Akamai
FASTER FORWARD

VOLUME 5, NUMBER 2

The State of the Internet

2ND QUARTER, 2012 REPORT

INCLUDES INSIGHT ON MOBILE TRAFFIC AND CONNECTED DEVICES FROM ERICSSON

Letter From the Editor

After the success of 2011's World IPv6 Day event, the Internet Society organized the World IPv6 Launch event in June 2012, promoting it with the tag line "This Time It Is For Real". The associated Web site (http://www.worldipv6launch.com) noted "Major Internet service providers (ISPs), home networking equipment manufacturers, and Web companies around the world are uniting to redefine the global Internet and permanently enable IPv6 for their products and services on 6 June 2012." By all indications, this year's event was a success as well, and it came none too soon, as September saw RIPE, the European Internet registry, announce that they were down to their final "/8" block (~16 million) of IPv4 addresses, and ARIN, the regional Internet registry for the Americas, announce that they only had three "/8" blocks remaining. It is critical that service providers, equipment manufacturers, and content providers continue planning for a long-term transition to IPv6 while enabling support for it now.

The state of broadband connectivity in the United States also continued to be a key area of government focus during the second quarter. The United States Federal Communications Commission (FCC) released a report that examined how the country's ISPs fared when actual download speeds were compare to advertised download speeds. In addition, President Obama signed an executive order intended to "ensure that agencies charged with managing Federal properties and roads take specific steps to adopt a uniform approach for allowing broadband carriers to build networks on and through those assets and speed the delivery of connectivity to communities, businesses, and schools." The White House also announced the "US Ignite" partnership between cities, corporate and non-profit entities, and national research universities, charged with developing new services to take advantage of high-speed broadband networks. At a state level, based on interactions that I have had with various folks working on "local" efforts, a lot of attention is being paid to connection speeds and broadband adoption within the states (and how to improve it, of course), not to mention concern about how a given state compares to other similar/neighboring states.

Going forward, as IPv6 adoption increases, broadband connectivity (in the U.S. and around the world) continues to improve, and new applications are developed to take advantage of this improved connectivity, Akamai stands ready to help customers, partners, and end users exploit these advantages to their fullest potential, ensuring optimal delivery speeds and unmatched scalability. And with this increased usage will come a wealth of additional data that we will be able to aggregate, analyze, and present in outlets such as the *State of the Internet* report and Akamai IO.

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

–David Belson

Table of Contents

Executive Summary

Akamai's globally distributed Intelligent Platform allows us to gather massive amounts of information on many metrics, including connection speeds, attack traffic, network connectivity/availability/latency problems, and IPv6 growth/transition progress, as well as traffic patterns across leading Web sites and digital media providers. Each quarter, Akamai publishes the *State of the Internet* report. This report includes data gathered from across the Akamai Intelligent Platform during the second quarter of 2012 about attack traffic, broadband adoption, and mobile connectivity, as well as trends seen in this data over time. In addition, this quarter's report includes insight into SSL, the state of IPv6 adoption as measured by Hurricane Electric and the World IPv6 Launch event, and observations from Akamai partner Ericsson regarding variations observed in mobile traffic patterns by screen resolution and screen size.

Security

During the second quarter of 2012, Akamai observed attack traffic originating from 188 unique countries/regions. China remained the top attack traffic source, once again responsible for 16% of total observed attack traffic. The United States and Turkey held the second and third place spots respectively, accounting for just under 20% of observed attack traffic combined. Attack traffic concentration declined from the first quarter of 2012, with the top 10 ports seeing 62% of observed attack traffic. In June, unnamed attackers disclosed nearly 10.5 million passwords after compromising three leading Web sites that were not using a technique known as "salted hashing" for securely storing encrypted passwords, meaning that the compromised password files were much more vulnerable than they should have been.

Internet and Broadband Adoption

Akamai observed a 0.1% quarterly decrease in the number of unique IPv4 addresses connecting to Akamai, falling to just over 665 million, just less than one million fewer addresses than were seen in the first quarter. Looking at connection speeds, the global average connection speed grew 13% to 3.0 Mbps, and the global average peak connection speed grew 19% to 16.1 Mbps. At a country level, South Korea had the highest average connection speed at 14.2 Mbps, while Hong Kong recorded the highest average peak connection speed, at 49.2 Mbps. As was noted in last quarter's report, Akamai is now defining "high broadband" as connections of 10 Mbps or higher and "broadband" as connections of 4 Mbps or higher. Globally, high broadband (>10 Mbps) adoption dropped 1.6% in the second quarter, staying at 10%, and South Korea continued to have the highest level of high broadband adoption, at 49%. Global broadband (>4 Mbps) adoption dropped 2.8% to 39%, with South Korea having the highest level of broadband adoption, at 84%. Note that starting with last quarter's report, we are no longer including figures for narrowband (<256 kbps) adoption, nor city-level data.

Mobile Connectivity

In the second quarter of 2012, average connection speeds on known mobile network providers ranged from a high of 7.5 Mbps down to 340 kbps. Average peak connection speeds for the quarter ranged from 44.4 Mbps down to 2.5 Mbps. Based on data collected by Ericsson, mobile data traffic doubled from the second quarter of 2011 to the second quarter of 2012, and grew 14% quarter-over-quarter.

Analysis of Akamai IO data collected in June of a sample of requests to the Akamai Intelligent Platform indicates that for users of mobile devices on cellular networks, the largest percentage of requests (~38%) comes from Android Webkit, with Apple's Mobile Safari close behind (~33%). However, for users of mobile devices across all networks, Apple's Mobile Safari accounts for approximately 60% of requests, indicating that significantly more users of iOS devices use these devices on Wi-Fi networks—heavily driven by iPad usage.

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. (Ports are network-level protocol identifiers.) This section provides insight into port-level attack traffic, as observed and measured by Akamai, during the second quarter of 2012. It also provides insight into trends related to the usage of client-side ciphers for SSL connections to Akamai, as well observations on password hash disclosures that occurred on a number of large Web sites during the second quarter.

1.1 Attack Traffic, Top Originating Countries

During the second quarter of 2012, Akamai observed attack traffic originating from 188 unique countries/regions, up from 182 in the prior quarter. As shown in Figure 1, China remained the source of the largest volume of observed attack traffic, accounting for approximately 16% of the total, consistent with the first quarter. The United States saw a slight quarterly increase, originating 12% of observed attacks in the second quarter. Nine of the top 10 countries remained consistent quarter-over-quarter, with the exception of Germany, which ceded its place on the list to Italy this quarter. Six of the top 10 countries saw quarterly growth in the associated percentage of observed attack traffic, while three saw a quarterly decline.

In examining the regional distribution of observed attack traffic in the second quarter, we found that nearly 38% originated in the Asia Pacific/Oceania region, just over 36% in Europe, 23% in North and South America, and just under 3% from Africa. The Asia Pacific/Oceania region was the only one where attack traffic concentration declined quarter-over-quarter.

1.2 Attack Traffic, Top Ports

As shown in Figure 2, attack traffic concentration among the top 10 ports declined during the second quarter of 2012, with these ports responsible for 62% of observed attacks, down from 77% last quarter, and consistent with the level seen in the fourth quarter of 2011. It appears that this decline is largely attributable to the significant decline in the percentage of attacks targeting Port 445, after an unusually large increase last quarter.

In addition to the decrease seen in the percentage of attacks targeting Port 445, decreases were also seen for Port 23, Port 1433, Port 3389, Port 80, Port 22, and Port 4899. The average relative decline seen across these ports was on the order of 25%. Port 8080 saw the greatest increase quarter-over-quarter, jumping over 200% (but still the target of less than 2% of observed attacks), with Port 135 and Port 139 also seeing quarterly increases. Research does not indicate the discovery of any new attacks or vulnerabilities during the quarter that would account for the doubling of Port 8080-targeted attacks.

	Country	Q2 '12 % Traffic	Q1 '12 %
1	China	16%	16%
2	United States	12%	11%
3	Turkey	7.6%	5.7%
4	Russia	6.3%	7.0%
5	Taiwan	5.4%	5.3%
6	Brazil	4.6%	4.0%
7	Romania	3.5%	3.0%
8	India	2.9%	3.0%
9	Italy	2.1%	1.9%
10	South Korea	2.1%	4.3%
–	Other	37%	39%

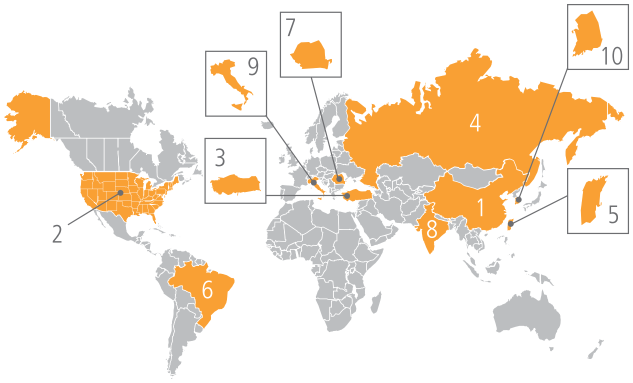

Figure 1: Attack Traffic, Top Originating Countries

Port	Port Use	Q2 '12 % Traffic	Q1 '12 %
445	Microsoft-DS	32%	42%
23	Telnet	9.2%	11%
1433	Microsoft SQL Server	4.5%	4.9%
3389	Microsoft Terminal Services	4.2%	4.6%
80	WWW (HTTP)	3.8%	5.0%
22	SSH	2.2%	3.4%
8080	HTTP Alternate	1.9%	0.6%
135	Microsoft-RPC	1.9%	1.6%
4899	Remote Administrator	1.2%	1.6%
139	NetBIOS	1.0%	0.8%
Various	Other	38%	–

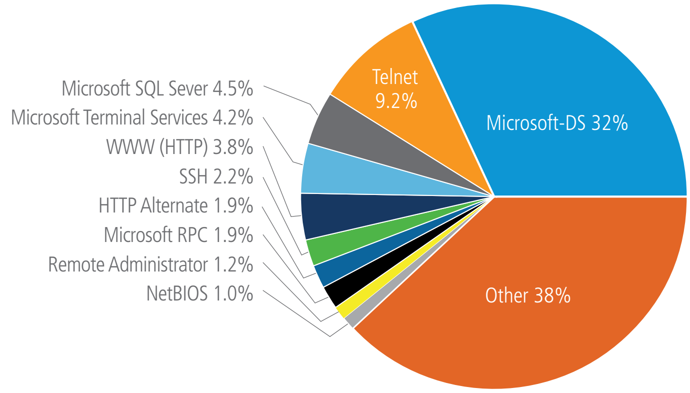

Figure 2: Attack Traffic, Top Ports

Port 445 remained the most targeted port in eight of the top 10 countries, accounting for as many as 85 times (in Romania) the number of attacks seen by the next most targeted port. Once again, Port 23 remained the most targeted port in observed attacks originating in Turkey, with seven times as many attacks targeting that port than Port 445, the next most targeted port. In China, Port 1433 remained the most targeted port, with 1.7 times as many attacks targeting that port as Port 3389, the next most targeted port for attacks observed to be originating from the country. Port 23 was the most common second-most targeted port, ranking second in India, South Korea, Taiwan, and the United States potentially indicating the prevalence of malware in these countries that attempts to exploit default or common passwords on remotely accessible systems that would allow attackers to gain access to these systems.

1.3 SSL Insight, Client-Side Ciphers

In addition to the large number of requests for content that Akamai serves over HTTP (Port 80), the Akamai Intelligent Platform also services millions of requests per second for secure content over HTTPS/SSL (Port 443). This massive volume of encrypted traffic provides Akamai with a unique perspective on the client-side SSL ciphers that are in popular use, as well as their usage trends over time. The statistics presented in this section are for SSLv3 and TLSv1.

Figure 3 illustrates the distribution of SSL ciphers presented by Web clients (generally browsers) to Akamai's Secure Content Delivery Network during the second quarter of 2012. Once again, the shifts in usage trends varied from those observed in prior quarters. As shown in the figure, it appears that usage of the RC4-MD5-128 cipher grew significantly during the quarter, including an unusual bump seen throughout May. Usage of this cipher increased from 10.3% at the start of the quarter, to 14.8% at the end of the quarter—an increase of 44%. Usage of other ciphers declined across the course of the quarter, with RC4-SHA-128 losing the most, declining from 3.7% to 3.2%—a loss of just over 14%. Usage of AES-256-SHA-1 once again declined slightly, losing 2.9% to end the quarter at 43.8% usage. AES128-SHA-1 also lost some ground in the second quarter, dropping 6.6% to 36.3% usage. Despite the declines, these two ciphers are still responsible for 80% of the ciphers presented to Akamai servers.

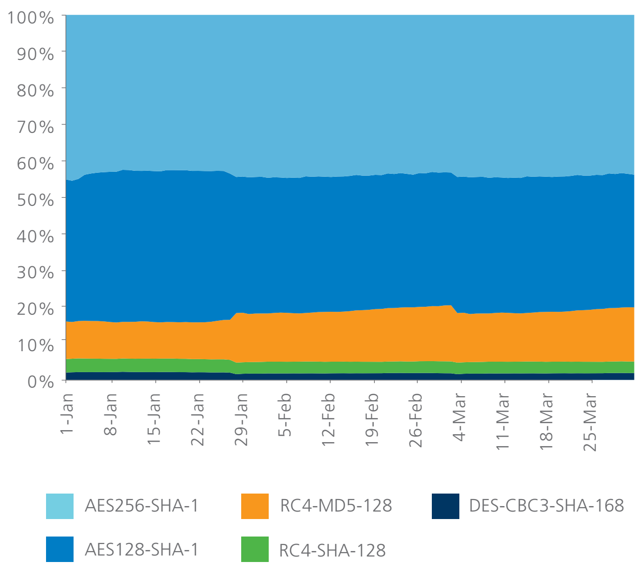

Figure 3: Client-Side SSL Ciphers Observed by Akamai, Q2 2012

On the server side, a nonprofit organization known as the Trustworthy Internet Movement has started publishing the results of scans of the HTTPS implementations on Web sites included in Alexa's list of the top one million sites, in an initiative known as "SSL Pulse".[1] The idea behind the SSL Pulse initiative, according to its Web site, is to focus on auditing the SSL ecosystem, raising awareness, and providing tools and documentation to Web site owners so they can improve their SSL implementations. We hope to include data and observations from SSL Pulse's measurements in upcoming issues of the *State of the Internet* report in order to provide a more comprehensive picture of the state of SSL usage on both Web clients and Web servers.

1.4 Password Hash Disclosures

On June 6th, 2012, it was discovered that 6.5 million password hashes from social networking site LinkedIn had been revealed by hackers, and that some 300,000 of these hashes had already been compromised. Later the same day, it was revealed that 1.5 million password hashes from online dating site eHarmony had also been posted to the Internet. The final member of this list, music site Last.fm, revealed that it had discovered a file containing 2.5 million password hashes of their own the week before. In total, unnamed attackers had disclosed nearly 10.5 million passwords from these three companies in the span of a week.

A hash, or message digest, is a one-way encryption algorithm that allows the original data to be verified, but makes it impossible to decrypt to find the original value of the data. In other words, a password can be hashed, and when the password is used again, it can be verified against the hash, but it is impossible to decrypt the hash to find the original password.

Hashes are used extensively on Web sites to protect passwords and maintain the integrity of the password files without exposing the actual password. Hashes can be broken, but to do so, requires methods such as dictionary or brute force attacks that hash words and random characters in order to find collisions with the hashed data. Dictionary attacks use common words in the hash function to find the collisions with the encrypted passwords and are quite fast. Brute force attacks use strings of random characters to find collisions with stronger passwords, but can be quite time and computing power intensive.

Examples of commonly used hashing algorithms include 'Secure Hashing Algorithm 1' or SHA-1, used by LinkedIn, and the slightly older and less secure Message Digest 5 or MD5, used by Last.fm and eHarmony. A well-implemented password hashing function includes what is called a 'salt', which is a series of random characters that are prepended to the password in order to greatly increase the amount of time and computing power required to find collisions with the hashed passwords. Unfortunately, none of the companies whose passwords were compromised were using salted hashes, meaning their compromised password files were much easier to find collisions in than they should have been.

All three companies have since implemented salt in their hashing functions for passwords, and have implemented 'additional security features', though the exact nature of these security measures has yet to be disclosed. One of the largest concerns with these compromises is that many users re-use passwords across many sites, for example using the same password for a site like eHarmony as they use for their banking site. The exposure of the password for one site may lead to a compromise of a completely unrelated site due to bad end-user password practices. Users of the affected sites were notified and asked to change their passwords, but many who are already overloaded by e-mail may have missed the notifications, or assumed the notifications were simply spam.

