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FASTER FORWARD

VOLUME 5, NUMBER 1

The State of the Internet

1ST QUARTER, 2012 REPORT

INCLUDES INSIGHT ON MOBILE TRAFFIC AND CONNECTED DEVICES FROM ERICSSON

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Letter From the Editor

This issue of the *State of the Internet* report marks the beginning of the fifth year of the report's publication. With the start of this fifth volume, we are taking the opportunity to introduce some changes to the report:

- The report has defined "broadband" as connections to Akamai at speeds of 2 Mbps or greater for the last four years. Going forward, we are revising the definition with a 4 Mbps threshold. This brings it into line with the definition used as part of the United States National Broadband Plan, as well as with target speeds in the European Union and China.
- The report has defined "high broadband" as connections to Akamai at speeds of 5 Mbps or greater for the last four years. Going forward, we are revising the definition with a 10 Mbps threshold. Many countries and regions (such as the European Union) have longer-term connection speed targets in the tens or hundreds of Mbps, gigabit projects are underway in many countries, and in countries with established broadband infrastructure and multiple service providers, advertised service tiers above 10 Mbps are generally affordable by most subscribers. As such, we believe our revised definition aligns well with the current state of connectivity, and should accommodate expected future growth and improvements in Internet connectivity.
- The report has defined "narrowband" as connections to Akamai at speeds of 256 kbps or below. As connection speeds continue to increase globally, especially in countries with developing infrastructure, the number of connections that Akamai sees at these levels continues to decline. As such, we have decided to remove narrowband adoption statistics from the report going forward.
- The report will also no longer include city-level data due to the level of manual effort required to review the data. In addition, the report will also no longer include insight into attack traffic originating from mobile networks, as we work behind the scenes to enhance and expand the data sources used to identify such traffic.

We expect to continue to make additional changes, additions, and improvements across the remaining 2012 issues, as outlined in last quarter's "Letter From The Editor".

In line with our goal of moving more of the *State of the Internet* online, Akamai is also working to make additional insights from our platform available through "Akamai IO," a destination site that strives to deepen understanding of the Akamai Intelligent Platform through data and visualizations derived from usage of the platform by thousands of enterprise customers and millions of end users around the world. Akamai IO is available at www.akamai.com/io; it includes an initial data set that highlights browser usage across PC and mobile devices, connecting via fixed and mobile networks.

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

–David Belson

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Executive Summary

Akamai's globally distributed Intelligent Platform allows us to gather massive amounts of information on many metrics, including connection speeds, attack traffic, network connectivity/availability/latency problems, and IPv6 growth/transition progress, as well as traffic patterns across leading Web sites and digital media providers. Each quarter, Akamai publishes the *State of the Internet* report. This report includes data gathered from across the Akamai Intelligent Platform during the first 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 observations from Akamai partner Ericsson regarding traffic variations on mobile-connected PCs by application and data plan.

Security

During the first quarter of 2012, Akamai observed attack traffic originating from 182 unique countries. China remained the top attack traffic source, responsible for 16% of observed traffic in total. The United States and Russia held the second and third place spots respectively, accounting for 18% of observed traffic combined. Attack traffic concentration increased significantly from the fourth quarter of 2011, with the top 10 ports seeing 77% of observed attack traffic. In the first half of 2012, Akamai's support teams logged requests for assistance with 89 DoS attacks, primarily sourced from networks in the Americas and targeting American companies.

Internet and Broadband Adoption

Akamai observed a 6.0% increase globally from the fourth quarter of 2011 in the number of unique IP addresses connecting to Akamai, growing to over 666 million. Looking at connection speeds, the global average connection speed was 2.6 Mbps, and the global average peak connection speed increased to 13.5 Mbps. At a country level, South Korea had the highest average connection speed at 15.7 Mbps, while Hong Kong recorded the highest average peak connection speed, at 49.3 Mbps. Starting with this issue of the report, Akamai will be 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 increased 19% to 10% in the first quarter, and South Korea had the highest level of high broadband adoption, at 53%. Global broadband (>4 Mbps) adoption grew 10% to 40%, with South Korea having the highest level of broadband adoption, at 86%. Also starting with this issue of the report, we will no longer be including figures for narrowband (<256 kbps) adoption, nor including city-level data.

