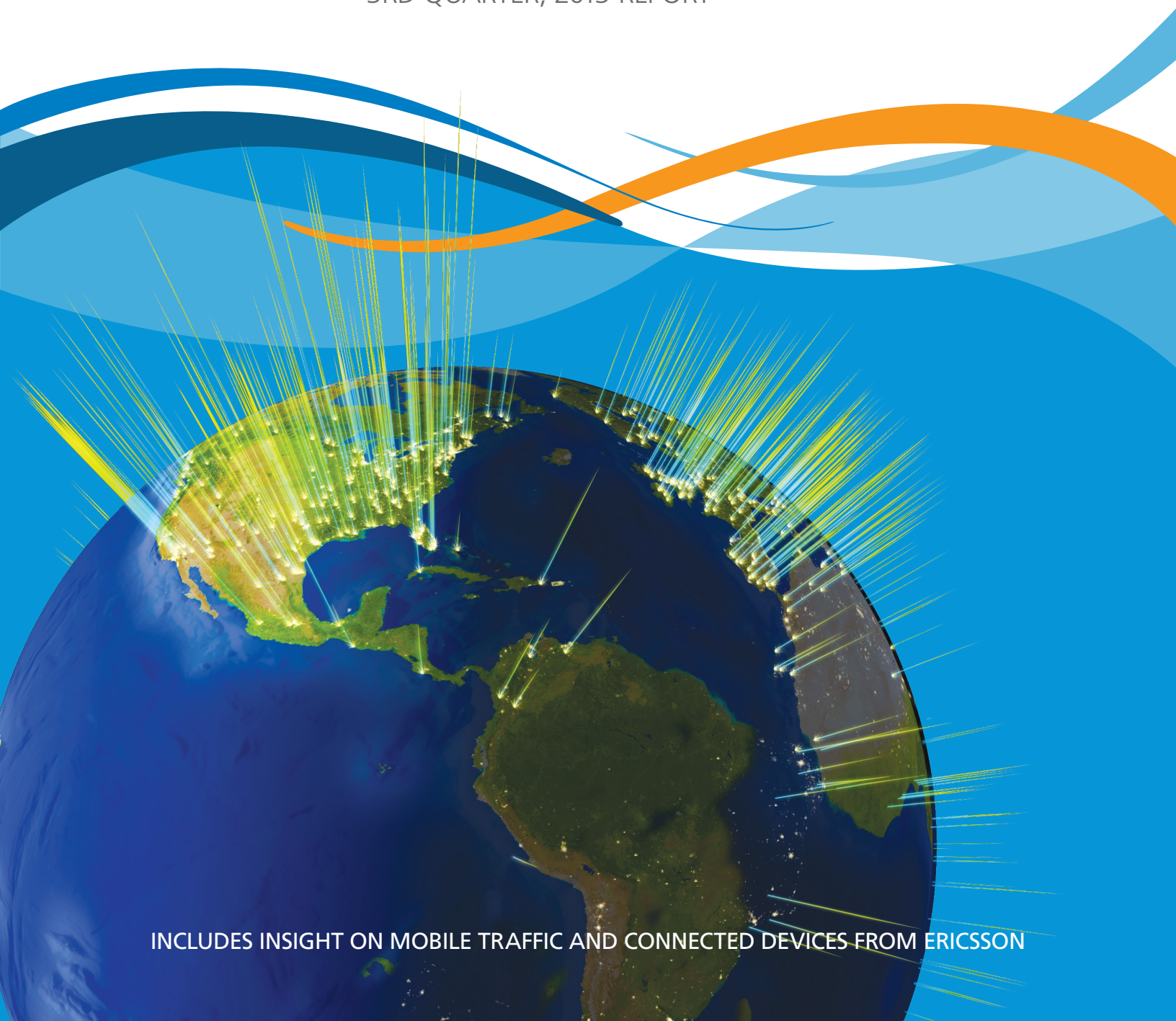
Akamai
FASTER FORWARD

VOLUME 6, NUMBER 3

The State of the Internet

3RD QUARTER, 2013 REPORT



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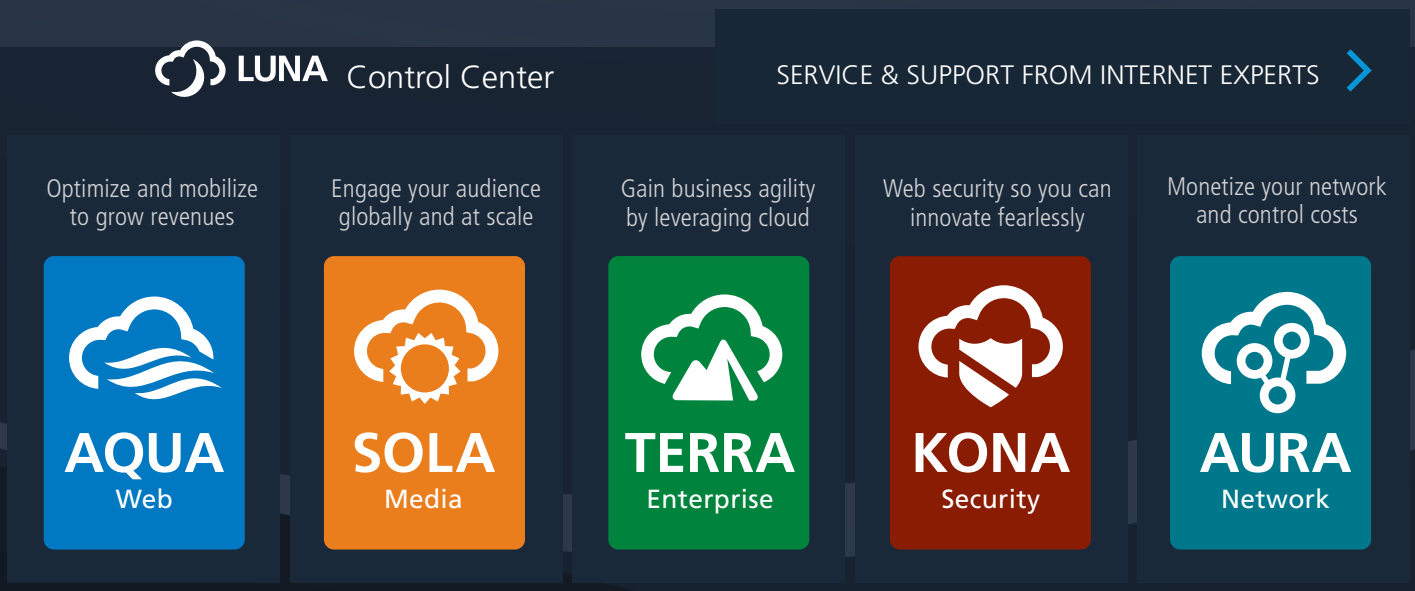

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Letter From the Editor

Over the last five-plus years, the *State of the Internet Report* has grown into a key reference for those involved in broadband initiatives around the world, whether at an industry or government level. I am extremely excited to see that it has become such a valuable resource for those tracking the progress of high-speed Internet connectivity in their state or country. Going forward, I am confident that average and average peak connection speeds, as well as high broadband and broadband adoption levels, will continue to improve over the long term, and that the *State of the Internet Report* and associated data visualization tools will continue to provide valuable and actionable data for this constituency.

While those tracking broadband progress often focus primarily on wired connectivity, we also need to make sure that we don't lose sight of the progress being made on mobile Internet connectivity as well. While the *State of the Internet Report* currently provides somewhat limited insight into connection speeds across mobile network providers, we plan to improve this insight throughout 2014, expanding the scope of coverage. In addition, the often vast differences in experience across users on various types of devices and platforms on mobile and fixed connections means that content providers are now faced with the challenge of optimizing for each unique user experience – something known as "situational performance". In this issue, we begin looking at situational performance, analyzing actual end-user performance measurement data from Akamai customers that have implemented Akamai's Real User Monitoring (RUM). Going forward, we plan to expand this insight as well, looking at things like differences between device types and trends over time.

In addition, the ongoing improvements in Internet connectivity and the growth in connected devices continue to contribute to the exhaustion of available IPv4 address space. This exhaustion has, in part, driven growth in the adoption of IPv6, though arguably not quite as fast as necessary. Starting with this issue of the report, we are also looking at IPv6 adoption rates at a country and network level, as observed from content requests to the Akamai Intelligent Platform, highlighting those that have taken a leadership position in making this important new technology available. We will track changes and trends in this data going forward.

Finally, Akamai is launching a *State of the Internet* companion application for Apple iOS devices. The app provides easy access to interactive *State of the Internet* data, including the ability to drill down on trends over time at a country level. Each new issue of the report will be available through the app as it is published, and a library of past issues of the report is available as well. The app also includes a feed of *State of the Internet*-related news items. To download it onto your iPhone or iPad (iOS 6 or 7 required), search the Apple iOS App Store for "*Akamai's State of the Internet*".

As always, if you have questions, comments, or suggestions regarding 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 issues, and IPv6 growth/transition progress, as well as traffic patterns across leading Web properties 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 third quarter of 2013, covering attack traffic, Internet connection speeds and 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 ongoing Syrian Electronic Army attacks, the states of IPv4 exhaustion and IPv6 adoption, Internet disruptions that occurred during the quarter, and observations from Akamai partner Ericsson regarding data and voice traffic growth on mobile networks.

Security

During the third quarter of 2013, Akamai observed attack traffic originating from source IP addresses in 185 unique countries/regions. Note that our methodology captures the source IP address of an observed attack and cannot determine attribution of an attacker. China regained the top slot, growing to 35% of observed attack traffic. After spiking over the last several quarters, Indonesia's share fell by nearly half, as it originated 20% of observed attack traffic during the quarter. In addition to China's increase, the United States also saw significant growth in observed attack traffic, responsible for 11%. Overall attack traffic concentration across the top 10 countries/regions was on par with the second quarter, up slightly to 83% of observed attacks. Along with the decline in observed attacks originating in Indonesia, the percentage of attacks targeting Ports 80 and 443 declined in the second quarter as well, accounting for just over 27% combined. Port 445 returned to its position in as the most-targeted port, growing to 23% of attacks. During the third quarter, Akamai customers reported being targeted by 281 DDoS attacks, an 11% reduction from the prior quarter. Enterprise and Commerce customers together accounted for just over 70% of the reported attacks. In addition, a group known as the Syrian Electronic Army continued its attacks, compromising domain name registrations to redirect traffic away from legitimate sites.

Internet and Broadband Adoption

In the third quarter, Akamai observed a 1.1% increase in the number of unique IPv4 addresses connecting to the Akamai Intelligent Platform, growing to just under 761 million, or about 8 million more than were seen in the second quarter of 2013. Looking at connection speeds, the global average connection speed grew 10% to 3.6 Mbps, but the global average peak connection speed declined 5.2% to 17.9 Mbps. At a country level, South Korea had the highest average connection speed at 22.1 Mbps, while Hong Kong continued to have the highest average peak connection speed at 65.4 Mbps. Globally, high broadband (>10 Mbps) adoption jumped 31% to 19%, and South Korea remained the country with the highest level of high broadband adoption, growing to 70%. Global broadband (>4 Mbps) adoption grew 5.8% quarter-over-quarter to 53%, with South Korea taking the top slot for this metric as well, with an adoption rate of 93%.

Mobile Connectivity

In the third quarter of 2013, average connection speeds on surveyed mobile network providers ranged from a high of 9.5 Mbps down to a low of 0.6 Mbps. Average peak connection speeds ranged from 49.8 Mbps down to 2.4 Mbps. Based on traffic data collected by Ericsson, the volume of mobile data traffic increased by 80% from the third quarter of 2012 to the third quarter of 2013, and grew around 10% between the second and third quarters of 2013.

Analysis of Akamai IO data collected across the third quarter from a sample of requests to the Akamai Intelligent Platform indicates that, for users of devices on cellular networks, just over 50% more requests came from Android Webkit-based browsers than from Apple Mobile Safari, with Webkit accounting for almost 38% of requests, and less than 24% for Safari. However, for users of mobile devices across all networks (not just cellular), Apple Mobile Safari accounted for just over 47% of requests, with Android Webkit approximately two-thirds of that, at just over 33% of requests.

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 third quarter of 2013.

It also includes insight into DDoS attacks that targeted Akamai customers during the third quarter of 2013, as well as additional insight into ongoing attacks for which a group known as the Syrian Electronic Army has claimed responsibility. Within this report, all representations represent our view of the best and most consistent ways of attributing attacks we have been seeing, based not only on published claims, but on analysis of the tools, tactics, and procedures that tend to provide a consistent signature for different adversaries.

1.1 Attack Traffic, Top Originating Countries

During the third quarter of 2013, Akamai observed attack traffic originating from 185 unique countries/regions, up 10 from the second quarter. As shown in Figure 1, after surging earlier in the year, Indonesia dropped back to the second-place slot, responsible for 20% of observed attacks—just over half of the volume seen in the prior quarter. China, which returned as the source of the largest percentage of observed attacks, saw a nominal increase from the second quarter, originating 35% of observed attacks. Though its percentage grew significantly from the second quarter, the United States remained well behind in third place, originating 11% of observed attacks, up from just under 7% in the prior quarter. With the exception of Indonesia and India, all of the countries/regions among the top 10 saw attack traffic percentages increase quarter-over-quarter. This includes Venezuela, which replaced Turkey among the top 10. The overall concentration of attacks declined as compared to the second quarter, with the top 10 countries originating 83% of observed attacks, down from 89% in the prior quarter.

With Indonesia and China continuing to originate significantly more observed attack traffic than any other country/region, the regional distribution of attack traffic remains heavily weighted to the Asia Pacific region. In the third quarter, the region was responsible for just over 68% of observed attacks, down from 79% in the second quarter. Europe's contribution increased, growing to 13.5% of observed attacks, while North and South America also increased, originating a combined 16%. The percentage of observed attacks originating in Africa also increased slightly in the third quarter, but was still miniscule, at 0.4%.

	Country	Q3 '13 % Traffic	Q2 '13 %
1	China	35%	33%
2	Indonesia	20%	38%
3	United States	11%	6.9%
4	Taiwan	5.2%	2.5%
5	Russia	2.6%	1.7%
6	Brazil	2.1%	1.4%
7	India	1.9%	2.0%
8	Romania	1.7%	1.0%
9	South Korea	1.2%	0.9%
10	Venezuela	1.1%	0.6%
–	Other	17%	11%

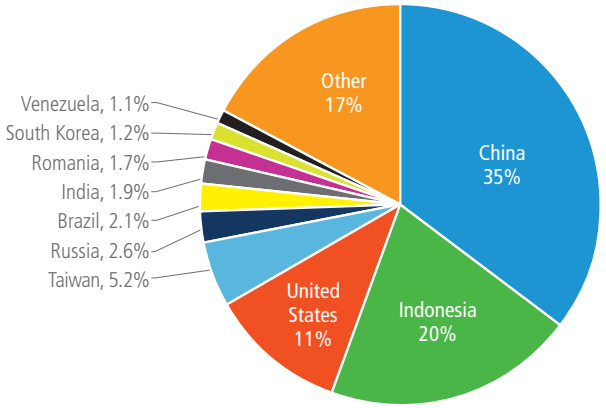

Figure 1: Attack Traffic, Top Originating Countries (by source IP address, not attribution)

1.2 Attack Traffic, Top Ports

As shown in Figure 2, Port 445 (Microsoft-DS) returned to its spot as the most targeted port in the third quarter, drawing 23% of observed attacks. Commensurate with the observed decline in attacks originating in Indonesia, the volume of attacks targeting Ports 80 (WWW/HTTP) and 443 (SSL/HTTPS) also declined in the third quarter, dropping to 14% and 13% respectively. The overall concentration of attacks across the top 10 ports declined quarter-over-quarter as well, dropping from 82% to 76%. Nine of the top 10 targeted ports remained consistent from the prior quarter, with Port 6666 (IRCU) leaving the list, replaced by Port 1998 (Cisco X.25 Over TCP Service), which grew from next to nothing to 1.6% of observed attacks. Data published[1] by the Internet Storm Center indicates elevated rates of attack activity targeting Port 1998 during both July and September—this could be part of the same attack activity that pushed the port into the top 10 for the third quarter. Interestingly, approximately 60% of the observed attacks targeting the port originated in China, with the balance mostly originating from Taiwan.

As noted above, Ports 80 and 443 both saw quarterly declines in traffic percentages, and were joined by Port 1433 (Microsoft SQL Server) and Port 23 (Telnet). In addition to the quarterly increase seen by Port 445, quarter-over-quarter growth in observed attack traffic volume was also seen on Port 3389 (Microsoft Terminal Services), Port 135 (Microsoft-RPC), Port 22 (SSH), Port 8080 (HTTP Alternate), and Port 1998, as mentioned previously.

As the most targeted port overall for the third quarter, Port 445 was the top target port in eight of the top 10 countries/regions—all except for China and Indonesia. In half of those countries/regions, it was responsible for a significantly larger volume of attack traffic than the second most targeted port, ranging from 10x more in Brazil to nearly 57x more in Romania. Within China, Port 1433 continued to be the top target of attacks observed to originate in that country, with just over 2x as many attacks targeting that port as Port 3389, the second most targeted port from the country. Indonesia's top targeted ports remained Port 443 and Port 80, with over 30x as many attacks targeting those ports as Port 445, the next most targeted port for attacks from the country.

1.3 Observations on DDoS Attacks

Akamai has been analyzing Distributed Denial of Service (DDoS) attacks aimed at our customers for the *State of the Internet Report* since the end of 2012. The Akamai Intelligent Platform is a massively distributed network of servers that is designed to deliver Web content from optimal servers, ideally as close to the end user as possible. Part of the value of the Akamai platform is to enable our clients to deal with sudden spikes in Web site requests, such as during holiday sales or flash mobs created by news events. Malicious traffic often attempts to overload sites by mimicking these types of events and the difference is often only distinguishable through human analysis and intervention. Akamai combats these attacks by serving the traffic for the customer while the analysis is being performed and creating specific Web application firewall rules or implementing other protections such as blocking specific geographic regions or IP address blocks as necessary.