An ancillary concern from these compromises is the amount of user information that may have been compromised along with the passwords. Both LinkedIn and eHarmony have large amounts of very personal data about their users, and this data can be used to craft highly targeted phishing campaigns or to answer user security questions on other sites.

None of the three companies, LinkedIn, Last.fm or eHarmony, have disclosed much information on the nature of how they were compromised. Security researchers and hackers have used various tools to discover all of the passwords that were contained in these files, so it is important for users to verify that they have changed their passwords. Since password re-use is common, it is important for users to look at using password vault software to help create and store strong passwords, rather than reusing the same ones repeatedly.

SECTION 2: Internet Penetration

2.1 Unique IPv4 Addresses

Through its globally-deployed Intelligent Platform, and by virtue of the approximately two trillion requests for Web content that it services on a daily basis, Akamai has unique visibility into levels of Internet penetration around the world. In the second quarter of 2012, over 665 million IPv4 addresses, from 242 countries/regions, connected to the Akamai Intelligent Platform—0.1% fewer than in the first quarter of 2012 and 10% more than in the second quarter of 2011. Although we see more than 600 million unique IPv4 addresses, Akamai believes that we see well over one billion Web users. This is because, 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. Conversely, 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 4, the global unique IP address count saw an unusual, though extremely slight, decline as compared to the prior quarter — just less than one million fewer addresses. This quarterly decline is in contrast to the quarterly increase in unique IP address count that we have come to expect over the last four years of this report. However, we do not believe that this decline portends any sort of imminent decline in Internet penetration globally, nor do we believe that it is yet related to increased content consumption over IPv6. Rather, we believe that the decline is likely due to changes made to Akamai's back-end data collection and analysis processes. Along these lines, nominal quarterly declines were also seen among four of the top 10 countries in the second quarter, with the United States, Japan, South Korea, and Russia all having lower unique IP address counts. Increases were seen in the remaining six countries, with Brazil again seeing very strong growth, adding over 2 million IP addresses quarter over quarter. Globally, quarterly growth was seen in just over 60% of countries/regions around the world, with 31 countries seeing increases of 10% or more.

Looking at year-over-year changes, we see that among the top 10 countries, seven countries had higher unique IP address counts as compared to the second quarter of 2011, with five of the seven increasing more than 10%. In contrast, the United States saw a slight yearly decline, while Japan and South Korea both continued the string of losses observed over the last several quarters. As noted in previous quarters' reports, the longer-term negative trending in Japan and South Korea could be due to a number of possible causes, including ongoing changes to data in Akamai's EdgeScape IP geolocation database, shifts in IP address block utilization by local network service providers, increased use of proxies, or deployment of so-called "large scale NAT" (network address translation) infrastructure by carriers in an effort to conserve limited IPv4 address space. On a global basis, however, approximately 80% of countries/regions had higher unique IP address counts year-over-year. Among those countries/regions that saw declines, the largest losses were generally seen in geographies with comparatively smaller address counts—low enough that they do not qualify for inclusion in subsequent sections.

	Country	Q2 '12 Unique IP Addresses	QoQ Change	YoY Change
–	Global	665,180,961	-0.1%	10%
1	United States	142,879,594	-2.4%	-0.3%
2	China	93,604,214	1.3%	22%
3	Japan	39,876,417	-1.6%	-11%
4	Germany	36,196,309	0.4%	3.7%
5	United Kingdom	26,579,255	3.3%	17%
6	France	26,103,462	2.2%	7.4%
7	Brazil	21,546,894	12%	40%
8	South Korea	19,666,997	-0.7%	-14%
9	Italy	17,965,986	6.2%	25%
10	Russia	15,472,955	-2.4%	26%

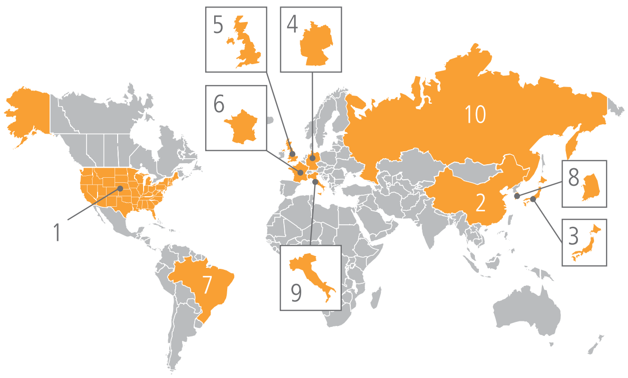

Figure 4: Unique IPv4 Addresses Seen By Akamai

2.2 IPv4 Exhaustion

The number of available IPv4 addresses continued to decline during the second quarter of 2012, as Regional Internet Registries (RIRs) continued to assign/allocate blocks of address space to requesting organizations within their respective territories.[2] Based on data published by the RIRs,[3] Figure 5 compares IPv4 address assignment/allocation activity by RIR during the second quarter of 2012.

As shown, both RIPE and APNIC had fairly steady consumption patterns during the second quarter. However, ARIN, LACNIC, and AFRINIC all saw "stairsteps" occur in their consumption, where comparatively larger numbers of IPv4 addresses were assigned/allocated on one or more days during the quarter. The most pronounced step in the graph occurred with ARIN on May 15, when over 13 million IPv4 addresses were assigned/allocated in three separate transactions. The largest involved over 11 million addresses, assigned in multiple smaller blocks to Bell Northern Research, according to ARIN records.[4] Vodafone also got a block of just over one million addresses that day as well.[5] The second step evident on the ARIN graph is from an allocation of just over two million IPv4 addresses to T-Mobile USA.[6] At LACNIC, the evident stairstep on April 25 appears to be due to the allocation of just over two million addresses to Vivo S.A.[7] An allocation of just over one million addresses to Vodacom on June 6 accounts for the stairstep observed in AFRINIC's otherwise minimal consumption of IPv4 space in the second quarter.[8]

In late May, Daniel Karrenberg, RIPE's Chief Scientist noted[9] in a post to industry forum CircleID that the RIPE NCC's pool of unallocated IPv4 addresses is expected to reach the "last /8" this year, which means that the organization will have 16,777,216 IPv4 addresses left in the available pool. When that milestone is reached, RIPE will go into an "austerity mode" similar to the one that APNIC has been operating under since the second quarter of 2011, in which RIPE will only be able to distribute IPv6 addresses and a one-off allocation of IPv4 address space (1,024 IPv4 addresses) from the "last /8" to those members that meet the policy requirements. One may expect that the imminent arrival of such a milestone would cause a rush to obtain IPv4 address space before small one-off allocations become the norm. However, in examining the yearly volume of IPv4 address distribution in the RIPE service region, it was found that consumption during the first four months of 2012 was in line with distribution trends for the prior three years, and that there was no evidence of a "last-minute rush" taking place during the early part of the year. Regarding this observation, Karrenberg noted, "It's good to see that the address space distribution policies set by the RIPE community to ensure that the remaining IPv4 address space is conserved and distributed fairly over the last few years have worked well."

(It is worth noting that according to the RIPE Web site, "On Friday 14 September, 2012, the RIPE NCC, the Regional Internet Registry (RIR) for Europe, the Middle East and parts of Central Asia, distributed the last blocks of IPv4 address space from the available pool."[10] This means that RIPE has, indeed, reached the last "/8" of their address space.)

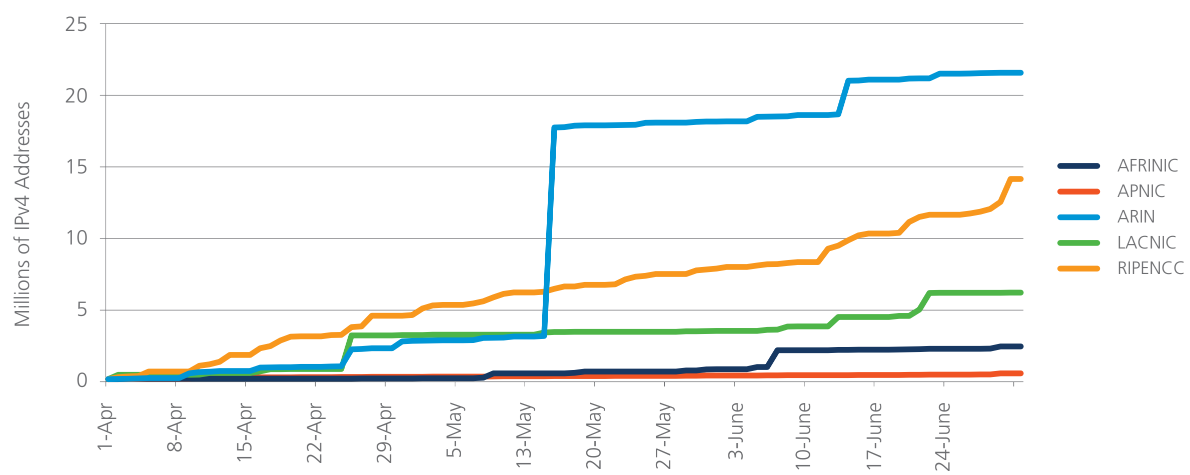

Figure 5: Total Number of IPv4 Addresses Assigned/Allocated by RIRs, Q2 2012

2.3 IPv6 Adoption

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

One helpful source of IPv6 information is Hurricane Electric, which provides Internet transit, Web hosting, and collocation services and notes that it is "considered the largest IPv6 backbone in the world as measured by number of networks connected."[11] A white paper[12] available from Hurricane Electric notes that it has operated IPv6 network elements since 2000 and that it implemented extensive native IPv6 peering in early 2006 as a result of a core router and backbone upgrade. Hurricane Electric also publishes the output of a set of measurement tools on its "Global IPv6 Deployment Progress Report" page, available at http://bgp.he.net/ipv6-progress-report.cgi.

Figure 6 illustrates the growth in the number of ASes in the global IPv6 routing table during the second quarter of 2012, comparing it to the second quarters of the previous three years as well. As shown in the figure, the second quarter 2012 rate of growth was just under 7%, lower than the growth rates seen in 2009, 2010, or 2011. Just under half as many ASes were added in the second quarter of 2012 as in 2011, though it was over three times as many as was added in 2009, and almost twice as many as in 2010. It is likely that the significant growth seen in 2011 was related to preparations for World IPv6 Day—many ASes were likely already IPv6 capable ahead of 2012's World IPv6 Launch event. In addition, as has been discussed in the past, while the "IPv6 ASes" metric provides some perspective around IPv6 adoption, it is also important to recognize that not all autonomous systems are equivalent. That is, IPv6 adoption on an autonomous system that is associated with a large number of end users/subscribers is ultimately more meaningful and impactful for measuring the ultimate success of IPv6 than adoption by an autonomous system that is not directly associated with end user connectivity/traffic.

To that end, in a May presentation[13] at the "ENOG 3" (Eurasia Network Operators' Group) conference, Jim Cowie of Internet monitoring firm Renesys noted that "less than 15% of ASNs worldwide participate", with only 5.78% of those in the Eurasian region participating. He noted that there has been success in "convincing a small number of large ASNs", but that there was still work to be done in convincing "large numbers of small ASNs to implement IPv6". As one large ASN example, in April, Comcast announced that it had made IPv6 service available to residential users in two U.S. cities that were using one of six specific IPv6-enabled home gateways, and that it planned to support IPv6 across their entire network by the end of 2012.[14] In another similar example, mobile network provider T-Mobile also announced in April that it had completed the deployment of IPv6 services across its entire U.S. network, with a published report noting that it was the largest wireless IPv6 deployment in the world.[15]

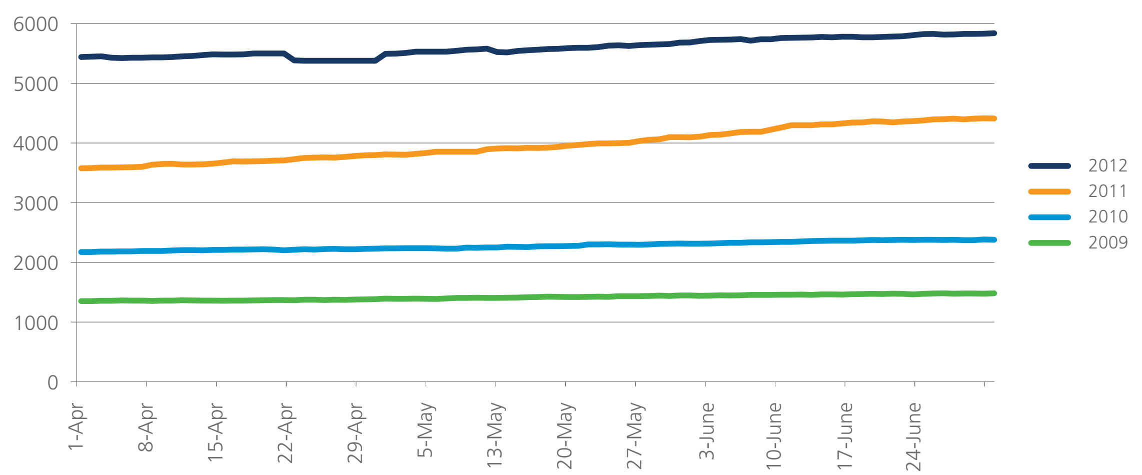

Figure 6: Total Number of Autonomous Systems in the IPv6 Routing Table

2.4 World IPv6 Launch

Building on the success of 2011's "World IPv6 Day" event, the Internet Society organized "World IPv6 Launch", which took place on June 6, 2012. The intent of this year's event was to establish IPv6 as the "new normal" for the Internet, with a list of participants that include the top Web sites, content delivery networks, home router manufacturers, and Internet Service Providers in more than 100 countries around the world.[16] With an IPv6 footprint in over 50 countries at the time of the event, Akamai supported customers that chose to participate in the event by enabling them to make content available over IPv6 for World IPv6 Launch. (This content remains available over IPv6 after the event as well, and new customers have also made content available via IPv6 through Akamai since the event.)

Figure 7 highlights IPv6 hits/second traffic on the Akamai Intelligent Platform during the second quarter of 2012, and is taken from the "Historical" tab of the data visualization at http://www.akamai.com/ipv6. As is clearly evident within the graph, IPv6 traffic levels on Akamai grew significantly as several major customers IPv6-enabled their Web sites and embedded content. However, because so many customers enabled IPv6 support ahead of World IPv6 Launch, there was no "big spike" that occurred in the days immediately preceding, or during the day of, the event. Traffic continued to grow into the World IPv6 Launch event, reaching a quarterly peak several days thereafter, and traffic patterns for the remainder of the quarter appeared to settle into something of a weekly peak & trough pattern that is similar to traffic graphs from content delivered over IPv4.