Mobile Connectivity

In the first quarter of 2012, average connection speeds on known mobile providers ranged from 6.0 Mbps down to 322 kbps. Average peak connection speeds during the quarter ranged from 32.2 Mbps down to 2.2 Mbps. Based on data collected by Ericsson, mobile data traffic almost doubled from the first quarter or 2011 to the first quarter of 2012, and grew 19% quarter-over-quarter.

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 first quarter of 2012. It also provides insight into trends related to the usage of client-side ciphers for SSL connections to Akamai, as well as insight into application-layer Distributed Denial of Service (DDoS) activity observed on the Akamai Platform.

1.1 Attack Traffic, Top Originating Countries

During the first quarter of 2012, Akamai observed attack traffic originating from 182 unique countries/regions, down from 187 in the prior quarter. After spending the prior two quarters in the top three, Indonesia fell to twentieth place this quarter, responsible for just one percent of observed traffic, likely indicating that the threats seen from the country have shifted elsewhere, or that they have been largely mitigated. With Indonesia gone from the top 10, Germany moved back into the tenth place spot, as shown in Figure 1, responsible for just under two percent of observed attack traffic. Aside from Germany, the other nine countries in the top 10 remained consistent with the fourth quarter of 2011. Quarterly growth in the percentage of observed attack traffic was seen in China, the United States, Russia, Turkey, Romania, and Germany, while Taiwan, South Korea, and Brazil all saw percentages drop relative to the prior quarter.

In examining the regional distribution of observed attack traffic in the first quarter, we found that over 42% originated in the Asia Pacific/Oceania region, 35% in Europe, 21% in North and South America, and just under 1.5% came from Africa.

DID YOU KNOW?

Over the last four years:

- The United States has been responsible for as little as 6.9% and as much as 22.9% of observed attack traffic.
- The highest concentration of observed attack traffic was seen in China, which originated 26.9% back in the third quarter of 2008.
- Among major South American countries, Brazil has originated the most observed attack traffic.

	Country	Q1 '12 % Traffic	Q4 '11 %
1	China	16%	13%
2	United States	11%	10%
3	Russia	7.0%	6.8%
4	Turkey	5.7%	5.6%
5	Taiwan	5.3%	7.5%
6	South Korea	4.3%	5.2%
7	Brazil	4.0%	4.4%
8	Romania	3.0%	2.6%
9	India	3.0%	3.0%
10	Germany	1.9%	1.8%
–	Other	39%	35%

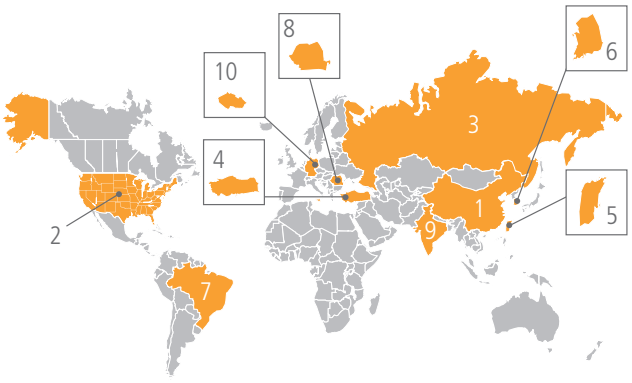


Figure 1: Attack Traffic, Top Originating Countries

Port	Port Use	Q1 '12 % Traffic	Q4 '11 %
445	Microsoft-DS	42%	25%
23	Telnet	11%	6.3%
80	WWW (HTTP)	5.0%	8.3%
1433	Microsoft SQL Server	4.9%	12%
3389	Microsoft Terminal Services	4.6%	3.0%
22	SSH	3.4%	2.7%
135	Microsoft-RPC	1.6%	1.6%
4899	Remote Administrator	1.6%	0.9%
5900	Virtual Network Computer	1.5%	0.7%
3306	MySQL	1.4%	1.2%
Various	Other	23%	–