An additional aspect of the Akamai platform is that some of the most common methodologies that are used in DDoS attacks are simply ignored. Attacks that target the lower levels of the

Port	Port Use	Q3 '13 % Traffic	Q2 '13 %
445	Microsoft-DS	23%	15%
80	WWW (HTTP)	14%	24%
443	SSL (HTTPS)	13%	17%
1433	Microsoft SQL Server	8.6%	9.5%
3389	Microsoft Terminal Services	5.1%	4.7%
23	Telnet	3.8%	3.9%
135	Microsoft-RPC	2.8%	1.4%
22	SSH	2.2%	1.9%
8080	HTTP Alternate	2.0%	1.4%
1998	Cisco X.25 Over TCP	1.6%	<0.1%
Various	Other	24%	–

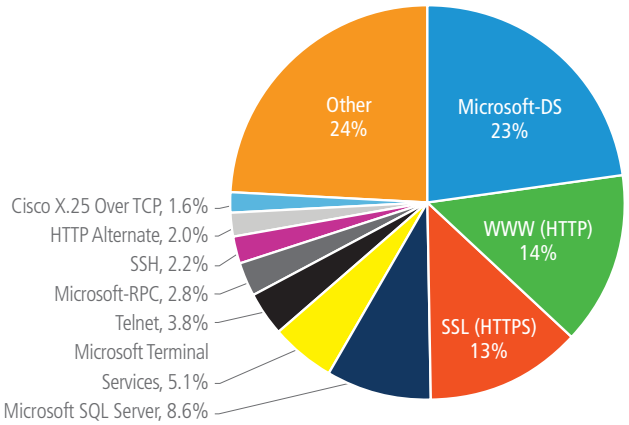

Figure 2: Attack Traffic, Top Ports

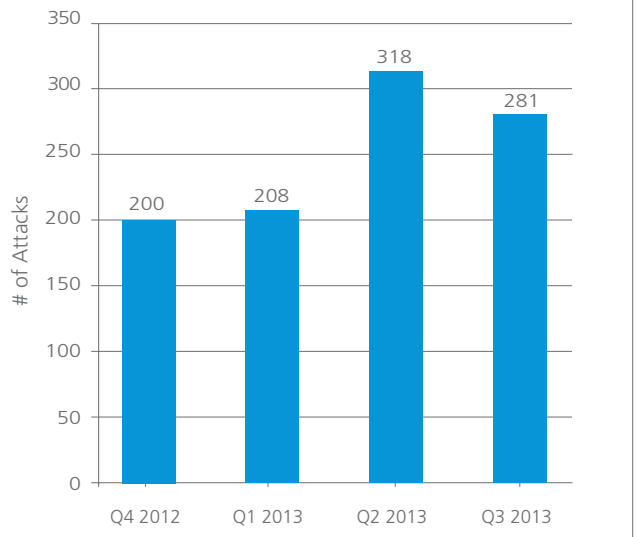

Figure 3: DDoS Attacks Reported by Akamai Customers by Quarter

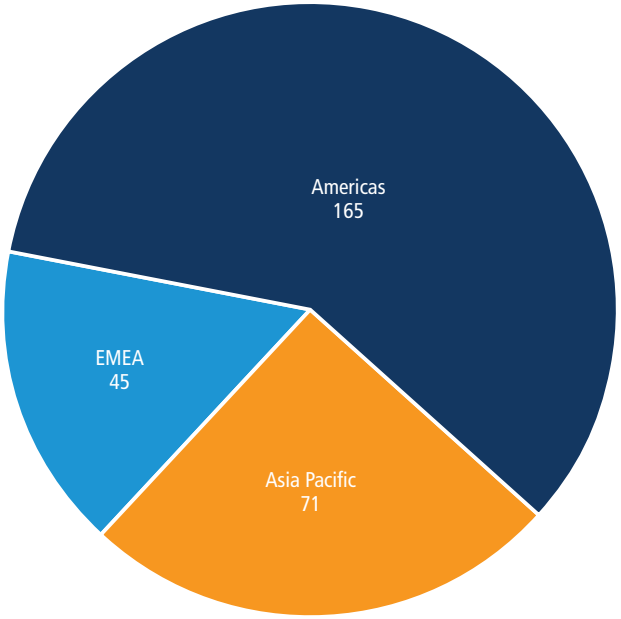

Figure 4: Q3 2013 DDoS Attacks by Region

TCP/IP stack, such as UDP floods and SYN floods, hit the Akamai platform and are dropped. Specifically, Layer 1-4 traffic does not contain the information needed by Akamai to route it to a specific customer, and is automatically assumed to be either malicious or malformed traffic.

The vast majority of the attacks that Akamai is reporting on here is related to traffic in layers 5–7 of the TCP stack, such as volumetric attacks like HTTP GET floods and repeated file downloads, or application and logical layer attacks, which require much less traffic to be effective. These statistics are based on the higher level attacks reported by our customers.

As shown in Figure 3, for the first time since Akamai first began reporting on DDoS attacks, we have seen fewer attacks on a quarterly basis than during the prior quarter, with 281 attacks seen in the third quarter, compared to 318 in the second quarter. Despite this decrease in attacks, Akamai has already seen more attacks so far in 2013 (807) than was seen in all of 2012 (768). While there was a minor reduction (11%) in the number of attacks during the third quarter, 2013 will end up being a much more active year for DDoS than 2012 was. One explanation for the shrinking number of attacks in this quarter is relative silence by one of the biggest attackers from last year and earlier this year, the Izz ad-Dim al-Qassam Cyber Fighters.

Figure 4 illustrates the distribution of DDoS attack targets by geography. Customers in North America saw only 165 attacks in the third quarter of 2013, an 18% decrease from the previous quarter. These customers continued to see the majority of the attack traffic, although it was only 57% of the total attacks in the third quarter, as opposed to 65% in the second quarter. Customers in the Asia Pacific region saw 71 attacks this quarter, representing a modest decrease of 10% from the previous quarter, but still well above the number of attacks seen in late 2012 and the first quarter of 2013. In contrast, Europe saw a 22% increase in attacks over the previous quarter. Overall, the attacks seen in the third quarter appeared to be targeting customers in European countries while moving away from American customers, with little change seen across Asia Pacific customers.

Looking at each sector as a proportion of the overall DDoS attacks suffered in the third quarter, Enterprise and Commerce continue to account for nearly the same amount of attacks as the previous quarter, together just over 70% of the total number of attacks, as shown in Figure 5. Both the Media & Entertainment and High Tech segments saw significantly fewer attacks, which was a key contributor to the overall reduction in the number of attacks seen. Given that these two sectors experienced a significantly smaller number of attacks than Commerce and Enterprise, third quarter attack volume

represented a large decrease in the amount of attacks as compared to the second quarter, with the numbers much closer to what was seen in the first quarter of 2013.

A key question that Akamai has started to explore within the DDoS data set is "If you're the victim of a DDoS attack, what are the chances that you'll be attacked again?" Figure 6 shows the results as seen in the third quarter data. Out of the 281 attacks that were reported to Akamai in the third quarter, there were a total of 169 unique targets. Twenty-seven customers were attacked a second time, five more reported three attacks, and an additional seven companies were attacked more than three times during the quarter. One customer reported a total of 51 unique attacks in the third quarter of 2013 alone, meaning that on average, at least every other day during the quarter, this customer was the target of a DDoS attack. Based on initial analysis of this data, if your company has been the target of a DDoS attack, there is a 1 in 4 (25%) chance that you will be attacked again within 3 months.

While Akamai saw a modest decrease in the overall number of attacks that were reported in the third quarter of 2013, there is no indication that this is a long-term reduction. Given that previous quarters saw major increases in the number of attacks, any decrease in the amount of DDoS attacks is a positive sign. However, despite the apparently reduced DDoS threat in the third quarter, Akamai is still projecting that we'll have seen over a thousand attacks reported by customers by the end of 2013.

1.4 Ongoing Syrian Electronic Army Attacks

In the third quarter of 2013, the hacktivist group calling itself the Syrian Electronic Army (SEA) continued its march. The SEA, which supports the regime of Syrian President Bashar Hafez al-Assad, claimed credit for launching a series of phishing attacks against the DNS registrars of multiple enterprises.

One such attack compromised the administrative panel of a third-party content discovery engine. As part of the attack, malicious code was injected into content served to customers. Other attacks led to compromises at DNS registrars Melbourne IT and GoDaddy. These attacks allowed the SEA to redirect traffic for legitimate domains to one they controlled. Any visitor to an affected Web site was sent to syrianelectronicarmy.com, a propaganda page for the SEA.

Before we delve deeper into the attack details, it's important to understand who the targets are. Specifically, there are three parties involved when talking about domain names:

- Registrants: People or companies that own a domain name. This is the customer or prospect of the registrar.
- Registrars: Companies that provide domain name registration services to registrants. These companies make money by selling domain names to registrants and uploading the records to a registry. Melbourne IT and GoDaddy are two examples.

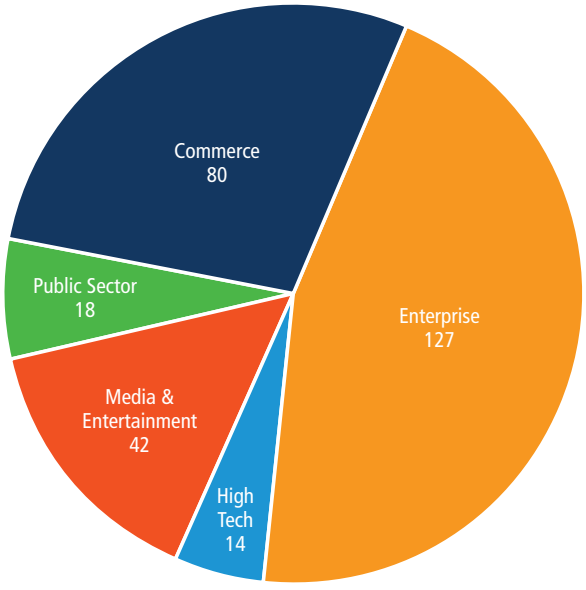

Figure 5: Q3 2013 DDoS Attacks by Sector

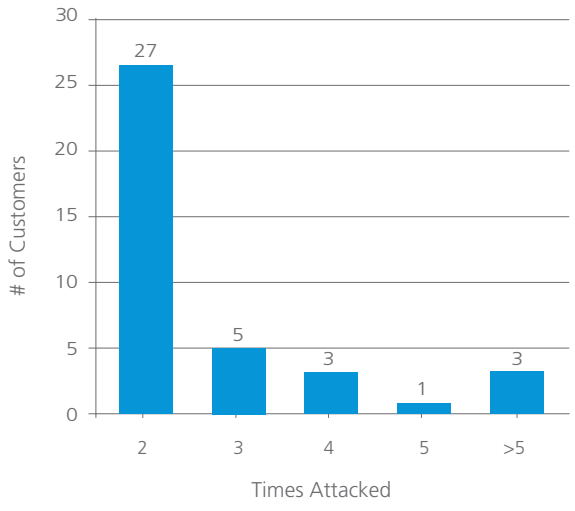

Figure 6: Frequency of Repeated DDoS Attacks

- Registries: Companies that maintain the Top Level Domains (TLDs). Registries operate a central database of domain names, but do not sell the names themselves. Registries take the data from the registrars and make it available to anyone querying their servers. Registry examples include Verisign for .com and .net, the Public Interest Registry for .org and the General Services Administration for .gov.

In the most successful and high-profile attacks executed by the SEA in the third quarter, attackers were able to hijack an administrative account from the DNS registrars' servers. According to published reports[2] about the attacks, account access was obtained through a phishing attack that compromised an e-mail account where the credentials were stored — specifically, an e-mail account associated with the registrar login was compromised. With these high-level credentials, the attackers were able to change the DNS entries for several common domains at once, resulting in a flood of traffic to the attacker's propaganda page.

Following these attacks by the SEA, Akamai offered the following guidance to customers to mitigate such attacks:

- First, properly educate the employees with the appropriate access that allows them to update DNS records with the registrar. Many times in these attacks, the username and password were successfully phished away from someone with the relevant credentials. If the credentials can be phished away, the second part of the protection will not help.
- The second part is to have domain locks in place. The site owner can set and control registrar locks. These will prevent any other registrar from being able to successfully request a change to DNS for a domain. The locks that can be set at the registrar level by the site owner are:
  - clientDeleteProhibited: prevents the registrar from deleting the domain records without the owner first unlocking the site.
  - clientUpdateProhibited: prevents the registrar from making updates to the domain name.
  - clientTransferProhibited: prevents the registrar from transferring the domain name to another registrar.

The only exception to these locks is when the domain registration period has expired. These locks can be set and unset by the site owner and many registrars will allow these locks at no cost.

A second level of locks can also be set, although a domain owner may incur additional costs in implementing these. These second level locks are:

- serverDeleteProhibited
- serverUpdateProhibited
- serverTransferProhibited

These server locks operate similarly to the client locks in that they prevent unauthorized changes. Using two-factor authentication, the customer must confirm with the registrar, usually with a passphrase, that it wishes to make the requested changes. This reduces the chance of the registrar being able to make accidental or unwanted changes to the DNS records for the domain.

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 serves on a daily basis, Akamai has unique levels of visibility into levels of Internet penetration around the world. In the third quarter of 2013, over 760 million IPv4 addresses, from 239 unique countries/regions, connected to the Akamai Intelligent Platform—just over 1% more than in the second quarter, and 11% more than in the third quarter of 2012. Although we see saw more than 760 million unique IPv4 addresses, Akamai believes that this represents 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; 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 7, the global number of unique IPv4 addresses seen by Akamai grew by over eight million quarter-over-quarter. Quarterly growth was also seen in six of the top 10 countries, with Brazil once again seeing the largest increase, growing 11% through the addition of approximately 3.3 million IPv4 addresses. Similar to the second quarter, four of the top 10 countries saw IPv4 address counts decline quarter-over-quarter, but again, the losses were generally minimal and were likely due to updates to the underlying database used by Akamai for IP address geolocation. In other words, given prior trends, it is unlikely that these losses represent a reduction in Internet penetration/usage in these countries. Looking at the full set of global countries/regions, just over 58% of them saw a quarterly increase in unique IPv4 address counts, with 33 growing 10% or more. Of the 38% of countries/regions that saw unique IPv4 address counts decline, 26 lost 10% or more from the second quarter. Interestingly, seven countries/regions saw no change from the previous quarter.

	Country/Region	Q3 '13 Unique IPv4 Addresses	QoQ Change	YoY Change
–	Global	760,980,743	1.1%	11%
1	United States	158,501,183	2.6%	9.3%
2	China	115,336,684	1.3%	17%
3	Japan	40,008,677	-1.9%	-0.7%
4	Germany	36,792,239	-3.4%	0.7%
5	Brazil	34,298,144	11%	52%
6	United Kingdom	29,142,389	<0.1%	10%
7	France	27,164,647	0.2%	6.2%
8	South Korea	21,169,590	-0.8%	7.1%
9	Italy	19,173,868	-5.0%	5.5%
10	India	18,371,345	4.9%	32%

Figure 7: Unique IPv4 Addresses Seen by Akamai

Looking at year-over-year changes, Brazil, India, China, and the United Kingdom saw the most aggressive growth rates as compared to the third quarter of 2012, with unique IPv4 address counts increasing 10% or more year-over-year in each of these countries. As noted in last quarter's report, the long-term growth rate of China's unique IPv4 address count continues to be greater than that seen in the United States, and with a national broadband plan[3] that aims to provide broadband access to all urban and rural areas by 2020, China will likely continue to see strong growth going forward, so that its unique IPv4 address count may ultimately surpass that of the United States. On a global basis, nearly 77% of countries/regions around the world had higher unique IPv4 address counts year-over-year. The small Indian Ocean island of Réunion had the largest rate of growth, increasing 925% over the last year.

2.2 IPv4 Exhaustion

The overall pool of available IPv4 address space continued to shrink in the third quarter of 2013, as Regional Internet Registries allocated/assigned blocks of IPv4 address space to organizations within their respective territories.[4] In the Americas, this ongoing delegation of address space caused ARIN to enter Phase Three of its IPv4 Countdown Plan, as it reached just two "/8s" (blocks of ~16.7 million IPv4 addresses) of available space in its inventory.[5] Leveraging data[6] collected by Geoff Huston,[7] Chief Scientist at APNIC, the *State of the Internet Report* provides a perspective on the size of the available IPv4 address pool at each RIR, and how the sizes of the available pools are shrinking over time. In addition, the report also uses data published by the RIRs to highlight IPv4 address space assignment/allocation activity by the individual RIRs over the course of the quarter.