Several weeks after the World IPv6 Launch event, Akamai published a blog post ("A Data-Driven View of IPv6 Adoption" at https:/blogs.akamai.com/2012/07/a-data-driven-view-of-ipv6-adoption.html)that included the infographic shown in Figure 8. Both the blog post and infographic highlight the year-over-year growth that Akamai observed in IPv6 traffic, including:

- A 67x increase in the number of unique IPv6 addresses making requests for content
- A 460x increase in the number of requests made for content over IPv6
- A 9x increase in requests from end users in the United States made against a dual-stack (IPv4 & IPv6) consumer-oriented Web site

The infographic also calls out that nearly three-quarters of the native IPv6 addresses observed were from the United States, and that over one-third of the requests were from Verizon Wireless, a mobile network provider in the United States. This latter observation is not surprising, given that the Verizon Wireless 4G LTE network has IPv6 built-in, with the requirement that all LTE devices must be IPv6 capable.[17]

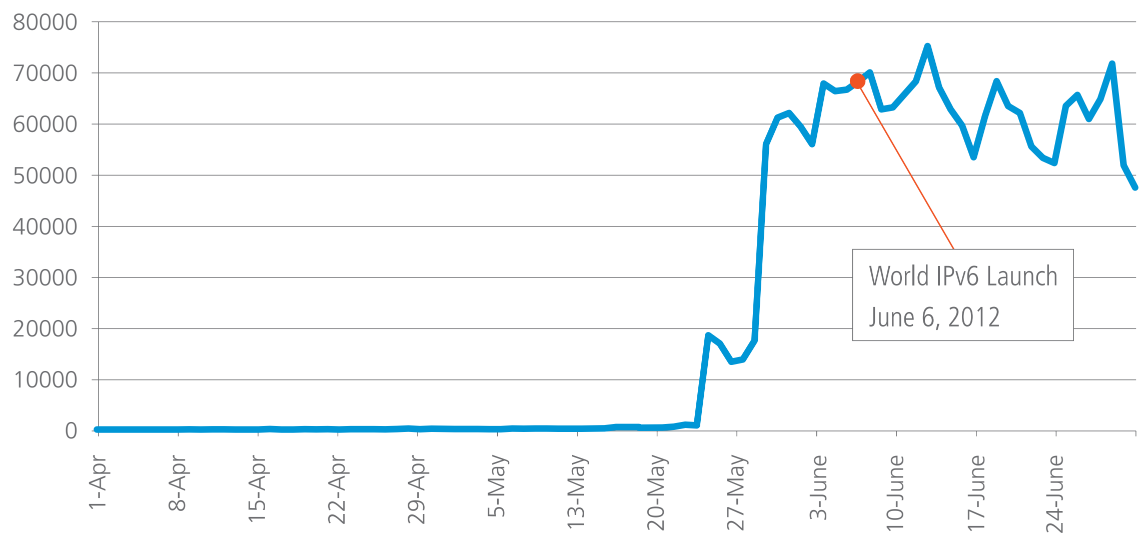

Figure 7: Akamai IPv6 Hits/Second Traffic Levels, Q2 2012

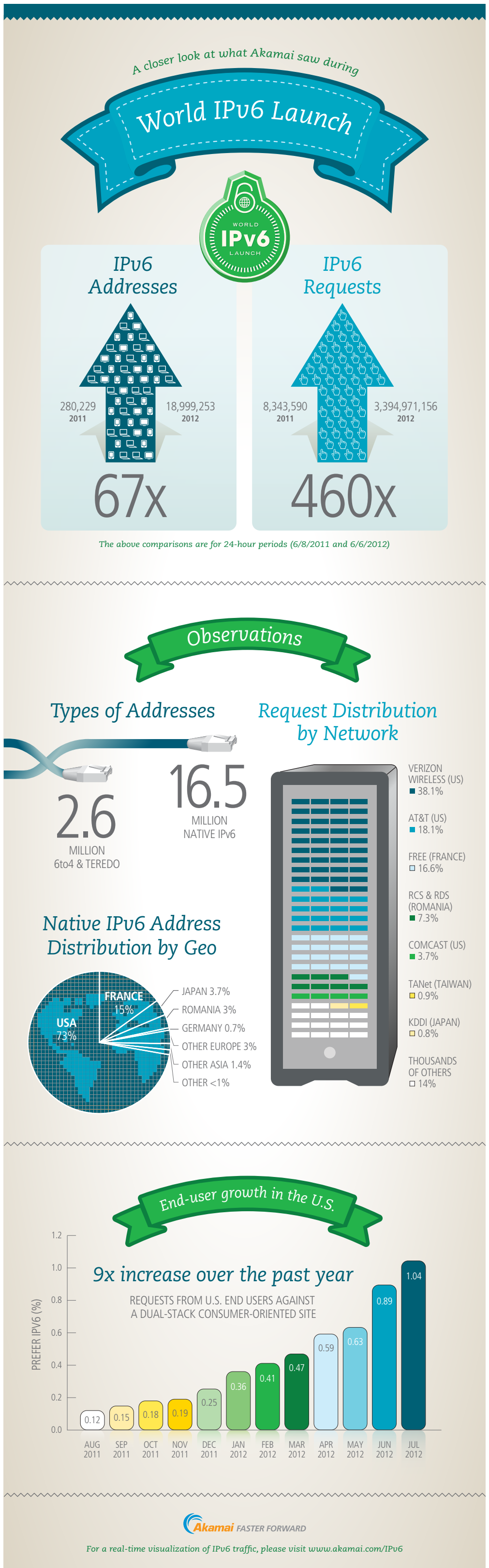

Figure 8: World IPv6 Launch Infographic

2.5 New Generic Top Level Domains (gTLDs)

Generic top level domains (gTLDs) have been in use on the Internet since 1985, when IETF RFC 920[18] specified the initial set of five (.gov, .edu, .com, .mil, and .org). Additional gTLDs including .biz, .info, .name, .museum, .coop, .pro, and .aero were activated during 2001–2002,[19] and other gTLDs have been added over time as well, resulting in a total of 22 gTLDs[20] in the domain name system.

The Internet Corporation for Assigned Names and Numbers (ICANN) voted on June 20, 2011 to end most of the restrictions on gTLDs from the currently available set of 22, allowing companies and organizations to choose essentially arbitrary top-level domain names. (The expectation was that most applicants would pursue gTLDs associated with their brands.[21]) ICANN started to accept applications for new gTLDs on January 12, 2012, with an associated deposit fee of $5,000 USD and an evaluation fee of $185,000 USD.[22] The application process closed on May 30, and on June 13, "Reveal Day" occurred, during which ICANN published the list of nearly 2,000 gTLDs that were applied for, including information on the organizations that submitted the applications.[23]

According to ICANN,[24] applications were received from 60 countries, including:

- 911 from North America.
- 675 from Europe.
- 303 from the Asia-Pacific region.
- 24 from Latin America and the Caribbean.
- 17 from Africa.

In addition, 116 applications were for Internationalized Domain Names, for strings in scripts such as Arabic, Chinese, and Cyrillic.

Examining the list, one can see that there are quite a few applications related to brands (like .AMEX, .ALLSTATE, and .ALFAROMEO), others related to specific geographical locations (like .AFRICA and .AMSTERDAM), as well as a number that have multiple applicants competing for the right to a given gTLD (like .APP and .ART). As expected, Google, Amazon, Microsoft, and others applied for multiple gTLDs -- some generic terms, others related to their products/services. However, it will be some time before any of these new gTLDs are approved and activated for use on the Internet, as there are associated objection, evaluation, dispute resolution, and pre-delegation processes/stages that each application needs to pass through, according to the new gTLD FAQ published by ICANN.[25]

Geography – Global

By virtue of the approximately two trillion requests for Web content that it services on a daily basis through its globally deployed Intelligent Platform, Akamai has a unique level of visibility into the speeds of end-user connections and, therefore, into broadband adoption around the globe. Because Akamai has implemented a distributed platform model, deploying servers within edge networks, it can deliver content more reliably and consistently than centralized providers that rely on fewer deployments in large data centers. For more information on why this is possible, please see Akamai's *How Will The Internet Scale?* white paper[26] or the video explanation at http://www.akamai.com/whytheedge.

The data presented within this section was collected during the second quarter of 2012 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. As noted in last quarter's report, these definitions have been updated to reflect an overall trend toward greater availability of higher speed connections. Similarly, as noted last quarter, the *State of the Internet* report will no longer include "narrowband" (connections of 256 kbps or less) data, nor will it include city-level data.

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

Finally, traffic from known mobile networks will be 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 once again saw a solid quarter-over-quarter increase, growing 13% to reach 3.0 Mbps, as shown in Figure 9. However, quarterly changes were not as positive across the top 10 countries, with eight seeing lower average connection speeds than in the previous quarter. Among this group, only Switzerland and the Czech Republic grew quarter-over-quarter, increasing 4.0% (to 8.4 Mbps) and 0.7% (to 7.2 Mbps) respectively. The quarterly declines seen in the other eight countries were fairly nominal, ranging from a loss of just half a percent in Denmark (to 6.7 Mbps) to a loss of just under 10% in South Korea (to 14.2 Mbps). Globally, 69 total countries that qualified for inclusion saw average connec-

	Country	Q2 '12 Avg. Mbps	QoQ Change	YoY Change
–	Global	3.0	13%	15%
1	South Korea	14.2	-9.8%	2.9%
2	Japan	10.7	-1.6%	21%
3	Hong Kong	8.9	-4.1%	-14%
4	Latvia	8.7	-1.1%	5.5%
5	Switzerland	8.4	4.0%	16%
6	Netherlands	8.0	-9.6%	-6.8%
7	Czech Republic	7.2	0.7%	-2.5%
8	Denmark	6.7	-0.5%	9.1%
9	United States	6.6	-1.4%	16%
10	Finland	6.6	-4.1%	16%

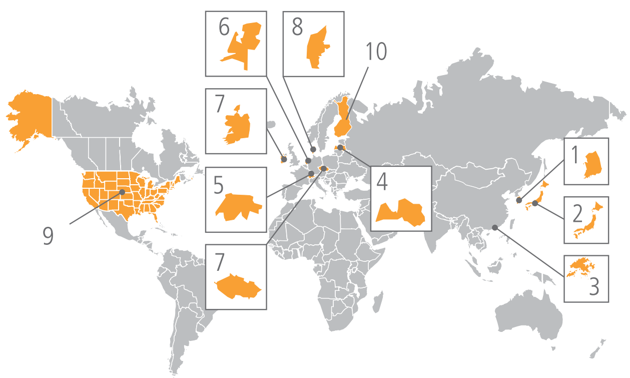

Figure 9: Average Measured Connection Speed by Country

tion speeds increase quarter-over-quarter, ranging from a 227% increase in Kenya (to 1.8 Mbps) to a barely perceptible increase of just 0.1% in the Ukraine (to 4.4 Mbps). In contrast, 65 total qualifying countries saw average connection speeds decline quarter-over-quarter, ranging from losses of just a tenth of a percent in Lithuania and Germany (to 5.1 Mbps and 5.8 Mbps respectively) to a 29% decline in Côte D'Ivoire (to just 0.4 Mbps).

Long term trends were generally more positive, with the global average connection speed growing 15% year-over-year, and seven of the top 10 countries also seeing increases year-over year. Four countries saw particularly strong growth, with Japan, Switzerland, the United States, and Finland all growing more than 10%. Among the top 10, only Hong Kong, the Netherlands, and the Czech Republic lost ground year-over-year, with the 14% decline seen in Hong Kong the most significant. Globally, 100 qualifying countries saw year-over-year increases, ranging from 242% in Kenya to just 0.4% in New Zealand (to 3.9 Mbps). Year-over-year declines were seen in 34 countries, with losses ranging from a meager 0.3% in Bangladesh (to 0.7 Mbps) to Libya's 69% decline (to 0.5 Mbps).

According to the Global Information Technology Report of 2012, Kenya was ranked 136th out of 142 countries in the broadband subcategory.[27] However, the changes noted above do point towards improved connectivity within the country, possibly related to recently-laid fiber optic cables that aim to improve broadband interconnectivity among East African nations. In May, the government of Kenya invited the newly created nation of South Sudan to connect to these recently-laid fiber optic cables.[28] In addition, submarine telecommunications network provider Seacom noted in May that it was putting plans into place to double capacity on its system later in 2012 — the system brings multi-terabit Internet connectivity to Kenya, connecting it with countries including South Africa and France.[29]

In the second quarter, 22 qualifying countries had average connection speeds of 1 Mbps or less, down from 24 in the first quarter of 2012. Côte D'Ivoire displaced Libya as the country with the lowest average connection speed, declining 29% from the prior quarter to 0.4 Mbps, as noted above.

3.2 Global Average Peak Connection Speeds

The average peak connection speed metric represents an average of the maximum measured connection speeds across all of the unique IP addresses seen by Akamai from a particular geography. The average is used in order to mitigate the impact of unrepresentative maximum measured connection speeds. In contrast to the average connection speed, the average peak connection speed metric is more representative of Internet connection capacity. (This includes the application of so-called speed boosting technologies that may be implemented within the network by providers in order to deliver faster download speeds for some larger files.)

The global average peak connection speed one again showed strong improvement, growing 19% in the second quarter to 16.1 Mbps. However, Figure 10 shows that this strong improvement was not reflected in the quarter-over-quarter changes seen in the top 10 countries. Five countries saw quarterly

	Country	Q2 '12 Peak Mbps	QoQ Change	YoY Change
–	Global	16.1	19%	44%
1	Hong Kong	49.2	-0.2%	11%
2	South Korea	46.9	-1.9%	31%
3	Japan	40.5	2.4%	28%
4	Romania	38.6	-0.6%	15%
5	Latvia	33.5	–	14%
6	Switzerland	29.9	4.3%	25%
7	Belgium	29.5	1.1%	10%
8	Singapore	28.3	-1.1%	36%
9	Hungary	28.0	0.3%	15%
10	Bulgaria	27.9	1.7%	17%
…				
13	United States	27.1	-5.4%	24%

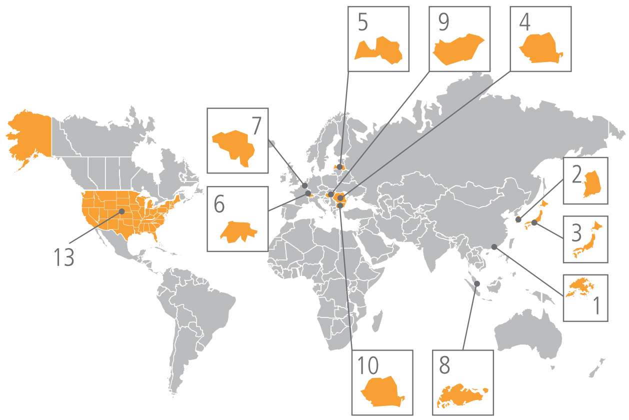

Figure 10: Average Peak Connection Speed by Country

increases in average peak connection speeds, though they were significantly more modest than the global increase, with growth ranging from 0.3% in Hungary (to 28.0 Mbps) to 4.3% in Switzerland (to 29.9 Mbps). Latvia remained flat quarter-over-quarter, at 33.5 Mbps, while the remaining 4 countries and the United States (at #13) all saw quarterly declines in average peak connection speeds. Globally, a total of 54 countries that qualified for inclusion also saw quarterly declines in average peak connection speeds, with changes ranging from a loss of just a tenth of a percent in Trinidad and Tobago (to 17.7 Mbps) to a significantly larger 27% loss in Oman (to 5.5 Mbps). On a more positive note, 79 qualifying countries around the world saw average peak connection speeds increase quarter-over-quarter. The largest increase was seen in Kenya, which grew 161% to 7.2 Mbps. The smallest increase was seen in Hungary, as noted above.

Looking at year-over-year changes, significant improvement was once again seen in the global average peak connection speed, which grew 44%. Yearly increases were seen across all of the top 10 countries, as well as in the United States, with growth of 10% or more seen in all countries. Year-over-year changes ranged from 10% in Belgium (to 29.5 Mbps) to 36% in Singapore (to 28.3 Mbps). Globally, 126 qualifying countries saw year-over-year increases in average peak connection speeds, including six countries that grew in excess of 100%. Growth ranged from 1.4% in Luxembourg (to 16.6 Mbps) to 216% in Kenya. Quarterly declines were seen in only eight qualifying countries, ranging from a 4.7% loss in Tanzania (to 5.6 Mbps) to a sizable 54% drop in Oman.

3.3 Global High Broadband Connectivity

As was noted in the 1st *Quarter, 2012 State of the Internet* report, the term "high broadband" (as used within the report) was redefined to include connections to Akamai of 10 Mbps or greater.

After a sizable increase seen last quarter, the global high broadband adoption rate declined slightly in the second quarter, losing 1.6%, but remained at 10%. As shown in Figure 11, seven of the top 10 countries also had negative quarter-over-quarter changes, with wildly varying magnitudes of change, ranging from a trivial loss of just 0.6% in Latvia (to 26%) to a much more concerning decline of 24%, seen in both the Netherlands and Belgium (to 17% and 14% respectively). Of the three countries that saw high broadband adoption levels improve quarter-over-quarter, the United States grew 5.5% (to 16%), while Switzerland and the Czech Republic saw solid growth, increasing 15% (to 22%) and 21% (to 14%) respectively. On a global basis, 20 countries that qualified for inclusion saw high broadband adoption levels increase quarter-over-quarter, ranging from Italy's 1.6% increase (to 2.6%) to an extremely strong 56% increase in South Africa (to 1.1%). Among the 25 qualifying countries that saw high broadband adoption levels decline quarter-over-quarter, losses ranged from just half a percent in Germany (to 8.3%) up to 35% in Portugal (to 4.4%). In the second quarter, all of the top 10 countries had high broadband adoption levels above the global average of 10%, as did six additional countries. China continued to have the lowest level of high broadband adoption, giving back the increase seen in the first quarter, but remaining at just 0.1%.