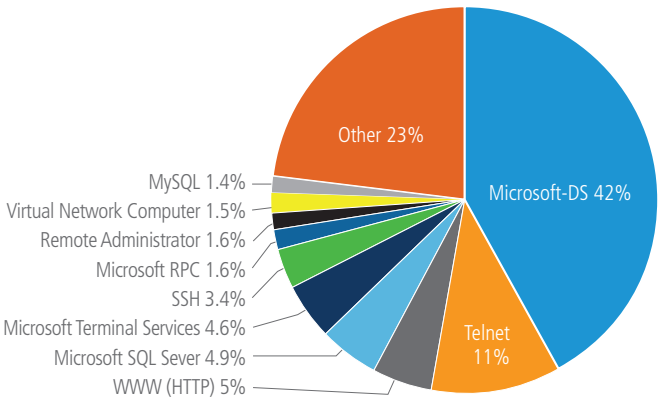


Figure 2: Attack Traffic, Top Ports

1.2 Attack Traffic, Top Ports

As shown in Figure 2, attack traffic concentration among the top 10 ports increased significantly in the first quarter of 2012, with these ports responsible for 77% of observed attacks, up from 62% in the fourth quarter of 2011. It appears that this increase is largely attributable to significant growth in the percentage of attacks targeting Port 445, after seeing declines over the prior several quarters. As has been noted multiple times in past reports, Port 445 is associated with the Conficker worm, which caused significant alarm back in early 2009. Despite patches issued by Microsoft and mitigation activities by the Conficker Working Group, it appears that the worm/botnet is still actively infecting user systems. According to a statement from Microsoft, Conficker infected or tried to infect 1.7 million computers running Windows operating systems in the fourth quarter of 2011, an increase of 100,000 from the previous quarter.[1] (Figures for the first quarter of 2012 were not available as of the date of publication.)

In addition to the increase seen in the percentage of attack traffic targeting Port 445, increases were also seen for Port 23 (Telnet), Port 3389 (Microsoft Terminal Services), Port 22 (SSH), Port 4899 (Remote Administrator), Port 5900 (Virtual Network Computer), and Port 3306 (MySQL). The relative increases seen were fairly significant across most of these ports, ranging from 16% to 114%. MySQL may have been targeted more in the first quarter due to a vulnerability that was published in January, which allowed attackers to crash MySQL instances running on Microsoft Windows servers by sending a special packet to Port 3306.[2] In March, Microsoft published[3] an advisory on a vulnerability in its Remote Desktop software, which, according to[4] security vendors, can be exploited by connections to Port 3389. Attempts to exploit this vulnerability may be responsible for the increase in attacks targeting Port 3389. In past issues of the *State of the Internet* report, we have highlighted similar behavior, where attacks targeting a specific port increased during the same quarter in which related vulnerabilities are discovered/published.

Unsurprisingly, Port 445 was the most attacked port in seven of the top 10 countries, accounting for as many as 66 times (in Romania) the number of attacks seen by the next most targeted port. Port 23 continued to be the most targeted port in South Korea and Turkey, while Port 1433 remained the top target for observed attacks originating in China. In the United States, Germany, and Brazil, Port 80 was the second-most targeted port, likely indicating that attackers were searching for the presence of Web-based applications with known vulnerabilities that could be exploited to gain control of the system or to install malware. In Russia and Taiwan, Port 23 was the second-most targeted port, likely indicating attempts to exploit default or common passwords that would allow attackers to gain access to a system.

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 first quarter of 2012. Usage trends observed during the quarter differed slightly from prior quarters, with AES128-SHA-1 and RC4-MD5-128 both seeing increases, while usage of the all other ciphers declined. In prior quarters, usage of AES256-SHA-1 generally increased, while usage of RC4-MD5-128 generally decreased. It is not clear why observed usage of AES256-SHA-1 dropped from 48.6% to 44.8% over the course of the quarter—the decline is not of significant concern, as the cipher is still the most widely used and, together with AES128-SHA-1, accounts for nearly 85% of the ciphers presented to Akamai servers. Of the other ciphers that saw declines, RC4-SHA-128 decreased from 4.7% to 3.6% and usage of DES-CBC-SHA-168 dropped from 3.1% to 1.9%. The increase seen by RC4-MD5-128 was nominal, growing from 10.1% to 10.5%, while AES128-SHA-1 had the most significant change, increasing from 33.4% to 39.1%.