Figure 8 illustrates the data provided by Mr. Huston, showing how the size of the available IPv4 address pools at each of the RIRs changed during the third quarter of 2013. APNIC and RIPE had the lowest levels of depletion during the third quarter, which is not surprising, given that both RIRs had already reached their final "/8" block of available IPv4 address space. APNIC delegated 379,904 addresses, or 2.6% of their available pool space, while RIPE delegated 440,064 addresses, or 2.9% of their available pool space. AFRINIC fell in the middle of the pack in terms of activity in the third quarter, delegating 2,914,560 addresses, amounting to 4.6% of available pool space, though it ended the quarter with just under 60 million IP addresses in its available pool,

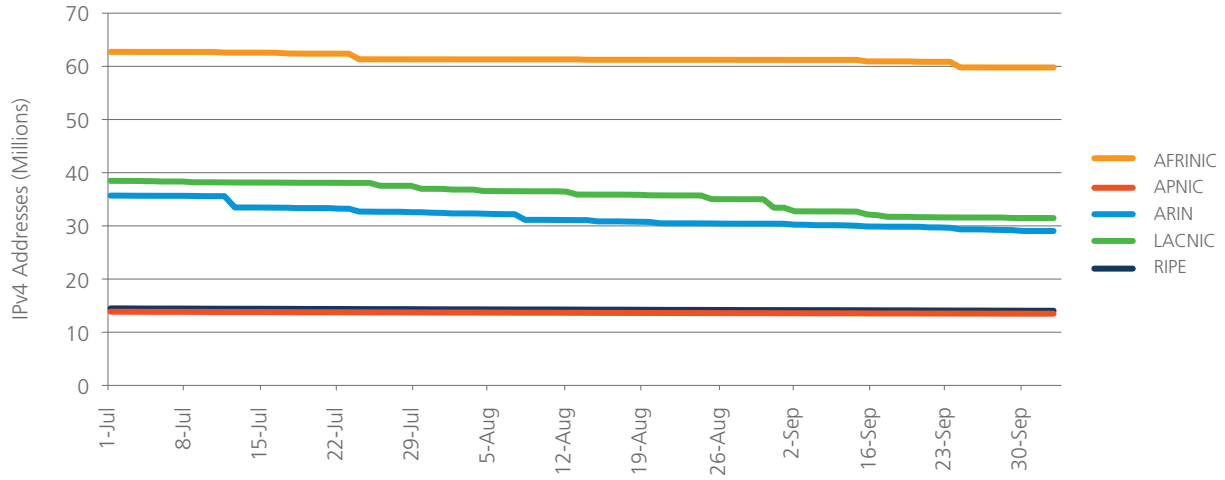

Figure 8: Available IPv4 Address Pool Size by RIR, Q3 2013

approximately twice as many as at ARIN and LACNIC. In fact, a Tweet posted[8] by @IPv4Countdown on September 22 noted that "Africa's registry AFRINIC now has less than sixty million IPv4s left to delegate". Activity at these latter two RIRs was fairly similar, with ARIN delegating 6,603,264 addresses, or 18.4%, of available pool space, while LACNIC delegated 6,938,880 addresses, or 17.9%, of available pool space. After reaching its last two "/8s" of available space on August 1, as noted above, just seven weeks later, ARIN had only 30 million available IPv4 addresses, according to a Tweet posted[9] by @IPv4Countdown.

Figure 9 illustrates the IPv4 allocation/assignment activity across each of the RIRs during the third quarter. As it shows, such activity within RIPE and APNIC was minimal in comparison to the other RIRs due to the "austerity" rules in place at the European and Asia Pacific RIRs. At AFRINIC, just under three million IPv4 addresses were delegated during the third quarter, with the greatest activity seen on July 24 and September 20. On the former date, a "/12" (1,048,576 IPv4 addresses) was allocated to CloudInnovation,[10] which is apparently associated with a Netherlands-based ISP.[11] On the latter date, a "/12" was allocated to Airtel Nigeria,[12] a mobile network service provider.[13] Delegation activity at LACNIC showed a stair-step pattern in the third quarter, with the allocation of six separate "/14" blocks (each comprising 262,144 IPv4 addresses). Two[14] of the blocks went to Tim Celular S.A., while the other four[15] went to Telefônica Brasil S.A. In North America, ARIN's most active day was July 12, when a "/11" block (2,097,152 IPv4 addresses) was allocated to Akamai Technologies.[16]

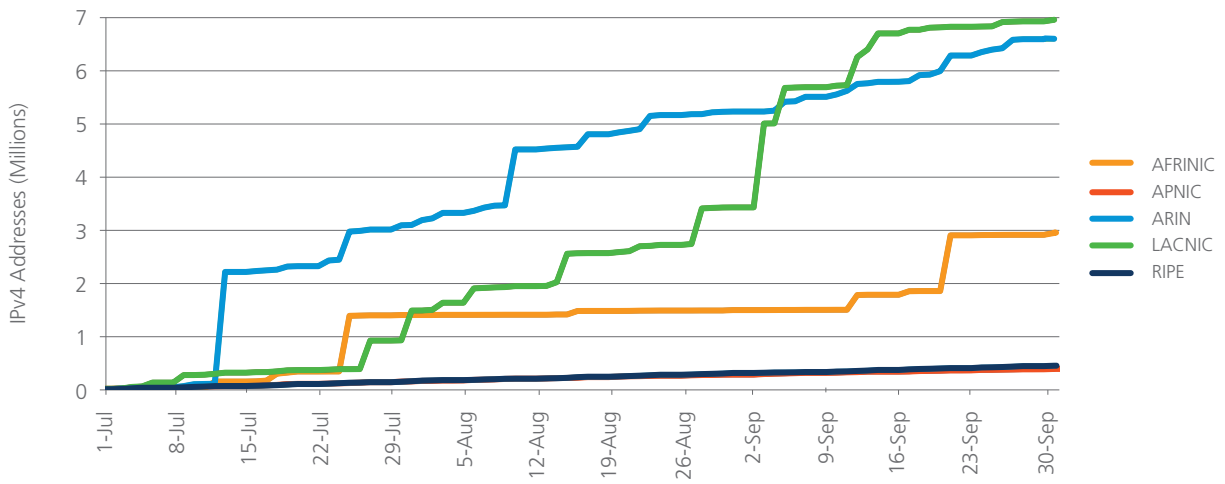

Figure 9: Total Number of IPv4 Addresses Assigned/Allocated by RIR, Q3 2013

2.3 IPv6 Adoption

Over the last several quarters, the *State of the Internet Report* has included information from network service provider Hurricane Electric regarding the adoption of IPv6 as measured by the number of autonomous systems in the IPv6 routing table. Unfortunately, due to data availability issues, the information was unavailable for this quarter's report. However, leveraging data analysis work initially done for the one-year anniversary of the World IPv6 Launch event,[17] we are now able to provide additional Akamai insight into IPv6 adoption across a number of vectors, and we expect to be able to include this information, as well as insight into trends over time, within the *State of the Internet Report* going forward. The traffic percentages included in Figure 10, Figure 11, and Figure 12 are calculated by dividing the number of content requests made to Akamai over IPv6 by the total number of requests made to Akamai (over both IPv4 and IPv6) for customer Web properties that have enabled Akamai edge delivery via IPv6—in other words, for dual-stacked hostnames. Note that this measurement/reporting methodology provides something of a lower bound for IPv6 adoption, as some dual-stacked clients, such as Safari on Apple's Mac OS X Lion and Mountain Lion will only use IPv6 for a portion of possible requests.[18] While not all of Akamai's customers have yet chosen to enable IPv6 delivery, the data set used for this section includes traffic from a number of leading Web properties and software providers, so we believe that it is sufficiently representative.

Figure 10 provides insight into the countries/regions that had the largest percentage of content requests made to Akamai over IPv6 during the third quarter. Looking at these figures, one observation is that the United States and some European countries have taken a clear lead in IPv6 adoption, with Europe having seven of the top 10 countries. Interestingly, IPv6 adoption appears to lag across Asia Pacific countries, with Japan the only country from the region within the top 10, with 1.9% of requests to Akamai coming over IPv6. Given that APNIC was the first RIR to enter IPv4 "austerity", one would expect to see greater use of IPv6 across major countries in the region. We expect that over time, IPv6 traffic percentages will generally increase. (Early indications are positive, as traffic percentages in both the United States and Germany had increased to over 6% by mid-December.) The per-country IPv6 adoption data published[19] by Google does not align exactly with Akamai's figures, but the measurements are relatively similar—this is reassuring and is to be expected given the differences in measurement methodologies and measurement timeframes.

Colleges and universities have historically been early adopters of new Internet technologies, and this appears to be especially true for IPv6 as well. In contrast to the prevalence of European countries among the top 10 in Figure 10, however, the institutions with the highest percentage of content requests over IPv6 were more broadly mixed geographically, as Figure 11 shows. In reviewing the data for this figure, a minimum of 90 million total requests to Akamai during the third quarter was required to be considered for inclusion. As this is the first review of Akamai-sourced IPv6 adoption data in the *State of the Internet Report*, we thought that looking at adoption across institutions of higher learning provided an interesting perspective.

Figure 12 shows IPv6 traffic percentages across a selected set of network providers and is not intended to represent an absolute ranking of such providers. The list of providers was primarily derived from an Akamai blog post[20] on IPv6, and the list in that post was derived, in large part, from one published on the World

	Country/Region	Q3'13 IPv6 Traffic %
1	Romania	7.3%
2	Switzerland	7.0%
3	France	5.0%
4	Luxembourg	4.9%
5	United States	4.2%
6	Germany	4.1%
7	Peru	3.9%
8	Belgium	3.8%
9	Ireland	3.8%
10	Japan	1.9%

Figure 10: IPv6 Traffic Percentage, Top Countries/Regions

	Country/Region	Q3'13 IPv6 Traffic %
1	Universidade Estadual de Ponta Grossa (Brazil)	80%
2	Brno University of Technology (Czech Republic)	66%
3	Gustavus Adolphus College (U.S.)	65%
4	Rensselaer Polytechnic Institute (U.S.)	48%
5	University of Waterloo (Canada)	48%
6	Virginia Tech (U.S.)	47%
7	Marist College (U.S.)	45%
8	University of Saskatchewan (Canada)	44%
9	University of Vermont (U.S.)	39%
10	Curtin University (Australia)	39%

Figure 11: IPv6 Traffic Percentage, Top Colleges/Universities

Network Provider	Q3'13 IPv6 Traffic %
Google Fiber (U.S.)	51%
Verizon Wireless (U.S.)	39%
Brutele (Belgium)	30%
Proxad/Free (France)	20%
RCS & RDS (Romania)	17%
Swisscom (Switzerland)	16%
KDDI (Japan)	9.6%
AT&T (U.S.)	8.2%
Comcast (U.S.)	6.9%
Deutsche Telekom (Germany)	5.0%
Telefonica Del Peru (Peru)	4.2%
Time Warner Cable (U.S.)	1.8%

Figure 12: IPv6 Traffic Percentage, Selected Networks

IPv6 Launch Network Measurements page,[21] which included providers that had opted-in with the Internet Society to be measured on worldipv6launch.org. The composition of the list in Figure 12 will likely evolve in future reports, possibly to include a ranking of adoption among top network providers in major geographies. Looking at the data presented, we find that Google Fiber is the only network provider that had more than half of its requests coming in over IPv6. Given that Google is essentially starting from scratch in building out its network infrastructure, this strong IPv6 adoption rate is not surprising. At Verizon Wireless, nearly 40% of the requests came in over IPv6—also not surprising, as Verizon Wireless has been a leader in IPv6 adoption since 2009, when it announced that any device that connected to its LTE network "shall support IPv6" and further stated that "the device shall be assigned an IPv6 address whenever it attaches to the LTE network."[22] Across the remaining providers in the list, there was a wide variance in adoption rates, from 30% at Brutele in Belgium, to about 2% at Time Warner Cable in the United States. As noted above, we expect that the percentage of requests being made over IPv6 will continue to grow over time, especially as many providers are actively rolling out IPv6 support more broadly across their networks, and we plan to track those trends within future issues of the *State of the Internet Report*.

Since mid-2012, the *State of the Internet Report* has also been tracking IPv6 traffic levels on the Akamai Intelligent Platform. The graph in Figure 13 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 third quarter of 2013. Similar to observations noted in prior quarters, a somewhat cyclical weekly pattern remains evident, with IPv6 traffic volumes dipping each Saturday, likely indicating a greater level of IPv6 adoption across corporate/enterprise networks than consumer ISPs. In addition, the graph shows a period of elevated activity between August 30 and September 14—while the root cause is not immediately clear, the time frame does align reasonably well with students in the United States returning to college/university campuses.

Looking at IPv6 traffic growth over the course of the quarter, absolute volume grew from just above 176,000 hits/second at the start to over 244,000 hits/second on the second-to-last day of the quarter. The peak traffic level of just over 277,000 hits/second was reached on September 4.

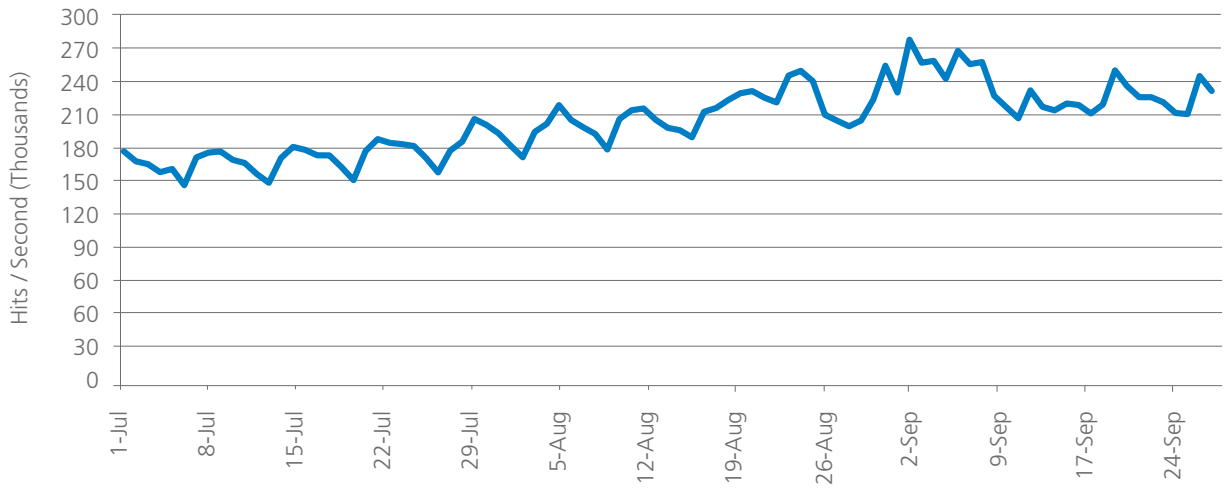

Figure 13: IPv6 Traffic to the Akamai Intelligent Platform, Q3 2013

Geography – Global

The data presented within this section was collected during the third 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. (See the blog post at https://blogs.akamai.com/2013/04/clarifying-state-of-the-internet-report-metrics.html for more information on how these metrics are calculated.)

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 its upward trajectory in the third quarter of 2013, growing an impressive 10% quarter-over-quarter to 3.6 Mbps, as shown in Figure 14. This strong quarterly growth was driven by surprisingly large quarter-over-quarter changes seen in many countries. Such growth is clearly evident in perennial speed leader South Korea, which saw a massive 66% quarterly increase in its average connection speed, growing to 22.1 Mbps. However, this increase is also likely related to an expanded partnership between Akamai and Korean telecommunications provider KT.[23] Among the balance of the top 10 countries/regions, the next highest quarterly growth was seen in the Netherlands, which added 23%. It was joined by six other countries/regions in seeing increases greater than 10%, while Switzerland and Latvia had the smallest increases seen in the group, at 5.3% and 4.6% respectively. In addition, the Czech Republic became the seventh country with an average connection speed over the 10 Mbps "high broadband" threshold—a year ago, only South Korea and Japan could make that claim. Globally, a total of 122 qualifying countries/regions saw average connection speeds increase in the third quarter, ranging from an increase of just 0.5% in Namibia (to 1.1 Mbps) to a 76% increase in Nepal (to 3.6 Mbps). Just 18 qualifying countries/regions saw quarterly declines in average connection speed, with losses ranging from 0.4% in Bahrain (to 2.2 Mbps) to a drop of 19% in El Salvador (to 1.9 Mbps).

	Country/Region	Q3 '13 Avg. Mbps	QoQ Change	YoY Change
–	Global	3.6	10%	29%
1	South Korea	22.1	66%	51%
2	Japan	13.3	12%	27%
3	Hong Kong	12.5	16%	39%
4	Netherlands	12.5	23%	46%
5	Switzerland	11.6	5.3%	33%
6	Czech Republic	11.3	16%	49%
7	Latvia	11.1	4.6%	28%
8	United States	9.8	13%	31%
9	Belgium	9.7	16%	46%
10	Ireland	9.6	19%	43%

Figure 14: Average Connection Speed by Country/Region

Long-term trends obviously remained very positive among the top 10 in the third quarter, with the global average connection speed seeing a 29% year-over-year increase. Growth was very strong among the top 10 countries/regions as well, ranging from 27% in Japan to 51% in South Korea. The Czech Republic, the Netherlands, Belgium, and Ireland followed close behind South Korea, all seeing yearly increases in excess of 40%. Around the world, 133 qualifying countries/regions saw a year-over-year increase in average connection speeds, ranging from growth of just 0.2% in Egypt (to 1.2 Mbps) to growth of more than 100% in Réunion (up 259% to 6.8 Mbps), Sudan (up 167% to 2.0 Mbps), Iraq (up 117% to 3.1 Mbps), and Oman (up 111% to 2.0 Mbps). Year-over-year declines were seen in just seven qualifying countries/regions, ranging from a drop of 8% in El Salvador (to 1.9 Mbps) to a loss of 45% in Guatemala (to 1.7 Mbps).

In the third quarter, only four qualifying countries/regions had average connection speeds of 1 Mbps or less, down from 11 in the second quarter, and 14 in the first quarter. This sharp decline

is likely related to the strong increases in average connection speeds seen around the world in the third quarter. Both Madagascar and Bangladesh had average connection speeds of 1.0 Mbps, while Cameroon was at 0.8 Mbps. Libya remained the country with the lowest average connection speed, at 0.6 Mbps—the same as in the second quarter.

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 for 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.