	Country	% Above 10 Mbps	QoQ Change	YoY Change
–	Global	10%	-1.6%	25%
1	South Korea	49%	-7.4%	49%
2	Japan	37%	-1.8%	22%
3	Hong Kong	26%	-6.9%	-12%
4	Latvia	26%	-0.6%	7.1%
5	Switzerland	22%	15%	59%
6	Netherlands	18%	-24%	-16%
7	United States	16%	5.5%	76%
8	Czech Republic	14%	21%	19%
9	Belgium	14%	-24%	25%
10	Finland	14%	-16%	46%

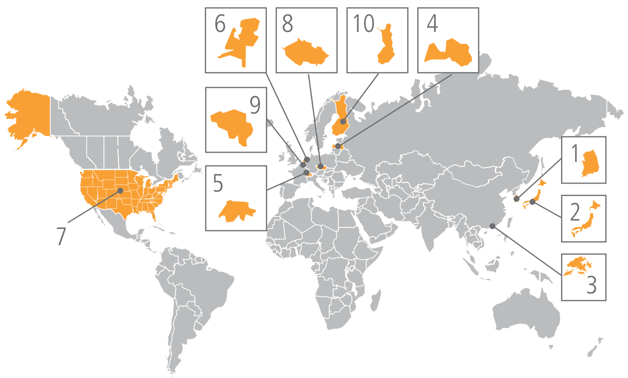

Figure 11: High Broadband (>10 Mbps) Connectivity

Looking at year-over-year changes, the global high broadband adoption level saw a solid 25% increase as compared to the second quarter of 2011. Among the top 10 countries, none saw adoption levels double year-over-year (as three did last quarter), though Switzerland and the United States both posted increases of more than 50%. Five other countries among the top 10 experienced double-digit yearly growth rates, while Latvia was the only country among the group that grew less than 10% year-over-year, with a still respectable 7.1% increase (to 26%). Around the world, a total of 34 countries that qualified for inclusion saw high broadband adoption levels increase year-over-year, with five countries seeing adoption levels more than double—South Africa's 284% was far and away the largest increase. The smallest year-over-year increase was seen in the Ukraine, which added 2.6% (to 6.3%). Eleven qualifying countries saw high broadband adoption levels decline year-over-year, ranging from a 0.3% decline in Slovenia (to 5.4%) to 27% losses in both Turkey and Portugal (to 0.5% and 4.4% respectively).

3.4 Global Broadband Connectivity

As was noted in the 1st Quarter, 2012 State of the Internet report, the term "broadband" (as used within the report) was redefined to include connections to Akamai of 4 Mbps or greater.

After a solid increase in the first quarter, the global broadband adoption level saw a minor decrease in the second quarter, losing 2.8% and declining to 39%. Six countries among the top 10, as well as the United States, also saw quarterly declines in broadband adoption levels. As shown in Figure 12, these quarterly declines were fairly nominal, with the largest seen in the Czech Republic, which lost 6.4%, (to 64%). Quarterly increases across the remaining four countries in the top 10 were also fairly nominal, ranging from just 0.8% in Canada (to 69%) to 5.2% in Denmark (to 66%). Globally, just 25 countries that qualified for inclusion saw higher broadband levels than in the prior quarter, with adoption levels more than doubling in both Kenya and Morocco. Fifty-five countries around the world had broadband adoption levels greater than 10%, while India and Indonesia had the lowest levels of adoption among countries on the list, at 1.4% and 0.8% respectively.

Looking at year-over-year changes, global broadband adoption increased 6.9%, while increases were also seen in just half of the top 10 countries, as well as the United States. Among the five countries that saw yearly growth, increases ranged from 5.0% in Denmark to 28% in South Korea (to 84%). Yearly declines among the other five countries were fairly modest, with the largest seen in the Czech Republic, which lost 10%. Globally, 46 total countries that qualified for inclusion saw broadband adoption levels increase year-over-year, with growth above 100% seen in nine countries, and another 29 seeing growth of 10% or more. Lithuania had the lowest level of yearly growth, increasing just 0.8% to 51% adoption. Among the qualifying countries where broadband adoption levels declined year-over-year, losses ranged from a meager 0.1% in Cyprus (to 9.4%) to a surprisingly large 47% drop in Vietnam (to 3.0%).

	Country	% Above 4 Mbps	QoQ Change	YoY Change
–	Global	39%	-2.8%	6.9%
1	South Korea	84%	-2.2%	28%
2	Switzerland	79%	2.3%	14%
3	Netherlands	79%	-5.0%	-2.0%
4	Japan	74%	2.4%	20%
5	Belgium	69%	-4.7%	-6.3%
6	Canada	69%	0.8%	8.2%
7	Hong Kong	68%	-5.2%	-4.7%
8	Latvia	67%	-1.7%	-2.8%
9	Denmark	66%	5.2%	5.0%
10	Czech Republic	64%	-6.4%	-10%
…				
13	United States	57%	-4.6%	7.9%

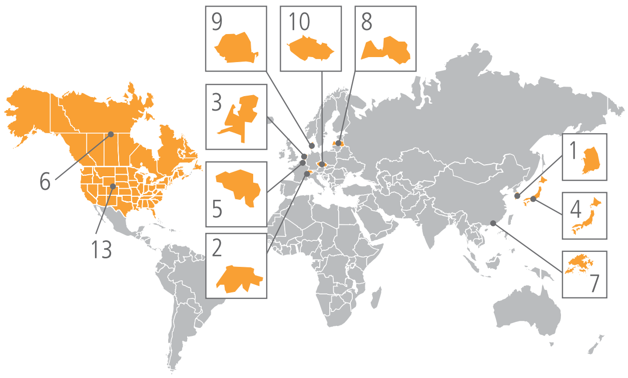

Figure 12: Broadband (>4 Mbps) Connectivity

SECTION 4:

Geography–United States

The metrics presented here for the United States are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. (The subset used for this section includes connections identified as coming from networks in the United States, based on classification by Akamai's EdgeScape geolocation tool.) As was noted in the introduction to Section 3, this section no longer includes city-level data nor data on narrowband (<256 kbps) connections, and the "new" definitions of high broadband (>10 Mbps) and broadband (>4 Mbps), put into place starting with last quarter's report, are used here as well.

4.1 United States Average Connection Speeds

Consistent with its standing in the prior quarters, Delaware continued to rank as the fastest state in the union in the second quarter of 2012, improving its average connection speed to 12.1 Mbps, an 18% quarter-over-quarter increase. As shown in Figure 13, nine of the top 10 state saw positive quarter-over-quarter changes in average connection speeds, with the largest increase seen in Delaware, and the smallest, at 3.8%, seen in Connecticut. The 8.2% increase in New Hampshire pushed the state's average connection speed past the 10 Mbps mark, allowing it join Delaware in that respect.Across the whole country, 39 total states saw average connection speeds increase in the second quarter, with six of those states growing in excess of 10%. The largest increase was seen in New Mexico, at 19% (to 6.0 Mbps), while the smallest increase was seen in Nebraska, at 0.1% (to 5.8 Mbps). A 12% quarter-over-quarter decline in Missouri allowed it to displace Arkansas as the state with the lowest average connection speed, at 3.6 Mbps.

Looking at year-over-year trends, all of the top 10 states saw average connection speeds increase, with fairly significant growth seen across the states on the list—the smallest increase was seen in Rhode Island, at just over 9%, while New Hampshire's 54% increase was the largest. Across the whole country, 45 states and the District of Columbia saw increased average connection speeds as compared to the second quarter of 2011, and over 30 states saw double digit percentage increases.

Several announcements made in the second quarter point toward continued improvements in connection speeds across the United States. Gig.U is a group of over 30 research universities from across the United States that aims to bring high speed broadband connectivity to the communities surrounding these universities via a public-private partnership model. To date, Gig.U has worked with private companies to build projects in Maine and Atlanta, and in May, it announced that it will be working with startup Gigabit Squared, to select and deploy

	State	Q2 '12 Avg. Mbps	QoQ Change	YoY Change
1	Delaware	12.1	18%	49%
2	New Hampshire	10.1	8.2%	54%
3	District Of Columbia	9.7	9.3%	31%
4	Vermont	9.7	6.9%	38%
5	Rhode Island	9.0	5.4%	9.2%
6	Massachusetts	8.8	7.3%	35%
7	Connecticut	8.7	3.8%	34%
8	Virginia	8.3	6.0%	22%
9	Washington	8.3	5.2%	26%
10	Utah	8.1	-5.7%	15%

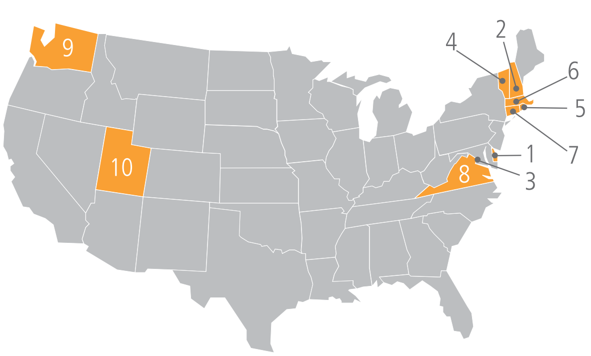

Figure 13: Average Measured Connection Speed by State

fast broadband to six more communities.[30] While the names of the six communities were not named within the announcement, the small town of Orono, Maine, announced a plan to build a local gigabit network, in conjunction with the University of Maine and local network provider GWI — Gig.U executive director Blair Levin noted that "the University of Maine was one of the first institutions to sign-up to participate in Gig.U and is now one of the first to move forward, in partnership with GWI, to make the idea of Gig.U a reality…"[31]

In addition, in June, the White House announced[32] the signing of an Executive Order by President Obama that is intended "to make broadband construction along Federal roadways and properties up to 90 percent cheaper and more efficient." According to the announcement, "The new Executive Order will ensure that agencies charged with managing Federal properties and roads take specific steps to adopt a uniform approach for allowing broadband carriers to build networks on and through those assets and speed the delivery of connectivity to communities, businesses, and schools." The announcement also highlighted that nearly 100 partners — including more than 25 cities as well as corporate and non-profit entities — would be joining with more than 60 national research universities to form a new public-private partnership called "US Ignite" to create a new wave of services that "take advantage of state-of-the-art, programmable broadband networks running up to 100 times faster than today's Internet."

4.2 United States Average Peak Connection Speeds

Even with a slight quarter-over-quarter decline to 41.6 Mbps, Delaware continued to have the highest average peak connection speed in the second quarter. As shown in Figure 14, a decline in Vermont's average peak connection speed pushed it down to third place, allowing it to be bested by the District of Columbia, which grew 8.8% from the first quarter (to 37.5 Mbps). Four other states in the top 10 also saw average peak connection speeds increase quarter-over-quarter, while Massachusetts, New York, and Connecticut joined Delaware and Vermont in experiencing quarterly declines. Across the whole country, 21 states and the District of Columbia grew average peak connection speeds quarter-over-quarter — New Mexico's 11% increase (to 25.7 Mbps) was the largest seen. Interestingly, New Mexico had the lowest level of quarterly growth in the first quarter, though it was still fairly high, at 8.1%. In contrast, this quarter, eight states grew less than one percent quarter-over-quarter, with Florida and Ohio both adding just one tenth of a percent (to 29.5 Mbps and 26.3 Mbps respectively). Similar to the average connection speed metric, Missouri's 14% quarterly decline (to 15.7 Mbps) made it the state with the lowest average peak connection speed — former last place state Arkansas grew 7.0% to 17.7 Mbps.

Year-over-year changes among the top 10 states were all positive, and in general, fairly major. Rhode Island, which had yearly growth of 7.5%, was the only state among the group to grow less than 10%. Among the other states in the top 10, three grew 40% or more, another four grew in excess of 30%, and the remaining two grew more than 20%. Across the whole country, all of the states in the U.S. saw yearly improvements in average peak connection speeds, with all but five states growing 10% or more. Particularly strong growth was seen in Oregon and Montana, which both increased 49% year-over-year (to 28.6 Mbps and 21.6 Mbps respectively), as well as in Alaska, which increased 59% (to 24.5 Mbps).

	State	Q2 '12 Peak Mbps	QoQ Change	YoY Change
1	Delaware	41.6	-4.1%	35%
2	District Of Columbia	37.5	8.8%	35%
3	Vermont	35.1	-0.7%	37%
4	New Hampshire	34.2	1.3%	42%
5	Virginia	34.1	0.6%	28%
6	Rhode Island	33.6	0.3%	7.5%
7	Washington	32.7	3.7%	40%
8	Massachusetts	32.4	-1.3%	36%
9	New York	31.3	-3.6%	24%
10	Connecticut	31.3	-0.3%	40%

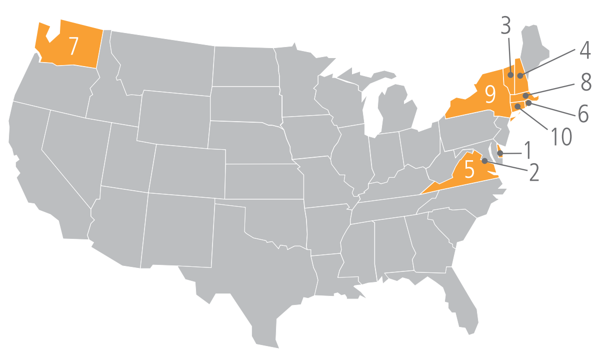

Figure 14: Average Peak Connection Speed by State

4.3 United States High Broadband Connectivity

As was noted previously, starting with the *1st Quarter, 2012 State of the Internet* report, the term "high broadband", as used within the report, has been redefined to include connections to Akamai of 10 Mbps or greater.

As shown in Figure 15, quarter-over-quarter changes among the top 10 states were generally positive in the second quarter, with eight of the ten turning in double-digit percentage growth, Connecticut coming in just below that at 9.1% growth, and New Jersey remaining unchanged from the first quarter. The largest quarterly growth among the group was seen in Massachusetts and Pennsylvania, which both added 22% (to 29% and 23% adoption respectively). Across the whole country, a total of 37 states and the District of Columbia saw high broadband adoption levels increase quarter-over-quarter. The largest increase was seen in New Mexico, which grew 52% (to 12%), while the smallest increase was just a tenth of a percent, seen in Maine (also to 12%). Arkansas remained the state with the lowest level of high broadband adoption, though it increased 12% to 3.0%

The levels of year-over-year change in high broadband adoption rates across the top 10 states were once again extremely significant, with levels more than doubling in eight states. Of those eight, New Hampshire and Connecticut saw year-over-year changes in excess of 200%. Across the remainder of the country, South Dakota and Kansas also increased more than 200% year-over-year, while seven other states also saw broadband adoption up by 100% or more. Nebraska was the only state that grew less than 10% year-over-year, up 3.0% (to 9.2%), while only Idaho posted a yearly decline, dropping 3.3% (to 6.0%).

DID YOU KNOW?

- Across the whole country, a total of 37 states and the District of Columbia saw high broadband adoption levels increase quarter-over-quarter.
- The levels of year-over-year change in high broadband adoption rates across the top 10 states were once again extremely significant, with levels more than doubling in eight states.
- Deleware, Vermont, New Hampshire, Massachusetts and the District of Columbia all had more than 10% of connections to Akamai at speeds above 15 Mbps.

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	Delaware	39%	19%	153%
2	New Hampshire	33%	14%	298%
3	District Of Columbia	32%	17%	91%
4	Vermont	31%	17%	196%
5	Massachusetts	29%	22%	179%
6	Rhode Island	29%	18%	39%
7	Washington	24%	14%	100%
8	Connecticut	24%	9.1%	203%
9	Pennsylvania	23%	22%	169%
10	New Jersey	23%	–	160%

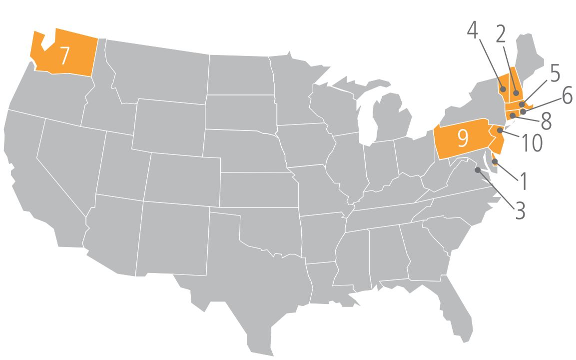

Figure 15: High Broadband (>10 Mbps) Connectivity, U.S. States

4.4 United States Broadband Connectivity

As was noted previously, starting with the *1st Quarter, 2012 State of the Internet* report, the term "broadband", as used within the report, has been redefined to include connections to Akamai of 4 Mbps or greater.

Figure 16 shows that Delaware continued to hold the top spot among the top 10 states, with a nominal quarter-over-quarter increase to a second-quarter broadband adoption level of 94%. Similar increases were seen across most of the remaining top 10 states, with only New York seeing a slight quarterly decline, losing 3.3% (to 69%). The rate of growth among this group was generally less aggressive than that seen in the first quarter, with Connecticut's 4.2% increase the largest of the group. However, it was not the largest when looking at the country as a whole, with Arkansas, New Mexico, and Minnesota all growing broadband adoption rates more than 10% quarter-over-quarter. In spite of the solid quarterly growth, Arkansas was the state with the lowest level of broadband adoption, at just 30%. In total, 35 states and the District of Columbia saw higher broadband adoption levels than in the prior quarter, while the remaining 15 states saw quarterly declines in adoption levels.

