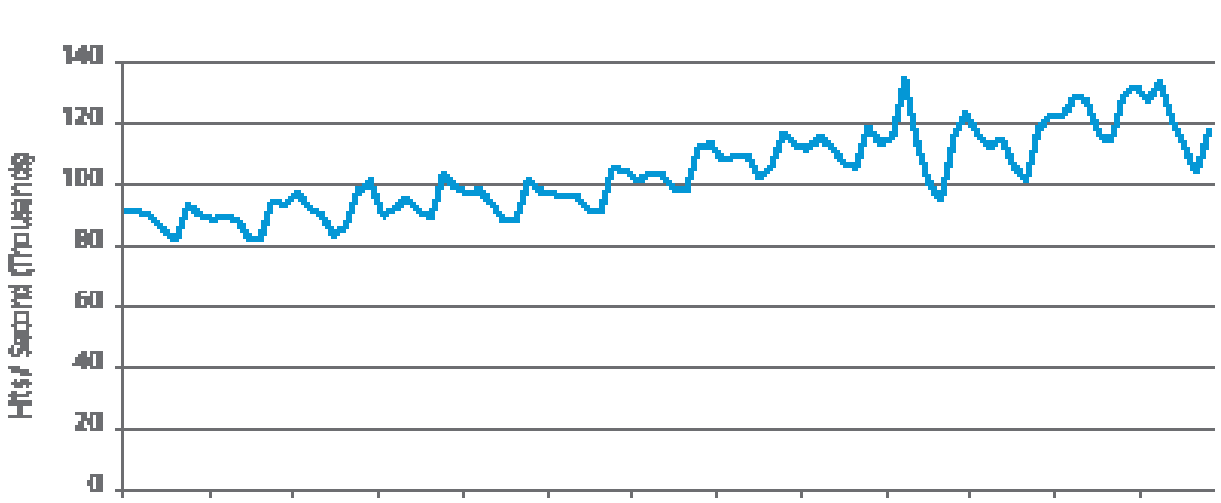

Figure 10: IPv6 Traffic to the Akamai Intelligent Platform, Q1 2013

DID YOU KNOW?

- In the IPv6 network operator statistics update published by the Internet Society in March 2013, tens of additional networks qualified for listing. The Internet Society noted that Deutsche Telekom, Telefonica del Peru, and VOO from Belgium are all new entrants that were already in the top 12 operators listed, meaning they were already delivering services for significant numbers of IPv6 users.

[Source: http://www.worldipv6launch.org/more-operators-more-ipv6-2013-off-to-a-flying-start/]

- You can follow the Regional Internet Registries on Twitter to find out more about local IPv4 exhaustion and IPv6 adoption:
  - AFRINIC: @AFRINIC
  - APNIC:@APNIC
  - ARIN: @TeamARIN
  - LACNIC: @LACNIC
  - RIPE: @RIPE_NCC
- RIPE, the European RIR, provides insight into the percentage of IPv6-enabled networks at a country or group of countries level at *http://v6asns.ripe.net/v/6*

SECTION 3:
Geography – Global

The data presented within this section was collected during the first quarter of 2013 through Akamai's globally-deployed Intelligent Platform and includes all countries that had more than 25,000 unique IP addresses make requests for content to Akamai during the quarter. For purposes of classification within this report, the "high broadband" data included below is for connections at greater than 10 Mbps, and "broadband" is for connections of 4 Mbps or greater.

In addition to providing insight into high broadband and broadband adoption levels, the report also includes data on average and average peak connection speeds—the latter provides insight into the peak speeds that users can likely expect from their Internet connections.

Finally, traffic from known mobile networks is analyzed and reviewed in a separate section of the report; mobile network data has been removed from the data set used to calculate the metrics in the present section, as well as subsequent regional "Geography" sections.

3.1 Global Average Connection Speeds

The global average connection speed continued to grow in the first quarter of 2013, increasing 4.0% to 3.1 Mbps. As shown in Figure 11, increases were seen among all of the top 10 countries/regions, with particularly strong increases seen in the Netherlands, Sweden, and Denmark—all three European countries grew 10% or more quarter-over-quarter. Overall, among the top 10, growth ranged from just 1.5% in South Korea to 13% in Denmark. While South Korea maintained its position as the country with the highest average connection speed, both Hong Kong and Switzerland posted large enough quarterly gains to push them over the "high broadband" 10 Mbps threshold as well. Globally, a total of 117 countries/regions that qualified for inclusion saw average connection speeds increase from the fourth quarter of 2012, ranging from 0.7% in Kuwait (to 2.1 Mbps) to a massive 75% in Guatemala (to 3.2 Mbps). Quarterly losses ranged from 0.1% in Tunisia (to 1.5 Mbps) to 13% in Bahrain (to 1.9 Mbps).

Long-term trends are generally rather positive as well. At a global level, the average connection speed is up 17% year-over-year, and eight of the top 10 countries/regions also grew by double-digit percentages, led by the Czech Republic and Sweden, which had yearly growth of 34% and 32% respectively. Only Japan had a growth rate below 10%, and South Korea was the only country of the set that saw a year-over-year decline. Around the world,

	Country/Region	Q1 '13 Avg. Mbps	QoQ Change	YoY Change
–	Global	3.1	4.0%	17%
1	South Korea	14.2	1.5%	-10%
2	Japan	11.7	3.9%	6.8%
3	Hong Kong	10.9	9.0%	16%
4	Switzerland	10.1	6.1%	24%
5	Netherlands	9.9	10%	12%
6	Latvia	9.8	4.5%	12%
7	Czech Republic	9.6	9.1%	34%
8	Sweden	8.9	10.8%	32%
9	United States	8.6	7.4%	27%
10	Denmark	8.2	13%	17%

Figure 11: Average Measured Connection Speed by Country/Region

a total of 123 qualifying countries/regions saw a year-over-year increase in average connection speeds, ranging from just 1.4% in Oman (to 1.2 Mbps) to a surprisingly high 122% in Iraq (to 2.0 Mbps). Year-over-year declines in average connection speeds were seen in just 15 countries/regions, ranging from a loss of just 0.6% in Panama (to 2.8 Mbps) to a drop of 19% in Egypt (to 1.1 Mbps).

In the first quarter, 14 qualifying countries/regions had average connection speeds of 1 Mbps or less, down from 18 in the prior quarter. This continued decline is an encouraging trend, likely pointing to improved broadband connectivity across even the slowest geographies. Libya once again held the spot as the country with the lowest average connection speed, clocking in at 0.6 Mbps, growing just less than one percent quarter-over-quarter, but 19% year-over-year.

3.2 Global Average Peak Connection Speeds

The average peak connection speed metric represents an average of the maximum measured connection speeds across all of the unique IP addresses seen by Akamai from a particular geography, and is more representative of Internet connection capacity. The average is used to mitigate the impact of unrepresentative maximum measured connection speeds.

	Country/Region	Q1 '13 Peak Mbps	QoQ Change	YoY Change
–	Global	18.4	9.2%	36%
1	Hong Kong	63.6	9.0%	29%
2	Japan	50.0	13%	26%
3	Romania	47.9	8.9%	23%
4	South Korea	44.8	1.5%	-6.3%
5	Latvia	44.2	10%	32%
6	Singapore	41.1	8.8%	43%
7	Switzerland	40.3	12%	41%
8	Bulgaria	38.2	14%	39%
9	Netherlands	38.2	15%	30%
10	Belgium	38.0	14%	30%

Figure 12: Average Peak Connection Speed by Country/Region

	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
–	Global	13%	10%	28%
1	South Korea	50%	1.5%	-6.2%
2	Japan	43%	5.7%	17%
3	Hong Kong	34%	10%	20%
4	Latvia	31%	6.3%	19%
5	Switzerland	30%	11%	58%
6	Netherlands	29%	25%	21%
7	Sweden	25%	18%	61%
8	United States	25%	14%	69%
9	Czech Republic	23%	10%	96%
10	Finland	21%	12%	30%

Figure 13: High Broadband (>10 Mbps) Connectivity

As shown in Figure 12, the global average peak connection speed saw very strong growth during the first quarter of 2013, increasing 9.2% to 18.4 Mbps. A quarterly increase of 9.0% pushed first place Hong Kong up past 60 Mbps for the first time, as it reached an average peak connection speed of 63.6 Mbps. Japan's solid 13% quarter-over-quarter change pushed it to 50 Mbps, making it only the second country to reach that threshold. Five additional countries among the top 10 joined Japan with double-digit percentage quarterly growth, with the Netherlands seeing the biggest increase, at 15%. On a global basis, 130 qualifying countries/regions saw higher average peak connection speeds quarter-over quarter, with increases ranging from 0.9% in Nicaragua (to 13.3 Mbps) to 55% in Ghana (to 21.3 Mbps). Only six qualifying countries/regions saw lower average peak connection speeds quarter-over-quarter, with losses ranging from just 0.4% in Indonesia (to 12.8 Mbps) to 7.9% in Sudan (to 6.1 Mbps).

Looking at year-over-year changes, the long term trends are very strong as well. The global average peak connection speed was up by 36%, and it was joined by similarly strong growth rates among nine of the top 10 countries/regions, led by Singapore and Switzerland. Average peak connection speeds in both countries grew by more than 40%—Singapore was up 43% and Switzerland 41% year-over-year. Around the rest of the world, all but six of the qualifying countries/regions saw yearly growth in average peak connection speeds, ranging from 3.7% in Chile (to 20.4 Mbps) to 152% in Indonesia. Mozambique also posted a year-over-year increase of over 100%, gaining 107% (to 9.6 Mbps). Of the countries/regions that saw yearly declines, losses ranged from 3.8% in Guatemala (to 15.6 Mbps) to 28% in Sudan. The lowest average peak connection speed in the first quarter was recorded in Iran, at 3.2 Mbps—up 17% quarter-over-quarter, but down 7.1% year-over-year.

3.3 Global High Broadband Connectivity

In line with the strong growth seen in the connection speed metrics, Figure 13 shows that high broadband adoption rates followed suit in the first quarter, with the global high broadband adoption rate growing to 13%, thanks to a 10% quarterly increase. Among the top 10 countries/regions, seven also grew 10% or more quarter-over-quarter, with an impressive 25% quarterly increase in the Netherlands topping the list. Quarterly growth in the remaining three countries on the list was nominal, with South Korea once again seeing half of its connections to Akamai at speeds above 10 Mbps. In a similar vein, all of the top ten countries are now seeing at least one in five connections to Akamai at speeds above 10 Mbps—an encouraging sign. Of the 50 countries/regions around the world that qualified for inclusion, only Thailand and China saw high broadband adoption rates decline quarter-over-quarter, losing 0.5% (to 2.7% adoption) and 21% (to 0.2% adoption) respectively. Quarterly growth in the other countries/regions ranged from a slight 0.8% increase in Australia (to 4.8% adoption) to a surprisingly large 102% jump in India (to 0.3% adoption). With India's massive increase, China returned to its position as the country with the lowest level of high broadband adoption among qualifying countries.

Looking at year-over-year changes, the global high broadband adoption rate saw strong growth, up 28%. Among the top 10 countries/regions, nine saw extremely strong improvement as compared to the first quarter of 2012, with growth rates ranging from 17% in Japan, to a near-doubling in the Czech Republic, which added 96%. Yearly changes among the qualifying countries/regions around the world ranged from growth of just 2.1% in Belgium (to 19% adoption) to increases of over 200% in both Moldova (up 227% to 16% adoption) and the United Kingdom

(up 208% to 20% adoption). Nine additional countries grew by more than 100% year-over-year, while Greece fell just short, with a year-over-year change of 99%. In addition to South Korea, yearly declines were seen in Portugal (down 11% to 6.0% adoption), and Chile (down 12% to 0.9% adoption).

3.4 Global Broadband Connectivity

In the first quarter of 2013, the global broadband adoption rate saw nominal growth from the prior quarter, reaching 46% on an increase of 5.8%. As shown in Figure 14, similar nominal growth was seen across the top 10 countries/regions, though Austria and Denmark stood out with quarter-over-quarter changes above 10%, increasing 16% and 11% respectively. The smallest change among the group was seen in the Netherlands, which grew just 1.2%. Across the countries/regions in the top 10, all of them had at least three of every four requests to Akamai at speeds above 4 Mbps. Globally, a total of 72 countries/regions that qualified for inclusion saw higher levels of broadband adoption quarter-over-quarter, with growth ranging from 1.2% in the Netherlands to an unusual 108% increase in Réunion (to 27% adoption). Thirty-seven countries/regions around the world saw at least half of their connections to Akamai occurring at speeds above 4 Mbps. In contrast, Venezuela had the lowest level of broadband adoption in the first quarter, at just 1.2%.