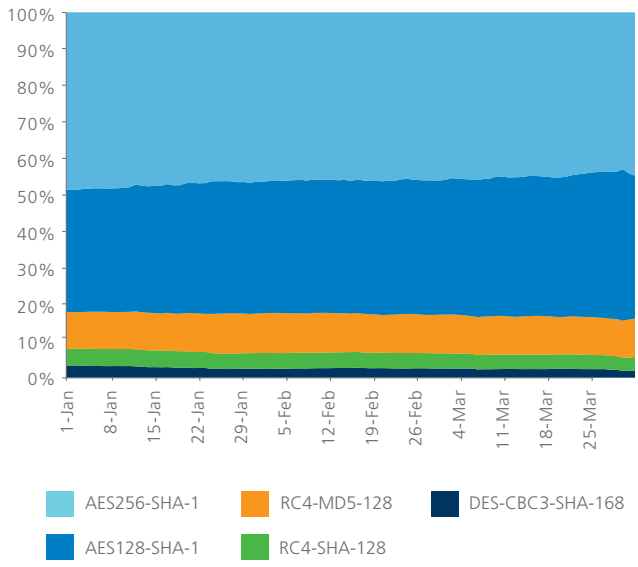


Figure 3: Client-Side SSL Ciphers Observed by Akamai, Q1 2012

1.4 Observed Denial-of-Service (DoS) Attack Activity

Continuing a trend that has grown over time, many of Akamai's customers experienced denial-of-service (DoS) attacks during the first half of 2012. Although the Akamai Intelligent Platform silently deflects network-layer attacks, customers experiencing application layer DoS (high volume or "Slow DDoS") or Web application attacks (SQL Injections, Cross Site Scripting, etc.) will often engage with Akamai for additional assistance in mitigating such attacks. In the first half of the year alone, Akamai's support teams logged requests for assistance in defending against 89 DoS attacks, in large part because attackers are moving up the network stack as purely network layer volumetric attacks have less impact on the Internet's infrastructure. Examination of the attacks shows that tools that require lower traffic volumes, such as hashdos and slowloris, have become more widely used. However, the most common vector has been SQL injection attacks that, when successful, not only significantly impact the availability of targeted sites but also create a significant risk of data leakage by their nature.

The observed attacks were primarily (73%) sourced from networks in the Americas and targeted American companies. A significant percentage (17%) of attacks also originated in Europe and the Middle East, not only against EMEA companies, but also targeting sites based in other regions. The smallest percentage of DoS attacks observed during this period came from the Asia Pacific region. However, we expect the volume and severity of attacks from the region to increase over time.

Looking at the set of DoS attacks where customers engaged Akamai for additional assistance, online retailers and public sector (government) sites were targeted in roughly equal proportion, each seeing approximately 20% of these reported attacks. Historically, online retailers have been tempting targets for extortion efforts, with some being targeted by attacks that promise to return if demands for money are not met. The Public Sector has largely been targeted by protestors, a trend that shows little indication of changing in the near future. The remaining attacks were nearly evenly distributed between Digital Media, Enterprise and High Tech customers. Perhaps unsurprisingly, once a site has become a target, it is almost a given that attackers will return again in the future in an attempt to further their agendas.

Note that the set of attacks reviewed here does not constitute the full set of attacks experienced by Akamai customers. Because Akamai drops network-level attacks at the edge of the Internet (typically 80% or more of DoS attacks), customer sites do not experience service interruptions or other negative impacts from these attacks. Other customer sites may have experienced volumetric or application-level DoS attacks during 2012 but were able to mitigate the impact of the attacks through the use of Akamai's Kona Security Solutions; alternatively, targeted customers may have chosen not to engage with Akamai's support teams in relation to an attack.