Looking at year-over-year changes, seven of the top 10 states saw increases in excess of 10%, while only Rhode Island saw a decrease, dropping 0.7% year-over-year (to 82%). Across the whole country, 42 states and the District of Columbia all saw broadband adoption levels increase year-over-year, with four states (Kansas, Arkansas, Idaho, and Mississippi) growing more than 50%, and an additional 33 gaining 10% or more. Of the eight states that saw yearly declines in broadband adoption, Arizona and Maryland were the only two that lost more than 10%.

DID YOU KNOW?

- Thirty-five states and the District of Columbia saw higher broadband adoption levels than in the prior quarter.
- Across the whole country, 42 states and the District of Columbia saw broadband adoption levels increase year-over-year.
- Thirty-six states and The District of Columbia all grew broadband adoption levels 10% or more year-over-year, while only three states saw similar quarter-over-quarter growth.

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	Delaware	94%	2.1%	7.6%
2	New Hampshire	86%	2.1%	11%
3	Vermont	83%	2.7%	16%
4	Rhode Island	82%	0.8%	-0.7%
5	Connecticut	74%	4.2%	25%
6	Massachusetts	72%	3.0%	16%
7	District Of Columbia	70%	3.0%	12%
8	Washington	69%	3.9%	12%
9	New York	69%	-3.3%	4.5%
10	Florida	69%	2.7%	17%

Figure 16: Broadband (>4 Mbps) Connectivity, U.S. States

Geography – Asia Pacific Region

The metrics presented here for the Asia Pacific region are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. (The subset used for this section includes connections identified as coming from networks in the Asia Pacific region, based on classification by Akamai's EdgeScape geolocation tool.) As was noted in the introduction to Section 3, this section will no longer include city-level data, nor data on narrowband (<256 kbps), and the "new" definitions of high broadband (>10 Mbps) and broadband (>4 Mbps) are used here as well.

5.1 Asia Pacific Average Connection Speeds

In the second quarter of 2012, the top three countries in the Asia Pacific region remained South Korea, Japan, and Hong Kong, as shown in Figure 17. All three countries experienced quarterly declines in average connection speed, as did six of the other surveyed countries within the region. The losses, in general, were fairly nominal, ranging from just 0.3% in New Zealand (to 3.9 Mbps) to 9.8% in South Korea (to 14.2 Mbps). However, there were also quarterly gains seen in five countries in the region, ranging from a 4.0% increase in the Philippines (to 1.2 Mbps) to a solid 24% increase in Australia (to 4.4 Mbps). (Australia's quarterly growth in this, and other, metrics appear to represent a "correction" of the issues that led to the unusually large declines that were seen in the first quarter.) India remained above the 1 Mbps mark, growing nearly 5% quarter-over-quarter, and was displaced from the bottom of the list by the addition of Indonesia — its average connection speed of just 0.8 Mbps is the lowest among the surveyed Asia Pacific countries.

Year-over-year changes were also mixed in the Asia Pacific region, with 10 countries seeing yearly growth, and four countries experiencing yearly losses. The largest yearly increase was seen in China, at 29%, though it still has one of the lowest average connection speeds in the region. Japan, Australia, India, and Indonesia all joined China in growing 20% or more year-over-year, while Singapore and Malaysia both grew more than 10%. Among countries that lost ground year-over-year, both Hong Kong and Vietnam had particularly large declines (losing 14% and 15% respectively), while Thailand had the lowest loss, at just 1.1%.

Global Rank	Country	Q2 '12 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	14.2	-9.8%	2.9%
2	Japan	10.7	-1.6%	21%
3	Hong Kong	8.9	-4.1%	-14%
25	Singapore	5.1	-2.4%	12%
39	Australia	4.4	24%	25%
44	New Zealand	3.9	-0.3%	0.4%
46	Taiwan	3.7	-3.7%	-9.9%
50	Thailand	3.1	-5.5%	-1.1%
70	Malaysia	2.2	7.4%	17%
94	Vietnam	1.6	-1.0%	-15%
97	China	1.5	-0.5%	29%
109	Philippines	1.2	4.0%	1.7%
116	India	1.0	4.6%	21%
127	Indonesia	0.8	7.2%	20%

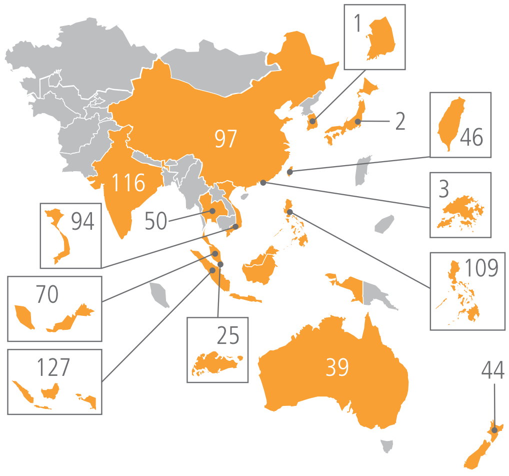

Figure 17: Average Measured Connection Speed by Asia Pacific Country

5.2 Asia Pacific Average Peak Connection Speeds

As shown in Figure 18, Hong Kong remained the Asia Pacific country with the highest average peak connection speed in the second quarter, remaining more than 2 Mbps ahead of South Korea. These two countries were joined by Japan, thanks to a 2.4% quarterly increase, in having average peak connection speeds above 40 Mbps. There was a significant gap between these top three countries and Singapore, the next fastest country, which had an average peak connection speed of 28.3 Mbps, not to mention a gap of over 40 Mbps between Hong Kong's average peak connection speed, and China's 5.9 Mbps average peak connection speed, which was the lowest among surveyed countries in the Asia Pacific region. Within the region, quarterly changes were mixed, with eight countries seeing quarter-over-quarter growth, and six seeing quarter-over-quarter declines. The 30% quarterly increase seen in Australia was likely related to the resolution of the issues noted in the first quarter, though Indonesia saw the largest increase among surveyed countries, growing 66% quarter-over-quarter. The smallest increase was 2.4%, seen in Japan. The observed quarterly declines were fairly minimal, ranging from just 0.2% in Hong Kong to 1.9% in South Korea — none represent a meaningful change.

In looking at year-over-year changes in average peak connection speeds, very strong changes were once again seen across the surveyed countries, with the exception of new addition Vietnam, which dropped 12% from the same period a year ago (to 8.9 Mbps). Indonesia, also new to the list of surveyed countries in the second quarter, had the highest year-over-year change, nearly doubling its average peak connection speed with a 93% increase. Increases of more than 40% were seen in Australia and Malaysia, while South Korea, the Philippines, and India all grew in excess of 30%. None of the surveyed countries within the region grew less than 10% year-over-year in the second quarter.

Global Rank	Country	Q2 '12 Peak Mbps	QoQ Change	YoY Change
1	Hong Kong	49.2	-0.2%	11%
2	South Korea	46.9	-1.9%	31%
3	Japan	40.5	2.4%	28%
8	Singapore	28.3	-1.1%	36%
18	Taiwan	24.5	-1.0%	21%
31	Australia	21.7	30%	43%
42	Thailand	19.1	-1.3%	14%
53	New Zealand	16.5	2.7%	10%
54	Malaysia	16.4	6.1%	44%
85	Philippines	10.9	9.0%	31%
99	Vietnam	8.9	4.8%	-12%
104	Indonesia	8.4	66%	93%
114	India	7.3	5.7%	33%
127	China	5.9	-0.5%	28%

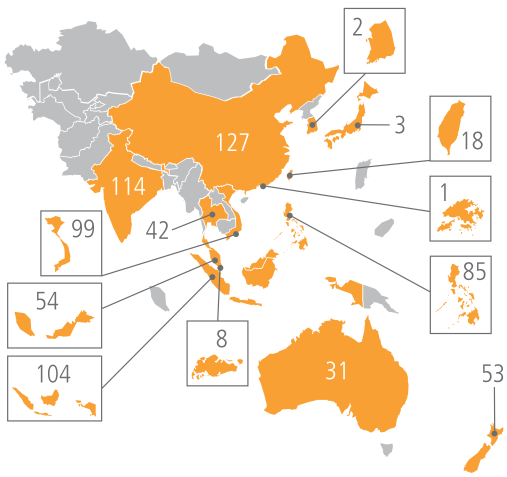

Figure 18: Average Peak Connection Speed by Asia Pacific Country

DID YOU KNOW?

Singapore will undertake bold steps in the next five years to make strategic investments to deploy their Next Generation National Infocomm Infrastructure, comprised of a nationwide ultra high-speed fiber optic infrastructure called the Next Gen Nationwide Broadband Network (Next Gen NBN), along with a complementary pervasive wireless network.

[Source: http://www.ida.gov.sg/Infrastructure/20060411230420.aspx]

5.3 Asia Pacific High Broadband Connectivity

As was noted previously, starting with the *1st Quarter, 2012 State of the Internet* report, the term "high broadband", as used within the report, has been redefined to include connections to Akamai of 10 Mbps or greater. As was highlighted in last quarter's report, with the redefinition of "high broadband", a number of surveyed countries from the Asia Pacific region no longer qualify to be included as part of the global ranking. However, the high broadband adoption rates for those countries are still listed in Figure 19 for the sake of completeness.

Among the surveyed countries in the Asia Pacific region that qualified for inclusion, there was once again an extremely large range of high broadband adoption levels, ranging from 49% in South Korea down to just a tenth of a percent in China. Only South Korea, Japan, and Hong Kong had double-digit adoption rates, while the other countries were mostly well below 10% adoption. Quarterly declines were seen in a majority of the qualifying countries, as only Australia, Taiwan, and Thailand saw higher adoption as compared to the prior quarter, with double-digit percentage increases in both Australia and Taiwan. Among the countries that saw high broadband adoption decline quarter-over-quarter, the losses were fairly nominal, with none over 10%— the smallest was in New Zealand, which lost 1.7% (to 2.3%), while the largest was in Singapore, which lost 9.7% (to 7.1%).

Once again, only two of the countries that qualified for inclusion saw year-over-year declines in high broadband adoption, with Hong Kong losing 12% (to 26%) and Thailand losing 18% (to 0.9%). Otherwise, the observed yearly growth was generally pretty strong, ranging from 7.4% in Taiwan (to 3.3%) to a massive 122% year-over-year increase in China, though adoption there remains stuck at just a tenth of a percent. Interestingly, the Chinese government reported that the [fixed] broadband subscriber base in the country actually shrunk across the first and second quarters of 2012, as mobile became the most popular way for users to access the Internet.[33]

Among the countries in the Asia Pacific region that did not qualify for inclusion, Malaysia has the highest level of high broadband adoption, and saw very strong quarterly and yearly growth in the second quarter. Similar to China, India remains stuck at 0.1% adoption, while the Philippines and new additions Indonesia and Vietnam also struggle to achieve meaningful levels of high broadband adoption.

5.4 Asia Pacific Broadband Connectivity

As was noted previously, starting with the *1st Quarter, 2012 State of the Internet* report, the term "broadband", as used within the report, has been redefined to include connections to Akamai of 4 Mbps or greater.

Global Rank	Country	% Above 10 Mbps	QoQ Change	YoY Change
1	South Korea	49%	-7.4%	49%
2	Japan	37%	-1.8%	22%
3	Hong Kong	26%	-6.9%	-12%
24	Singapore	7.1%	-9.7%	53%
32	Australia	4.8%	34%	41%
36	Taiwan	3.3%	11%	7.4%
38	New Zealand	2.3%	-1.7%	8.3%
41	Thailand	0.9%	4.1%	-18%
45	China	0.1%	-7.7%	122%
–	Malaysia	1.2%	75%	138%
–	India	0.1%	1.4%	17%
–	Indonesia	0.1%	25%	-11%
–	Vietnam	0.1%	-27%	-55%
–	Philippines	0.1%	24%	58%

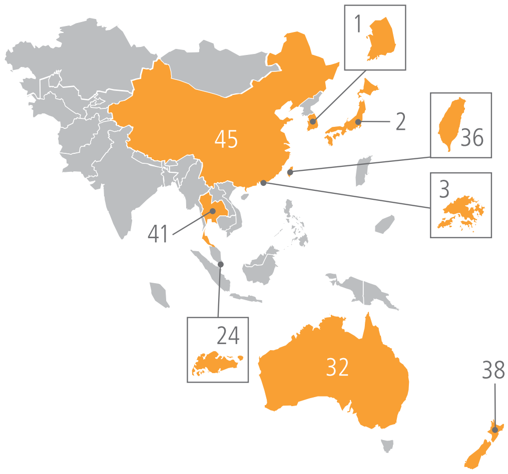

Figure 19: High Broadband (>10 Mbps) Connectivity, Asia Pacific Countries

There continues to be wide variations in broadband adoption rates among countries in the Asia Pacific region, ranging from 84% in perennial leader South Korea down to under one percent in Indonesia. Even between the surveyed countries, there are noticeable gaps in adoption levels. In looking at quarterly changes for the second quarter, six countries saw broadband adoption rates grow quarter-over-quarter, while seven countries saw adoption rates decline. Australia's 40% increase (to 38%) led the region, while Japan's 2.4% growth (to 74%) was the smallest. Of note, Malaysia, India, and Indonesia all saw quarter-over-quarter changes in excess of 10%. Across the countries that lost ground quarter-over-quarter, the largest decline was seen in Thailand, which dropped 25% (to 17%), and the smallest decline was seen in New Zealand, which dropped just 0.3% (to 34%). Indonesia had the lowest level of broadband adoption in the Asia Pacific region, at 0.8%. The Philippines did not qualify for inclusion in this metric, but the country's data is presented in Figure 20 for the sake of completeness.

Surprisingly, year-over-year changes were also mixed among countries in the Asia Pacific region. Both China and India turned in surprisingly large growth rates, both more than doubling broadband adoption year-over-year, as did Malaysia, which was up 83%. Strong growth rates were also seen in South Korea, Japan, and Australia, while New Zealand had the lowest yearly growth rate, increasing just 2.5%. Among the countries where broadband adoption rates declined year-over-year, Taiwan, Thailand, and Vietnam saw notable losses, all dropping more than 20%. Hong Kong and Singapore, however, saw more moderate losses, declining 4.7% and 1.0% respectively.

DID YOU KNOW?

- Six countries in the Asia Pacific region saw broadband adoption rates grow quarter-over-quarter, while seven countries saw growth year-over-year.
- The largest rate of quarterly growth in broadband adoption in the Asia Pacific region was the 40% increase in Australia, while the largest rate of yearly growth was the 147% increase in China.
- Broadband adoption rates in the Asia Pacific region vary widely, ranging from 84% in South Korea to under 1% in Indonesia.

Global Rank	Country	% Above 4 Mbps	QoQ Change	YoY Change
1	South Korea	84%	-2.2%	28%
4	Japan	74%	2.4%	20%
7	Hong Kong	68%	-5.2%	-4.7%
23	Singapore	47%	-7.3%	-1.0%
37	Australia	38%	40%	31%
40	New Zealand	34%	-0.3%	2.5%
42	Taiwan	32%	-12%	-22%
48	Thailand	17%	-25%	-24%
52	Malaysia	12%	11%	83%
69	China	3.1%	3.0%	147%
70	Vietnam	3.0%	-19%	-47%
72	India	1.4%	17%	101%
73	Indonesia	0.8%	14%	-15%
–	Philippines	1.3%	2.2%	10%

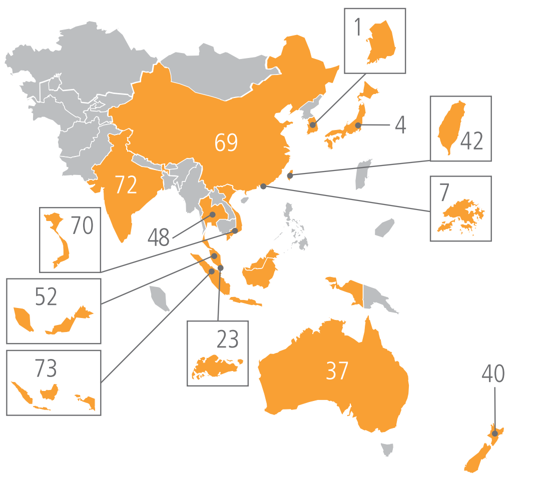

Figure 20: Broadband (>4 Mbps) Connectivity, Asia Pacific Countries

Geography – EMEA

The metrics presented here for the Europe/Middle East/Africa (EMEA) region are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within that section. (The subset used for this section includes connections identified as coming from networks in the EMEA region, based on classification by Akamai's EdgeScape geolocation tool.) As was noted in the introduction to Section 3, this section no longer includes city-level data nor data on narrowband (<256 kbps) connections, and the "new" definitions of high broadband (>10 Mbps) and broadband (>4 Mbps), put into place starting with last quarter's report, are used here as well. Starting with this quarter's report, Russia and South Africa have been added to the list of surveyed countries within the EMEA region.