As shown in Figure 15, the global average peak connection speed declined slightly in the third quarter, falling 5.2% to 17.9 Mbps. Given the aggressive growth seen across the average connection speed metric, this decline is somewhat surprising. However, among the top 10 countries/regions, quarter-over-quarter changes were mixed as well. Seven countries/regions saw higher average peak connection speeds quarter-over-quarter, with increases ranging from just 0.5% in Hong Kong to 19% in Israel. Interestingly, the three countries that saw quarterly losses are all in Europe—Romania's average peak connection speed declined 4.4%, Latvia lost 3.3%, and Belgium was 3.6% lower than the prior quarter. On a global basis, changes appeared to be more negative this quarter, with just 34 qualifying countries/regions seeing a quarter-over-quarter increase in average peak connection speed. Growth rates ranged from just 0.1% in Fiji and Denmark (to 11.2 and 29.9 Mbps respectively) to 3% in Kuwait (to 36.4 Mbps). Negative quarterly changes were see in 106 qualifying countries regions, with losses ranging from just 0.4% in Puerto Rico and Bulgaria (to 27.1 and 37.0 Mbps respectively) to an unusually high 63% decline in Bahrain (to 15.1 Mbps). Bahrain was the only country to lose more than 50% from the prior quarter, though 54 other countries also saw double-digit percentage declines.

Examining the longer-term trends, the story is significantly more positive, as the global average peak connection speed grew 13% from the third quarter of 2012, while all of the top 10 countries/regions also saw average peak connection speeds increase over the same period. Yearly increases of more than 10% were seen across all countries/regions in the group, with growth rates ranging from 15% in Latvia to 63% in Singapore. Around the world, a total of 115 qualifying countries/regions saw yearly growth in average peak connection speeds, with increases ranging from 0.3% in South Africa (to 6.8 Mbps) to 181% in Iraq (to 276.5 Mbps). Four other countries joined Iraq in seeing average peak connection speeds more than double over the last year: Kuwait (up 164% to 36.4 Mbps), Oman (up 113% to 11.9 Mbps), Palestine (up 111% to 19.9 Mbps), and the Bahamas (up 105% to 26.3 Mbps). Across the qualifying countries/regions that saw yearly declines, losses ranged from 1.2% in the Dominican Republic (to 11.5 Mbps) to 67% in the United Arab Emirates (to 36.0 Mbps). The UAE's large loss is related to the "correction" from abnormally high average peak connection speeds that had been observed in the country over the previous year. Kenya once again remained the qualifying country with the lowest average peak connection speed at 4.3 Mbps (down 3.1% quarter-over-quarter and down 44% year-over-year).

	Country/Region	Q3 '13 Peak Mbps	QoQ Change	YoY Change
–	Global	17.9	-5.2%	13%
1	Hong Kong	65.4	0.5%	21%
2	South Korea	63.6	19%	30%
3	Japan	52.0	6.4%	23%
4	Singapore	50.1	9.9%	63%
5	Israel	47.7	19%	55%
6	Romania	45.4	-4.4%	22%
7	Latvia	43.1	-3.3%	15%
8	Taiwan	42.7	8.2%	50%
9	Netherlands	39.6	1.9%	29%
10	Belgium	38.5	-3.6%	18%

Figure 15: Average Peak Connection Speed by Country/Region

	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
–	Global	19%	31%	69%
1	South Korea	70%	53%	33%
2	Japan	49%	14%	30%
3	Netherlands	44%	45%	106%
4	Switzerland	39%	6.7%	75%
5	Hong Kong	38%	19%	41%
6	Czech Republic	35%	31%	136%
7	Latvia	34%	3.7%	31%
8	Belgium	34%	36%	117%
9	United States	34%	40%	82%
10	Denmark	28%	38%	64%

Figure 16: High Broadband (>10 Mbps) Connectivity

3.3 Global High Broadband Connectivity

In line with the strong growth seen in average connection speeds, the global high broadband adoption rate saw extremely strong growth in the third quarter, adding 31% to reach 19%—this growth is on top of double-digit percentage increases seen during the first and second quarters of 2013 as well. As seen in Figure 16, quarter-over-quarter changes among the top 10 countries/regions were overwhelmingly positive. Among the 55 countries/regions around the world that qualified for inclusion, 48 saw high broadband rates increase from the second quarter, with growth ranging from 0.5% in Italy (to 3.7% adoption) to 394% in Kazakhstan (to 2.3% adoption). In addition to Kazakhstan, quarterly growth above 100% was also seen in Taiwan (up 147% to 21% adoption), Argentina (up 142% to 0.9% adoption), and Colombia (up 125% to 0.5% adoption). Of the seven countries/regions that saw high broadband adoption rates drop quarter-over-quarter, losses ranged from 1.2% in China (to 1.1% adoption) to a surprisingly large 44% in Réunion (to 18% adoption). Although it saw an impressive 49% quarter-over-quarter increase, India remained the country with the lowest level of high broadband adoption among qualifying countries, at 0.3%.

Looking at year-over-year changes, the global high broadband adoption rate saw amazingly strong growth, up 69%. It was joined by extremely strong growth among the top 10 countries/regions, with the Netherlands, the Czech Republic, and Belgium all seeing high broadband adoption rates more than double year-over-year. When looking at the full set of qualifying countries/regions, Japan's 30% increase was also the smallest seen, while the largest increases were seen in Réunion and Kazakhstan, which added 6,325% and 2,727% respectively as compared to the third quarter of 2012. Only two countries saw high broadband adoption rates decline year-over-year: the United Arab Emirates, which declined 44% to 5.4% adoption, and South Africa, which declined 45% to 1.1% adoption.

	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
–	Global	53%	5.8%	27%
1	South Korea	93%	8.7%	7.4%
2	Switzerland	90%	-0.6%	11%
3	Curaçao	87%	15%	87%
4	Netherlands	87%	4.6%	6.4%
5	Czech Republic	83%	0.6%	22%
6	Japan	83%	3.8%	9.9%
7	Canada	82%	2.4%	17%
8	Denmark	81%	6.3%	19%
9	Hong Kong	81%	4.3%	14%
10	Bulgaria	81%	7.3%	38%

Figure 17: Broadband (>4 Mbps) Connectivity

3.4 Global Broadband Connectivity

Although the increase was not quite as significant as that seen for the high broadband adoption metric, the global broadband adoption rate also saw a nice improvement in the third quarter, adding 5.8% to reach 53% of all connections to Akamai taking place at speeds of 4 Mbps or above. As Figure 17 shows, among the top 10 countries/regions, at least eight of every 10 connections during the third quarter were faster than 4 Mbps. Broadband adoption rates among the top 10 ranged from 81% in Denmark, Hong Kong, and Bulgaria (tied due to rounding) to 93% in South Korea. Switzerland joined South Korea as the only country among the top 10 with a broadband adoption rate above 90%, although it was also the only country among the group to see a decline from the second quarter. Among the other countries/regions in the top 10, growth was more muted than was seen in the high broadband adoption metric, with quarter-over-quarter increases ranging from 0.6% in the Czech Republic to 15% in Curaçao (which pushed it into the top 10 for the first time). Globally, a total of 71 countries/regions that qualified for inclusion had higher levels of broadband adoption quarter-over-quarter, with growth ranging from 0.6% in Latvia (to 76% adoption) and the Czech Republic, to 280% in Iraq (to 15% adoption). Broadband adoption also more than doubled quarter-over-quarter in Kenya (up 267% to 2.1% adoption), Iran (up 252% to 1.9% adoption), Uruguay (up 200% to 4.4% adoption, and Argentina (up 120% to 18% adoption). A total of 45 countries/regions, up from 41 in the second quarter, saw at least half of their connections to Akamai occurring at speeds above 4 Mbps. Venezuela remained the country with the lowest level of broadband adoption, at 1.5% after a 9.5% quarterly loss.

Global broadband adoption once again grew nicely year-over-year, increasing 27% from the third quarter of 2012. Adoption rates were also up year-over-year in all of the top 10 countries/regions, with growth ranging from 6.4% in the Netherlands to 87% in Curaçao. Double-digit percentage yearly increases were seen in seven of the top 10 countries. Looking across the whole world, a total of 83 qualifying countries/regions saw higher broadband adoption levels year-over-year. Yearly growth rates ranged from 5.3% in Hungary (to 65% adoption) to 3607% in Iraq (to 15% adoption). In addition to Iraq, 26 other countries/regions had yearly growth rates of 100% or more, with eight of them growing by more than 500%, and another 10 by more than 200%. Four qualifying countries saw broadband adoption rates decline over the past year: Indonesia (down 1.9% to 1.8% adoption), South Africa (down 12% to 7.7% adoption), the United Arab Emirates (down 23% to 43% adoption), and Kenya (down 62% to 2.1% adoption).

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 within the United States, based on classification by Akamai's EdgeScape geolocation tool. For the purposes of this section, the District of Columbia is treated as a state.

4.1 United States Average Connection Speeds

The third quarter of 2013 saw strong quarter-over-quarter increases across the top 10 states, as shown in Figure 18, with all of the states seeing average connection speeds grow by more than 10% from the second quarter. The smallest increases were seen in New Hampshire and Utah, which both added 12%, while Rhode Island's 19% increase was the largest seen. Once again, all of the top 10 states remained above the 10 Mbps "high broadband" threshold. Across the whole country, average connection speeds were up in all states but Ohio, which saw a surprisingly large 20% quarter-over-quarter decline to 7.5 Mbps. Five states saw average connection speeds increase by less than 10%, with Vermont seeing the smallest quarterly gain, at 4.4% (to 9.4 Mbps). Thirty-three states saw quarterly growth above 10%, while another 10 states saw quarterly growth above 20%. Nevada grew by 32% from the second quarter (to 10.1 Mbps), and the largest quarterly increase was seen in Arkansas, which added 41% quarter-over-quarter (to 6.4 Mbps). Although it had the largest quarterly increase, Arkansas remained the state with the lowest average connection speed.

On a year-over-year basis, growth was very strong among the top 10 states. Observed yearly increases ranged from 15% in New Hampshire to 53% in Virginia, and only New Hampshire and Delaware saw yearly growth below 20%. Looking at the whole country, Vermont was the only state to see a year-over-decline, and was down 9.7% as compared to the third quarter of 2012. Among the other states, yearly growth ranged from 14% in Ohio (to 7.5 Mbps) to 71% in Arkansas. Kentucky's yearly growth was just behind Arkansas', adding 70% to reach an average connection speed of 7.1 Mbps. Virginia, Louisiana, and Kansas all saw speeds increase by more than 50% year-over-year, while speeds in another nine states improved by more than 40% over the same period. A total of 21 states saw speeds improve by more than 30%, while another dozen saw year-over-year changes of more than 20%.

4.2 United States Average Peak Connection Speeds

In the third quarter of 2013, the quarter-over-quarter changes in average peak connection speeds among the top 10 states were generally positive, with only the District of Columbia seeing a decline; it dropped 3.0% to 48.1 Mbps. With a 12% quarterly increase, Massachusetts became the first state to achieve an average peak connection speed above above 50 Mbps, as Figure 19 shows. Quarterly changes among the top 10 states ranged from 3.7% in Washington to 14% in Delaware. Looking across the whole country, a total of 44 states experienced quarterly increases, with growth ranging from just 0.4% in Montana (to

	State	Q3 '13 Avg. Mbps	QoQ Change	YoY Change
1	District Of Columbia	13.5	18%	25%
2	Massachusetts	13.2	18%	44%
3	Virginia	12.9	17%	53%
4	Delaware	12.7	18%	17%
5	Maryland	12.0	13%	36%
6	New Hampshire	11.9	12%	15%
7	Rhode Island	11.8	19%	29%
8	New Jersey	11.7	15%	34%
9	Utah	11.6	12%	28%
10	Washington	11.4	13%	34%

Figure 18: Average Connection Speed by State

	State	Q3 '13 Peak Mbps	QoQ Change	YoY Change
1	Massachusetts	51.6	12%	43%
2	Maryland	49.4	9.4%	42%
3	New Jersey	49.2	6.0%	37%
4	Virginia	48.8	11%	38%
5	Delaware	48.1	14%	23%
6	District Of Columbia	48.1	-3.0%	13%
7	Washington	46.7	3.7%	43%
8	Rhode Island	46.0	13%	33%
9	New Hampshire	45.6	4.0%	23%
10	New York	45.0	5.6%	25%

Figure 19: Average Peak Connection Speed by State

26.1 Mbps) to 23% in North Dakota (to 39.3 Mbps). Including North Dakota, only 13 states saw quarterly increases of 10% or more. Of the seven states that saw average peak connection speeds decline quarter-over-quarter, losses ranged from 0.4% in Vermont (to 35.9 Mbps) and Missouri (to 33.4 Mbps) to 27% in Ohio (to 17.2 Mbps). This significant quarterly decline also pushed Ohio into last place, with former slowest state Arkansas jumping 16% quarter-over-quarter to 24.7 Mbps.

Year-over-year increases among the top 10 states were very strong in the third quarter, with growth above 20% seen in all but one state. The District of Columbia's 13% year-over-year change was the smallest seen among the group, while the largest increases were seen in Massachusetts and Washington, which both added 43% over the last year. Strong yearly growth was also seen across nearly all of the rest of the country. Among the states that saw average peak connection speeds improve year-over-year, growth rates ranged from 7.4% in Maine (to 29.7 Mbps) to 45% in Oregon (to 42.9 Mbps). In addition to Massachusetts, Washington, and Oregon, three other states (Maryland, Kentucky, and Arkansas) also grew by more than 40% year-over-year. Seven more states saw increases above 30%, while another 35 saw average peak connection speeds increase by 20% or more. Nine additional states grew by more than 10%, while Oklahoma and Maine were the only two states to see single-digit percentage increases. In contrast, Vermont and Ohio were the only two states that lost ground year-over-year, with Vermont shedding 7.5% and Ohio losing 38%.

Although the states listed in the top 10 have some of the fastest Internet connections in the country, connectivity is improving gradually in other states as well. In July, a property management company announced that a new Chicago, Illinois rental community would offer 1 Gbps connectivity starting in September.[24] Also in July, it was reported[25] that the tiny town of Melrose, Minnesota will get 1 Gbps connectivity, though it would be priced at $300 per month, with 100 Mbps connections priced at $200 per month. August saw AT&T announce[26] that U-verse subscribers in 40 additional cities could now get service at speeds of up to 45 Mbps – these cities are in Alabama, Connecticut, Florida, Georgia, Illinois, Indiana, Louisiana, Michigan, Mississippi, North Carolina, Ohio, South Carolina, Tennessee, and Wisconsin. Finally, in September, network service provider C Spire announced[27] a "Fiber to the Home" initiative, representing a plan to bring 1 Gbps connectivity to subscribers in Mississippi. While it is unlikely that the increased speeds available to subscribers across all of these cities will drive their states into the top 10, it is encouraging to see providers big and small continue to invest in improving broadband connectivity across their service areas.

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	Massachusetts	54%	30%	74%
2	New Jersey	54%	32%	81%
3	Rhode Island	53%	44%	72%
4	Maryland	51%	31%	80%
5	Delaware	50%	39%	54%
6	New Hampshire	48%	20%	35%
7	New York	45%	41%	78%
8	Virginia	45%	44%	98%
9	Pennsylvania	43%	32%	83%
10	District Of Columbia	42%	5.7%	23%

Figure 20: High Broadband (>10 Mbps) Connectivity, U.S. States

4.3 United States High Broadband Connectivity

As shown in Figure 20, the quarterly changes in high broadband adoption rates among the top 10 states were extremely strong in the third quarter. Thanks to quarter-over-quarter growth in excess of 30%, the top five states all saw at least half of their connections to Akamai at speeds over 10 Mbps; this quarter is the first time that any state has had a high broadband adoption rate above 50%, let alone five states. The District of Columbia had the lowest adoption rate among the top 10 states at 42%, and was the only state with quarterly growth below 10%. This quarter's figures are in marked contrast to those seen in the second quarter, when Massachusetts' 42% adoption rate was the highest in the nation. Looking at high broadband adoption across the balance of the country, two additional states were at or above 40% — Connecticut (42%) and Washington (40%). Nineteen more states saw adoption rates of 30% or more, while 13 additional states saw adoption rates better than 20%. Arkansas had the lowest high broadband adoption rate in the third quarter, at 13%, although it also had the highest quarter-over-quarter increase, at 223%. In addition to Arkansas, four other states also saw high broadband adoption rates more than double quarter-over-quarter: Kansas (up 183% to 24% adoption), Idaho (up 115% to 14% adoption), Louisiana (up 112% to 24% adoption), and Maine (up 105% to 26% adoption). An additional 18 states saw quarterly growth of 50% or more. Only the District of Columbia had a quarterly change below 10%, and Ohio was the only state to see its high broadband adoption rate decline quarter-over-quarter, dropping 4.4% to 22% adoption.

Year-over-year changes across the top 10 states were also extremely high, ranging from 23% in the District of Columbia to 98% in neighboring Virginia. Among the group, eight of the states saw high broadband adoption rates grow by more than half over the course of the year. Looking across the whole country, 22 states saw yearly growth in high broadband adoption of 100% or more. Arkansas was the largest gainer, adding 306%, while Kentucky, Kansas, and Louisiana all added more than 200%. Only three states saw yearly growth rates below 50%: Utah, which increased 49% (to 34% adoption), New Hampshire, which increased 35%, and the District of Columbia, which increases 23%. The only state to see a year-over-year decline in high broadband adoption for the third quarter was Vermont, which dropped 7.0% (to 32% adoption).

4.4 United States Broadband Connectivity

Quarter-over-quarter changes to broadband adoption rates among the top 10 states in the third quarter were all positive, though rather nominal in nature, as seen in Figure 21. Hawaii was the only state in the group with quarterly growth over 10%, adding 14% from the second quarter to reach an 81% broadband adoption rate. Among the other states in the group, quarterly growth ranged from 1.5% in New Jersey to 5.0% in Massachusetts. Among the top 10, at least four of every five requests to Akamai were at speeds of 4 Mbps or more, while in Delaware and Rhode Island, more than nine of every 10 were at those speeds. For the first time across the whole country, every state had at least half of its connections to Akamai at speeds above the 4 Mbps threshold. Arkansas, which fell below the 50% mark in the second quarter, saw a tremendous 45% quarter-over-quarter increase to boost it to 54% broadband adoption, although it still placed as the state with the lowest broadband adoption rate. Increases were seen across all but three states, with growth ranging from 0.7% in Missouri (to 71% adoption) to 45% in Arkansas. In the states that saw broadband adoption rates fall, Kentucky lost 3.5% (to 68% adoption), Ohio dropped 5.5% (to 60% adoption), and the District of Columbia declined 7.4% (to 71% adoption).