	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
–	Global	46%	5.8%	12%
1	Switzerland	88%	2.5%	14%
2	South Korea	87%	1.5%	1.5%
3	Netherlands	84%	1.2%	1.2%
4	Czech Republic	81%	8.7%	19%
5	Japan	79%	3.8%	9.9%
6	Hong Kong	78%	3.3%	8.4%
7	Austria	78%	16%	28%
8	Canada	77%	3.9%	13%
9	Denmark	77%	11%	14%
10	Belgium	76%	4.5%	5.1%

Figure 14: Broadband (>4 Mbps) Connectivity

Broadband adoption grew year-over-year at a global level, increasing 12%, and was also up across all of the top 10 countries/regions, though the changes were not as large as those seen for the high broadband metric. Among the group, yearly increases ranged from just 1.2% in the Netherlands to 28% in Austria, while Switzerland, the Czech Republic, Canada, and Denmark all joined Austria in growing more than 10% year-over-year. Looking across the whole world, a total of 69 countries/regions saw higher broadband adoption levels year-over-year. Growth rates ranged from the 1.2% increase in the Netherlands to a massive 716% increase in Morocco (to 6.6% adoption). In addition to Morocco, yearly growth in excess of 200% was also seen in Indonesia (up 414% to 3.7% adoption), Réunion (up 330% to 27% adoption), Georgia (up 237% to 20% adoption), and Ecuador (up 218% to 13% adoption). Levels of broadband adoption more than doubled in an additional eight countries as compared to the first quarter of 2012. Only seven qualifying countries saw lower levels of broadband adoption year-over-year, with Vietnam's 48% loss (to 1.9% adoption) the largest seen.

Unsurprisingly, broadband access continues to be seen as a global priority. Dr. Hamadoun Touré, the Secretary-General of the International Telecommunication Union (ITU), told the 7th Meeting of the Broadband Commission in Mexico City that he'd like to "dream big" and set a new goal to ensure that broadband Internet speeds of 20Mbps for $20 a month are accessible to everyone in the world by 2020.[26] However, it is interesting to note that this goal, while admirable, falls short of more localized goals, such as the EU Digital Agenda goal of 30 Mbps connectivity for EU households by 2020 and the United Kingdom's goal of 25+ Mbps connectivity for 90% of citizens by 2015.

DID YOU KNOW?

A report published by the International Telecommunication Union (ITU) comparing broadband prices in countries around the world highlighted that there are 17 countries that have prices equal to 100% or more of average monthly income, while 25 countries have a price equal to 1% or less of average monthly income.

[Source: http://royal.pingdom.com/2013/03/12/broadband-prices/]

SECTION 4:

Geography – United States

The metrics presented here for the United States are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in the United States, based on classification by Akamai's EdgeScape geolocation tool.

4.1 United States Average Connection Speeds

The first quarter of 2013 brought extremely strong quarter-over-quarter increases in average connection speed for the top 10 states, as illustrated in Figure 15. Vermont remained the fastest state, at 12.7 Mbps, with a quarterly increase of 18%. However, it wasn't the largest increase among the group, as Virginia added 22%, reaching an average connection speed of 10.7 Mbps. Impressively, all of the states among the top 10 had average connection speeds above the "high broadband" 10 Mbps threshold in the first quarter, and all of them saw quarterly growth of more than 10% as well. Across the whole country, average connection speeds were up in every state, with increases ranging from 3.2% in Minnesota (to 7.9 Mbps) to an unexpectedly high 34% in North Dakota (to 9.6 Mbps). In addition to North Dakota, Ohio, South Dakota, and Virginia all saw quarterly increases above 20%. Unfortunately, Arkansas continued to maintain its position as the state with the lowest average connection speed, despite growing 16% to 4.4 Mbps.

On a year-over-year basis, growth was extremely strong among the top 10 states, which saw increases ranging from 17% in Delaware to 40% in Vermont—Delaware was the only state on the list that saw growth lower than 20%. Solid year-over-year growth was also seen across the rest of the country, with North Dakota and Ohio surpassing Vermont's aggressive growth, increasing 43% (to 9.6 Mbps) and 42% (to 8.2 Mbps) respectively. A total of 13 states saw growth of 30% or more, while another 26 increased 20% or more year-over-year. Nevada was the only state that increased less than 10% year-over-year, growing 8.1% (to 7.4 Mbps).

4.2 United States Average Peak Connection Speeds

The first quarter of 2013 marks the first time that all of the top 10 states had average peak connection speeds above 40 Mbps, as Figure 16 shows. The District of Columbia led the pack, with an average peak connection speed of 47.2 Mbps, up 9.4%. Vermont was just 86 kbps behind, with an average peak connection speed of 47.1 Mbps, up 14% quarter-over-quarter. Utah had the lowest average peak connection speed among the top 10 states, at 41.9 Mbps, while Delaware had the lowest quarterly increase, at 5.8%. Across the whole country, 33 states grew by 10% or more quarter-over-quarter, while the lowest quarterly increase was seen in Nevada, at 4.2% (to 31.3 Mbps). A total of 14 states had average peak connection speeds of 40 Mbps or more in the first quarter, while another 26 came in above 30 Mbps. Ten more had average peak connection speeds above 20 Mbps, and the only state that had an average peak connection speed below 20 Mbps was Arkansas, at 19.8 Mbps (up 13% quarter-over-quarter.)

	State	Q1 '13 Avg. Mbps	QoQ Change	YoY Change
1	Vermont	12.7	18%	40%
2	New Hampshire	12.0	18%	28%
3	Delaware	11.9	12%	17%
4	District Of Columbia	11.3	11%	28%
5	Utah	11.0	16%	29%
6	Massachusetts	10.7	15%	31%
7	Virginia	10.7	22%	36%
8	Maryland	10.6	13%	31%
9	New Jersey	10.5	15%	34%
10	Connecticut	10.4	13%	24%

Figure 15: Average Connection Speed by State

	State	Q1 '13 Peak Mbps	QoQ Change	YoY Change
1	District Of Columbia	47.2	9.4%	37%
2	Vermont	47.1	14%	33%
3	New Jersey	45.7	19%	42%
4	New Hampshire	44.4	18%	32%
5	Massachusetts	43.8	14%	34%
6	Maryland	43.8	16%	37%
7	New York	43.1	12%	33%
8	Virginia	43.1	16%	27%
9	Delaware	42.8	5.8%	-1.5%
10	Utah	41.9	14%	34%

Figure 16: Average Peak Connection Speed by State

Year-over-year changes among the top 10 states were generally very strong, with eight of the 10 above 30%. Delaware was the only state among the group to see a long-term decline in its average peak connection speed, dropping 1.5% from the first quarter of 2012—it's not clear why, after increasing for several quarters, the long-term trend in Delaware has turned negative. Among all of the states in the union, year-over-year changes were positive everywhere but Delaware. Kentucky saw the highest level of year-over-year growth, and was the only state with a yearly increase above 50%, growing 52% (to 31.9 Mbps). Overall, a total of 17 states grew by 30% or more, while another 19 grew by 20% or more. The smallest yearly increase was seen in Nevada, which added 10% (to 31.3 Mbps).

4.3 United States High Broadband Connectivity

Quarterly changes in high broadband adoption among the top 10 states followed the connection speed metrics in showing strong growth in the first quarter, as evidenced in Figure 17. Surprisingly high rates of quarterly growth were seen across these states, ranging from 25% in New York to 42% in New Hampshire. In New Hampshire, nearly half of connections to Akamai were at speeds above 10 Mbps; in New York, just over one in three connected at 10 Mbps or more. All but three states across the whole country had high broadband adoption rates above 10%—those three are Hawaii (9.3% adoption, up 21%), Idaho (7.5% adoption, up 10%), and Arkansas, which had the lowest level of high broadband adoption in the country (4.4%, up 32%).

Year-over-year changes across the top 10 states were also extremely strong, ranging from a low of 27% in Delaware, to a doubling (100%) in New Jersey. Impressively, Delaware was the only state among the top 10 that saw a yearly growth rate below 50%. Year-over-year changes were also particularly high when looking at the whole country. Three states saw growth over 100%—Missouri (up 120% to 16% adoption), Michigan (up 117% to 26% adoption), and New Jersey. Kentucky fell just short, growing 99% year-over year (to 12% adoption). In addition to these four states, an additional 37 saw high broadband adoption rates grow more than 50% from the same period a year prior. Maine had the lowest yearly increase in the first quarter, growing 21% (to 14% adoption).

High broadband adoption rates may continue to see aggressive growth over the next couple of years if broadband providers and local/state governments come together in support of the "Gigabit City Challenge" issued by outgoing FCC Chairman Julius Genachowski in January 2013.[27] At the U.S. Conference of Mayors in January, Mr. Genachowski called for "at least one gigabit community in all 50 states by 2015." To help communities achieve this goal, he also announced plans "to create a new online clearinghouse of best practices to collect and disseminate information about how to lower the

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	New Hampshire	48%	42%	65%
2	New Jersey	45%	36%	100%
3	Vermont	43%	36%	61%
4	Massachusetts	41%	29%	74%
5	Delaware	41%	30%	27%
6	District Of Columbia	41%	23%	52%
7	Maryland	40%	32%	74%
8	Rhode Island	40%	25%	64%
9	Connecticut	35%	32%	65%
10	New York	35%	25%	80%

Figure 17: High Broadband (>10 Mbps) Connectivity, U.S. States

DID YOU KNOW?

Gigabit broadband connectivity is already available in a number of U.S. cities, including:

- Kansas City, KS / MO
- Chattanooga, TN
- Lafayette, LA
- East Lansing, MI
- Bristol, VA / TN
- Morristown, TN
- Burlington, VT
- Springfield, VT
- Omaha, NE
- Tullahoma, TN
- Minneapolis, MN
- Cedar Falls, Iowa
- Seattle, WA

[Source: http://highspeedgeek.com/america-gigabit-internet/]

costs and increase the speed of broadband deployment nationwide, including to create gigabit communities." Some communities are already taking steps to become "gigabit communities" by working with initiatives such as Gig. U. In February, Gig. U announced that it had helped the North Carolina Next Generation Network, which includes four universities (North Carolina State, University of North Carolina-Chapel Hill, Duke and Wake Forest) and six communities, put together an RFP for a project that they are hoping will entice both existing and new broadband providers to bid on building and running a network offering 1 Gbps, with a goal to start offering service within 18 months.[28]

4.4 United States Broadband Connectivity

Although still all positive, the quarterly changes in broadband adoption levels among the top 10 states were much lower than those seen for high broadband connectivity, or for the connection speed metrics. Interestingly, as shown in Figure 18, the changes were fairly tightly clustered, ranging from 3.0% in Delaware to 5.4% in Florida. Broadband adoption rates among the top 10 states are also very strong, with at least three of every four requests (and more in most cases) to Akamai from these states made at speeds above 4 Mbps. The spread of quarter-over-quarter changes across the whole country is broader, but tops out at 24% in Arkansas. However, at 33% adoption, Arkansas also ranks as the state with the lowest level of broadband adoption in the first quarter. In addition to Arkansas, nine additional states had quarterly growth rates above 10%, while the balance all grew less than that.

Year-over-year changes among the top 10 states, while generally positive, were also less aggressive than those seen in the other metrics. New Hampshire, Rhode Island, and Vermont grew less than 10% on a yearly basis, while increases in the other states on the list topped out at 15%, in Maryland and New York. Across the whole country, Kentucky had the highest rate of yearly growth, at 66% (to 64% adoption) – well ahead of Arkansas, which had the next highest yearly increase, at 36%. In total, 14 states improved broadband adoption levels by 20% or more year-over-year, while an additional 27 saw improvements of 10% or more. Aside from Delaware's 2.7% yearly decrease, Vermont had the smallest rate of growth, at 6.5%.

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	New Hampshire	90%	4.0%	6.8%
2	Delaware	90%	3.0%	-2.7%
3	Rhode Island	87%	5.0%	7.3%
4	Vermont	86%	4.9%	6.5%
5	New Jersey	84%	4.9%	12%
6	Maryland	82%	4.9%	15%
7	New York	82%	5.2%	15%
8	Connecticut	81%	4.9%	14%
9	Massachusetts	77%	3.6%	11%
10	Florida	76%	5.4%	14%

Figure 18: Broadband (>4 Mbps) Connectivity, U.S. States

DID YOU KNOW?

- The 2013 Measuring Broadband America—February Report from the United States Federal Communication Commission made three primary observations regarding the current state of residential broadband service in the United States:
  - Many ISPs continue to closely meet or exceed the speeds they advertise.
  - Consumers are continuing to migrate to faster speed tiers.
  - Satellite broadband has made significant improvements in service quality.
- The 2013 Measuring Broadband America—February Report also found that on average, during peak periods DSL-based services delivered download speeds that were 85 percent of advertised speeds, cable-based services delivered 99 percent of advertised speeds, fiber-to-the-home services delivered 115 percent of advertised speeds, and satellite delivered 137 percent of advertised speeds.

[Source: http://www.fcc.gov/measuring-broadband-america/2013/February]

SECTION 5:
Geography – Americas

The metrics presented here for the Americas region (North and South America) are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in North and South America, based on classification by Akamai's EdgeScape geolocation tool.