6.1 EMEA Average Connection Speeds

After spending the last couple of quarters as the EMEA country with the highest average connection speed, a nearly 10% quarterly decline in the Netherlands to 8.0 Mbps allowed Switzerland, which grew 4.0% to 8.4 Mbps, to move to the top of the list. As shown in Figure 21, similar to what was seen in other regions, quarterly changes in average connection speeds among surveyed EMEA countries were mixed in the second quarter. Poland remained unchanged at 5.0 Mbps, while eight countries saw speeds increase quarter-over-quarter and 16 countries saw lower average connection speeds. Among the countries that saw quarterly growth, the biggest increase was observed in Austria and the United Arab Emirates, which both added 11% (to 6.3 Mbps and 5.2 Mbps respectively). Spain had the smallest increase, gaining just 0.5% (to 4.6 Mbps). Quarterly losses ranged from a tenth of a percent in Germany (to 5.8 Mbps) to a sizable 15% loss in Ireland (to 6.2 Mbps). South Africa, new to the EMEA region list in the second quarter, was the country with the lowest average connection speed in the region, at 1.8 Mbps.

Year-over-year changes were somewhat more positive, with 17 countries seeing increases, seven countries seeing decreases, and Turkey remaining unchanged. The United Arab Emirates had the highest year-over-year change, growing 59%, while 2 other countries grew 20% or more, and 9 additional countries grew 10% or more. The lowest yearly growth was seen in Belgium, at 1.5% (to 6.5 Mbps). Among the countries in the region that saw average connection speeds drop year-over-year, declines ranged from just 0.4% in Slovakia (to 5.5 Mbps) to the 12% loss observed in Portugal (to 4.7 Mbps).

Global Rank	Country	Q2 '12 Avg. Mbps	QoQ Change	YoY Change
5	Switzerland	8.4	4.0%	16%
6	Netherlands	8.0	-9.6%	-6.8%
7	Czech Republic	7.2	0.7%	-2.5%
8	Denmark	6.7	-0.5%	9.1%
10	Finland	6.6	-4.1%	16%
11	Romania	6.5	-0.9%	-3.6%
12	Belgium	6.5	-8.1%	1.5%
14	Austria	6.3	11%	20%
15	Ireland	6.2	-15%	1.6%
16	Sweden	5.9	-7.6%	10%
17	Germany	5.8	-0.1%	9.1%
18	United Kingdom	5.7	1.5%	12%
19	Hungary	5.6	-4.9%	-3.0%
21	Norway	5.5	-4.3%	1.7%
22	Slovakia	5.5	-4.8%	-0.4%
23	United Arab Emirates	5.2	11%	59%
27	Israel	5.0	8.1%	12%
29	Poland	5.0	–	15%
30	Russia	4.8	6.2%	22%
32	Portugal	4.7	-12%	-12%
33	Spain	4.6	0.5%	18%
34	France	4.6	-5.2%	18%
41	Italy	4.0	-2.9%	-4.2%
60	Turkey	2.7	-4.4%	–
81	South Africa	1.8	-1.7%	19%

Figure 21: Average Measured Connection Speed by EMEA Country

In an effort to improve local connection speeds, fed up waiting for private companies to bring high-speed connectivity to their community, a community in the United Kingdom assembled a group of volunteers to dig a 51 mile (83 km) trench to connect several villages in Lancashire, England to fiber optic cables in Manchester.[34] Part of the "B4RN" initiative, the intent is to build a community-owned municipal broadband network that will offer a 1 Gbps connection to every home for £30/month.[35]

6.2 EMEA Average Peak Connection Speeds

As shown in Figure 22, at 38.6 Mbps, Romania remained the country with the highest average peak connection speed in the EMEA region, remaining nearly 9 Mbps faster than Switzerland. Similar to the prior metric, quarterly changes in average peak connection speeds were also mixed in the second quarter. Eleven countries saw average peak connection speeds improve, ranging from a 0.3% increase in Hungary (to 28.0 Mbps) to 11% increases in both Israel and Austria (to 26.1 Mbps and 22.4 Mbps respectively). Among the remaining thirteen countries that saw average peak connection speeds decline quarter-over-quarter, losses ranged from 0.6% in Romania to 11% in Ireland (to 22.4 Mbps). Newcomer to the list South Africa had the lowest average peak connection speed in the region, at 5.5 Mbps—nearly 12 Mbps slower than the next lowest speed, which was the 17.4 Mbps observed in Italy and Turkey. (As has been the case over the last several quarters, data from the United Arab Emirates is not included in Figure 22 due to anomalies in the data that we believe are due to the network architecture within the country.)

In line with the last several quarters, year-over-year changes in the EMEA region have remained positive, with all surveyed countries seeing yearly increases in average peak connection speed. Yearly growth ranged from 4.9% in Italy to 39% in Russia, a newcomer to the list of EMEA region countries. Although growth rates were not as aggressive as those seen in the first quarter, both Poland and Russia grew in excess of 30%, while five more countries grew 20% or more, and an additional thirteen countries grew more than 10%.

Global Rank	Country	Q2 '12 Peak Mbps	QoQ Change	YoY Change
4	Romania	38.6	-0.6%	15%
6	Switzerland	29.9	4.3%	25%
7	Belgium	29.5	1.1%	10%
9	Hungary	28.0	0.3%	15%
11	Netherlands	27.9	-5.0%	10%
12	Portugal	27.8	-1.5%	6.2%
14	Israel	26.1	11%	18%
15	Czech Republic	25.8	5.6%	14%
19	United Kingdom	24.5	3.4%	28%
20	Germany	24.0	2.6%	20%
21	Spain	23.8	-0.8%	28%
22	Sweden	23.6	-2.2%	17%
23	Slovakia	23.4	-3.3%	14%
25	Denmark	22.8	5.9%	17%
26	Poland	22.7	3.0%	38%
27	Finland	22.6	-4.1%	17%
28	Ireland	22.4	-11%	13%
29	Austria	22.4	11%	21%
32	Russia	21.3	3.9%	39%
38	Norway	19.7	-1.9%	8.0%
43	France	18.3	-4.2%	18%
47	Italy	17.4	-1.7%	4.9%
48	Turkey	17.4	-6.1%	15%
129	South Africa	5.5	-9.0%	8.5%

Figure 22: Average Peak Connection Speed by EMEA Country

DID YOU KNOW?

In line with the last several quarters, year-over-year changes in average peak connection speeds for countries in the EMEA region remained positive, with all surveyed countries seeing yearly increases.

6.3 EMEA High Broadband Connectivity

As shown in Figure 23, in addition to having the highest average connection speed, Switzerland also had the highest level of high broadband adoption among surveyed countries in the EMEA region, with 22% of connections to Akamai at speeds above 10 Mbps. As with the connection speed metrics, quarter-over-quarter changes for high broadband adoption levels were also mixed in the second quarter. Twelve countries saw increases in high broadband adoption levels, led by the impressive 56% growth in South Africa (to 1.1%). Four other countries within the region also saw adoption rates increase in excess of 10%, while the smallest growth was seen in Italy, which added just 1.6% (to 2.6%). Of the 13 countries where high broadband adoption levels declined quarter-over-quarter, losses ranged from just half a percent in Germany (to 8.3%) to a more concerning 35% drop in Portugal (to 4.4%). Turkey had the lowest level of high broadband adoption in the EMEA region, with just half a percent of connections to Akamai at speeds above 10 Mbps.

Looking at year-over-year changes, these were also mixed, but the number of countries that saw an increase was more than double the number that saw a decrease. Seventeen countries saw high broadband adoption levels grow year-over-year, with particularly large growth seen in the United Arab Emirates, which increased 123% (to 7.6%), Spain, which increased 132% (to 4.5%), and South Africa, which increased a massive 284%. Sweden had the smallest year-over-year change, growing a still-impressive 14%. Among the countries that declined year-over-year, losses ranged from 1.1% in Ireland (to 8.1%) to 27% drops seen in both Portugal and Turkey.

Global Rank	Country	% Above 10 Mbps	QoQ Change	YoY Change
5	Switzerland	22%	15%	59%
6	Netherlands	18%	-24%	-16%
8	Czech Republic	14%	21%	19%
9	Belgium	14%	-24%	25%
10	Finland	14%	-16%	46%
11	Denmark	13%	-14%	32%
12	Romania	13%	-2.9%	-2.5%
13	Sweden	11%	-19%	14%
14	Norway	11%	-5.9%	26%
15	Austria	11%	6.4%	34%
17	Germany	8.3%	-0.5%	50%
18	Ireland	8.1%	-21%	-1.1%
19	Hungary	7.9%	-21%	-9.5%
21	United Kingdom	7.6%	17%	85%
22	United Arab Emirates	7.6%	29%	123%
23	Poland	7.3%	3.1%	60%
25	Slovakia	7.1%	-20%	-2.7%
26	Russia	6.8%	5.5%	46%
30	Israel	5.9%	5.9%	59%
33	Spain	4.5%	7.6%	132%
34	Portugal	4.4%	-35%	-27%
35	France	3.9%	-14%	57%
37	Italy	2.6%	1.6%	-8.8%
40	South Africa	1.1%	56%	284%
43	Turkey	0.5%	6.7%	-27%

Figure 23: High Broadband (>10 Mbps) Connectivity, EMEA Countries

DID YOU KNOW?

Twelve countries in the EMEA region saw increases in high broadband adoption levels in the second quarter of 2012. The largest quarterly increase (56%) was seen in South Africa.

6.4 EMEA Broadband Connectivity

As shown in Figure 24, broadband adoption levels remained fairly strong across most countries in the EMEA region in the second quarter, despite a mix of quarterly changes. Switzerland topped the list for this metric as well, growing 2.3% to boost its broadband adoption level to 79%. (Due to rounding, Switzerland and the Netherlands are both listed as having a 79% adoption rate, though Switzerland's actual rate was just slightly above that mark, while the rate in the Netherlands was actually slightly below it.) Seven other countries also saw higher broadband adoption levels, with growth ranging from 0.7% in Germany and South Africa (to 57% and 6.9% adoption) to a solid 22% jump in Austria (to 57%). Seventeen countries had lower levels of broadband adoption than in the first quarter, with declines ranging from 1.8% in Romania (to 62%) to a surprisingly large 31% decline in Turkey (to 8.0%). South Africa's 6.9% broadband adoption level was the lowest among surveyed countries in the EMEA region, and Turkey, at 8.0%, joined it as the only other country that had less than 10% of connections to Akamai at speeds above 4 Mbps. (And, for that matter, as the only two countries that also had less than 20% of their connections to Akamai below that threshold.)

Year-over-year changes were also mixed among surveyed countries in the EMEA region. Yearly increases were observed in 17 countries, while only eight saw declines. Particularly strong growth was seen across a number of countries, with two countries seeing growth in excess of 70%, another two growing more than 50%, and five additional countries adding 20% or more. South Africa had the largest increase, growing 79% year-over-year, while Denmark had the smallest, adding only 5.0% (to 66%). Among the countries where broadband adoption levels decreased year-over-year, Portugal was the only one to see a decline of more than 10%, losing 21%, while the Netherlands' drop of just 2.0% was the smallest loss seen.

Global Rank	Country	% Above 4 Mbps	QoQ Change	YoY Change
2	Switzerland	79%	2.3%	14%
3	Netherlands	79%	-5.0%	-2.0%
5	Belgium	69%	-4.7%	-6.3%
9	Denmark	66%	5.2%	5.0%
10	Czech Republic	64%	-6.4%	-10%
11	Romania	62%	-1.8%	-2.4%
12	Hungary	57%	-5.2%	-4.1%
14	Germany	57%	0.7%	7.8%
15	Austria	57%	22%	26%
16	United Kingdom	56%	-3.3%	14%
17	Finland	56%	-6.1%	20%
18	United Arab Emirates	51%	16%	74%
20	Portugal	50%	-17%	-21%
21	Russia	48%	12%	34%
22	Ireland	48%	-8.2%	10%
25	Israel	46%	14%	54%
27	France	45%	-9.2%	56%
28	Sweden	44%	-7.9%	12%
30	Poland	43%	-2.1%	29%
31	Spain	43%	-3.1%	28%
35	Norway	41%	-7.4%	-6.1%
36	Slovakia	39%	-2.6%	8.3%
44	Italy	28%	-14%	-8.5%
59	Turkey	8.0%	-31%	11%
62	South Africa	6.9%	0.7%	79%

Figure 24: Broadband (>4 Mbps) Connectivity, EMEA Countries

DID YOU KNOW?

Yearly increases in broadband adoption were observed in 17 countries in the EMEA region. The largest yearly increase (79%) was seen in South Africa.

SECTION 7:
Mobile Connectivity

Building on the data presented in previous editions of the *State of the Internet* report, Akamai continues to review mobile networks for inclusion in the report, as well as filtering out networks subsequently identified as having proxy/gateway configurations that could skew results. The source data in this section encompasses usage not only from smartphones, but also laptops, tablets, and other devices that connect to the Internet through these mobile networks. In addition, this edition of the *State of the Internet* Report once again includes insight into mobile traffic growth and data traffic patterns contributed by Ericsson, a leading provider of telecommunications equipment and related services to mobile and fixed network operators globally. Akamai and Ericsson have partnered to develop the first ever end-to-end solution to address performance, scalability, and availability of mobile content and applications on a global scale.

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

- A minimum of 1,000 unique IP addresses connecting to Akamai from the network in the second quarter of 2012 was required for inclusion in the list.
- In countries where Akamai had data for multiple network providers, only the top three are listed, based on unique IP address count.
- The names of specific mobile network providers have been made anonymous, and providers are identified by a unique ID.
- Data is included only for networks where Akamai believes that the entire Autonomous System (AS) is mobile — that is, if a network provider mixes traffic from fixed/wireline (DSL, cable, etc.) connections with traffic from mobile connections on a single network identifier, that AS was not included in the source data set.
- Akamai's EdgeScape database was used for the geographic assignments.

7.1 Connection Speeds on Mobile Networks

In the second quarter of 2012, Russian provider RU-1 took over the top spot as the mobile network provider with the highest average connection speed, at just over 7.5 Mbps. In reviewing the full list of providers in Figure 25, we find that there are six providers (RU-1, UA-1, DE-2, CZ-3, GR-1, RU-4) that had average connection speeds in the "broadband" (>4 Mbps) range. An additional 67 mobile providers had average connection speeds greater than 1 Mbps in the second quarter. The mobile provider with the lowest average connection speed was once again Nigerian provider NG-1, at 340 kbps (up 18 kbps from the previous quarter). Including NG-1, a dozen providers had average connection speeds below 1 Mbps in the second quarter.

Examining the average peak connection speed data for the second quarter of 2012, we find that mobile provider UK-1, in the United Kingdom, moved into the top spot with an average peak connection speed of 44.4 Mbps. However, this speed represents a nearly 60% increase from the prior quarter, so it may be indicative of an upgrade or change to the provider's network architecture. German provider DE-2, which has topped the list in the past, fell to third place this quarter with an average peak connection speed of 26.6 Mbps, while last quarter's leader HK-1 in Hong Kong dropped to fifth place, with an average peak connection speed of 23.5 Mbps. Across the surveyed set of providers, just five had average peak connection speeds over 20 Mbps, down from four in the prior quarter. Average peak connection speeds above 10 Mbps were seen in an additional 33 mobile providers, up two from the prior quarter. All mobile providers had average peak connection speeds above 2 Mbps, including last place South African provider ZA-1, at 2.5 Mbps, up 0.3 Mbps from the first quarter.

As was noted last quarter, the *State of the Internet* report will no longer include per-provider average MB per month consumption data.