Year-over-year changes among the top 10 states were generally positive, with New Hampshire the only state to see a yearly decline, losing 1.5%. Among the states where broadband adoption increased on a yearly basis, all but one saw growth rates in excess of 10%—the increases seen ranged from 9.9% in Connecticut to 33% in Hawaii. Across the whole country, Ohio and Vermont joined New Hampshire in seeing a long-term decline in broadband adoption—Ohio was down 2.4% as compared to the third quarter of 2012, while Vermont saw a 22% decline. In contrast, Arkansas saw its broadband adoption rate grow 106% year-over-year. A total of 43 states saw double-digit percentage increases over the last year, ranging from 10% in Tennessee (to 76% adoption) to 81% in Kentucky. Only four states had yearly growth rates below 10%—Connecticut, South Carolina (up 9.7% to 77% adoption), Maine (up 2.4% to 71% adoption), and the District of Columbia (up 0.3%).

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	Delaware	94%	1.9%	11%
2	Rhode Island	91%	3.0%	11%
3	New Jersey	88%	1.5%	12%
4	Maryland	87%	2.4%	13%
5	Massachusetts	87%	5.0%	20%
6	New Hampshire	86%	3.3%	-1.5%
7	New York	85%	2.5%	12%
8	Connecticut	84%	2.4%	9.9%
9	Hawaii	81%	14%	33%
10	South Dakota	81%	5.0%	18%

Figure 21: Broadband (>4 Mbps) Connectivity, U.S. States

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 within North and South America, based on classification by Akamai's EdgeScape geolocation tool.

5.1 Americas Average Connection Speeds

In the third quarter of 2013, the United States and Canada remained far and away the fastest countries in the Americas region, as shown in Figure 22. The United States had an average connection speed of 9.8 Mbps, up 13% from the second quarter, and Canada had an average connection speed of 8.8 Mbps, up 7.3% quarter-over-quarter. They were trailed by Mexico, which had an average connection speed less than half that of Canada's, reaching 3.9 Mbps after a 9.4% quarterly increase. Large quarter-over-quarter changes were also seen across many of the other surveyed countries in the Latin/South America region, with growth as high as 40% in Argentina and 23% in Ecuador. An additional seven countries also had quarterly growth rates above 10%, with Colombia and Costa Rica the only countries among the sub-group that saw growth below 10% (adding 5.2% and 1.6% respectively). Beyond the United States, Mexico, and Canada, average connection speeds among the other Americas countries ranged from 1.1 Mbps in Bolivia to 3.6 Mbps in Ecuador.

On a year-over-year basis, changes across the surveyed countries in the Americas region were generally very positive, with increases seen across all countries; only Chile and Costa Rica saw yearly growth rates below 10% (at 9.1% and 3.2% respectively). Among the other countries, growth rates ranged from 12% in Colombia and Paraguay to 53% in Ecuador. One country added more than 40% (Venezuela, at 41%), while five more (the United States, Canada, Mexico, Argentina, and Uruguay) added in excess of 30% from the third quarter of 2012. Peru and Bolivia grew more than 20% year-over-year, at 26% and 22% respectively, while Brazil added 19%, and was joined by Colombia and Paraguay in growing more than 10%.

5.2 Americas Average Peak Connection Speeds

Interestingly, while quarterly changes in average connection speeds across surveyed Americas countries were strongly positive in the third quarter, they were decidedly more mixed, and generally more negative, for the average peak connection speed metric. As Figure 23 shows, among the surveyed countries, only the United States, Canada, and Argentina saw average peak connection speeds grow from the prior quarter. The United States and Canada both increased by less than 2% (to 37.0 Mbps and 34.8 Mbps respectively), while Argentina saw a much larger change, growing 10% (to 15.9 Mbps). Among the surveyed Americas countries that saw average peak connection speeds decline from the second quarter, losses ranged from

Global Rank	Country/Region	Q3 '13 Avg. Mbps	QoQ Change	YoY Change
8	United States	9.8	13%	31%
15	Canada	8.8	7.3%	31%
57	Mexico	3.9	9.4%	39%
62	Ecuador	3.6	23%	53%
68	Chile	3.3	13%	9.1%
74	Colombia	3.0	5.2%	12%
80	Argentina	2.8	40%	33%
84	Brazil	2.7	10%	19%
91	Peru	2.4	18%	26%
97	Uruguay	2.2	16%	37%
101	Costa Rica	2.1	1.6%	3.2%
120	Venezuela	1.5	18%	41%
122	Paraguay	1.5	14%	12%
136	Bolivia	1.1	18%	22%

Figure 22: Average Connection Speed by Americas Country

Global Rank	Country/Region	Q3 '13 Peak Mbps	QoQ Change	YoY Change
13	United States	37.0	1.8%	19%
17	Canada	34.8	1.1%	28%
64	Ecuador	18.5	-5.5%	11%
71	Chile	17.2	-11%	-17%
72	Mexico	17.1	-9.3%	19%
73	Brazil	16.7	-10%	1.9%
76	Argentina	15.9	10%	9.8%
79	Colombia	15.4	-8.4%	7.6%
87	Uruguay	13.5	-12%	3.9%
89	Peru	13.2	-17%	-2.2%
113	Costa Rica	10.0	-19%	-15%
124	Paraguay	8.5	-13%	-30%
126	Bolivia	8.3	-5.9%	-13%
130	Venezuela	8.0	-5.5%	-3.7%

Figure 23: Average Peak Connection Speed by Americas Country

5.5% in Ecuador and Venezuela to 19% in Costa Rica. It's not clear just what drove the declines, though they were certainly more prevalent for this metric than for the average connection speed metric. In looking at the peak speeds, the United States and Canada again remained far ahead of the other countries in the region, with average peak connection speeds nearly double that seen in third-place Ecuador. Only three countries had average peak connection speeds below 10 Mbps: Paraguay (8.5 Mbps), Bolivia (8.3 Mbps), and Venezuela, which had the lowest average peak connection speed in the Americas in the third quarter, at 8.0 Mbps.

Year-over-year changes in average peak connection speeds among Americas countries were also mixed in the third quarter, although there were more countries seeing an increase than a decrease. Growth rates ranged from 1.9% in Brazil to 28% in Canada, and of the eight countries that saw increases, half grew more than 10%, while growth in the other half was below 10%. Losses ranged from 2.2% in Peru to a surprisingly high 30% in Paraguay. Of the six countries that saw declines, four declined more than 10% from the third quarter of 2012.

Although both Brazil and Canada saw long-term growth in average peak connection speeds in the third quarter, the growth seen in Canada was significantly larger than that seen in Brazil. This difference may be exacerbated even further going forward, based on several announcements from the third quarter. In Brazil, proposed changes[28] to the country's so-called "Internet Constitution" would allow local Internet service providers to provide slower services (reduced speeds) to subscribers that have exceeded contracted consumption volumes, as well as blocking subscribers from accessing selected services/content. In contrast, in Canada, a Vancouver-based Internet provider, as well as a small Alberta town, both announced plans to bring gigabit connectivity to local subscribers. Published reports[29,30] indicate that Vancouver's gigabit service will cost between $45–65 per month, while in Alberta, the community-owned network will charge $57–90 per month for gigabit connectivity.

5.3 Americas High Broadband Connectivity

In the third quarter of 2013, high broadband adoption across the Americas remained extremely lopsided, as highlighted in Figure 24. Of the 14 surveyed countries in the region, only half qualified for inclusion in the global rankings, and of those, the adoption levels in the top two were well ahead of the others.

The United States saw just over a third of its connections to Akamai at speeds of 10 Mbps or above after a significant 40% quarterly gain, while just under a quarter of all connections to Akamai from Canada were at 10 Mbps or above after adding 22% quarter-over-quarter. Across the other five qualifying countries, adoption rates ranged from 1.7% in Mexico down to 0.5% in Colombia. High broadband adoption rates were similarly as low among the countries that did not qualify for inclusion, with only Ecuador seeing an adoption rate above 1%. However, in looking at the quarter-over-quarter changes across the countries in the Americas region, all were particularly strong. Among the seven qualifying countries, quarterly growth ranged from 16% in Brazil to 125% in Colombia and 142% in Argentina. Among the other countries in the region, quarterly growth ranged from 13% in Venezuela to a whopping 333% in Paraguay.

Among the seven countries that qualified for inclusion, year-over-year changes were extremely high, with three of the countries seeing yearly growth levels above 100%. Increases ranged from a solid 38% in Chile to an impressive 269% in Mexico. In the other seven countries, year-over-year increases ranged from a reasonable 12% in Costa Rica to an incredibly large 542% in Uruguay. However, as these countries did not qualify for inclusion, these particularly high rates of change, coupled with their extremely low adoption rates, should be considered inconclusive and not taken as evidence of significant improvement in broadband connectivity within the country.

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
9	United States	34%	40%	82%
16	Canada	24%	22%	109%
48	Mexico	1.7%	66%	269%
51	Chile	1.1%	67%	38%
52	Argentina	0.9%	142%	157%
53	Brazil	0.9%	16%	61%
54	Colombia	0.5%	125%	82%
–	Ecuador	1.6%	82%	103%
–	Costa Rica	0.5%	17%	12%
–	Uruguay	0.2%	235%	542%
–	Venezuela	0.1%	13%	125%
–	Peru	0.1%	117%	37%
–	Bolivia	0.1%	27%	195%
–	Paraguay	<0.1%	333%	271%

Figure 24: High Broadband (>10 Mbps) Connectivity by Americas Country

5.4 Americas Broadband Connectivity

As shown in Figure 25, 11 of the 14 surveyed countries in the Americas region qualified for inclusion in the broadband adoption rankings, up from nine countries in the second quarter. Among the countries that qualified for inclusion, Canada once again had the highest level of broadband adoption, at 82%, followed by the United States, which had three quarters of all connections to Akamai at speeds above 4 Mbps. Among the remaining qualifying countries, broadband adoption ranged from 1.5% in Venezuela to 33% in Mexico. In the three countries that did not qualify to be included in the global rankings, Costa Rica had a broadband adoption rate of 4.2%, while Bolivia and Paraguay were both below 1%. Quarterly changes had a very broad range in the third quarter. Venezuela was the only qualifying country to see a quarter-over-quarter decline, losing 9.5%, while increases ranged from 2.4% growth in Canada to Argentina and Uruguay more than doubling, adding 120% and 200% respectively. Among the other countries, quarterly growth was also fairly strong, with Paraguay growing by 174% (but remaining under 1% adoption), and Costa Rica and Bolivia seeing double-digit percentage growth.

Year-over-year changes among qualifying countries also covered an extremely broad range in the third quarter. The United States and Canada came in on the low end, increasing 15% and 17% respectively from the third quarter of 2012. Uruguay had the largest increase, growing 573% over the last year, while Argentina, Peru, and Mexico also saw broadband adoption rates more than double over the past year, with Ecuador just missing it with a 99% growth rate. Among the three non-qualifying countries, Costa Rica and Bolivia had strong year-over-year growth, while Paraguay saw growth of almost 10%.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
7	Canada	82%	2.4%	17%
18	United States	75%	4.0%	15%
57	Mexico	33%	31%	204%
62	Ecuador	25%	43%	99%
63	Chile	24%	60%	82%
65	Brazil	20%	36%	65%
67	Argentina	18%	120%	100%
69	Colombia	18%	28%	83%
79	Uruguay	4.4%	200%	573%
81	Peru	3.6%	94%	132%
87	Venezuela	1.5%	-9.5%	62%
–	Costa Rica	4.2%	44%	46%
–	Bolivia	0.8%	12%	74%
–	Paraguay	0.6%	174%	9.8%

Figure 25: Broadband (>4 Mbps) Connectivity by Americas Country

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 within the Asia Pacific region, based on classification by Akamai's EdgeScape geolocation tool.

6.1 Asia Pacific Average Connection Speeds

In the third quarter of 2013, South Korea, Japan, and Hong Kong all once again had average connection speeds well above the 10 Mbps "high broadband" threshold, as seen in Figure 26. However, if Taiwan and Singapore continue to see aggressive quarterly growth, they too will surpass that threshold in the coming quarters. Among the surveyed Asia Pacific countries/regions, average connection speeds ranged from 22.1 Mbps in South Korea down to just 1.4 Mbps in India, which had the lowest average connection speed in the region despite an 11% quarterly increase. Looking at quarter-over-quarter changes, they were generally positive, with only Indonesia seeing a lower average connection speed compared to the second quarter, losing 14% (to 1.5 Mbps). Gains across the Asia Pacific region ranged from 2.8% in China (to 2.9 Mbps) to 66% in South Korea. As noted in Section 3.1, this massive increase in South Korea is likely related to an expanded partnership between Akamai and Korean telecommunications provider KT. A total of 10 surveyed countries/regions saw quarterly increases greater than 10%.

Looking at the year-over-year changes seen across the Asia Pacific region in the third quarter, we see that all of the surveyed countries/regions saw long-term growth in average connection speeds, and strong growth at that. None of the surveyed countries/regions saw growth below 10%, with Indonesia seeing the smallest increase, at 26%. The largest increase was seen in Taiwan, which added 84% year-over-year, and it was joined by five other countries/regions (South Korea, Singapore, Thailand, China, and Vietnam) in having a year-over-year increase above 50%.

6.2 Asia Pacific Average Peak Connection Speeds

As shown in Figure 27, Hong Kong's 65.4 Mbps average peak connection speed continued to rank it first both globally and in the Asia Pacific region. However, after a 19% quarterly increase, South Korea is not far behind, with a 63.6 Mbps average peak connection speed in the third quarter. Japan and Singapore joined Hong Kong and South Korea in having average peak connection speeds above 50 Mbps, with Singapore just barely making it past at 50.1 Mbps. Among the other surveyed Asia Pacific countries/regions, only Indonesia and India had

Global Rank	Country/Region	Q3 '13 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	22.1	66%	51%
2	Japan	13.3	12%	27%
3	Hong Kong	12.5	16%	39%
19	Taiwan	8.0	46%	84%
22	Singapore	7.8	19%	57%
43	Australia	5.5	13%	28%
46	New Zealand	5.1	11%	31%
49	Thailand	4.7	5.9%	61%
71	Malaysia	3.2	3.0%	44%
75	China	2.9	2.8%	77%
109	Vietnam	2.0	18%	57%
114	Philippines	1.8	14%	39%
118	Indonesia	1.5	-14%	26%
123	India	1.4	11%	34%

Figure 26: Average Connection Speed by Asia Pacific Country/Region

Global Rank	Country/Region	Q3 '13 Peak Mbps	QoQ Change	YoY Change
1	Hong Kong	65.4	0.5%	21%
2	South Korea	63.6	19%	30%
3	Japan	52.0	6.4%	23%
4	Singapore	50.1	9.9%	63%
8	Taiwan	42.7	8.2%	50%
28	Thailand	30.4	-8.0%	51%
30	Australia	30.1	3.6%	32%
46	Malaysia	24.9	-6.5%	37%
57	New Zealand	20.5	-2.4%	15%
75	Philippines	16.1	0.2%	35%
104	Vietnam	11.4	-19%	32%
106	China	11.3	-1.1%	58%
115	Indonesia	9.7	-15%	-30%
119	India	9.0	-15%	12%

Figure 27: Average Peak Connection Speed by Asia Pacific Country/Region

average peak connection speeds below 10 Mbps as a result of both countries seeing a 15% quarterly decline, with India's 9.0 Mbps average peak connection speed the lowest in the region. Quarterly declines were also seen in five other surveyed countries/regions, ranging from a loss of 1.1% in China to a more significant 19% drop in Vietnam. Among the countries/regions that saw quarterly increases, growth ranged from 0.5% in top-ranked Hong Kong to 19% in second-place South Korea.

Year-over-year changes across the surveyed Asia Pacific countries/regions were nearly all positive, with the exception of the 30% decline seen in Indonesia. The yearly increases seen were all fairly strong, and all above 10%, with the 12% increase seen in India the smallest of the group. Singapore's 63% increase was the largest in the region, while Taiwan, Thailand, and China also had yearly increases of 50% or more. Five additional countries/regions grew by 30% or more year-over-year, while two more saw increases in excess of 20%.

6.3 Asia Pacific High Broadband Connectivity

The third quarter saw an extremely wide range of high broadband adoption rates across the surveyed Asia Pacific countries/regions that qualified for inclusion. As shown in Figure 28, South Korea led the list with seven of every 10 connections to Akamai at speeds above 10 Mbps, after growing 53% from the prior quarter. It was followed by Japan, which had nearly half of its connections to Akamai in the third quarter at speeds above 10 Mbps. In contrast, India once again had the lowest level of high broadband adoption among the qualifying countries/regions.

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
1	South Korea	70%	53%	33%
2	Japan	49%	14%	30%
5	Hong Kong	38%	19%	41%
21	Taiwan	21%	147%	340%
24	Singapore	20%	50%	190%
37	Australia	8.1%	58%	96%
38	New Zealand	6.2%	61%	164%
43	Thailand	2.4%	14%	330%
46	Malaysia	2.1%	6.8%	145%
50	China	1.1%	-1.2%	544%
55	India	0.3%	49%	109%
–	Indonesia	0.1%	9.6%	-22%
–	Vietnam	0.1%	85%	236%
–	Philippines	0.1%	6.8%	-6.0%

Figure 28: High Broadband (>10 Mbps) Connectivity by Asia Pacific Country/Region

Even after a 49% quarterly increase, it still only reached 0.3% high broadband adoption. While India was the only country with an adoption rate below 1%, five other qualifying countries had adoption rates below 10%. Among the three countries that did not qualify for inclusion, all had adoption rates of 0.1%. As noted above, South Korea had an extremely strong growth rate, adding 53%, but Australia, New Zealand, and Taiwan all had stronger growth with the latter leading the region at 147%. Malaysia was the only qualifying country to see a quarterly gain below 10%, while China's 1.2% decline was the only quarterly loss seen in the region.