5.1 Americas Average Connection Speeds

In the first quarter of 2013, the United States and Canada had the highest average connection speeds among countries in the Americas, as shown in Figure 19. Measured connection speeds of 8.6 Mbps and 7.8 Mbps respectively were more than double that of neighboring Mexico. Within Latin and South America, average connection speeds ranged from 3.3 Mbps in Mexico to just 0.9 Mbps in Bolivia. Quarter-over-quarter changes among the surveyed countries were generally positive, though fairly nominal. Only Bolivia saw its average connection speed drop quarter-over-quarter (by 0.7%), while the other countries saw increases ranging from 1.5% in Colombia to 9.2% in Mexico.

On a year-over-year basis, changes were, surprisingly, more mixed, though the majority of surveyed countries saw yearly growth in average connection speeds. Among the surveyed countries that saw increases, the growth was fairly strong, ranging from 7.4% in Brazil to 51% in Bolivia; Brazil was the only country with growth below 10%. The observed quarterly declines were fairly nominal—Paraguay lost 3.6%, Argentina was down 6.6%, and Chile dropped 11% year-over-year.

Interestingly, Bolivia and Venezuela, the two countries with the lowest average connection speed in the first quarter, recently renationalized their incumbent telecommunications providers.[29] Bolivia's rank as the country with the lowest average connection speed may be related to the high cost of Internet connectivity there—a 1 Mbps connection costs 55% of GDP per capita. In contrast, the same connection costs 1.3% of GDP per capita in Uruguay and a fraction of a percent in European nations such as Spain and France.[30]

Global Rank	Country/Region	Q1 '13 Avg. Mbps	QoQ Change	YoY Change
9	United States	8.6	7.4%	27%
13	Canada	7.8	7.8%	21%
57	Mexico	3.3	9.2%	19%
63	Chile	3.0	2.7%	-11%
64	Colombia	2.8	1.5%	5.8%
72	Ecuador	2.3	2.8%	34%
73	Brazil	2.3	4.4%	7.4%
78	Costa Rica	2.1	5.7%	19%
82	Argentina	2.1	4.7%	-6.6%
85	Peru	2.0	5.7%	24%
99	Uruguay	1.7	4.0%	29%
117	Paraguay	1.2	6.3%	-3.6%
123	Venezuela	1.1	5.1%	19%
128	Bolivia	0.9	-0.7%	51%

Figure 19: Average Connection Speed by Americas Country

5.2 Americas Average Peak Connection Speeds

Similar to the gap seen in the average connection speed metric, the United States and Canada were far ahead of the other surveyed Americas countries in the average peak connection speed metric as well, as demonstrated in Figure 20. The United States topped the list at 36.6 Mbps, up a solid 11% quarter-over-quarter, while Canada posted a 34.2 Mbps average peak connection speed, growing 13% from the fourth quarter of 2012. Chile was the only other country in the Americas region that came in above 20 Mbps, though just barely, while nine more countries had average peak connection speeds above 10 Mbps. The lowest average peak connection speed among surveyed countries was seen in Venezuela, at 8.2 Mbps, up 8.8% quarter-over-quarter. Similar to Venezuela's quarterly growth, changes seen in other surveyed countries were similarly as moderate, ranging from a low of 2.9% in Chile to a high of 17% in Mexico.

Aside from more moderate year-over-year changes seen in Chile (up 3.7%) and Argentina (up 8.1%), yearly growth among the other Americas countries was more aggressive. Three countries (Uruguay, Ecuador, and Bolivia) all grew more than 50% from the first quarter of 2012, while an additional six grew more than 25%. While the United States and Canada had some of the fastest average peak connection speeds, the year-over-year changes seen there were in the middle of the pack. Looking into the future, it is likely that the average peak speeds seen in a number of South American countries will continue to see aggressive growth. A February 2013 blog post[31] from BuddeComm, a telecommunications research consultancy, noted that:

- Fiber-optic backbone networks are being deployed in Brazil's major cities as part of a National Broadband Plan
- Colombia's National Fiber Optic Project aims to invest the equivalent of $600 million USD to deploy over 15,000 km of optical fiber
- Peru's national broadband plan aims to provide Internet connectivity to the more remote regions of the country via a fiber-optic backbone

5.3 Americas High Broadband Connectivity

Though the first quarter average and average peak connection speeds observed across Americas countries were respectable, the distribution of high speed Internet connections is much more limited, as evidenced by Figure 21. As it shows, only six countries in North and South America had more than 25,000 unique IP addresses connecting to Akamai at speeds above 10 Mbps, qualifying them for inclusion within this section. Unsurprisingly, the United States and Canada were well ahead of the other qualifying countries, with high broadband adoption rates more than 20-25 times higher than Chile, which had the next highest adoption rate, at 0.9%. The other three qualifying countries (Mexico, Brazil, and Argentina) all had high broadband adoption rates below 1% as well, with Argentina the lowest, at 0.6%. Among the six qualifying countries, the quarter-over-quarter changes were strong, ranging from 13% in Brazil to 41% in Mexico. For the sake of completeness, data for the remaining Americas countries that did not qualify for inclusion can also be found in Figure 21. In these countries, high broadband adoption was essentially non-existent in Bolivia and Paraguay, while reaching only 0.7% in Ecuador.

Among the qualifying countries, the year-over-year changes in high broadband adoption levels were generally positive, and strongly so. Increases ranged from a very respectable 38% in Brazil to growth of 106% year-over-year in Mexico. Chile was the only qualifying country to see a lower high broadband adoption rate as compared to a year prior, dropping 12%. Particularly high rates of yearly change were seen in Bolivia, Ecuador, and especially Uruguay, but as these countries did not qualify for inclusion, and as their adoption rates are so low, these changes should be considered inconclusive.

Global Rank	Country/Region	Q1 '13 Peak Mbps	QoQ Change	YoY Change
11	United States	36.6	11%	27%
18	Canada	34.2	13%	35%
56	Chile	20.4	2.9%	3.7%
60	Ecuador	19.4	14%	59%
62	Brazil	18.9	14%	25%
67	Mexico	17.5	17%	29%
72	Colombia	16.0	6.7%	12%
76	Argentina	15.5	9.3%	8.1%
80	Uruguay	15.3	9.7%	76%
82	Peru	15.2	10%	32%
97	Costa Rica	12.8	12%	31%
106	Paraguay	11.1	14%	14%
119	Bolivia	9.1	8.2%	50%
122	Venezuela	8.2	8.8%	20%

Figure 20: Average Peak Connection Speed by Americas Country

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
8	United States	25%	14%	69%
15	Canada	19%	22%	77%
45	Chile	0.9%	17%	-12%
46	Mexico	0.8%	41%	106%
47	Brazil	0.7%	13%	38%
48	Argentina	0.6%	28%	51%
–	Ecuador	0.7%	36%	179%
–	Costa Rica	0.6%	40%	56%
–	Colombia	0.2%	-20%	-44%
–	Peru	0.1%	1.7%	1.7%
–	Venezuela	0.1%	-1.9%	56%
–	Uruguay	0.1%	33%	767%
–	Bolivia	0.0%	-13%	100%
–	Paraguay	0.0%	-50%	-46%

Figure 21: High Broadband (>10 Mbps) Connectivity by Americas Country

5.4 Americas Broadband Connectivity

The story for broadband adoption within the surveyed Americas countries in the first quarter of 2013 was somewhat better than high broadband adoption, with nine of the 14 surveyed countries qualifying for inclusion, as shown in Figure 22. Consistent with the other metrics reviewed in this section, the United States and Canada had broadband adoption levels far and away above those seen in the other countries. However, for broadband adoption, Canada's 77% adoption rate is 10% higher than the 70% adoption rate seen in the United States. Both countries had nearly identical quarterly increases as well, with Canada adding 3.9% and the United States growing 3.8%. Although the data is from October 2012, a report[32] published by the United States National Telecommunications & Information Administration (NTIA) noted that 72.4% of American households have high-speed Internet at home. While not in perfect agreement, this figure is relatively close to the broadband adoption rate observed by Akamai.

Among the other qualifying countries, broadband adoption levels ranged from 20% in Mexico to just 1.2% in Venezuela. The highest and lowest quarterly changes were also seen in those same countries, with changes ranging from 3.6% in Venezuela to 37% in Mexico. Broadband adoption rates and insight into quarterly/yearly changes for the five countries that did not qualify for inclusion appear within Figure 22 for the sake of completeness.

Yearly changes among the qualifying Americas countries were very mixed. Two countries, Chile and Argentina, saw broadband adoption rates decline year-over-year, losing 16% and 11% respectively. In contrast, Ecuador and Venezuela both saw extremely aggressive yearly growth, gaining 218% and 98% respectively. Mexico added 68% from the first quarter of 2012, and the remaining four countries all posted yearly increases below 25%.

Although Cuba is not among the surveyed countries in the Americas region, international Internet connectivity showed signs of improvement on the island nation during the first quarter. A blog post[33] from Internet monitoring firm Renesys described signs of change observed in Cuba's Internet connectivity, as seen through new routes and lower latencies, pointing to the operationalization of the ALBA-1 submarine cable. This observation was later confirmed in a statement[34] from the Cuban state telecommunications company (ETECSA).

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
8	Canada	77%	3.9%	13%
18	United States	70%	3.8%	16%
57	Mexico	20%	37%	68%
58	Chile	18%	23%	-16%
60	Brazil	14%	11%	18%
61	Ecuador	13%	13%	218%
62	Colombia	13%	11%	22%
65	Argentina	10%	13%	-11%
76	Venezuela	1.2%	3.6%	98%
–	Costa Rica	3.3%	10%	28%
–	Peru	1.9%	22%	99%
–	Uruguay	1.2%	61%	598%
–	Bolivia	0.5%	5.0%	153%
–	Paraguay	0.4%	32%	-47%

Figure 22: Broadband (>4 Mbps) Connectivity by Americas Country

DID YOU KNOW?

According to a study by watchdog organization Freedom House, Cubans can legally access the Internet only through government-approved institutions, such as points of access run by the state telecommunications company ETECSA, and users are generally required to present identification to use computers at these sites.

[Source: http://www.freedomhouse.org/report/freedom-net/2012/cuba]

SECTION 6:

Geography – Asia Pacific Region

The metrics presented here for the Asia Pacific region are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section.The subset used for this section includes connections identified as coming from networks in the Asia Pacific region, based on classification by Akamai's EdgeScape geolocation tool.

6.1 Asia Pacific Average Connection Speeds

In the first quarter of 2013, three Asia Pacific countries/regions saw average connection speeds above the "high broadband" threshold of 10 Mbps. Not only were they the top three Asia Pacific countries/regions, but they topped the global ranks as well. As shown in Figure 23, South Korea, Japan, and Hong Kong all saw modest quarterly increases, growing to 14.2 Mbps, 11.7 Mbps, and 10.9 Mbps respectively. Average connection speeds in the remaining Asia Pacific countries/regions ranged from 6.9 Mbps in Singapore down to 1.3 Mbps in India. Quarter-over-quarter changes across these countries/regions were generally positive, with only China and Vietnam seeing minor quarterly losses. Among those seeing quarterly increases, the gains were as high as 10% in Singapore and 20% in India.

Looking at year-over-year changes in the Asia Pacific region, we find that they were generally positive in the first quarter, and were fairly strong as well. Japan was the only country in the region to see a yearly increase below 10% (at 6.8%), while Indonesia saw the most significant growth, up 113% from a year prior. Four additional countries grew more than 30% year-over-year, and three more saw increases in the 20% range. Taiwan, New Zealand, and Hong Kong rounded out the group with year-over-year growth at or above 10%. South Korea and Vietnam were the only two Asia Pacific countries to see negative year-over-year changes, declining 10% and 9.1% respectively.

Global Rank	Country/Region	Q1 '13 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	14.2	1.5%	-10%
2	Japan	11.7	3.9%	6.8%
3	Hong Kong	10.9	9.0%	16%
21	Singapore	6.9	10%	31%
41	Australia	4.7	2.1%	31%
43	New Zealand	4.4	6.2%	14%
44	Thailand	4.4	2.4%	32%
47	Taiwan	4.3	4.8%	10%
70	Malaysia	2.7	9.2%	36%
98	China	1.7	-5.6%	20%
104	Indonesia	1.5	6.9%	113%
108	Vietnam	1.5	-3.1%	-9.1%
109	Philippines	1.4	3.7%	24%
114	India	1.3	20%	21%

Figure 23: Average Connection Speed by Asia Pacific Country/Region

DID YOU KNOW?

- According to the 2013 ICT Facts & Figures update from the International Telecommunications Union, 32% of people in the Asia Pacific region use the Internet, while an estimated 33% of households in the Asia Pacific region have Internet access.

[Source: http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013.pdf]

- In March, Telecom New Zealand launched its "next generation broadband" plans for services on the government-funded Ultra-Fast Broadband (UFB) fiber network. The UFB network offer two tiers of connection speeds: 30 Mbps down, 10 Mbps up and 100 Mbps down, 50 Mbps up.