Country	ID	Q2 '12 Avg. kbps	Q2 '12 Peak kbps
AFRICA			
Egypt	EG-1	677	4256
Morocco	MA-1	1122	10268
Nigeria	NG-1	340	6479
South Africa	ZA-1	552	2542
ASIA			
China	CN-1	1857	5161
Hong Kong	HK-2	1916	11205
Hong Kong	HK-1	2027	23482
Indonesia	ID-1	773	12603
Israel	IL-1	1549	7747
Kuwait	KW-1	1414	6178
Malaysia	MY-3	1205	8520
Malaysia	MY-1	583	7132
Pakistan	PK-1	1403	7175
Qatar	QA-1	1323	4405
Saudi Arabia	SA-1	1435	6603
Singapore	SG-3	1388	7869
Sri Lanka	LK-1	932	10053
Taiwan	TW-1	1591	8516
Taiwan	TW-2	1060	7159
Thailand	TH-1	920	8352
EUROPE			
Austria	AT-1	2463	9072
Belgium	BE-1	3340	13799
Belgium	BE-3	1008	5594
Czech Republic	CZ-1	1700	8300
Czech Republic	CZ-3	4532	13815
Czech Republic	CZ-2	1302	7548
Estonia	EE-1	1506	8107
France	FR-2	2768	10208
Germany	DE-1	1239	6440
Germany	DE-2	5411	26582
Germany	DE-3	1804	8125
Greece	GR-1	4488	18630
Hungary	HU-2	2244	11690
Hungary	HU-1	1588	8083
Ireland	IE-1	2739	13482
Ireland	IE-2	1869	15510
Ireland	IE-3	2200	17223
Italy	IT-2	3168	16130
Italy	IT-3	3127	15552
Italy	IT-4	1934	10943
Lithuania	LT-2	2293	15998
Lithuania	LT-1	3083	17974
Moldova	MD-1	1844	8530
Netherlands	NL-2	1521	4411
Netherlands	NL-1	1808	4483
Netherlands	NL-3	1809	8119
Norway	NO-1	2273	8258
Poland	PL-1	3132	16162
Poland	PL-2	1788	8371
Poland	PL-3	1737	10550
Romania	RO-1	1023	6281
Russia	RU-1	7538	36944
Russia	RU-4	4181	19380
Russia	RU-3	742	5038
Slovakia	SK-1	1165	6839
Slovenia	SI-1	2091	8762
Spain	ES-1	3580	25819
Turkey	TR-1	1806	8611
Ukraine	UA-1	5926	19287
United Kingdom	UK-3	2983	12612
United Kingdom	UK-2	3115	13010
United Kingdom	UK-1	2600	44355
NORTH AMERICA			
Canada	CA-2	1045	2628
El Salvador	SV-2	1854	12133
El Salvador	SV-1	1619	9355
El Salvador	SV-3	603	3297
Guatemala	GT-2	1579	10950
Nicaragua	NI-1	1809	12748
United States	US-1	2364	7326
United States	US-3	1278	3808
United States	US-2	1339	5089
OCEANIA			
Australia	AU-3	1955	12527
Australia	AU-1	1444	14514
New Zealand	NZ-2	1813	10071
SOUTH AMERICA			
Argentina	AR-1	1049	7265
Argentina	AR-2	2228	16677
Bolivia	BO-1	556	5094
Brazil	BR-1	866	7321
Brazil	BR-2	1390	8073
Chile	CL-3	1371	10644
Chile	CL-4	1281	13520
Colombia	CO-1	1171	7392
Paraguay	PY-2	864	7613
Uruguay	UY-1	1552	12974
Venezuela	VE-1	1002	7315

Figure 25: Average and Average Peak Connection Speed per Month by Mobile Provider

7.2 Mobile Browser Usage Data

As was highlighted in the "Letter From the Editor" in the *1st Quarter, 2012 State of the Internet* report, Akamai launched the "Akamai IO" destination site (http://www.akamai.com/io) in June, with an initial data set that highlights browser usage across PC and mobile devices, connecting via fixed and mobile networks. (Note that the current data set comes from sampling traffic across several hundred top-tier sites delivering content through Akamai, and that most of these sites are focused on a U.S. audience, so the data presented below is biased in favor of U.S. users. We expect to grow our sample set in the future, in turn being able to provide more global and geo-specific views of the data.)

Although a complete data set for the second quarter is not available, Figure 26 highlights observations made from traffic to Akamai during June 2012 from users identified to be on cellular networks.[36] When looking at requests from just mobile browsers, the figure clearly shows that the largest percentage of such requests came from Android Webkit, averaging around 37–38%. (Webkit is an open source Web browser engine,[37] and is the default browser in the Android mobile operating system.[38]) Following close behind was Mobile Safari, the default browser on Apple's iOS devices, which was responsible for approximately 33% of such requests over the course of the month. The Opera Mini browser accounted for an average of 22-23% of requests, while the Blackberry browser was significantly further behind, at approximately 4%. While more than a dozen additional browsers were also detected, they each accounted for 1–2% or less of the traffic that comprised the data set used for this figure.

However, a significantly different usage pattern appears when the scope is expanded to all networks[39] (not just those identified as "cellular"). As shown in Figure 27, Apple's Mobile Safari browser was far and away responsible for the majority of the requests, accounting for around 60% on average. The Android Webkit browser percentage was significantly lower than on cellular networks, accounting here for about 22-23% of requests, while the percentage of requests from Microsoft's Mobile Explorer browser, Opera Mini, and more than a dozen additional browsers was significantly lower.

An interesting observation can be made in examining the data presented in Figure 26 and Figure 27. For the set of sites currently being sampled for Akamai IO, it appears that significantly more mobile users (that is, using mobile devices on cellular networks) are using Android-powered devices than iOS devices. However, the ratio changes drastically when the scope is expanded beyond just cellular networks, indicating that significantly more users of iOS devices use these devices on WiFi networks—heavily driven by iPad usage. Digging further into the underlying data,[40] we find that on non-cellular networks, Mobile Safari accounts for ~67% of mobile browser activity, with the iPad accounting for ~43%, and iPhone/iPod Touch the remaining 24%. In contrast, on these networks, Android WebKit's share is ~18%. However, on cellular networks, iPads account for only about 20% of Mobile Safari usage.[41]

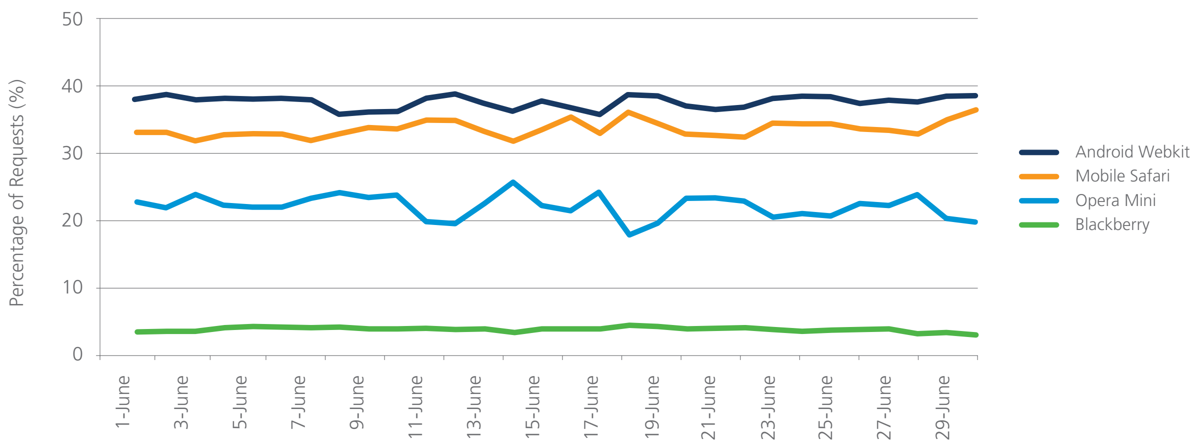

Figure 26: Mobile Browsers Seen Across Cellular Networks, June 2012

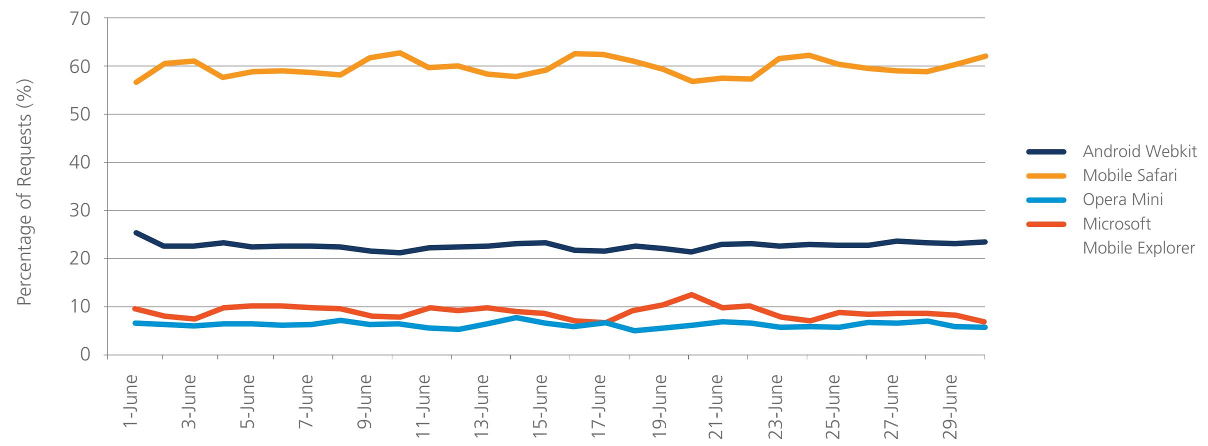

Figure 27: Mobile Browsers Seen Across All Networks, June 2012

7.3 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 28, the volume of mobile data traffic doubled from the second quarter of 2011 to the second quarter of 2012, and grew 14% between the first and second quarter of 2012.

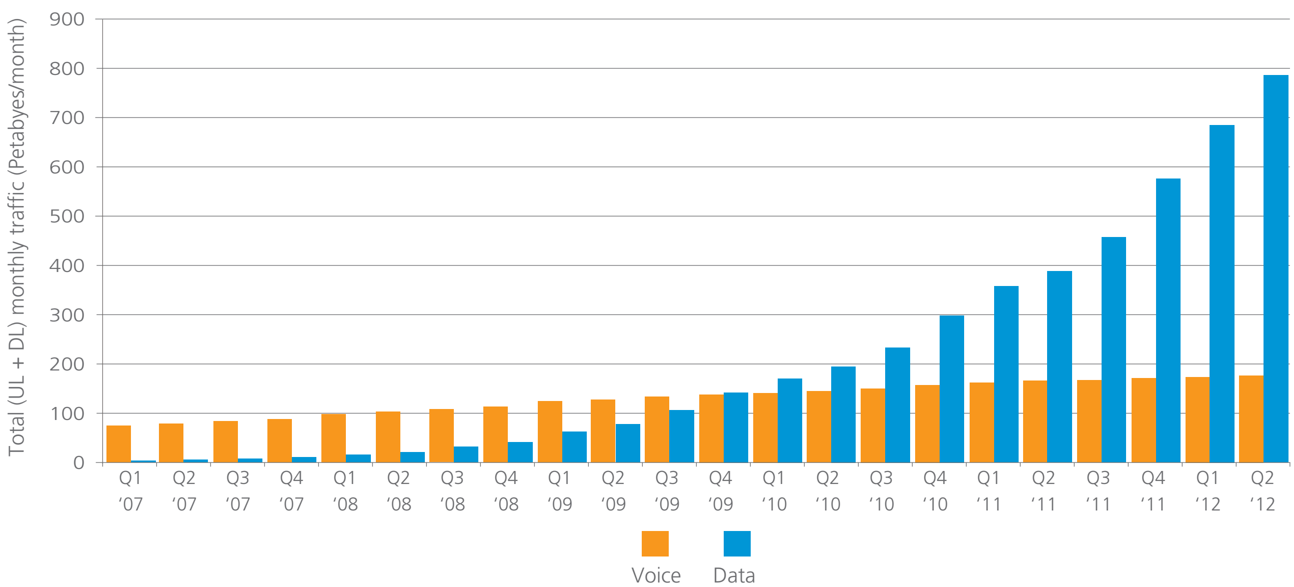

Figure 28: Total Monthly Mobile Voice and Data as Measured by Ericsson

7.4 Traffic Variation by Screen Resolution as Observed by Ericsson

Variations observed in mobile traffic patterns are dependent on many, often interacting, factors such as data plans, fixed & mobile penetration, content availability, traffic management, and device types. Here we take a closer look at how traffic varies with screen resolution and screen size.

Ericsson regularly performs detailed traffic measurements in all major regions of the world. The measurements in this section were made in a selected number of live commercial WCDMA/HSPA networks in Asia, Europe and the Americas.

Figure 29 shows, for Android devices with different screen resolutions and screen sizes, how average monthly traffic volume per subscription varies across selected operators around the world. Both charts show minimum (bottom of the bar), maximum (top of the bar) and average values (darkest shaded area in the middle) for popular Android models at the selected operators. For example, among popular Android models with 480x800 screen resolution, the highest measured average usage was above 1 GB / month / subscription for the model with the highest usage in the network with the highest usage. The chart shows clear correlation between per subscription traffic volume and screen parameters: average usage increases both with screen size and screen resolution.

We believe that one reason for this correlation is that devices with larger screens and/or better screen resolution often have higher usage of high traffic applications—owners of these devices are more likely to watch higher quality video clips for longer periods of time. This effect is even more pronounced in networks where there are low priced data plans and the most popular TV shows are available to stream for free. However, not all of this increased usage is due to screen size. Devices with larger screens are often bundled with data plans that have higher usage caps, and these data plans often attract high-end users. These additional factors also contribute to higher usage.

Based on screen parameters and average per subscription traffic volumes shown in Figure 29, Android devices can be categorized into the following three categories:

- **Low-end Android smartphones:** screen measures between 2.5"–3.5" diagonal, while the two most typical screen resolutions are 240 x 320 and 320 x 480. Average usage is typically 150–250 MB / month / subscription (up to ~500 MB for certain models in certain networks).
- **High-end Android smartphones:** screen measures between 3.5"–4.5" diagonal, while the typical screen resolution is 480 x 800. Average usage is typically ~500 MB / month / subscription, but can exceed 1 GB for certain models in certain networks.
- **Android tablets:** screen typically measures above 5" diagonal, while screen resolution is 600 x 1024 or higher. Average usage is typically 600–700 MB / month / subscription but can exceed 1 GB for certain models in certain networks.

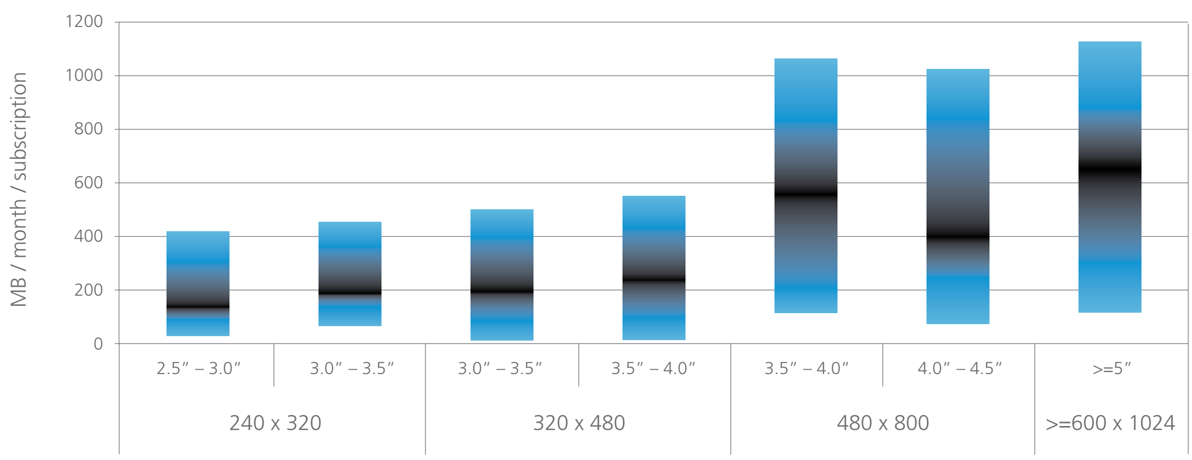

Figure 29: How traffic volume varies with screen parameters on popular Android devices

8.1 China

On April 12, it was reported that "At around 11 am local time Thursday, China's Internet suddenly began behaving very strangely."[42] Published reports indicated that users inside of China were unable to access some Chinese Web sites like the portal sites from sina.com, as well as popular foreign Web sites not normally blocked by China's firewall. Simultaneously, Internet users outside China, including in Hong Kong, reported difficulties accessing key Chinese sites, such as popular search engine Baidu, as well as the Web site of the People's Bank of China. The issues reportedly lasted about two hours, with service "more or less restored" by 1 pm.