Year-over-year changes across the qualifying Asia Pacific countries/regions were all extremely strong, with China seeing an increase of more than 500%, Taiwan and Thailand growing more than 300%, and Singapore, New Zealand, and Malaysia adding more than 100% from the second quarter of 2012. With a 96% yearly growth rate, Australia fell just short of doubling its high broadband adoption year-over-year, while South Korea, Japan, and Hong Kong all saw growth above 30%. Among the three countries that did not qualify for inclusion, Indonesia and the Philippines both saw losses year-over-year, while Vietnam saw a significant 236% increase. However, with just a 0.1% high broadband adoption rate and fewer than 25,000 unique IP addresses connecting to Akamai at speeds above 10 Mbps during the third quarter, this large increase does not reflect a significant improvement in connection speeds within the country.

6.4 Asia Pacific Broadband Connectivity

South Korea continued to grow to near-universal broadband adoption in the third quarter, as it reached a 93% adoption rate, as shown in Figure 29. In addition to South Korea, seven additional qualifying countries/regions had at least half of their connections to Akamai at speeds of 4 Mbps or above. Four countries had adoption rates below 10%, and Indonesia had the lowest broadband adoption rate among the surveyed countries/regions, at just 1.8%. Indonesia was also the only country to see a quarterly decline in broadband adoption, dropping a surprisingly large 44%, which pushed it into the last place spot. Among the other countries/regions, quarter-over-quarter growth ranged from 2.8% in Malaysia (to 27% adoption) to 68% in Vietnam (to 4.1% adoption). In addition to Vietnam, five other countries saw double-digit percentage increases from the second quarter.

With the exception of a nominal 1.9% decline in Indonesia, the balance of surveyed Asia Pacific countries/regions once again all saw long-term growth in broadband adoption rates.

Geography – Asia Pacific Region (Continued)

South Korea and Japan were the only two countries to grow less than 10% year-over-year, adding 7.4% and 9.9% respectively. In contrast, five of the surveyed countries saw broadband adoption rates more than double from the third quarter of 2012, led by China's 408% increase, with Thailand and Vietnam both seeing improvements of more than 200%. It is interesting to note that China has seen year-over-year growth rates above 100% in all three quarters of 2013—this sustained improvement points to ongoing improvements in the quality and availability of higher speed broadband connectivity within the country.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
1	South Korea	93%	8.7%	7.4%
6	Japan	83%	3.8%	9.9%
9	Hong Kong	81%	4.3%	14%
24	Singapore	68%	9.8%	60%
37	Taiwan	61%	22%	62%
42	Thailand	54%	5.6%	218%
43	New Zealand	54%	15%	56%
45	Australia	51%	24%	35%
61	Malaysia	27%	2.8%	134%
66	China	20%	7.1%	408%
80	Vietnam	4.1%	68%	247%
82	India	3.0%	43%	95%
83	Philippines	2.6%	18%	103%
86	Indonesia	1.8%	-44%	-1.9%

Figure 29: Broadband (>4 Mbps) Connectivity by Asia Pacific Country/Region

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 within the EMEA region, based on classification by Akamai's EdgeScape geolocation tool.

7.1 EMEA Average Connection Speeds

Thanks to a strong 23% quarter-over-quarter increase, the Netherlands replaced Switzerland as the EMEA country with the highest average connection speed in the third quarter, as shown in Figure 30. Both Switzerland and the Netherlands maintained average connection speeds above the 10 Mbps "high broadband" threshold and were joined by the Czech Republic, which grew to 11.3 Mbps after a 16% quarterly increase. Beyond the top three countries, quarter-over-quarter changes among the balance of the surveyed EMEA countries were broadly positive, with only three countries (Italy, the United Arab Emirates, and South Africa) seeing declines, and minor ones at that—all in the 1% range. Quarterly increases across the EMEA region ranged from 3.4% in Hungary (to 6.7 Mbps) to the aforementioned 23% growth in the Netherlands, and a total of a dozen surveyed countries had quarter-over-quarter growth rates higher than 10%. With the exception of South Africa, every country within the region had an average connection speed higher than the 4 Mbps "broadband" threshold in the third quarter; South Africa remained the qualifying country with the lowest average connection speed, at 2.3 Mbps.

Global Rank	Country/Region	Q3 '13 Avg. Mbps	QoQ Change	YoY Change
4	Netherlands	12.5	23%	46%
5	Switzerland	11.6	5.3%	33%
6	Czech Republic	11.3	16%	49%
9	Belgium	9.7	16%	46%
10	Ireland	9.6	19%	43%
11	Austria	9.3	15%	42%
12	Sweden	9.3	9.7%	37%
13	Denmark	9.2	13%	26%
14	United Kingdom	9.1	8.9%	45%
16	Finland	8.5	4.6	25%
17	Norway	8.3	13%	34%
18	Israel	8.3	12%	46%
20	Russia	7.8	11%	53%
21	Romania	7.8	4.3%	23%
27	Germany	7.6	4.1%	29%
29	Poland	7.4	17%	39%
30	Spain	6.9	17%	42%
31	Slovakia	6.8	6.0%	16%
33	Hungary	6.7	3.4%	15%
34	France	6.5	15%	36%
41	Portugal	5.9	8.4%	21%
48	Italy	4.9	-1.4%	24%
51	United Arab Emirates	4.5	-1.0%	-20%
54	Turkey	4.0	7.0%	39%
95	South Africa	2.3	-1.1%	5.2%

Figure 30: Average Connection Speed by EMEA Country

Aside from the 20% year-over-year decline seen in the United Arab Emirates (related to the "correction" discussed in last quarter's *State of the Internet Report*), long-term changes in average connection speeds were very positive across the EMEA region. South Africa had the smallest increase, at 5.2%, and was the only surveyed country to see a growth rate below 10%. Among the other countries, growth was extremely strong, ranging from 15% in Hungary to 53% in Russia. In addition to Russia, eight other countries saw yearly growth in excess of 40%, while six more grew more than 30% year-over-year. Another six countries saw average connection speeds grow by more than 20% year-over-year, while Slovakia and Hungary added more than 10% from the third quarter of 2012.

7.2 EMEA Average Peak Connection Speeds

A strong 19% quarterly increase to 47.7 Mbps helped Israel move ahead of Romania to become the EMEA country with the highest average peak connection speed in the third quarter; Romania's 4.4% quarterly decline dropped it to an average peak connection speed of 45.5 Mbps, as shown in Figure 31. These two countries were the only ones among the surveyed EMEA countries to have an average peak connection speed above 40 Mbps, but the Netherlands was close behind at 39.6 Mbps after a slight 1.9% quarterly increase. At the lower end of the list, Italy and South Africa were the only ones to have average peak connection speeds below 20 Mbps, with South Africa's 6.8 Mbps average peak speed the lowest seen across the region in the third quarter. In addition, Italy and South Africa had some of the largest declines seen in the third quarter, losing 22% and 18%

respectively. Eighteen additional surveyed EMEA countries also saw quarter-over-quarter declines in average peak connection speeds. Only five countries saw quarterly increases in average peak connection speeds, with growth ranging from 0.1% in Denmark (to 29.9 Mbps) to 19% in Israel.

Looking at year-over-year changes, all of the surveyed countries except for the United Arab Emirates and Italy saw increases. The United Arab Emirates saw a significant (correction-related) 67% decline, while Italy's loss was just 4.9%, but the reason for it was unclear. Among the surveyed EMEA countries that saw year-over-year growth, improvements ranged from just 0.3% in South Africa to 55% in Israel. Just one additional country (Russia) saw year-over-year growth above 30%, while eight more had increases of 20% or more. Only six of the surveyed countries grew less than 10% as compared to the third quarter of 2012, with Portugal's 9.9% quarterly increase coming in just below the threshold. Overall, seeing ongoing strong growth across so many of the surveyed EMEA countries remains an encouraging trend, pointing to continuous improvements in the quality, availability, and affordability of high speed Internet services within the region.

Global Rank	Country/Region	Q3 '13 Peak Mbps	QoQ Change	YoY Change
5	Israel	47.7	19%	55%
6	Romania	45.4	-4.4%	22%
9	Netherlands	39.6	1.9%	29%
10	Belgium	38.5	-3.6%	18%
11	Switzerland	38.4	-7.3%	18%
15	United Arab Emirates	36.0	-6.2%	-67%
16	United Kingdom	35.7	-3.9%	27%
18	Czech Republic	34.8	-1.7%	28%
20	Sweden	33.1	-1.9%	23%
21	Portugal	32.7	-6.6%	9.9%
22	Russia	32.6	6.0%	36%
24	Ireland	31.8	2.8%	20%
26	Hungary	31.1	-14%	3.8%
27	Germany	30.4	-6.7%	17%
29	Austria	30.4	-4.0%	23%
31	Denmark	29.9	0.1%	13%
33	Finland	29.7	-4.2%	19%
34	Norway	28.2	-1.8%	22%
37	Poland	27.7	-10%	11%
40	Slovakia	27.0	-9.3%	3.1%
41	Spain	26.8	-16%	3.1%
51	France	22.1	-8.7%	12%
54	Turkey	20.9	-22%	6.6%
69	Italy	18.2	-22%	-4.9%
133	South Africa	6.8	-18%	0.3%

Figure 31: Average Peak Connection Speed by EMEA Country

7.3 EMEA High Broadband Connectivity

As Figure 32 shows, the Netherlands led the EMEA region in high broadband adoption in the third quarter, as a 45% quarter-over-quarter increase to a 44% adoption rate allowed it to leapfrog former top country Switzerland, which saw a quarterly increase of just 6.7% (to 39% adoption). In addition to these two countries, the Czech Republic and Belgium also had at least one of every three requests to Akamai during the third quarter at speeds of 10 Mbps or above. Ten additional EMEA countries had at least a fifth of their requests made at those speeds, while another six of the surveyed countries had high broadband adoption rates higher than 10%. Only five of the surveyed EMEA countries had less than one-tenth of their connections to Akamai at speeds above 10 Mbps, with South Africa seeing the lowest high broadband adoption rate in the third quarter, at 1.1%, after a surprisingly large 29% quarterly decline. In contrast to this decline, most of the other surveyed countries saw growth in high broadband adoption rates in the third quarter, with improvements ranging from 0.5% in Italy (to 3.7% adoption) to an impressive 75%

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
3	Netherlands	44%	45%	106%
4	Switzerland	39%	6.7%	75%
6	Czech Republic	35%	31%	136%
8	Belgium	34%	36%	117%
10	Denmark	28%	38%	64%
11	United Kingdom	27%	20%	151%
12	Sweden	25%	17%	58%
13	Finland	25%	8.2%	56%
14	Ireland	25%	56%	126%
17	Russia	24%	28%	207%
18	Austria	23%	35%	90%
19	Norway	23%	25%	55%
23	Israel	20%	23%	193%
25	Romania	20%	20%	74%
26	Poland	19%	40%	99%
29	Germany	17%	13%	104%
30	Hungary	15%	34%	83%
31	Spain	14%	66%	174%
32	Slovakia	12%	19%	60%
33	France	12%	75%	188%
36	Portugal	9.9%	43%	104%
40	United Arab Emirates	5.4%	-8.0%	-44%
41	Italy	3.7%	0.5%	40%
47	Turkey	1.7%	23%	215%
49	South Africa	1.1%	-29%	-45%

Figure 32: High Broadband (>10 Mbps) Connectivity by EMEA Country

in France (to 12% adoption). Aside from Italy and Switzerland, Finland was the only other country to see a quarterly increase below 10% — it added 8.2% (to 25% adoption).

Once again, extremely strong year-over-year increases were seen across surveyed EMEA countries. Long-term growth rates greater than 100% were seen in 12 countries, led by a 215% increase in Turkey and a 207% jump in Russia. Ten additional countries grew by more than 50% over the last year, with Italy seeing the smallest year-over-year change, a still impressive 40%. Only the United Arab Emirates and South Africa saw high broadband adoption rates decline in the third quarter, with the United Arab Emirates losing 44%, and South Africa dropping 45%.

Although its high broadband adoption fell just behind the Netherlands in the third quarter, Switzerland may reclaim its top spot among surveyed EMEA countries in the coming quarters. In September, it was reported[31] that Swisscom was trialing 1 Gbps connectivity with 100 of its fiber-to-the-home (FTTH) customers, with a goal of having all of its FTTH customers upgraded by the end of 2013. In addition, Swisscom plans to extend coverage of its 100 Mbps+ broadband service to 2.3 million premises by 2015 through fiber-to-the-building and fiber-to-the-street deployments, as well as new "vectoring" technology.

7.4 EMEA Broadband Connectivity

Switzerland's broadband adoption rate held steady at 90% in the third quarter despite a slight decline, as seen in Figure 33. The Netherlands remained behind Switzerland for this metric, with 87% broadband adoption, and was joined by four other countries in having at least four of every five connections to Akamai at speeds of 4 Mbps or above. An additional 15 surveyed EMEA countries had a broadband adoption rate of at least 50%, while South Africa lagged for this metric as well, as the only country with a broadband adoption rate below 10%, at 7.7% adoption. Quarterly changes among the surveyed countries were somewhat mixed, with increases seen in 17 countries, ranging from 0.6% in the Czech Republic (to 83% adoption) to 25% in Turkey (to 35% adoption). Eight countries saw lower broadband adoption rates quarter-over-quarter, with losses ranging from just 0.3% in Finland (to 67% adoption) to Hungary's 9.7% decline (to 65% adoption).

In addition to once again posting the largest quarter-over-quarter change, Turkey also had, far and away, the largest year-over-year change in broadband adoption, growing 332% from the third quarter of 2012. None of the other surveyed countries saw an increase above 100%, as growth across the other countries ranged from 5.3% in Hungary to 93% in Italy. Similar to the high broadband adoption metric, the United Arab Emirates and South Africa were the only two surveyed EMEA countries to see a yearly decline, with South Africa's broadband adoption rate dropping 12% year-over-year, while adoption in the United Arab Emirates lost 23%.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
2	Switzerland	90%	-0.6%	11%
4	Netherlands	87%	4.6%	6.4%
5	Czech Republic	83%	0.6%	22%
8	Denmark	81%	6.3%	19%
11	Austria	81%	2.3%	39%
12	Israel	80%	7.5%	43%
13	Belgium	78%	1.0%	14%
14	Romania	78%	-1.9%	22%
15	United Kingdom	77%	3.3%	25%
17	Germany	75%	-0.6%	24%
21	Russia	73%	4.7%	40%
22	Spain	71%	10%	55%
23	France	69%	9.7%	45%
25	Poland	67%	11%	45%
27	Finland	67%	-0.3%	13%
30	Ireland	66%	5.8%	31%
32	Hungary	65%	-9.7%	5.3%
33	Portugal	64%	5.1%	22%
34	Sweden	64%	5.4%	28%
38	Slovakia	57%	-2.8%	19%
44	Norway	52%	5.5%	17%
46	Italy	49%	-6.4%	93%
50	United Arab Emirates	43%	4.5%	-23%
55	Turkey	35%	25%	332%
78	South Africa	7.7%	-0.5%	-12%

Figure 33: Broadband (>4 Mbps) Connectivity by EMEA Country

SECTION 8:
Mobile Connectivity

The source data in this section encompasses usage not only from smartphones and tablets, but also laptops and other connected devices that connect to the Internet through mobile (cellular, non Wi-Fi) networks. In addition, this edition of the *State of the Internet Report* once again includes insight into mobile traffic growth contributed by Ericsson, a leading provider of telecommunications equipment and related services to mobile and fixed 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 provider in the third 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 connections with traffic from mobile connections on a single autonomous system, that AS was excluded from the source data set.
- Akamai's EdgeScape database was used for the geographic assignments.

8.1 Connection Speeds on Mobile Networks

In the third quarter of 2013, Russian mobile provider RU-1 retained its spot as the mobile provider with the highest average connection speed, at 9.5 Mbps. Ukrainian provider UA-1 continued to have the second fastest average connection speed among surveyed providers, at 8.7 Mbps. In reviewing the full list of mobile providers in Figure 34, we find that there are a total of 18 providers that had average connection speeds in the "broadband" (>4 Mbps) range, up from 11 providers in the second quarter. A total of 74 surveyed mobile providers had average connection speeds above 1 Mbps, up from 62 in the second quarter. Only providers NC-1 in New Caledonia, AR-2 in Argentina, and ZA-1 in South Africa had average connection speeds below 1 Mbps, with mobile provider ZA-1 once again having the lowest average connection speed, at 0.6 Mbps. Observed quarter-over-quarter increases ranged from just under a tenth of a percent at NZ-2 to an impressive 69% increase at mobile provider US-2. Quarterly declines ranged from 0.2% at Singaporean provider SG-3 to a 39% decline at US-4 in the United States.

Examining the average peak connection speed data for the third quarter of 2013, we find that Russian provider RU-1 had the highest average peak connection speed at 49.8 Mbps, which was 10 Mbps ahead of Malaysian provider MY-2, which had the second highest speed. Italian provider IT-1 was the only other surveyed mobile provider with an average peak connection speed above 30 Mbps, while an additional 21 providers had an average peak speed higher than 20 Mbps. Average peak connection speeds above 10 Mbps were seen at an additional 31 mobile providers. South African mobile provider ZA-1 had the lowest average peak connection speed, at just 2.4 Mbps. Observed quarter-over-quarter increases ranged from just under a tenth of a percent at Spanish provider ES-1 to a jump of 50% at mobile provider HK-1 in Hong Kong. Observed quarterly declines ranged from just 0.2% at Malaysian provider MY-2 to a surprisingly large 64% decline at Greek provider GR-1, in which it gave back the significant gains seen in the prior quarter.