[Source: http://www.zdnet.com/au/telecom-nz-announces-ultra-fast-broadband-plans-7000013162/]

6.2 Asia Pacific Average Peak Connection Speeds

As shown in Figure 24, Hong Kong remained far and away the top region with the highest average peak connection speed, topping both the Asia Pacific and global ranks at 63.6 Mbps, up 9.0% quarter-over-quarter. Japan was the only other Asia Pacific country that had an average peak connection speed at/above 50 Mbps, after a strong 13% quarterly increase. Both South Korea and Singapore posted average peak connection speeds above 40 Mbps, while Taiwan and Thailand both leverage quarterly gains in the 6% range to achieve average peak speeds above 30 Mbps. The remaining surveyed countries, with the exception of China, all had average peak connection speeds above 10 Mbps in the first quarter. Up 4.1% quarter-over-quarter, China had the lowest average peak connection speed among the surveyed Asia Pacific countries/regions, at 8.3 Mbps. Quarterly changes among the surveyed countries/regions ranged from a low of 1.5% in South Korea to 27% in India; Japan, Malaysia, and New Zealand also saw quarterly growth in excess of 10%.

Year-over-year changes across the surveyed Asia Pacific countries/regions were particularly strong in the first quarter of 2013. Indonesia posted the greatest gain, at 152%, while Japan, Taiwan, and New Zealand all had the lowest level of yearly growth, at a still impressive 26%. Three countries (Thailand, Australia, and Malaysia) all grew by more than 50% year-over-year, with Australia's gain more than erasing the unexpected yearly loss seen in the fourth quarter of 2012. China and Singapore both grew more than 40% year-over-year, while the Philippines, India, and Vietnam all added more than 30%. With the exception of South Korea, the remaining countries/regions all saw yearly increases in excess of 20%.

Global Rank	Country/Region	Q1 '13 Peak Mbps	QoQ Change	YoY Change
1	Hong Kong	63.6	9.0%	29%
2	Japan	50.0	13%	26%
4	South Korea	44.8	1.5%	-6.3%
6	Singapore	41.1	8.8%	43%
21	Taiwan	31.3	6.8%	26%
25	Thailand	30.1	6.3%	56%
37	Australia	26.3	9.3%	58%
46	Malaysia	23.6	11%	53%
57	New Zealand	20.2	10%	26%
88	Philippines	13.9	3.6%	39%
99	Indonesia	12.8	-0.4%	152%
105	Vietnam	11.6	7.3%	36%
109	India	10.6	27%	34%
121	China	8.3	4.1%	41%

Figure 24: Average Peak Connection Speed by Asia Pacific Country/Region

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
1	South Korea	50%	1.5%	-6.2%
2	Japan	43%	5.7%	17%
3	Hong Kong	34%	10%	20%
18	Singapore	16%	20%	101%
36	Australia	4.8%	0.8%	34%
37	Taiwan	4.5%	12%	53%
38	New Zealand	3.7%	28%	55%
41	Thailand	2.7%	-0.5%	196%
43	Malaysia	1.5%	24%	116%
49	India	0.3%	102%	85%
50	China	0.2%	-21%	62%
–	Philippines	0.2%	25%	36%
–	Indonesia	0.2%	-22%	94%
–	Vietnam	0.1%	18%	-20%

Figure 25: High Broadband (>10 Mbps) Connectivity by Asia Pacific Country/Region

6.3 Asia Pacific High Broadband Connectivity

In the first quarter of 2013, there was a very broad range of high broadband adoption rates across the Asia Pacific countries/regions that qualified for inclusion. South Korea saw half of its connections to Akamai at speeds above 10 Mbps, while China saw just one fifth of one percent of connections to Akamai at those speeds. As shown in Figure 25, Japan, Hong Kong, and Singapore joined South Korea as the only other Asia Pacific countries/regions with high broadband adoption levels above 10%. The remaining countries all had adoption rates below 5%, ranging from 4.8% in Australia down to China's 0.2%. Quarterly changes among the qualifying countries were somewhat mixed, with increases ranging from just 0.8% in Australia to a massive 102% in India. Thailand and China saw declines of 0.5% and 21%, respectively. The Philippines, Indonesia, and Vietnam did not qualify for inclusion in the global ranking, but data from these countries is included in Figure 25 for the sake of completeness. As shown, high broadband adoption in these countries is extremely low.

On a year-over-year basis, high broadband adoption rates in the qualifying countries/regions generally saw significant improvements. Singapore, Malaysia, and Thailand all more than doubled adoption rates as compared to the first quarter of 2012, increasing 101%, 116%, and 196% respectively. India, China, New Zealand, and Taiwan also saw strong growth, posting yearly increases of over 50%. Among the three countries that did not qualify for inclusion in the global rankings, Indonesia and the Philippines saw solid yearly growth, while Vietnam saw a year-over-year loss.

6.4 Asia Pacific Broadband Connectivity

As Figure 26 shows, all but one of the surveyed Asia Pacific countries/regions qualified for inclusion in the global rankings in the first quarter of 2013—the Philippines was the lone exclusion. Among the qualifying countries/regions, the spread of adoption rates was significantly greater than that seen for the high broadband adoption metric, ranging from 87% in South Korea all the way down to 1.9% in Vietnam. Adoption rates continued to be fairly strong in most countries/regions, though China, Indonesia, India, and Vietnam maintained adoption rates below 10%. Quarter-over-quarter changes were mostly positive, and fairly nominal, across the qualifying countries/regions. While Malaysia and India did show quarterly increases above 10% (growing 18% and 33% respectively), growth in the other countries/regions fell below that level. Australia, China, and Vietnam all posted quarterly declines in broadband adoption, losing 5.6%, 12%, and 1.3% respectively.

Year-over-year changes were a mixed bag as well, with a broad range of growth rates, as well as losses seen in two qualifying countries/regions. An unusually high year-over-year change of 414% was seen in Indonesia, while Thailand, Malaysia, and China all posted growth rates just over 100%. Yearly growth below 10% was seen in the top three ranked countries/regions, with South Korea growing 1.5%, Japan growing 9.9%, and Hong Kong growing 8.4%. Although China's broadband adoption rate doubled on year-over-year basis, the research chief of China's Ministry of Industry and Information Technology indicated that there is still a significant gap between China's broadband coverage and that of developed nations, and that the lag is increasing.[35] While the Chinese government has said that it aims to increase broadband coverage to 95% percent by 2015, challenges to driving significant ongoing improvements to adoption rates include the relatively high price of broadband, poor connections and customer service, as well as disparity in coverage between cities and rural areas, and a general lack of infrastructure.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
2	South Korea	87%	1.5%	1.5%
5	Japan	79%	3.8%	9.9%
6	Hong Kong	78%	3.3%	8.4%
25	Singapore	62%	9.4%	22%
38	Thailand	48%	6.2%	108%
42	New Zealand	42%	8.7%	22%
44	Australia	37%	-5.6%	38%
47	Taiwan	33%	2.1%	-8.7%
54	Malaysia	21%	18%	103%
71	China	5.3%	-12%	101%
72	Indonesia	3.7%	2.7%	414%
74	India	2.4%	33%	66%
75	Vietnam	1.9%	-1.3%	-48%
–	Philippines	1.8%	18%	46%

Figure 26: Broadband (>4 Mbps) Connectivity by Asia Pacific Country/Region

DID YOU KNOW?

Many Chinese Internet users live in residential communities with only one broadband provider, but under new regulations announced in January by China's Ministry of Industry and Information Technology (MIIT), residential communities with fiber-optic broadband cables must allow multiple telecommunications operators access to give residents a choice in all county-size and larger cities across the country.

[Source: http://www.techinasia.com/chinese-broadband-customers-finally-choose-providers/]

SECTION 7:
Geography – Europe/Middle East/Africa (EMEA)

The metrics presented here for the EMEA region are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in the EMEA region, based on classification by Akamai's EdgeScape geolocation tool.

7.1 EMEA Average Connection Speeds

After topping the list during 2012, Switzerland remained the EMEA country with the highest average connection speed in the first quarter of 2013. As shown in Figure 27, Switzerland's 10.1 Mbps "high broadband"-level average connection speed was the fastest in the region, though it was once again followed closely by the Netherlands, which grew 10% quarter-over-quarter to 9.9 Mbps, just below the high broadband threshold. The greatest concentration of average connection speeds was between 6-8 Mbps, with 14 of the surveyed countries falling within that range. Quarter-over-quarter changes among the EMEA countries were all positive in the first quarter, ranging from 3.3% in Romania to 14% in Austria. In addition to Austria, the Netherlands, Sweden, Denmark, Ireland, and Turkey also saw quarterly growth in excess of 10%. South Africa remained the EMEA country with the lowest average connection speed, falling to 1 Mbps behind Turkey, at 2.1 Mbps after a 3.5% quarterly increase. These two countries were also the only two within the EMEA region that had average connection speeds below the "broadband" threshold.

With the exception of twin 1.5% year-over-year declines seen in both Ireland and Portugal, yearly changes among surveyed EMEA countries were fairly positive in the first quarter. Israel had the highest rate of change, at 51%, while the United Kingdom also saw aggressive yearly growth, at 41%. Five additional countries improved 30% or more over the prior year, while another three grew 20% or more. The lowest rate of change was seen in Belgium, which increased just 3.6% from the first quarter of 2012. Although it had the lowest average connection speed, South Africa turned in a respectable yearly increase, at 16%.

Global Rank	Country/Region	Q1 '13 Avg. Mbps	QoQ Change	YoY Change
4	Switzerland	10.1	6.1%	24%
5	Netherlands	9.9	10%	12%
7	Czech Republic	9.6	9.1%	34%
8	Sweden	8.9	10.8%	32%
10	Denmark	8.2	13%	17%
11	Austria	7.9	14%	14%
12	United Kingdom	7.9	7.3%	41%
14	Finland	7.7	5.5%	13%
15	Romania	7.5	3.3%	13%
16	Norway	7.4	6.5%	30%
17	Belgium	7.4	7.1%	3.6%
18	Ireland	7.3	12%	-1.5%
19	Israel	7.0	6.4%	51%
20	Germany	6.9	8.4%	20%
24	Hungary	6.6	5.9%	12%
25	Slovakia	6.4	6.6%	12%
27	Poland	6.2	8.6%	25%
28	United Arab Emirates	6.2	8.8%	32%
29	Russia	6.0	8.4%	32%
35	Portugal	5.3	3.5%	-1.5%
36	Spain	5.2	4.3%	14%
38	France	5.2	5.6%	5.2%
45	Italy	4.4	4.4%	5.4%
61	Turkey	3.1	12%	9.6%
80	South Africa	2.1	3.5%	16%

Figure 27: Average Connection Speed by EMEA Country

7.2 EMEA Average Peak Connection Speeds

Romania's 47.9 Mbps average peak connection speed once again placed it solidly ahead of Switzerland, which was the next fastest EMEA country in the first quarter of 2013, with an average peak connection speed of 40.3 Mbps. As is shown in Figure 28, Romania and Switzerland were the only two surveyed countries in the EMEA region to have average peak connection speeds above 40 Mbps in the first quarter. More than half of the countries (13) saw average peak connection speeds above 30 Mbps, while all but one of the remaining EMEA countries were above 20 Mbps in the first quarter. The lone standout was South Africa, which maintained its position as the only one of the surveyed countries below 10 Mbps, with an average peak connection speed that increased 12% quarter-over-quarter to 7.6 Mbps. In addition to South Africa, 17 other countries saw quarterly growth of 10% or more, with Turkey's 21% the highest in the region. The lowest rate of growth was found in Portugal, which added 6.5% from the fourth quarter of 2012.

Looking at year-over-year changes, growth was particularly strong across all of the surveyed EMEA countries. Impressively, the lowest level of yearly growth was 20%, seen in Slovakia. Nine additional surveyed countries saw yearly increases in the 20% range, seven more in the 30% range, five in the 40% range, while the United Kingdom and Israel saw the largest rates of year-over-year growth, at 53% and 52% respectively.

This aggressive growth may continue into the future as well, if proposals made by the European Commission in March are successfully implemented. In a speech[36] made by European Commission Vice President Neelie Kroes, four EU-wide actions were proposed with the aim of "Getting every home and town in Europe 'broadband ready'":

1. Ensuring that telecommunications companies know what physical infrastructure is already in place, and opening up access to it with fair and reasonable prices and conditions
2. Increasing coordination for "new works," with the goal of making it easier for operators and providers to work together
3. Cutting the complexity and cost associated with the red tape associated with getting permits for broadband and mobile buildout
4. Ensuring "broadband-ready buildings," with all new buildings and major renovations equipped for high-speed broadband

7.3 EMEA High Broadband Connectivity

Similar to the average connection speed metric, Switzerland just barely beat out the Netherlands to take the top spot for the highest level of high broadband adoption among surveyed EMEA countries in the first quarter of 2013. Figure 29 shows that 30% of connections to Akamai from Switzerland in the first quarter were at speeds above 10 Mbps, while the Netherlands was just 1% behind. At least a fifth of connections to Akamai from six additional countries were at 10 Mbps or above, while 10 more countries had high broadband adoption rates above 10%. Turkey was once again the EMEA country with the lowest level of high broadband adoption, but interestingly, was also the one with the largest quarterly increase, growing 68% quarter-over-quarter to 1.0%. In contrast, the smallest quarterly increases were seen in neighboring Spain and Portugal, which grew 4.1% and 4.6% respectively. Among the other surveyed countries in the EMEA region, quarter-over-quarter changes were generally fairly strong, with five countries (not including South Africa) growing more than 20%, and another dozen seeing quarterly increases of 10% or above.