Figure 30 illustrates the traffic patterns for HTTP (non-secure) content delivered into China by Akamai on April 12. The shaded area highlights a significant, albeit brief, decline in such traffic roughly coincident with the reported problems. The decline is clearly anomalous, as it is not part of a regularly occurring traffic pattern when looking at surrounding days. The cause of the observed disruption was the source of much speculation, though one source highlighted problems with two leading Chinese telecom companies that were observed concurrent with the reported access issues.[43]

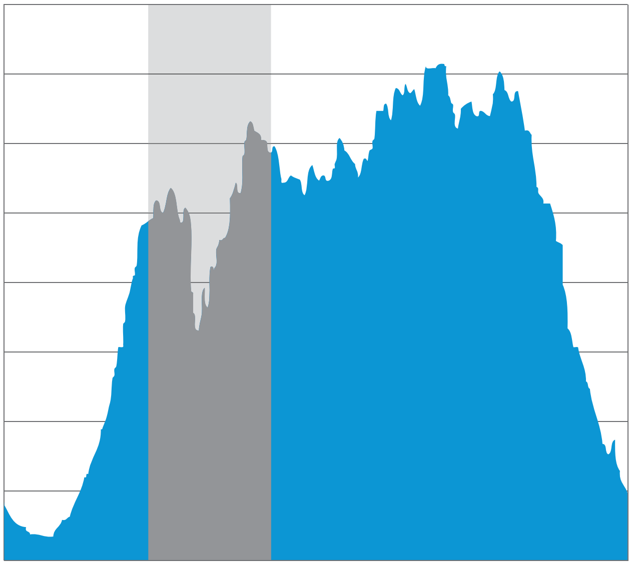

Figure 30: HTTP Traffic Served to China, April 12, 2012

DID YOU KNOW?

- On Wednesday, June 6, the Sea-Me-We-4 submarine cable suffered a break 60 kilometers from the coast of Singapore. One impact of this break was the severe disruption of Internet connectivity to Bangladesh, as the country is entirely reliant on Sea-Me-We-4 for high-speed connectivity to the global Internet.
  [Source: http://www.renesys.com/blog/2012/06/smw4-break-on-south-asia.shtml]

- On Thursday, April 26, the TEAMS (The East African Marine System) submarine cable was cut, disrupting Internet connectivity to Kenya, Uganda, Tanzania and Rwanda. This was the second outage in three months for the TEAMS cable, and came just 35 days after a previous cut was fixed.
  [Source: http://www.renesys.com/blog/2012/04/teams-cable-down-again.shtml]

8.2 Syria

On May 31, it was reported that users in Syria were experiencing a disruption in Internet connectivity, including problems accessing certain types of content. Figure 31 illustrates the traffic patterns for HTTP (non-secure) content delivered into Syria by Akamai between May 28 and June 1. The graph clearly shows cyclical traffic peaks on the 28th, 29th, and 30th, with traffic levels around the 31st about half of what would be expected. Figure 32 illustrates the disruption (as observed by Akamai) even more clearly, showing the traffic patterns for HTTPS (secure) traffic delivered into Syria by Akamai during the same four-day period. As shown in the graph, cyclical traffic peaks occur on the 28th, 29th, and 30th, but there is a significant decline in traffic observed around the 31st, though traffic appears to recover, in a limited fashion, late in the day.

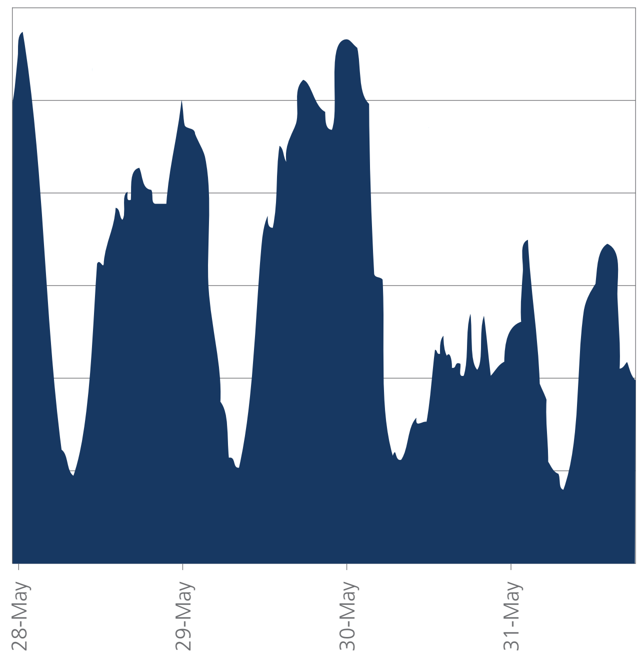

Figure 31: HTTP Traffic to Syria, May 28–31, 2012

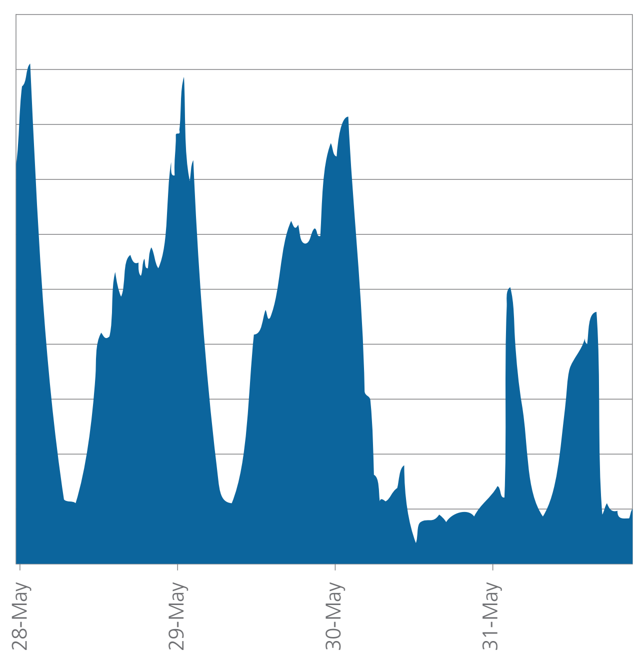

Figure 32: HTTPS Traffic to Syria, May 28–31, 2012

DID YOU KNOW?

- In April, the International Business Times reported that "Millions of Internet users in Iran will be permanently denied access to the World Wide Web and cut off from popular social networking sites and email services, as the government has announced its plans to establish a national Intranet within five months. *[Source: http://www.ibtimes.com/iran-shut-down-internet-permanently-clean-national-intranet-pipeline-434948]*
- In late September, Reuters reported that "According to Iranian media, the domestic system would be fully implemented by March 2013 but it was not clear whether access to the global Internet would be cut once the Iranian system is rolled out. *[Source: http://in.reuters.com/article/2012/09/23/net-us-iran-internet-national-idINBRE88M0AO20120923]*

SECTION 9:
Appendix

Region	% Attack Traffic	Unique IP Addresses	Avg. Connection Speed (Mbps)	Peak Connection Speed (Mbps)	% Above 10 Mbps*	% Above 4 Mbps*
EUROPE						
Austria	0.2%	2,575,797	6.3	22.4	11%	57%
Belgium	0.1%	4,295,061	6.5	29.5	14%	69%
Czech Republic	0.5%	2,194,394	7.2	25.8	15%	64%
Denmark	0.1%	2,751,789	6.7	22.8	13%	66%
Finland	0.1%	2,722,617	6.6	22.6	14%	56%
France	1.2%	26,103,462	4.6	18.3	3.9%	45%
Germany	1.9%	36,196,309	5.8	24.0	8.3%	57%
Greece	0.2%	2,828,681	3.9	20.6	1.7%	31%
Hungary	1.9%	2,618,168	5.6	28.0	7.9%	57%
Iceland	<0.1%	147,865	5.5	24.6	6.3%	42%
Ireland	0.1%	1,585,775	6.2	22.4	8.1%	48%
Italy	2.1%	17,965,986	4.0	17.4	2.6%	28%
Luxembourg	<0.1%	167,120	4.5	16.6	3.2%	42%
Netherlands	0.5%	8,319,010	8.0	27.9	19%	79%
Norway	0.1%	3,663,814	5.5	19.7	11%	42%
Poland	1.7%	8,149,172	5.0	22.7	7.3%	43%
Portugal	0.2%	3,043,488	4.7	27.8	4.4%	50%
Romania	3.5%	2,670,881	6.5	38.6	13%	62%
Russia	6.3%	15,472,955	4.8	21.3	6.8%	48%
Slovakia	0.1%	902,201	5.5	23.4	7.1%	39%
Spain	0.9%	13,483,737	4.6	23.8	4.5%	43%
Sweden	0.3%	6,557,474	5.9	23.6	12%	44%
Switzerland	0.3%	3,245,263	8.4	29.9	22%	79%
United Kingdom	0.9%	26,579,255	5.7	24.5	7.6%	56%
ASIA/PACIFIC						
Australia	0.3%	8,538,932	4.4	21.7	4.8%	38%
China	16%	93,604,214	1.5	5.9	0.1%	3.1%
Hong Kong	0.7%	2,906,372	8.9	49.2	26%	68%
India	2.9%	12,303,447	1.0	7.3	0.1%	1.4%
Indonesia	1.5%	3,287,593	0.8	8.4	0.1%	0.8%
Japan	2.0%	39,876,417	10.7	40.5	37%	74%
Malaysia	0.4%	2,205,250	2.2	16.4	1.2%	12%
New Zealand	0.1%	2,050,493	3.9	16.5	2.3%	34%
Singapore	0.2%	1,301,374	5.1	28.3	7.1%	47%
South Korea	2.1%	19,666,997	14.2	46.9	49%	84%
Taiwan	5.4%	11,382,264	3.7	24.5	3.3%	32%
Vietnam	1.1%	4,434,387	1.6	8.9	0.1%	3.0%
MIDDLE EAST & AFRICA						
Egypt	2.1%	2,411,680	1.3	8.5	0.2%	4.8%
Israel	0.8%	2,573,777	5.0	26.1	5.9%	46%
Kuwait	0.1%	936,233	1.7	11.9	0.6%	3.6%
Saudi Arabia	0.3%	3,546,444	2.1	9.7	0.1%	2.2%
South Africa	0.2%	4,683,988	1.8	5.5	1.1%	6.9%
Sudan	<0.1%	67,909	1.0	8.1	<0.1%	0.8%
Syria	<0.1%	566,084	1.8	6.3	0.1%	4.6%
United Arab Emirates (UAE)	0.2%	1,192,792	5.2	n/a	7.6%	51%
LATIN & SOUTH AMERICA						
Argentina	1.4%	6,720,553	2.0	13.2	0.2%	7.6%
Brazil	4.6%	21,546,894	2.1	14.9	0.5%	12%
Chile	0.5%	3,447,822	3.0	19.5	0.7%	12%
Colombia	0.7%	4,406,209	2.5	13.3	0.3%	7.6%
Mexico	0.6%	11,162,010	2.7	13.8	0.5%	9.8%
Peru	0.5%	974,836	1.8	12.7	0.1%	1.3%
Venezuela	0.5%	2,540,078	1.0	6.8	<0.1%	0.8%
NORTH AMERICA						
Canada	1.0%	13,589,452	6.5	25.5	11%	69%
United States	12%	142,879,594	6.6	27.1	16%	57%

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

SECTION 10:
Endnotes

[1] https://www.trustworthyinternet.org/ssl-pulse/
[2] https://www.arin.net/knowledge/rirs.html
[3] ftp://ftp.arin.net/pub/stats/arin/delegated-arin-latest
ftp://ftp.apnic.net/apnic/stats/apnic/delegated-apnic-extended-latest
ftp://ftp.ripe.net/pub/stats/ripencc/delegated-ripencc-latest
ftp://ftp.afrinic.net/pub/stats/afrinic/delegated-afrinic-latest
ftp://ftp.lacnic.net/pub/stats/lacnic/delegated-lacnic-latest
[4] http://whois.arin.net/rest/ip/47.74.0.0
[5] http://whois.arin.net/rest/net/NET-47-58-0-0-1.html
[6] http://whois.arin.net/rest/ip/162.160.0.0
[7] http://lacnic.net/cgi-bin/lacnic/whois?lg=EN (search for 177.160.0.0)
[8] http://www.afrinic.net/index.php/en/services/whois-query (search for 105.240.0.0)
[9] http://www.circleid.com/posts/20120529_ipv4_business_as_usual/
[10] https://www.ripe.net/internet-coordination/news/ripe-ncc-begins-to-allocate-ipv4-address-space-from-the-last-8
[11] http://he.net/about_us.html
[12] http://bgp.he.net/going-native.pdf
[13] http://www.renesys.com/tech/presentations/pdf/ENOG3-cowie.pdf
[14] http://www.cio.com/article/print/704136
[15] http://www.extremetech.com/mobile/127213-ipv6-now-deployed-across-entire-t-mobile-us-network
[16] http://www.worldipv6launch.org/press/world-ipv6-launch-unites-industry-leaders-to-redefine-the-global-internet/
[17] http://policyblog.verizon.com/BlogPost/780/VerizonandIPv6.aspx
[18] http://tools.ietf.org/html/rfc920
[19] http://en.wikipedia.org/wiki/Generic_top-level_domain
[20] http://newgtlds.icann.org/en/program-status/application-results/strings-1200utc-13jun12-en
[21] http://en.wikipedia.org/wiki/Generic_top-level_domain#New_top-level_domains
[22] http://newgtlds.icann.org/en/applicants/customer-service/faqs/faqs-en
[23] http://newgtlds.icann.org/en/program-status/application-results/strings-1200utc-13jun12-en
[24] https://www.icann.org/en/news/announcements/announcement-13jun12-en.htm
[25] http://newgtlds.icann.org/en/applicants/customer-service/faqs/faqs-en
[26] http://www.akamai.com/dl/whitepapers/How_will_the_internet_scale.pdf
[27] http://www.bikyamasr.com/66353/expensive-broadband-costs-decreases-internet-usage/
[28] http://www.itnewsafrica.com/2012/05/south-sudan-invited-to-connect-to-kenyas-broadband/
[29] http://www.techcentral.co.za/seacom-to-double-capacity/32121/
[30] http://gigaom.com/broadband/an-ohio-biz-200m-gigabit-broadband-for-6-towns/
[31] http://www.gwi.net/policy/news/university-of-maine-becomes-one-of-the-fastest-moving-gig-u-universities-in-the-country-gwis-gigabit-main-street-network-to-drive-economic-development-in-orono-and-old-town/
[32] http://www.whitehouse.gov/the-press-office/2012/06/13/we-can-t-wait-president-obama-signs-executive-order-make-broadband-const
[33] http://www.theregister.co.uk/2012/07/23/china_broadband_numbers_shrinking/
[34] http://news.bbc.co.uk/2/hi/programmes/click_online/9711150.stm
[35] http://b4rn.org.uk/about-b4rn
[36] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=15&type=line&start=20120601&end=20120630&net=m
[37] http://www.webkit.org/
[38] http://en.wikipedia.org/wiki/WebKit
[39] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=15&type=line&start=20120601&end=20120630&net=both
[40] http://www.akamai.com/html/io/io_dataset.html#stat=mobile_browser&top=5&type=bar&start=20120601&end=20120630&net=n
[41] http://blog.cloudfour.com/explaining-the-ios-and-android-mobile-disparity/#div-comment-11234
[42] http://blogs.wsj.com/chinarealtime/2012/04/12/mystery-outages-put-china-internet-on-edge/
[43] http://blogs.wsj.com/chinarealtime/2012/04/13/new-clarity-on-china-internet-outage/?mod=WSJBlog
[44] http://mailman.nanog.org/pipermail/nanog/2012-May/048589.html

Acknowledgements

EDITOR: David Belson
EXECUTIVE EDITOR: Brad Rinklin
EXECUTIVE EDITOR: Tom Leighton
GRAPHIC DESIGNER: Brendan O'Hara
CONTRIBUTOR: Jon Thompson
CONTRIBUTOR: Stephen Ludin
CONTRIBUTOR: Martin McKeay
CONTRIBUTOR: Péter Kersch (Ericsson)
CONTRIBUTOR: Richard Möller (Ericsson)
CONTRIBUTOR: Svante Bergqvist (Ericsson)
CONTRIBUTOR: Mathias Sintorn (Ericsson)
CONTRIBUTOR: Martin Levy (Hurricane Electric)

Please send comments, questions, and corrections to stateoftheinternet@akamai.com
Follow @akamai and @akamai_soti on twitter

Akamai FASTER FORWARD

Akamai® is the leading cloud platform for helping enterprises provide secure, high-performing user experiences on any device, anywhere. At the core of the company's solutions is the Akamai Intelligent Platform™ providing extensive reach, coupled with unmatched reliability, security, visibility and expertise. Akamai removes the complexities of connecting the increasingly mobile world, supporting 24/7 consumer demand, and enabling enterprises to securely leverage the cloud. To learn more about how Akamai is accelerating the pace of innovation in a hyperconnected world, please visit www.akamai.com and follow @Akamai on Twitter.

Asia Pacific Headquarters	1 Raffles Place, #16 – 61 One Raffles Place, Singapore 048616	Tel +65.6593.8700	Fax +65.6593.8799
European Headquarters	Pfingstweidstrasse 60, 8005, Zurich, Switzerland	Tel +41.43.210.91.00	Fax +41.43.210.91.01
North American Headquarters	8 Cambridge Center, Cambridge, Massachusetts, United States 02142	Tel +1.617.444.3000	Fax +1.617.444.3001