Internet Penetration

2.1 Unique IPv4 Addresses

Through its globally-deployed Intelligent Platform, and by virtue of the approximately two trillion requests for Web content that it services on a daily basis, Akamai has unique visibility into levels of Internet penetration around the world. In the first quarter of 2012, over 666 million unique IPv4 addresses, from 238 countries/regions, connected to the Akamai Intelligent Platform—6.0% more than in the fourth quarter of 2011 and nearly 14% more than in the first 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, quarterly changes across all but one of the top 10 countries were positive, with growth ranging from a scant 0.3% in Germany to a solid 9.2% in Italy. Only South Korea saw a minor decline, losing 1.2% quarter-over-quarter. However, coupled with similar losses over past quarters, the number of unique IP addresses seen by Akamai from South Korea has declined by 12% year-over-year. Japan has also seen a year-over-year decline, likely due to insufficient recovery from the 8.5% quarterly loss observed in the fourth quarter of 2011. 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 available IPv4 address space. Globally, quarterly growth was seen in a majority of countries around the world during the first quarter, with several dozen seeing increases of 10% or more. Of the handful of countries where Akamai saw fewer unique IP addresses quarter-over-quarter, the most significant losses were seen in Africa, where Sudan, Senegal, and Ghana all experienced declines of 10% or more.

Looking at year-over-year changes, we see that China, Brazil, Italy, and Russia all once again maintained growth rates in excess of 20%. Globally, 210 countries also saw year-over-year growth, with declines generally seen in smaller countries, with the exception of South Korea and Japan, as noted above. In comparing year-over-year changes among the top 10 countries with those observed in the fourth quarter of 2011, half of them saw higher rates of yearly change in the first quarter of 2012, while China's rate of change remained flat.

The unique IP address count across the top 10 countries represented nearly 66% of the global figure, a concentration level approximately one percent lower than in the fourth quarter of 2011. In looking at the "long tail", there were once again 180 countries with fewer than one million unique IP addresses connecting to Akamai in the first quarter of 2012, 131 with fewer than 100,000 unique IP addresses, and just 29 with fewer than 1,000 unique IP addresses connecting to Akamai (up from 27 in the prior quarter).

	Country	Q1 '12 Unique IP Addresses	QoQ Change	YoY Change
–	Global	666,113,448	6.0%	14%
1	United States	146,463,059	1.4%	2.9%
2	China	92,385,739	8.5%	26%
3	Japan	40,510,336	0.2%	-1.7%
4	Germany	36,042,604	0.3%	3.6%
5	United Kingdom	25,720,814	1.9%	17%
6	France	25,531,678	2.1%	6.4%
7	South Korea	19,808,619	-1.9%	-12%
8	Brazil	19,202,853	8.7%	36%
9	Italy	16,916,226	9.2%	24%
10	Russia	15,860,988	6.4%	29%

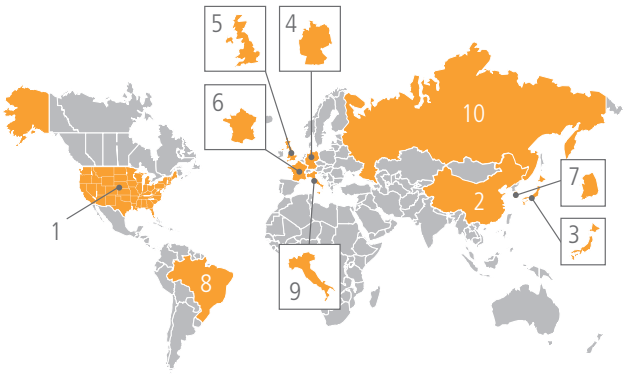


Figure 4: Unique IPv4 Addresses Seen By Akamai

As more end-user networks roll out native IPv6 connectivity to their subscribers, and as more popular content is made available over IPv6, the number of unique IPv4 addresses making requests to Akamai from a given network provider may decline. Over the long-term, we expect measurements to show movement of unique addresses from IPv4-based to IPv6-based.

2.2 IPv4 Exhaustion

The number of available IPv4 addresses continued to decline during the first quarter of 2012, as Regional Internet Registries (RIRs) continued to assign/allocate blocks of address space to requesting organizations within their respective territories.[5] Based on data published by the RIRs,[6] Figure 5 compares the total volume of IPv4 addresses assigned/allotted during the first quarter with the number of requests for address space.