Global Rank	Country/Region	Q1 '13 Peak Mbps	QoQ Change	YoY Change
3	Romania	47.9	8.9%	23%
7	Switzerland	40.3	12%	41%
9	Netherlands	38.2	15%	30%
10	Belgium	38.0	14%	30%
12	United Kingdom	36.3	12%	53%
13	Hungary	35.9	12%	28%
14	Israel	35.9	10%	52%
15	Czech Republic	35.5	11%	45%
16	Sweden	34.9	19%	38%
17	Portugal	34.5	6.5%	22%
19	Poland	32.2	17%	46%
20	Spain	31.3	14%	31%
22	Ireland	30.9	15%	22%
23	Germany	30.8	12%	31%
24	Austria	30.6	16%	29%
27	Denmark	29.5	15%	32%
29	Russia	29.3	18%	43%
30	Finland	29.2	9.5%	24%
31	Slovakia	29.1	9.5%	20%
32	Norway	28.7	14%	43%
42	Turkey	25.0	21%	35%
47	France	23.5	9.9%	23%
50	Italy	21.8	9.7%	24%
126	South Africa	7.6	12%	25%

Figure 28: Average Peak Connection Speed by EMEA Country

Year-over-year increases above 100% were surprisingly frequent in the first quarter, with the United Kingdom posting a 208% yearly gain, while the United Arab Emirates grew 129%, Turkey 130%, South Africa 126%, and Israel 117%. Strong yearly growth was also seen in Switzerland, Sweden, the Czech Republic, Norway, Germany, Poland, and Russia, which all added 50% or more year-over-year. Belgium saw the smallest year-over-year change among surveyed EMEA countries, up just 2.1%, and Portugal was the only EMEA country to see a yearly decline in its high broadband adoption rate, losing 11%.

The United Kingdom's impressive yearly gain can be seen as an indicator of strong improvements in the state of Internet connectivity within the country. In some communities, residents are getting access to gigabit-speed connections. One example is in Oxfordshire, where a privately funded company known as Gigaclear announced[37] in February that it would start providing 1 Gbps connections to local businesses and residents. Another is Arkholme, a village in rural Lancashire, where local

residents implemented a DIY effort, digging their own trenches and laying their own fiber, bring 1 Gbps FTTH connectivity to over 150 homes by February 2013.[38]

7.4 EMEA Broadband Connectivity

Broadband adoption across surveyed EMEA countries remained extremely strong in the first quarter of 2013, as evidenced by Figure 30. Switzerland led both the EMEA region and the global rankings by having the highest broadband adoption rate, with 88% of the connections to Akamai from the country at speeds above 4 Mbps. The Netherlands and the Czech Republic joined Switzerland in having broadband adoption rates above 80%, coming in at 84% and 81% respectively. Impressively, another eight of the surveyed EMEA countries saw broadband adoption rates grow to, or remain at, more than 70%. With the exception of Italy, Turkey, and South Africa, the remaining countries also had more than half of their connections to Akamai at speeds above 4 Mbps. South Africa was the only surveyed EMEA country with a broadband adoption rate below 10% in the first quarter, at 8.0% adoption after an 8.5% quarterly increase. However, South Africa's quarterly increase was more-or-less middle of the pack, with Turkey's 46% growth the highest, and the Netherlands' 1.2% the lowest, with 14 other countries (more than half of those surveyed) also seeing quarter-over-quarter changes below 10%.

Similar to the high broadband metric, Portugal was the only surveyed EMEA country to see a year-over-year decline in broadband adoption, though it was very slight, at just 0.4%. Within the EMEA region, Israel had the largest year-over-year change, adding 82% from the same period a year prior. An additional five countries grew 30% or more, while 14 more were up 10% or more and just four countries saw yearly increases below 10%. While clearly not a driver of the extremely high year-over-year growth seen in Israel in the first quarter, the country's planned national high-speed broadband network could help drive similar long-term growth in the future. In January, Israel's state-owned electric company announced plans, with government backing, to roll out FTTH-based gigabit connectivity; it aims to have 10% of the country wired by next year, and two-thirds of the country covered within seven years.[39]

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
5	Switzerland	30%	11%	58%
6	Netherlands	29%	25%	21%
7	Sweden	25%	18%	61%
9	Czech Republic	23%	10%	96%
10	Finland	21%	12%	30%
11	United Kingdom	20%	16%	208%
12	Norway	20%	6.7%	66%
13	Denmark	20%	21%	21%
14	Belgium	19%	19%	2.1%
16	Romania	19%	5.7%	39%
19	Austria	15%	19%	9.8%
22	United Arab Emirates	13%	39%	129%
23	Germany	13%	19%	53%
24	Poland	13%	18%	80%
25	Israel	12%	5.9%	117%
26	Russia	12%	23%	84%
27	Hungary	12%	14%	18%
28	Ireland	12%	27%	13%
31	Slovakia	9.6%	11%	7.9%
33	Portugal	6.0%	4.6%	-11%
34	Spain	5.8%	4.1%	37%
35	France	5.2%	5.8%	16%
39	Italy	3.2%	7.8%	24%
42	South Africa	1.5%	10%	126%
44	Turkey	1.0%	68%	130%

Figure 29: High Broadband (>10 Mbps) Connectivity by EMEA Country

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
1	Switzerland	88%	2.5%	14%
3	Netherlands	84%	1.2%	1.2%
4	Czech Republic	81%	8.7%	19%
7	Austria	78%	16%	28%
9	Denmark	77%	11%	14%
10	Belgium	76%	4.5%	5.1%
11	Hungary	75%	7.5%	23%
13	Romania	73%	4.4%	15%
14	Israel	73%	9.0%	82%
15	United Kingdom	73%	4.5%	25%
16	Germany	72%	8.6%	26%
20	Finland	66%	4.7%	11%
22	Russia	63%	11%	47%
23	Sweden	63%	15%	20%
24	United Arab Emirates	62%	5.5%	41%
27	Portugal	61%	7.0%	-0.4%
28	Poland	58%	11%	33%
30	Ireland	56%	8.7%	8.1%
32	Spain	55%	10%	23%
33	France	53%	11%	7.8%
35	Slovakia	52%	4.4%	30%
37	Norway	51%	4.9%	13%
45	Italy	35%	12%	10%
59	Turkey	16%	46%	35%
69	South Africa	8.0%	8.5%	16%

Figure 30: Broadband (>4 Mbps) Connectivity by EMEA Country

SECTION 8:
Mobile Connectivity

The source data in this section encompasses usage not only from smartphones, but also laptops, tablets, and other devices that connect to the Internet through these mobile networks. In addition, this edition of the *State of the Internet Report* once again includes insight into mobile traffic growth and data traffic patterns contributed by Ericsson, a leading provider of telecommunications equipment and related services to mobile and fixed network operators globally.

As has been noted in prior quarters, the source data set for this section is subject to the following constraints:

- A minimum of 1,000 unique IP addresses connecting to Akamai from the network in the first quarter of 2013 was required for inclusion in the list.
- In countries where Akamai had data for multiple network providers, only the top three are listed, based on unique IP address count.
- The names of specific mobile network providers have been made anonymous, and providers are identified by a unique ID.
- Data is included only for networks where Akamai believes that the entire Autonomous System (AS) is mobile—that is, if a network provider mixes traffic from fixed/wireline (DSL, cable, etc.) connections with traffic from mobile connections on a single network identifier, that AS was not included in the source data set.
- Akamai's EdgeScape database was used for the geographic assignments.

8.1 Connection Speeds on Mobile Networks

In the first quarter of 2013, Russian mobile provider RU-1 returned to its position as the provider with the highest average connection speed, at 8.6 Mbps, thanks to a 7.3% quarterly increase. It bested second-place provider AT-2 by 1 Mbps, which lost 5.9% quarter-over-quarter to 7.6 Mbps, after the two had swapped places in the fourth quarter of 2012. In reviewing the full list of mobile providers shown in Figure 31, we find that there are ten providers (CZ-3, GR-1, UA-1, DE-2, RU-4, AT-1, NO-1, CA-2, US-2, and ES-1) that had average connection speeds in the "broadband" (>4 Mbps) range. Similar to last quarter, an additional 63 providers had average connection speeds greater than 1 Mbps, including provider SV-3 in El Salvador, which was just 6 kbps over the threshold, boosted by a 20% quarterly increase. This increase was among the top 20 largest seen, with quarterly growth of 47% (RU-4, to 4.8 Mbps) and 41% (BO-2, to 0.9 Mbps) topping the list. The smallest quarterly increase was seen at provider TW-1, which added 0.6% to 1.7 Mbps. Quarterly declines were seen at 24 providers, ranging from less than 0.1% at US-3 to 17% at UY-1. Nigeria's NG-1 remained the mobile provider with the lowest average connection speed, at 0.4 Mbps (up 49 kbps from the fourth quarter of 2012). Including NG-1, a total of nine providers had average connection speeds below 1 Mbps in the first quarter.

Examining the average peak connection speed data for the first quarter of 2013, we find that Hong Kong provider HK-1 vaulted to the top of the list at 45.6 Mbps, thanks to a 50% increase from the prior quarter. Last quarter's leader ES-1 dropped further down the list due to an unusually high 36% quarterly decline to 28.0 Mbps. RU-1, which led the average connection speed rankings, placed second for this metric, with a 43.7 Mbps average peak connection speed and an 8.0% quarter-over-quarter change. These two were the only providers with average peak connection speeds over 40 Mbps, and only three more (DE-2, SK-2, AT-2) had speeds over 30 Mbps. However, an additional 13 providers posted average peak connection speeds over 20 Mbps, while another 39 were above 10 Mbps. The lowest average peak connection speed in the first quarter, 2.8 Mbps, was seen in South Africa, on provider ZA-1, up 2.8% quarter-over-quarter. This increase was one of the smallest seen in the first quarter, with changes ranging from 1.4% at provider IE-3 to SA-1's jump of 123%, and TW-2's 130% leap. Thirteen mobile providers saw average peak connection speeds decline as compared to the prior quarter, with losses ranging from 0.7% at provider DE-1 to the previously mentioned 36% decline at Spanish mobile provider ES-1.

Year-over-year trends for the average connection speed metric were, by and large, fairly encouraging in the first quarter. Mobile provider US-2 improved by nearly 300% from the first quarter of 2012, while Slovakian provider SK-1 was up nearly 200%. An additional 11 providers saw average connection speeds grow by 50% or more year-over-year, while another 23 were up 20% or more over the same period. Twenty-one providers did see average connection speeds decline on a yearly basis, with losses rang-

Country	ID	Q1 '13 Avg. Mbps	Q1 '13 Peak Mbps
AFRICA			
Egypt	EG-1	0.8	6.1
Morocco	MA-1	1.5	15.8
Nigeria	NG-1	0.4	5.3
South Africa	ZA-1	0.5	2.8
ASIA			
China	CN-1	2.2	6.5
Hong Kong	HK-2	2.9	17.1
Hong Kong	HK-1	2.9	45.6
Indonesia	ID-1	0.8	11.9
Kuwait	KW-1	1.4	12.2
Malaysia	MY-3	1.6	10.6
Malaysia	MY-2	2.4	22.3
Malaysia	MY-1	0.7	6.3
Pakistan	PK-1	1.5	10.3
Qatar	QA-1	1.4	12.3
Saudi Arabia	SA-1	1.5	12.6
Singapore	SG-3	2.2	12.0
Sri Lanka	LK-1	1.4	13.7
Taiwan	TW-1	1.7	12.4
Taiwan	TW-2	1.5	12.8
Thailand	TH-1	1.1	26.9
EUROPE			
Austria	AT-1	4.8	22.3
Austria	AT-2	7.6	32.4
Belgium	BE-3	1.7	11.6
Belgium	BE-2	2.1	6.8
Czech Republic	CZ-3	6.4	20.4
Czech Republic	CZ-1	1.5	6.3
Czech Republic	CZ-2	1.3	8.6
Estonia	EE-1	1.6	8.6
France	FR-2	2.8	11.1
Germany	DE-1	1.3	6.2
Germany	DE-2	5.7	32.8
Greece	GR-1	6.1	21.7
Hungary	HU-2	2.3	12.1
Hungary	HU-1	1.7	11.6
Ireland	IE-1	3.3	18.5
Ireland	IE-2	2.0	20.2
Ireland	IE-3	2.5	19.2
Israel	IL-1	1.7	9.1
Italy	IT-2	3.1	19.3
Italy	IT-3	3.7	19.6
Italy	IT-4	2.2	17.4
Lithuania	LT-2	2.5	21.5
Moldova	MD-1	2.8	12.8
Netherlands	NL-2	1.9	6.7
Netherlands	NL-1	2.3	6.1
Norway	NO-1	4.6	29.2
Poland	PL-1	3.1	19.0
Poland	PL-2	2.1	13.6
Poland	PL-3	2.0	14.9
Romania	RO-1	1.1	7.4
Russia	RU-1	8.6	43.7
Russia	RU-4	4.8	26.0
Russia	RU-3	1.0	8.1
Slovakia	SK-1	1.7	9.1
Slovakia	SK-2	3.1	32.7
Slovenia	SI-1	2.4	9.8
Spain	ES-1	4.1	28.0
Turkey	TR-1	2.0	13.6
Ukraine	UA-1	6.0	21.6
United Kingdom	UK-3	3.0	17.3
United Kingdom	UK-2	3.5	17.5
United Kingdom	UK-1	2.7	23.2
NORTH AMERICA			
Canada	CA-2	4.3	12.9
El Salvador	SV-2	1.8	13.3
El Salvador	SV-1	1.9	14.1
El Salvador	SV-3	1.0	6.1
Guatemala	GT-2	2.6	14.1
United States	US-2	4.3	15.6
United States	US-1	2.6	8.9
United States	US-3	1.4	4.8
OCEANIA			
Australia	AU-3	2.4	15.9
New Caledonia	NC-1	0.7	5.7
New Zealand	NZ-2	2.0	13.4
SOUTH AMERICA			
Argentina	AR-1	0.9	5.1
Argentina	AR-2	2.3	24.4
Bolivia	BO-1	0.9	5.5
Brazil	BR-1	0.9	8.8
Brazil	BR-2	1.3	11.6
Chile	CL-3	2.0	19.5
Chile	CL-4	1.5	15.9
Colombia	CO-1	1.4	9.5
Paraguay	PY-2	1.3	9.0
Uruguay	UY-1	1.5	12.4
Venezuela	VE-1	1.1	8.5