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 highlighted browser usage across PC and mobile devices, connecting via fixed and mobile networks. The original Akamai IO data set came from sampling traffic across several hundred top-tier sites delivering content through Akamai, most of which were focused on a U.S. audience, biasing the data presented in favor of U.S. users. However, the initial release of an updated data source in mid-February 2013 expanded the sample set, providing us with a more global view of the data. Future updates will allow us to provide more detailed insight into browser version trends as well as geography-specific trends. The data and graphs included below are derived from Akamai IO.

Country	ID	Q3 '13 Avg. Mbps	Q3 '13 Peak Mbps
AFRICA			
Egypt	EG-1	1.4	8.4
Morocco	MA-1	1.8	12.6
South Africa	ZA-1	0.6	2.4
ASIA			
China	CN-1	3.5	8.8
Hong Kong	HK-2	4.2	21.4
Hong Kong	HK-1	3.0	28.8
Indonesia	ID-1	1.0	13.7
Kuwait	KW-1	2.6	26.9
Malaysia	MY-3	1.7	11.7
Malaysia	MY-2	3.7	39.8
Pakistan	PK-1	1.5	12.6
Saudi Arabia	SA-1	3.0	28.5
Singapore	SG-3	2.4	12.1
Sri Lanka	LK-1	1.9	15.1
Taiwan	TW-1	3.0	20.0
Taiwan	TW-2	2.0	16.9
Thailand	TH-1	1.3	27.6
United Arab Emirates	AE-1	2.7	16.9
EUROPE			
Austria	AT-1	7.1	26.9
Austria	AT-2	6.9	21.6
Belgium	BE-3	2.7	15.5
Belgium	BE-2	3.1	11.0
Bulgaria	BG-1	2.2	11.6
Czech Republic	CZ-3	6.7	20.4
Czech Republic	CZ-1	1.8	7.6
Czech Republic	CZ-2	1.4	6.3
Estonia	EE-1	1.6	6.9
France	FR-2	3.2	10.5
Germany	DE-1	2.2	9.9
Greece	GR-1	4.4	19.5
Hungary	HU-1	2.0	9.7
Ireland	IE-1	5.1	22.2
Ireland	IE-2	2.4	12.9
Ireland	IE-4	3.3	19.0
Italy	IT-2	3.6	25.6
Italy	IT-3	4.5	19.8
Italy	IT-4	2.9	19.0
Lithuania	LT-2	3.0	18.9

Country	ID	Q3'13 Avg. Mbps	Q3'13 Peak Mbps
Moldova	MD-1	3.4	13.9
Netherlands	NL-2	2.2	6.4
Norway	NO-1	4.8	23.7
Poland	PL-2	4.9	25.4
Poland	PL-4	3.8	26.2
Poland	PL-3	2.3	13.3
Russia	RU-1	9.5	49.8
Russia	RU-4	6.0	27.4
Russia	RU-3	1.1	5.8
Slovakia	SK-2	3.2	28.0
Slovenia	SI-1	2.8	10.7
Spain	ES-1	6.0	26.8
Turkey	TR-1	2.4	13.4
Ukraine	UA-1	8.7	27.4
United Kingdom	UK-2	5.0	26.3
United Kingdom	UK-3	2.9	14.0
United Kingdom	UK-1	2.7	21.0
NORTH AMERICA			
Canada	CA-2	5.8	16.7
United States	US-2	6.4	24.5
United States	US-1	4.4	14.0
United States	US-4	8.4	15.5
United States	US-3	2.1	6.3
OCEANIA			
Australia	AU-3	3.0	16.1
New Caledonia	NC-1	0.9	6.0
New Zealand	NZ-2	2.5	11.2
SOUTH AMERICA			
Argentina	AR-1	1.0	3.9
Argentina	AR-2	0.9	8.0
Bolivia	BO-1	1.3	6.7
Brazil	BR-1	1.1	7.8
Brazil	BR-2	1.7	10.8
Chile	CL-3	1.1	6.1
Chile	CL-4	1.7	12.9
Colombia	CO-1	1.5	7.0
El Salvador	SV-1	2.1	11.0
El Salvador	SV-3	1.8	7.3
Paraguay	PY-2	1.4	6.4
Uruguay	UY-1	1.7	9.7
Venezuela	VE-1	1.3	7.3

Figure 34: Average and Average Peak Connection Speeds by Mobile Provider

Figure 35 illustrates mobile browser usage by users identified to be on cellular networks in the third quarter of 2013.[32] Similar to the prior two quarters, the figure focuses on the usage of Android Webkit, Apple Mobile Safari, and other browsers, designated as "Others" in the graph. As the graph shows, a gap of approximately 15% separated Android Webkit and Apple Mobile Safari through most of the quarter; however, this gap closed somewhat in mid-September, with a solid increase in Mobile Safari usage coinciding with a slight decline in Android Webkit usage. Interestingly, this Mobile Safari increase occurred just ahead of the launch of the iOS7 operating system for Apple's mobile devices. Overall, throughout the quarter, Android Webkit trended to an average of 37.6% of requests, while Apple Mobile Safari saw 23.8% of requests.[33] Other mobile browsers seen on cellular networks in the third quarter included Opera Mini, Google's Chrome Mobile, the Openwave Mobile Browser (integrated with early smartphones),[34] Access Netfront (used on Android devices),[35] the BlackBerry browser, and Microsoft Internet Explorer Mobile, among others.[36]

Expanding the data set to include all networks[37] (not just those identified as "cellular"), we again see (as in the prior two quarters) a pronounced, and fairly consistent, gap between usage of Android Webkit and Apple Mobile Safari. As shown in Figure 36, usage of Apple Mobile Safari was approximately 50% higher than that of Android Webkit at the start of the quarter,

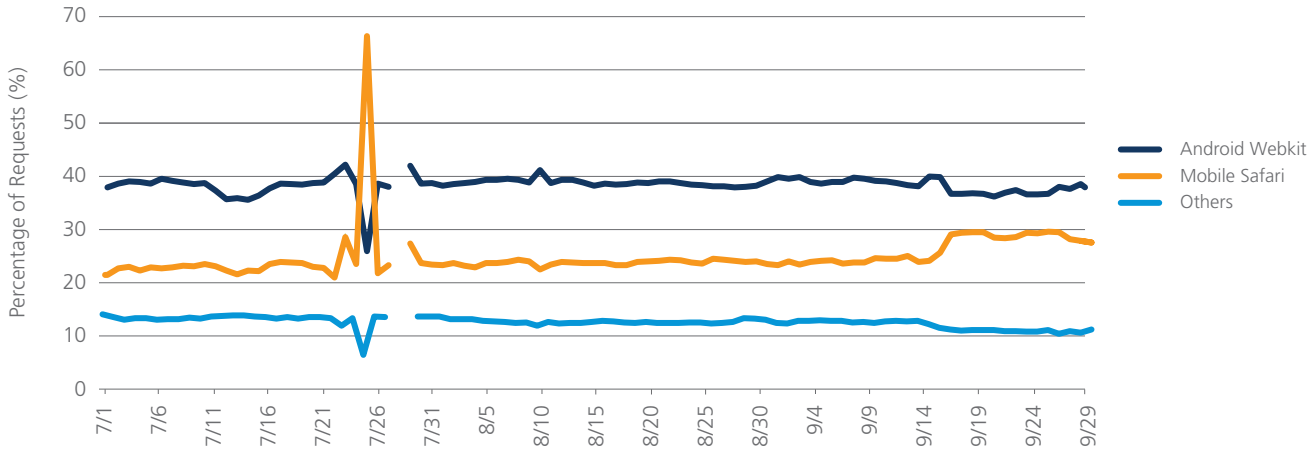

Figure 35: Mobile Browsers Seen Across Cellular Networks, Q3 2013

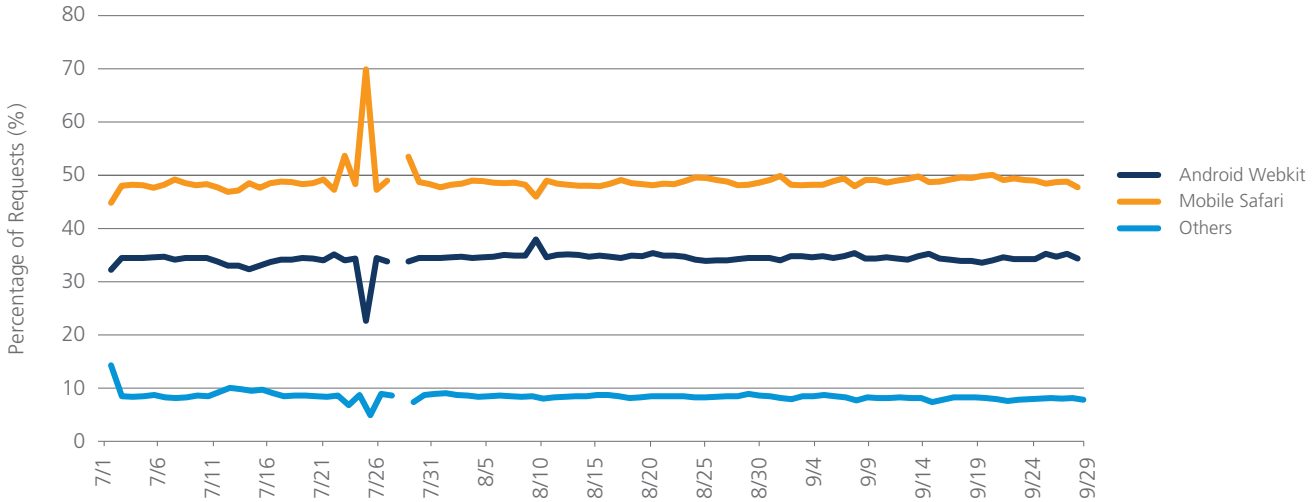

Figure 36: Mobile Browsers Seen Across All Networks, Q3 2013

although the gap gradually narrowed to approximately 40% by the end of the quarter. Usage of "other" browsers remained relatively consistent around 8% throughout the quarter. Averaged across the entire quarter, Apple Mobile Safari accounted for 47.3% of usage, while Android Webkit was responsible for a third of overall usage.[38]

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 Ericsson 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 37, the volume of mobile data traffic increased by 80% from the third quarter of 2012 to the third quarter of 2013, and grew around 10% between the second and third quarter of 2013. Mobile voice traffic shows a more flat progression.

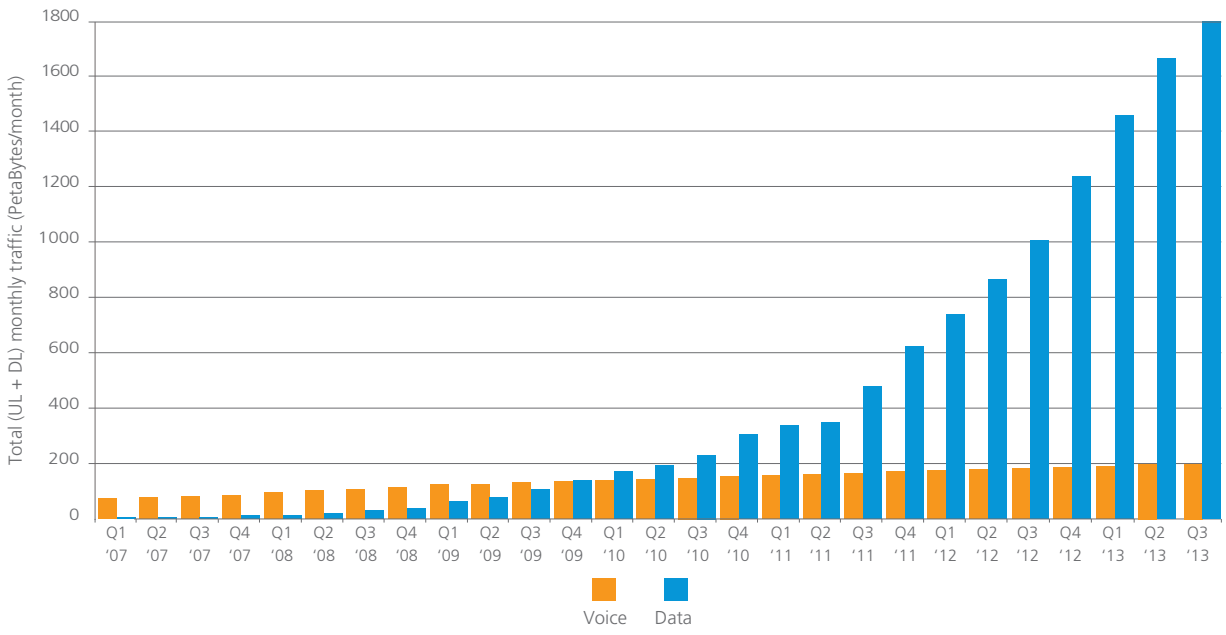

Figure 37: Total Monthly Mobile Voice and Data as Measured by Ericsson

Situational Performance

In June 2013, Akamai announced[39] the latest release of its Aqua Ion solution, which is designed to meet the unique challenges of optimizing both the desktop and mobile Web experience. This need to optimize differently for each situation presented by an individual user, known as "situational performance", requires new thinking about how to measure the user experience and apply this insight to the delivery process as seamlessly and efficiently as possible.

One component of the Aqua Ion service is a capability known as Real User Monitoring (RUM). RUM takes passive performance measurements from actual users of a Web experience to provide insight into performance across devices and networks. The intelligence gained through the use of RUM offers key insight to content providers who can respond accordingly—and deliver smarter optimizations—when challenges are uncovered. RUM is a complementary capability to synthetic testing, and the two can and should be used to gain a comprehensive picture of user experience.

A selected set of Akamai customers has implemented RUM across their sites and applications, and Akamai has been gathering data for these customers over the last several months. Given the growing importance of situational performance, we thought that it would be valuable to begin sharing some of our insight with the larger community. Note that there are a couple of different RUM measurement methodologies. The first is using what is known as "navigation timing"[40] ("navtiming"), which allows JavaScript to collect page load time component information directly from the user agent (browser) through an API. The second is to use a framework for timing Web pages, like Web Episodes,[41] which leverages JavaScript events such as "onload". While navtiming is the preferred methodology for collecting RUM measurements, note that not every user agent supports it at this time. The chart at *http://caniuse.com/nav-timing* illustrates Navigation Timing API support across the leading user agents. One key observation is the current lack of support in Apple's Safari browser, both on OSX and iOS. In addition, Android only added support starting with version 4.0 of the operating system, and Microsoft's Internet Explorer only added support in version 9 of the browser.

Figure 38 shows average page load times for users on both broadband and mobile connections, based on Akamai's RUM capabilities. The underlying data was collected with navtiming, so as noted above, it does not include measurements from users of Safari on iOS devices or OSX systems, users on older versions of Android, or users on older versions of Internet Explorer. The countries included within the table were selected based on several criteria, including the availability of measurements from users on networks identified as broadband as well as networks identified as mobile, and more than 90,000 measurements (1,000 per day, on average) from mobile networks having been made across the quarter. Note that this is the first time that RUM measurements have been included within the *State of the Internet Report*, so these criteria are subject to change in the future.

Continent	Country	Avg. Page Load Time-Broadband	Avg. Page Load Time-Mobile	Mobile Penalty
Asia	China	4121 ms	4141 ms	1.0x
Asia	India	5887 ms	8705 ms	1.5x
Asia	Japan	1798 ms	2992 ms	1.7x
Asia	Malaysia	4586 ms	6391 ms	1.4x
Europe	Italy	2850 ms	3820 ms	1.3x
Europe	U.K.	3481 ms	5285 ms	1.5x
N. America	U.S.	2794 ms	4410 ms	1.6x
S. America	Brazil	6086 ms	12304 ms	2.0x
S. America	Chile	4616 ms	7121 ms	1.5x

Figure 38: Average Page Load Times Based on Real User Monitoring

In reviewing the average page load time measurements for broadband users shown in Figure 38, it is interesting to note that if rank ordered from lowest to highest, there is a rough correlation between the position of the country in this table and its global ranking for average and average peak connection speeds. That said, both Italy and India fall higher in this table than would be expected. In comparing the average broadband page load times to those observed on mobile, we find a broad variance in what we've dubbed the "mobile penalty"—that is, how much slower does a page load for mobile users than for users on a broadband connection? In China, the average load times were essentially equivalent, with mobile pages only 20ms slower. Brazil, in contrast, saw average mobile page load times approximately twice those seen for pages loaded on a broadband connection.

As more customers integrate Akamai's RUM capabilities, and as more devices support the Navigation Timing API, we expect that we will be able to expand the scope of the Situational Performance measurements presented within future issues of the *State of the Internet Report.*

Internet Disruptions & Events

10.1 Syria

Disruptions to Internet connectivity within Syria have been covered in previous issues of the *State of the Internet Report*, and the third quarter of 2013 was no different, as connectivity within the country experienced several problems during the quarter, though the observed issues were only minutes long, as opposed to the multi-hour and multi-day problems seen in prior quarters.

At just before 9:00 AM UTC on July 18, Internet connectivity in Syria experienced a six-minute outage, with access returning at 9:04 AM UTC.[42] As shown in Figure 39, this caused Akamai HTTP traffic to users in Syria to drop to zero during the duration of the outage. (The figure also shows a sharp momentary drop in traffic around 6:15 AM UTC—it is unclear what caused this drop or whether it was related to the later outage.)

About two and one-half weeks later, Syrian users experienced another brief interruption in Internet connectivity,[43] as Figure 40 illustrates. At just before noon UTC, Akamai HTTP traffic to users in the country dropped to zero for a period of approximately five minutes, but traffic quickly returned to normal levels.