As the figure illustrates, RIPE (Europe) was the most active RIR, fielding over 1,400 requests for address space, assigning/allocating over 13.5 million IPv4 addresses in response. This address volume was surpassed only by ARIN (North America), which allotted over 14.7 million IPv4 addresses in response to 35% as many requests as seen in Europe. The volume of requests seen by AFRINIC (Africa), APNIC (Asia Pacific) and LACNIC (Latin and South America) were all below those seen by ARIN and RIPE, as were the total volume of IPv4 addresses assigned/allocated. RIRs in the Americas gave out, on average, the largest number of IPv4 addresses in response to a request, at over 50,000 per request from LACNIC, and nearly 30,000 per request from ARIN. RIPE gave out an average of over 9,600 IPv4 addresses per request, while AFRINIC gave out an average of just over 5,000 per request. APNIC distributed an average of just over 2,000 IPv4 addresses per request. It is not surprising that APNIC's average was the lowest, as the RIR has been in "austerity mode" since the first quarter of 2011, placing significant limits on the amount of IPv4 address space that can be requested.

Secondary market sales of IPv4 address space continued to take place in the first quarter. For example, as of March 31, ARIN had recorded the transfer of 88 IPv4 address blocks totaling more than 4 million IPv4 addresses, with two of these transfers involving more than 1 million IPv4 addresses each. Similar transfers may increase in coming quarters if ARIN and the other regional registries agree to a proposed policy change that would allow IPv4 address transfers between regions.[7] This could potentially allow providers under APNIC, for example, to ease their address space crunch by obtaining addresses from organizations under ARIN that hold larger blocks. While the adoption of IPv6 continues to increase, organizations will need IPv4 address space to accommodate continued growth in the short term.

2.3 IPv6 Adoption

As Akamai rolls out IPv6 support across its solution portfolio throughout 2012, 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."[8] A white paper[9] 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

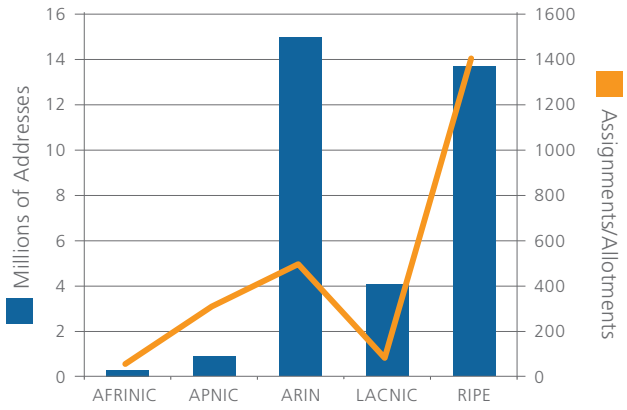


Figure 5: IPv4 Address Allocation/Assigment by RIR, Q1 2012

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.

In contrast to previous reports, going forward we will only be reviewing the "IPv6 ASes" metric, dropping the "ASes using only IPv6" metric due to lack of relevance. (Networks connected only via IPv6 are generally special-purpose or research networks.) 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.

Figure 6 illustrates the growth in the number of ASes in the global IPv6 routing table during the first quarter of 2012, comparing it to the first quarters of the previous three years as well. As shown in the figure, the 10% rate of growth seen in the first quarter of 2012 was half that seen during the same period in 2011; the net increase in the number of IPv6 ASes was lower as well—489 more during the first quarter of 2012 versus 589 more during the first quarter of 2011. 2012's rate of growth was the lowest of the past three years, with 2010 seeing growth of 12% and 2009 seeing growth of 11%. RIPE Labs, associated with the European RIR, examined the percentage of IPv6-enabled networks across all global regions and also observed that their graphs for most regions show some flattening after a rather steep increase earlier last year (around the time the IANA allocated the last IPv4 address space to the RIRs).[10]