Figure 31: Average and Average Peak Connection Speeds by Mobile Provider

ing from 1.2% at provider UK-1 to nearly 18% at Czech provider CZ-1. The long-term story is even better, as expected, when we look at the average peak connection speed metrics. Four mobile providers (QA-1, US-2, NO-1, TH-1) grew by more than 200% year-over-year, while four more (SA-1, BE-3, SK-1, SK-2) added over 100%. Another 17 providers saw average peak connection speeds increase by 50% or more, while 31 more grew by 20% or more over the past year. Just seven mobile providers saw average peak connection speeds decline on a yearly basis, losing anywhere from 2.7% (HU-2) to nearly 49% (MY-2).

8.2 Mobile Browser Usage Data

In June 2012, Akamai launched the "Akamai IO" destination site *(http://www.akamai.com/io)*, with an initial data set that highlights browser usage across PC and mobile devices, connecting via fixed and mobile networks. Note that the data set used for the figures in this section has historically come from sampling traffic across several hundred top-tier sites delivering content through Akamai, most of which are focused on a U.S. audience, biasing the data presented in favor of U.S. users. Planned back-end data collection and processing improvements should expand the sample set, which will allow us to provide more global and geo-specific views of the data, as well as more granular insight into browser versions. An initial release of this updated data source occurred in mid-February 2013, which drove some significant changes in adoption levels, as shown below. Future updates will allow us to provide insight into browser version trends as well as geo-specific trends in upcoming issues of the *State of the Internet Report*.

Figure 32 illustrates browser usage by users identified to be on cellular networks in the first quarter of 2013.[40] As noted below, an update to the data source was made in mid-February, and is evident by large shifts in the lines plotted in the figure. This update also drove the decision to focus on just Android Webkit, Apple Mobile Safari, and "Others" for the first quarter overview. As is shown in the graph, for the first half of the quarter, both of the named browsers were relatively close in usage, similar to what has been observed in prior quarters. Android Webkit trended to an average of just over 41% of requests, while Apple Mobile Safari saw nearly 38% of requests.[41] However, the gap between the two browsers widened considerably in the second half of the quarter, with Android Webkit responsible for nearly 44% of requests, and Apple Mobile Safari dropping to just over 30%.[42] It is not clear what caused the unusually large drops observed on March 25.

The impact of the updated data source is significantly different when we examine mobile browser usage across all networks[43] (not just those identified as "cellular") for the first quarter of 2013. As Figure 33 illustrates, the updated data did not cause much variation in the percentage of requests from Apple Mobile Safari—it came at just under 60%[44] for the first half of the quarter, and just over 60%[45] for the second half of the quarter. However, Android usage rises significantly coincident with the data update, averaging just over 20%[46] for the first half of the quarter, and just under 33% for the second half. Interestingly, the "Others" category appears to see a decline that mirrors the increase seen for Android Webkit—this could possibly indicate that use of a newer version of Akamai's device characterization engine with the updated data set caused it to start classifying a particular user agent as Android Webkit, where it had previously been counted as part of the Others category.

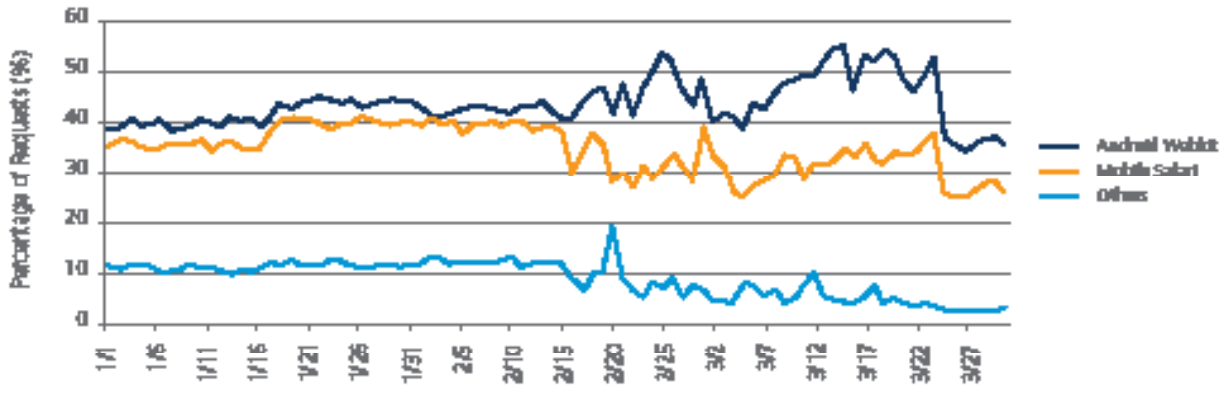

Figure 32: Mobile Browsers Seen Across Cellular Networks, Q1 2013

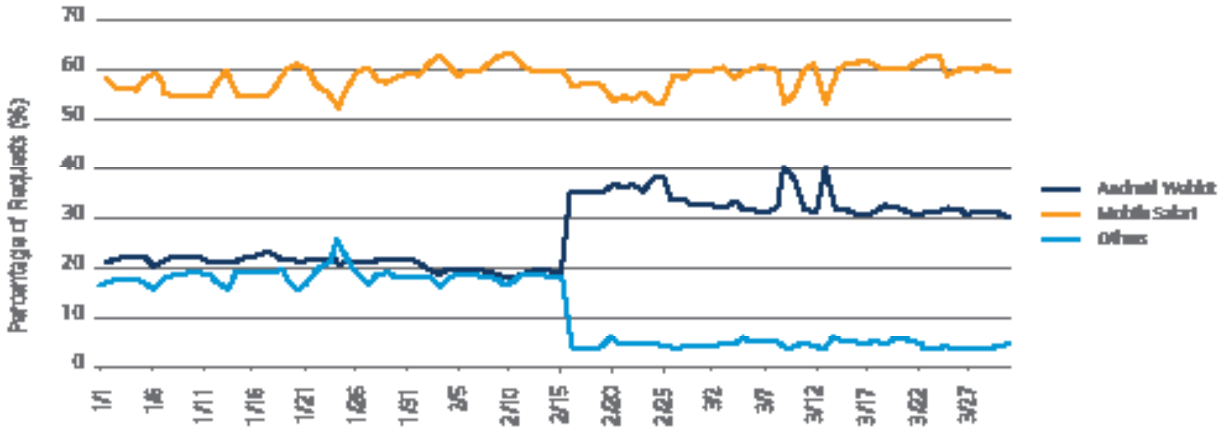

Figure 33: Mobile Browsers Seen Across All Networks, Q1 2013

8.3 Mobile Traffic Growth as Observed by Ericsson

In mobile networks, the access medium (spectrum) is being shared by different users in the same cell. It is important to understand traffic volumes and usage patterns in order to enable a good customer experience. Ericsson's presence in more than 180 countries and its customer base representing more than 1,000 networks enables it to measure mobile voice and data volumes. The result is a representative base for calculating world total mobile traffic in 2G, 3G, and 4G networks (not including DVB-H, WiFi, and Mobile WiMax).

These measurements have been performed for several years. It is important to note that the measurements of data and voice traffic in these networks (2G, 3G, 4G/LTE) around the world show large differences in traffic levels between markets and regions, and also between operators due to their different customer profiles.

As illustrated in Figure 34, the volume of mobile data traffic doubled from the first quarter of 2012 to the first quarter of 2013, and grew 19% between the fourth quarter of 2012 and first quarter of 2013. Note that mobile voice traffic continues to grow as well, though at a slower rate, increasing just 4% from the first quarter of 2012 to the first quarter of 2013.

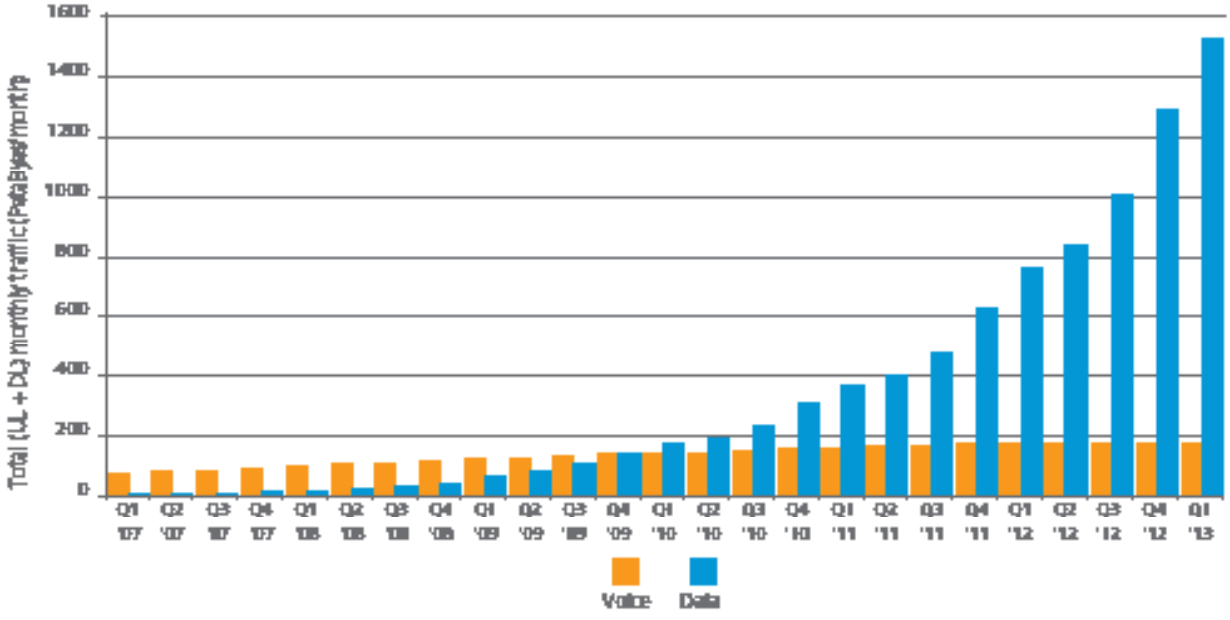

Figure 34: Total Monthly Mobile Voice and Data as Measured by Ericsson

9.1 Hugo Chavez Dies

Venezuelan president Hugo Chavez served as the President of Venezuela from 1999 through his death on March 13, 2013. A prominent and controversial leader, Chavez had been seriously ill with cancer for more than a year prior to his passing.[48] News of his death spread quickly, with Venezuelan citizens turning to online news sources for more information. As shown in Figure 35, Akamai HTTP traffic (in hits/second) from customers classified in the "Media & Entertainment" category, delivered to users in Venezuela, began to climb aggressively about an hour after Chavez died, peaking nearly two-thirds higher than traffic levels seen just before his death. Note that while not shown in the figure, the Mbps traffic levels spike in a similar fashion as well.