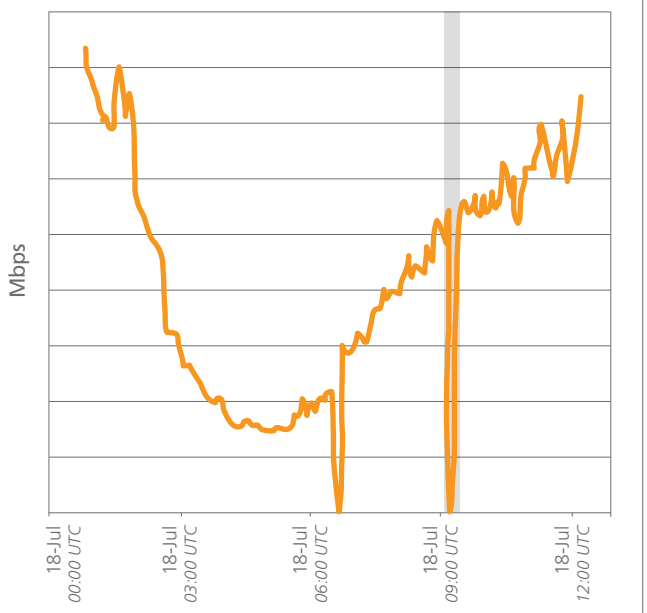

Figure 39: HTTP Traffic Served to Syria, July 18, 2013

As has been noted in the past, nearly all of the Internet traffic to/from Syria goes through networks controlled by the Syrian Telecommunications Establishment, which is affiliated with the Syrian government.[44] As such, actions taken by the Syrian Telecommunications Establishment, whether intentional or not, can easily sever Syria's Internet connections to the rest of the world.

10.2 Myanmar

In late July, Internet connectivity to Myanmar (Burma) was impacted by a problem with the SEA-ME-WE3 (SMW3) submarine cable. According to a published report,[45] the cable was cut on July 22 at approximately 5:00 PM, which forced the country to rely on a terrestrial cable, cutting capacity in half. Before the cut, it was estimated[46] that 800,000 users share 14 Gbps of capacity. As Figure 41 shows, the volume of Akamai HTTP traffic delivered to users in the country saw a significant dip around the time of the reported cut and, starting on July 24,

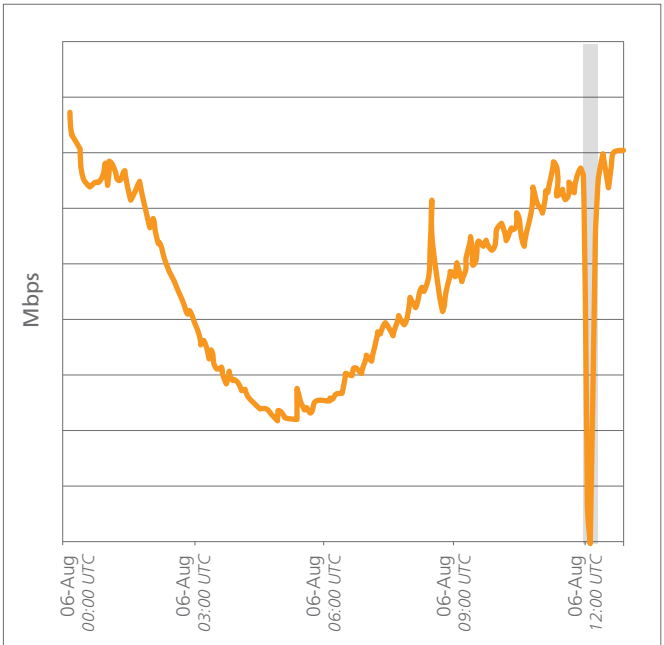

Figure 40: HTTP Traffic Served to Syria, August 6, 2013

a clear reduction in daily traffic levels for approximately a week. It was reported[47] on July 31 that repairs to the cable had been completed the previous day, which coincides with traffic levels beginning to return to normal, as shown in Figure 41.

However, less than a week later, Internet connectivity to the country suffered an hour-long disruption on August 5. As Figure 42 shows, Akamai HTTP traffic delivered to users in the country dropped to zero at approximately 2:00 AM UTC, recovering just after 3:00 AM UTC. According to a published report,[48] the chief engineer of the Information and Technology Department at the state-run Myanmar Posts and Telecommunications (MPT) said that the disruption was due to the compromise of an underground fiber-optic cable near the Irrawaddy Delta city of Pyapon, with damage to the cable in one location, and a failed power supply in another.

10.3 Sudan

On September 25, at approximately 10:00 AM UTC, Akamai HTTP traffic delivered to users in Sudan declined sharply. After a slight two-hour recovery that occurred just after noon, traffic levels remained near zero until approximately 10:00 AM UTC on September 26, as seen in Figure 43. According to Internet monitoring firm Renesys, the differences in the timing of outages seen across the primary network service providers in Sudan "implies that this event was not caused by a single catastrophic technical failure, but strongly suggests a coordinated action to remove Sudan from the Internet."[49] It is worth noting that the disruption to Internet service within the country occurred in the midst of several days of violent anti-government protests and riots in the capital city of Khartoum.

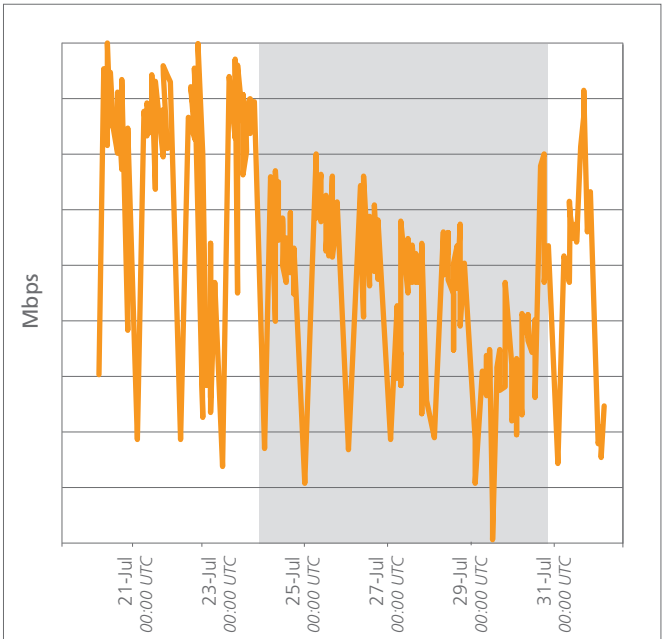

Figure 41: HTTP Traffic Served to Myanmar, July 20 - August 1, 2013

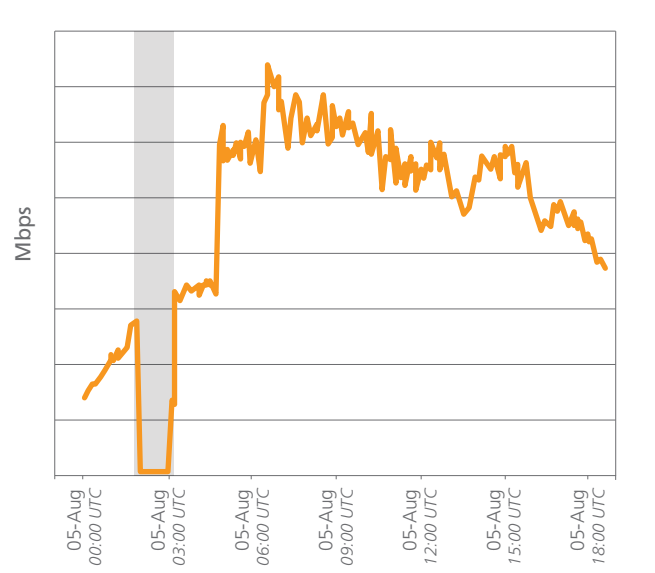

Figure 42: HTTP Traffic Served to Myanmar, August 5, 2013

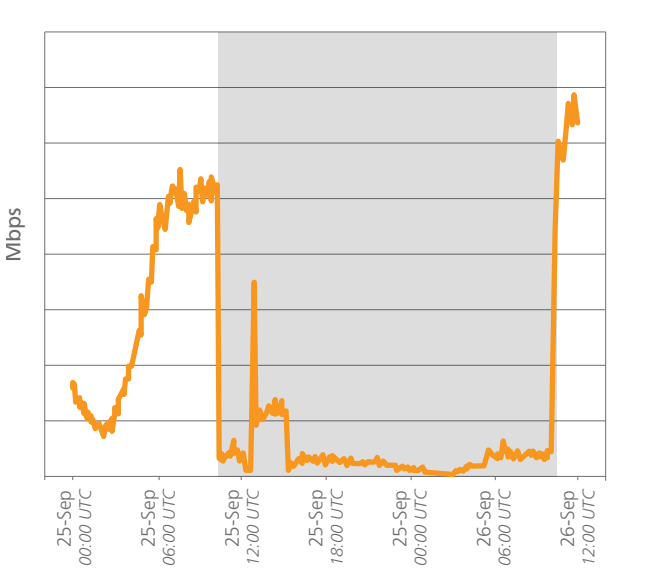

Figure 43: HTTP Traffic Served to Sudan, September 25-26, 2013

Region	% Attack Traffic	Unique IP Addresses	Avg. Connection Speed (Mbps)	Peak Connection Speed (Mbps)	% Above 10 Mbps*	% Above 4 Mbps*
Europe						
Austria	<0.1%	2,617,990	9.3	30.4	23%	81%
Belgium	<0.1%	4,668,675	9.7	38.5	34%	78%
Czech Republic	0.1%	1,854,322	11.3	34.8	35%	83%
Denmark	<0.1%	2,907,011	9.2	29.9	28%	81%
Finland	<0.1%	2,775,879	8.5	29.7	25%	67%
France	0.5%	27,164,647	6.5	22.1	12%	69%
Germany	0.9%	36,792,239	7.6	30.4	17%	75%
Greece	<0.1%	3,181,604	4.6	21.3	2.9%	45%
Hungary	0.8%	3,103,967	6.7	31.1	15%	65%
Iceland	<0.1%	168,829	7.5	31.9	14%	67%
Ireland	<0.1%	1,786,084	9.6	31.8	25%	66%
Italy	0.7%	19,173,868	4.9	18.2	3.7%	49%
Luxembourg	<0.1%	165,112	6.4	23.6	8.3%	74%
Netherlands	0.5%	9,036,140	12.5	39.6	44%	87%
Norway	<0.1%	3,789,628	8.3	28.2	23%	52%
Poland	0.5%	8,570,969	7.4	27.7	19%	67%
Portugal	0.1%	3,458,370	5.9	32.7	9.9%	64%
Romania	1.7%	2,862,979	7.8	45.4	20%	78%
Russia	2.6%	17,597,927	7.8	32.6	24%	73%
Slovakia	<0.1%	1,054,468	6.8	27.0	12%	57%
Spain	0.4%	13,668,278	6.9	26.8	14%	71%
Sweden	0.3%	6,893,485	9.3	33.1	25%	64%
Switzerland	0.1%	3,491,000	11.6	38.4	39%	90%
Turkey	1.0%	9,811,602	4.0	20.9	1.7%	35%
United Kingdom	0.7%	29,142,389	9.1	35.7	27%	77%
Asia/Pacific						
Australia	0.2%	9,096,235	5.5	30.1	8.1%	51%
China	35%	115,336,684	2.9	11.3	1.1%	20%
Hong Kong	0.8%	3,024,811	12.5	65.4	38%	81%
India	1.9%	18,371,345	1.4	9.0	0.3%	3.0%
Indonesia	20%	5,804,419	1.5	9.7	0.1%	1.8%
Japan	0.8%	40,008,677	13.3	52.0	49%	83%
Malaysia	0.2%	2,137,032	3.2	24.9	2.1%	27%
New Zealand	<0.1%	2,134,518	5.1	20.5	6.2%	54%
Singapore	0.1%	1,566,346	7.8	50.1	20%	68%
South Korea	1.2%	21,169,590	22.1	63.6	70%	93%
Taiwan	5.2%	12,024,858	8.0	42.7	21%	61%
Vietnam	0.8%	5,296,163	2.0	11.4	0.1%	4.1%
Middle East & Africa						
Egypt	0.3%	3,936,098	1.2	9.0	0.1%	0.7%
Israel	0.3%	2,245,183	8.3	47.7	20%	80%
Kuwait	0.1%	850,818	2.8	36.4	0.8%	8.0%
Saudi Arabia	0.1%	4,094,599	2.8	14.5	0.1%	9.1%
South Africa	0.1%	6,496,136	2.3	6.8	1.1%	7.7%
Sudan	<0.1%	382,524	2.0	7.3	<0.1%	2.7%
Syria	<0.1%	667,681	1.5	8.0	0.1%	1.6%
United Arab Emirates (UAE)	0.1%	1,498,314	4.5	36.0	5.4%	43%
Latin & South America						
Argentina	0.5%	7,397,954	2.8	15.9	0.9%	18%
Brazil	2.1%	34,298,144	0.5	16.7	0.9%	20%
Chile	0.2%	4,264,760	3.3	17.2	1.1%	24%
Colombia	0.3%	7,666,915	3.0	15.4	0.5%	18%
Mexico	0.5%	11,635,802	3.9	17.1	1.7%	33%
Peru	<0.1%	1,276,731	2.4	13.2	0.1%	3.6%
Venezuela	1.1%	3,333,533	1.5	8.0	0.1%	1.5%
North America						
Canada	0.4%	13,994,116	8.8	34.8	24%	82%
Costa Rica	<0.1%	437,121	2.1	10.0	0.5%	4.2%
United States	11%	158,501,183	9.8	37.0	34%	75%

SECTION 12:
Endnotes

[1] https://isc.sans.edu/port.html?port=1998, Start Date: 2013-07-01, End Date: 2013-09-30
[2] http://www.infosecurity-magazine.com/view/34149/syrian-electronic-army-hacks-sharethis-godaddy-domain/, http://www.eweek.com/security/syrian-electronic-army-goes-after-sharethis.html, http://www.huffingtonpost.com/2013/08/28/melbourne-it-hacker_n_3829593.html
[3] http://www.globaltimes.cn/content/804680.shtml#.Up4mfBCPWjd
[4] https://www.arin.net/knowledge/rirs.html
[5] https://www.arin.net/announcements/2013/20130801.html
[6] http://www.potaroo.net/tools/ipv4
[7] http://www.apnic.net/publications/research-and-insights/geoff-huston
[8] https://twitter.com/ipv4countdown/status/381953597610934272
[9] https://twitter.com/ipv4countdown/status/381583660144943104
[10] http://whois.domaintools.com/154.80.0.0
[11] http://www.outsideheaven.com/uk
[12] http://whois.domaintools.com/105.112.0.0
[13] http://www.africa.airtel.com/wps/wcm/connect/africarevamp/nigeria/home/about
[14] http://whois.domaintools.com/179.72.0.0, http://whois.domaintools.com/179.76.0.0
[15] http://whois.domaintools.com/179.80.0.0, http://whois.domaintools.com/179.84.0.0, http://whois.domaintools.com/179.88.0.0, http://whois.domaintools.com/179.92.0.0
[16] http://whois.domaintools.com/23.192.0.0
[17] https://blogs.akamai.com/2013/06/world-ipv6-launch-anniversary-measuring-adoption-one-year-later.html
[18] https://labs.ripe.net/Members/emileaben/hampered-eyeballs
[19] http://www.google.com/ipv6/statistics.html#tab=per-country-ipv6-adoption
[20] https://blogs.akamai.com/2013/06/world-ipv6-launch-anniversary-measuring-adoption-one-year-later.html
[21] http://www.worldipv6launch.org/measurements/
[22] http://www.networkworld.com/news/2009/061009-verizon-lte-ipv6.html
[23] http://www.akamai.com/html/about/press/releases/2013/press_032713.html
[24] http://bbpmag.com/wordpress2/2013/07/mac-offers-first-chicago-apartments-with-gigabit-speeds/
[25] http://news.yahoo.com/tiny-minnesota-town-becomes-latest-gigabit-fiber-024554796.html
[26] http://www.att.com/gen/press-room?pid=24734&cdvn=news&newsarticleid=36934
[27] http://circle.cspire.com/blogs/speedoflight/2013/09/24/c-spire-announces-breakthrough-fiber-to-the-home-initiative
[28] http://www.zdnet.com/slow-internet-could-become-legal-in-brazil-7000018690/
[29] http://www.cbc.ca/news/technology/ultrafast-internet-service-launched-by-vancouver-startup-1.1382430
[30] http://www.cbc.ca/news/technology/small-alberta-town-gets-massive-1-000-mbps-broadband-boost-1.1382428
[31] http://www.zdnet.com/swisscom-planning-1gbps-fibre-rollout-this-year-7000020652/
[32] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=line&start=20130701&end=20130930&net=m&hide=opera%20mini+docomo+chrome%20mobile
[33] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=pie&start=20130701&end=20130930&net=m
[34] http://www.prnewswire.com/news-releases/openwave-announces-mobile-browser-integration-for-qualcomms-brew-solution-56049422.html
[35] http://en.wikipedia.org/wiki/NetFront
[36] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=15&type=pie&start=20130701&end=20130930&net=m
[37] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=line&start=20130701&end=20130930&net=both
[38] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=pie&start=20130701&end=20130930&net=both
[39] http://www.akamai.com/html/about/press/releases/2013/press_061113.html
[40] http://www.w3.org/TR/navigation-timing/
[41] http://stevesouders.com/episodes/
[42] https://twitter.com/renesys/status/357862591424516096
[43] https://twitter.com/bgpmon/status/364731789866041344
[44] http://en.wikipedia.org/wiki/Syrian_Telecom
[45] http://www.mizzima.com/mizzima-news/myanmar/item/9735-broken-underwater-cable-plays-havoc-with-myanmar-internet
[46] http://irneasia.net/2013/07/bandwidth-famine-threatens-myanmars-mobile-future/
[47] http://www.irrawaddy.org/investment/fiber-fix-brings-burmas-internet-back-up-to-speed.html
[48] http://www.irrawaddy.org/investment/burmas-internet-delays-continue-ahead-of-88-uprising-anniversary.html
[49] http://www.renesys.com/2013/09/internet-blackout-sudan/

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