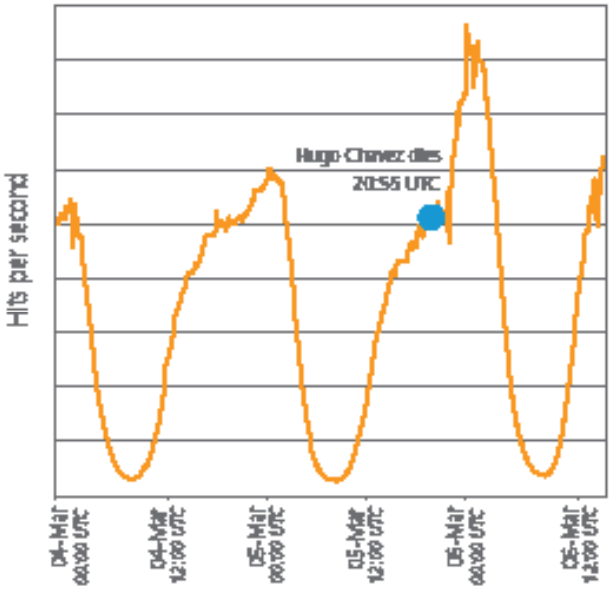

Figure 35: Spike in Akamai "Media & Entertainment" Traffic to Venezuela on March 6, 2013

9.2 New Pope Chosen

On February 11, Pope Benedict XVI announced[49] that he would be resigning effective February 28, citing his advanced age and lower energy levels as key factors in his decision. Upon his announcement, published reports[50] indicated that the conclave to choose the next Pope was expected to convene in mid-March, with the intent of selecting a new Pope in time to preside over Easter Mass. The conclave began on March 12, and was a significant media event, both for traditional mainstream broadcast media, as well as online outlets, with observers watching closely for signs of white smoke, signaling the selection of a new Pope. On March 13, white smoke appeared at 7:06 PM local time (2:06 PM Eastern Time).[51] Within minutes, live streaming traffic on the Akamai Intelligent Platform began to climb, as shown in Figure 36. Anticipation, and traffic, grew for the next hour, until the selection of Jorge Mario Bergoglio as the newly elected Pope Francis was announced at 8:15 PM local time (3:15 PM Eastern time). Live streaming traffic continued to grow for a few more minutes after the announcement, reaching a peak of 2197 Gbps (just under 2.2 Tbps) at 8:25 PM local time (3:25 PM Eastern time).

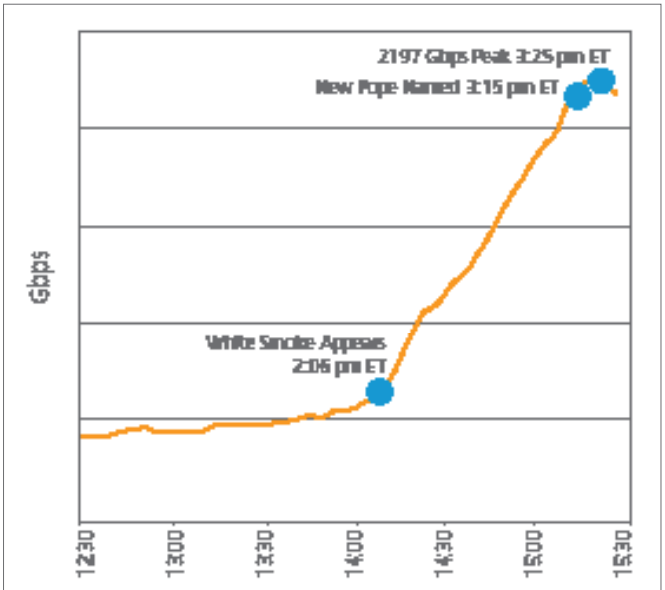

Figure 36: Akamai Live Streaming Traffic on March 13, 2013

9.3 Syria

After seeing a number of Internet disruptions during 2012, connectivity in the country saw problems right as 2013 began as well. Monitoring of HTTP traffic delivered from the Akamai Intelligent platform to users in Syria showed three brief outages that occurred on January 1, between 16:00-18:00 UTC, as seen in Figure 37. This observation is corroborated by outages seen by Internet monitoring firm Renesys, which noted[52] that it saw brief outages occur at 16:46 UTC, 17:15 UTC, and 17:39 UTC, with all of the impacted networks reaching the Internet through the Syrian Telecommunications Establishment.

Less than a week later, Syria's Internet connectivity saw another disruption. As shown in Figure 38, Akamai HTTP traffic to Syria dropped off just before 9:00 UTC on January 6, and remained out for approximately three-and-a-half hours. A published report notes[53] that this outage occurred at the

same time that Syrian President Bashar al-Assad gave his first televised speech since June 2012. In the days after connectivity returned, however, traffic patterns showed lower daily peaks than were seen before the disruption, indicating either a partial restoration of connectivity, or possibly the implementation of content filters, blocking access to certain customer content that is delivered by Akamai.

Finally, on January 20, another short disruption, lasting approximately half an hour, was observed. As seen in Figure 39, Akamai HTTP traffic to Syria dropped to zero just after 21:00 UTC, returning a short time later. It is also interesting to note that traffic levels showed a decline in the two hours ahead of the disruption, and remained below their normal range for approximately eight hours after the disruption as well.

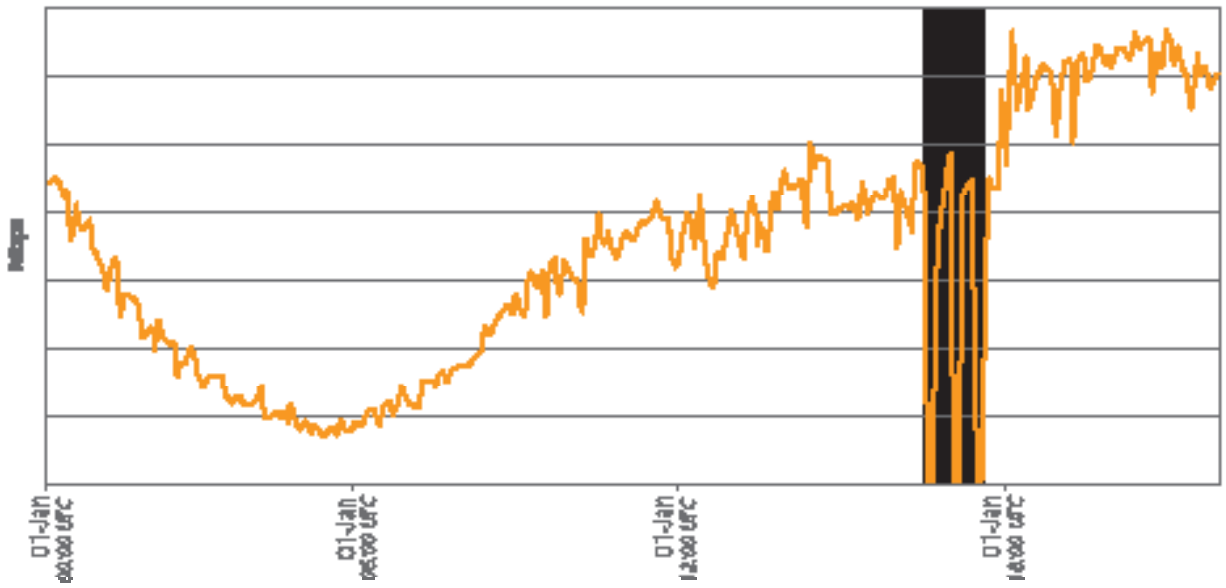

Figure 37: HTTP Traffic Served to Syria, January 1, 2013

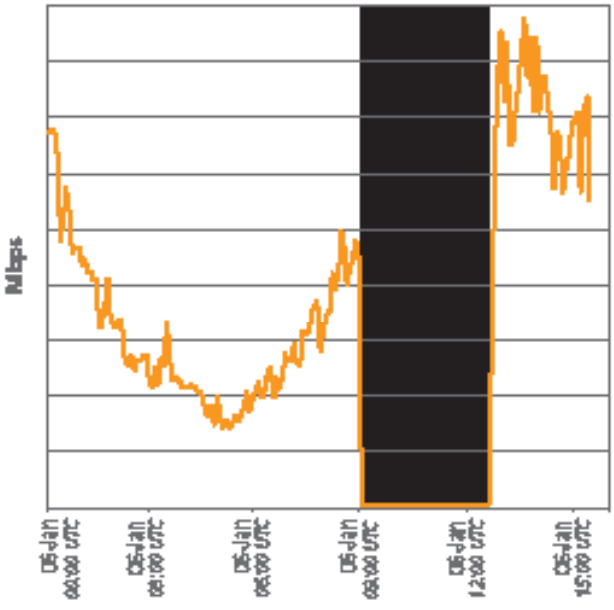

Figure 38: HTTP Traffic to Syria, January 6, 2013

DID YOU KNOW?

Internet monitoring firm Renesys classifies countries with only one or two Internet providers at their "international frontier" as being at severe risk of Internet disconnection. Syria is one of the countries at severe risk, as are 60 other countries including Tunisia, Turkmenistan, Libya, Ethiopia, Uzbekistan, Myanmar, and Yemen.

[Source: http://www.renesys.com/2012/11/could-it-happen-in-your-countr/]

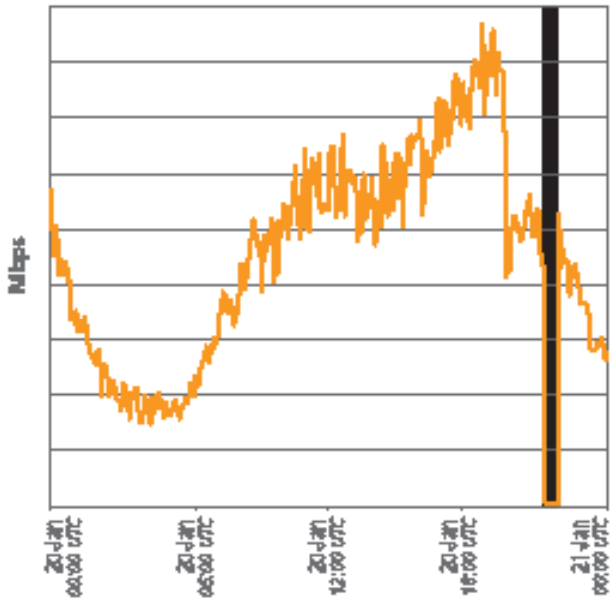

Figure 39: HTTP Traffic Served to Syria, January 20, 2013

9.4 SEACOM

On March 22, it was reported[54] that undersea cable provider SEACOM had experienced a number of cable cuts off the northern coast of Africa, which affected Internet connectivity to countries in Africa, the Middle East, and Asia. A subsequent statement[55] issued by the CEO of SEACOM noted "I know that many of you are keen to know the cause of the outage is a physical cable cut some kilometers north of the coast of Egypt in the Mediterranean Sea," and posited that "We suspect, based on our experience with sub-sea systems and the nature of the sea area where the cut has occurred, that the most likely cause is external aggression to the cable most probably caused by a larger vessel dragging its anchor across the sea bed." Repairs to the cable were reported[56] to have been completed during the first few days of April.

The cuts appear to have occurred just after 6:00 UTC, and Figure 40 illustrates the impact of the cuts on HTTP traffic levels from the Akamai Intelligent Platform to users in Ethiopia, Mozambique, and Tanzania—three countries that leverage the cable for international Internet connectivity.[57] As shown in the graphs, ahead of the cuts, traffic patterns in all three countries appeared to be following a daily cycle similar to the ones seen in prior days. However, when the cuts occurred, Akamai traffic to all three countries dropped sharply, though it did not disappear completely. Traffic levels remained much lower than expected in the hours following the event, at about two-thirds of expected levels in Ethiopia and Mozambique, but just one-third in Tanzania.

9.5 SEA-ME-WE 4 Cable Cut

On March 27, it was reported[58] that the South East Asia-Middle East-Western Europe 4 (SEA-ME-WE 4) cable was cut, which impacted Internet connectivity in a number of countries that connect to the cable. Published news reports[59] indicated that Egypt's Coast Guard apprehended three divers suspected of cutting an undersea Internet cable. The cable was also damaged in April 2010 and December 2008, both times also disrupting international Internet connectivity for countries that rely on the cable.

Figure 41 shows daily traffic patterns for Egypt, India, and Pakistan for several days ahead of the cable cut, as well about a day and a half afterwards. As can be clearly seen in the traffic graphs for all three countries, a disruption occurs at just after 6:00 UTC—published reports place the time of the failure at 6:20 UTC. It is interesting to observe the changes in traffic patterns to these countries after the cut occurred. Of the three countries, India appeared to be impacted the least, though traffic levels did remain lower that day than in previous days. In Egypt, traffic appeared to drop to near-zero levels for a few hours after the cut. For the remainder of the day, traffic levels peaked at approximately half the volume seen in previous days. Pakistan also saw several significant drops in traffic around the time of the cut, while peak traffic levels in the days following the event were only about three-quarters as high as in previous days. Given disruptions to this, and other, undersea cables in the past, it would appear that Internet providers within these countries are pursuing a strategy that includes geographic diversity of the use of such cables, so that the failure of a single path is not catastrophic.

Internet Events & Disruptions (Continued)

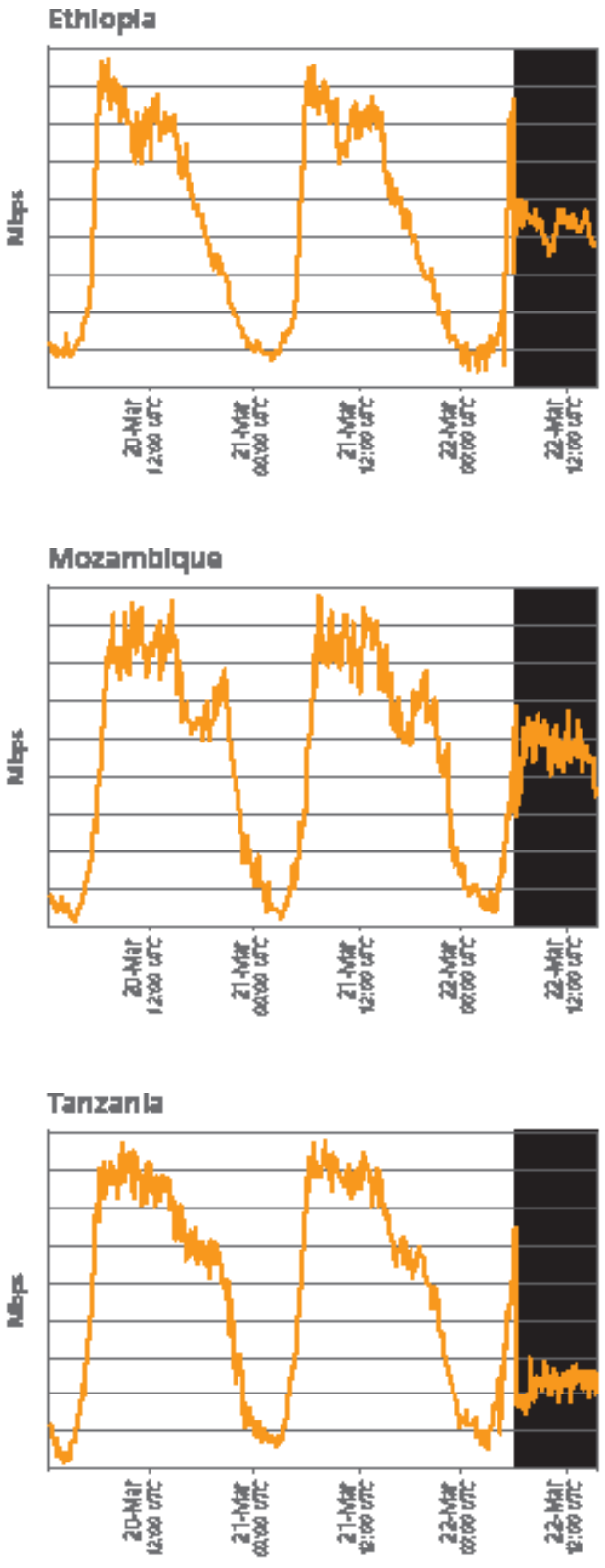

Figure 40: Impact of SEACOM Submarine Cable Outage beginning around 06:00 GMT March 22, 2013

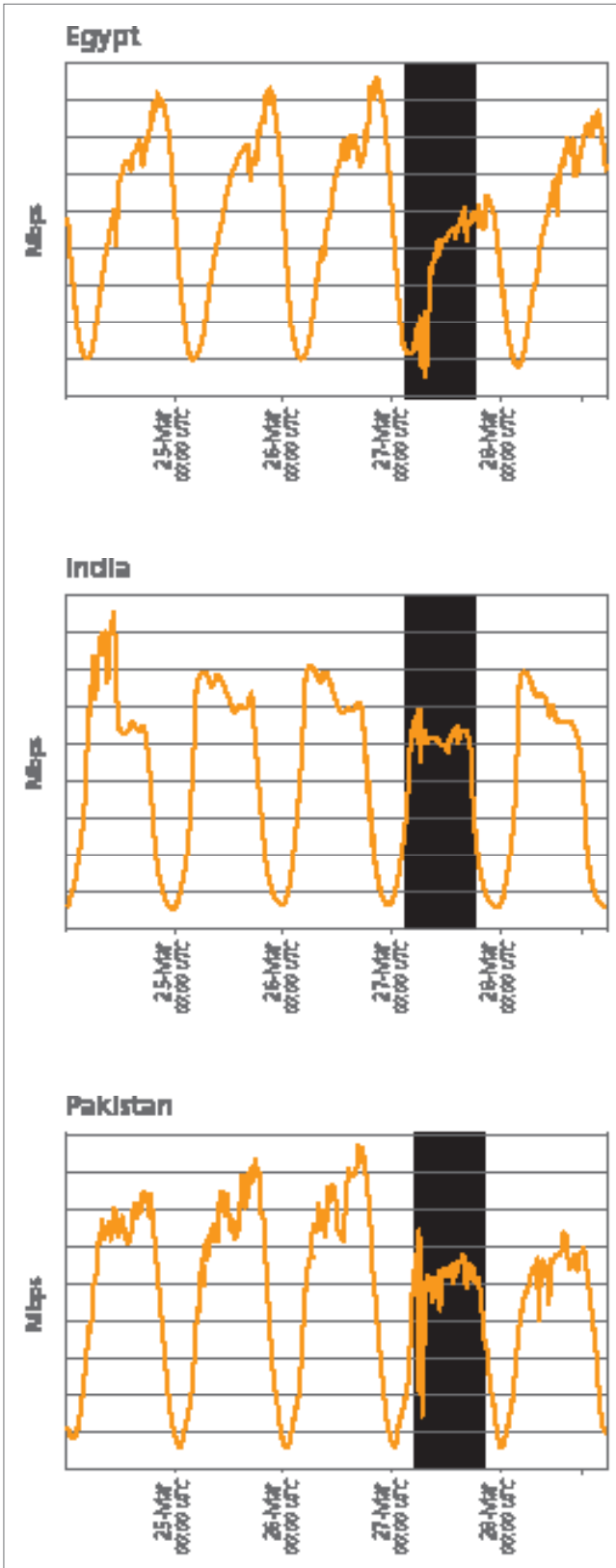

Figure 41: Impact of SEA-ME-WE4 Cable Cut. Outage begins around 06:20 GMT March 27, 2013

SECTION 10:
Appendix

Region	% Attack Traffic	Unique IP Addresses	Avg. Connection Speed (Mbps)	Peak Connection Speed (Mbps)	% Above 10 Mbps*	% Above 4 Mbps*
Europe						
Austria	<0.1%	2,561,887	7.9	30.6	15%	78%
Belgium	0.1%	4,801,100	7.4	38.0	19%	76%
Czech Republic	0.2%	1,977,952	9.6	35.5	23%	81%
Denmark	<0.1%	2,869,871	8.2	29.5	20%	77%
Finland	<0.1%	2,800,533	7.7	29.2	21%	66%
France	0.6%	26,992,978	5.2	23.5	5.2%	53%
Germany	1.1%	37,840,924	6.9	30.8	13%	72%
Greece	0.1%	3,130,624	4.7	25.5	3.2%	44%
Hungary	0.8%	2,888,175	6.6	35.9	12%	75%
Iceland	<0.1%	167,782	6.3	29.3	–	51%
Ireland	<0.1%	1,739,818	7.3	30.9	12%	56%
Italy	1.1%	20,232,010	4.4	21.8	3.2%	35%
Luxembourg	<0.1%	175,912	5.3	21.5	–	57%
Netherlands	0.3%	8,880,250	9.9	38.2	29%	84%
Norway	<0.1%	3,659,326	7.4	28.7	20%	51%
Poland	0.7%	9,184,728	6.2	32.2	13%	58%
Portugal	0.1%	3,332,758	5.3	34.5	6.0%	61%
Romania	2.0%	3,019,603	7.5	47.9	19%	73%
Russia	2.7%	18,240,078	6.0	29.3	12%	63%
Slovakia	<0.1%	1,033,864	6.4	29.1	9.6%	52%
Spain	0.4%	13,826,284	5.2	31.3	5.8%	55%
Sweden	0.2%	6,918,024	8.9	34.9	25%	63%
Switzerland	0.1%	3,530,481	10.1	40.3	30%	88%
Turkey	4.5%	9,654,262	3.1	25.0	1.0%	16%
United Kingdom	0.6%	28,524,028	7.9	36.3	20%	73%
Asia/Pacific						
Australia	0.2%	8,635,075	4.7	26.3	4.8%	37%
China	34%	110,473,009	1.7	8.3	0.2%	5.3%
Hong Kong	1.6%	2,997,610	10.9	63.6	34%	78%
India	2.6%	16,281,136	1.3	10.6	0.3%	2.4%
Indonesia	21%	5,157,140	1.5	12.8	–	3.7%
Japan	0.9%	42,052,616	11.7	50.0	43%	79%
Malaysia	0.2%	2,252,932	2.7	23.6	1.5%	21%
New Zealand	<0.1%	2,050,598	4.4	20.2	3.7%	42%
Singapore	0.1%	1,466,868	6.9	41.1	16%	62%
South Korea	1.4%	21,412,948	14.2	44.8	50%	87%
Taiwan	2.5%	12,370,121	4.3	31.3	4.5%	33%
Vietnam	0.7%	5,146,176	1.5	11.6	–	1.9%
Middle East & Africa						
Egypt	0.3%	3,068,473	1.1	9.3	–	–
Israel	0.2%	2,501,236	7.0	35.9	12%	73%
Kuwait	0.1%	979,795	2.1	19.8	–	–
Saudi Arabia	0.1%	3,855,115	2.0	12.9	–	2.7%
South Africa	0.1%	6,965,183	2.1	7.6	1.5%	8.0%
Sudan	<0.1%	295,030	0.8	6.1	–	–
Syria	<0.1%	591,025	1.9	7.9	–	–
United Arab Emirates (UAE)	0.1%	1,454,999	6.2	n/a	13%	62%
Latin & South America						
Argentina	0.6%	7,881,057	2.1	15.5	0.6%	10%
Brazil	2.2%	26,442,198	2.3	18.9	0.7%	14%
Chile	0.2%	3,790,528	3.0	20.4	0.9%	18%
Colombia	0.2%	5,802,203	2.8	16.0	–	13%
Mexico	0.4%	12,015,461	3.3	17.5	0.8%	20%
Peru	0.2%	1,134,543	2.0	15.2	–	–
Venezuela	0.6%	2,944,646	1.1	8.2	–	1.2%
North America						
Canada	0.4%	14,105,180	7.8	34.2	19%	77%
Costa Rica	0.1%	417,373	2.1	12.8	–	–
United States	8.3%	147,940,918	8.6	36.6	25%	70%

** Countries listed with "—" had fewer than 25,000 unique IP addresses connecting to Akamai during the first quarter at this speed. Based on the revised threshold for inclusion, they were not included.*

SECTION 11:
Endnotes

[1] https://isc.sans.edu/port.html?port=6882 (Start Date 2013-01-01, End Date 2013-04-01)
[2] http://tools.ietf.org/html/bcp38
[3] http://www.eassy.org/network_overview.html
[4] http://www.ace-submarinecable.com/ace/default/EN/all/ace_en/index.htm
[5] http://www.zdnet.com/chinas-internet-population-surges-to-564-million-75-percent-on-mobile-7000009813/
[6] https://www.arin.net/knowledge/rirs.html
[7] http://www.potaroo.net/tools/ipv4/
[8] http://www.apnic.net/publications/research-and-insights/geoff-huston
[9] https://isc.sans.edu/ipinfo.html?ip=197.228.0.0
[10] https://isc.sans.edu/ipinfo.html?ip=108.184.0.0
[11] https://isc.sans.edu/ipinfo.html?ip=23.72.0.0
[12] https://isc.sans.edu/ipinfo.html?ip=54.208.0.0
[13] https://isc.sans.edu/ipinfo.html?ip=162.192.0.0
[14] https://isc.sans.edu/ipinfo.html?ip=172.224.0.0
[15] https://isc.sans.edu/ipinfo.html?ip=179.252.0.0
[16] https://isc.sans.edu/ipinfo.html?ip=179.160.0.0
[17] https://isc.sans.edu/ipinfo.html?ip=179.164.0.0
[18] https://isc.sans.edu/ipinfo.html?ip=179.176.0.0, https://isc.sans.edu/ipinfo.html?ip=179.180.0.0, https://isc.sans.edu/ipinfo.html?ip=179.184.0.0
[19] https://isc.sans.edu/ipinfo.html?ip=179.24.0.0
[20] https://isc.sans.edu/ipinfo.html?ip=179.224.0.0
[21] https://isc.sans.edu/ipinfo.html?ip=179.200.0.0, https://isc.sans.edu/ipinfo.html?ip=179.204.0.0
[22] https://isc.sans.edu/ipinfo.html?ip=179.208.0.0, https://isc.sans.edu/ipinfo.html?ip=179.212.0.0, https://isc.sans.edu/ipinfo.html?ip=179.216.0.0, [1 1] https://isc.sans.edu/ipinfo.html?ip=179.220.0.0
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[44] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=pie&start=20130101&end=20130215&net=both
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Editor
David Belson

Design
Shawn Doughty, Creative Direction
Brendan O'Hara, Art Direction/Design

Contact
stateoftheinternet@akamai.com
Twitter: @akamai_soti / @akamai
www.stateoftheinternet.com

Contributors
Jon Thompson
Martin McKeay
Bill Brenner
Jennifer Sun
Richard Möller (Ericsson)
Mathias Sintorn (Ericsson)
Geoff Huston (APNIC)