We do not believe, however, that the lower growth rate seen during the first quarter portends slowing IPv6 adoption. With a larger baseline, higher growth rates become harder to achieve and maintain and, in 2011, growth ramped significantly as the Internet prepared for World IPv6 Day. It appears that a similar acceleration of growth started to occur at the end of the first quarter—the hook at the end of the 2012 line represents the addition of 210 ASes to the IPv6 routing table during the last day of the quarter. Furthermore, cable providers in the United States, including Comcast, Time Warner Cable, and Cox are all pursuing aggressive plans to bring subscribers onto IPv6 capable networks over the course of 2012.[11]

Also critically important to driving adoption is the availability of content over IPv6. There are various measures of site readiness and content availability:

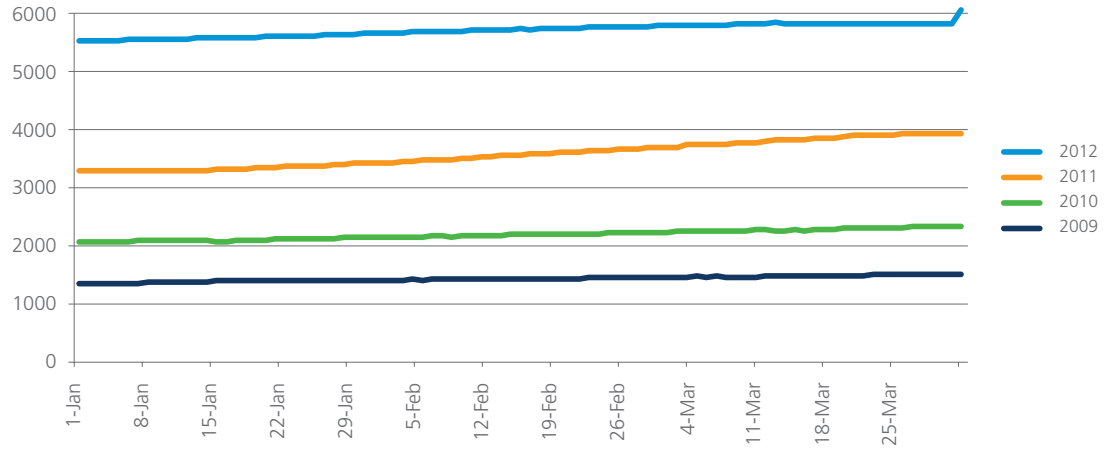


Figure 6: Total Number of Autonomous Systems in the IPv6 Routing Table

- Hurricane Electric makes use of Alexa's Top 1 Million Domains list, providing insight into "Top Websites Running IPv6" at http://bgp.he.net/ipv6-progress-report.cgi
- The United States National Institute of Standards and Technology (NIST) tracks the IPv6 availability of Web sites for key U.S. government agencies, colleges and universities, and top "industry" organizations (enterprises) at http://usgv6-deploymon.antd.nist.gov/. NIST also tracks the availability of DNS and mail servers over IPv6 for these organizations.

Akamai is enabling customers to make their content and applications available over IPv6 by including IPv6 support in newer solution families, as well as through IPv6 support modules available to customers using older solutions. Akamai's IPv6 White Paper and a visualization of current and historical IPv6 traffic volumes on the Akamai Intelligent Platform are available at http://www.akamai.com/ipv6.

DID YOU KNOW?

- According to network security and monitoring firm Arbor Networks, this year marked the first time that respondents to the survey gathering data for the *Worldwide Infrastructure Security Report VII* indicated that they had observed DDoS attacks on their networks.
  [Source: http://www.arbornetworks.com/report]

- In January, the Internet Society announced plans to hold the World IPv6 Launch event on June 6, 2012, with commitments from participating ISPs to enable IPv6 connectivity for at least 1% of wireline residential subscribers, from participating home networking equipment manufacturers to enable IPv6 by default through the range of their home router products, and from participating Web sites to permanently enable access over IPv6.
  [Source: http://www.internetsociety.org/news/world-ipv6-launch-solidifies-global-support-new-internet-protocol]

SECTION 3:
Geography– Global

By virtue of the nearly 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[12] or the video explanation at http://www.akamai.com/whytheedge.

The data presented within this section was collected during the first 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. Note that these definitions are different than those used in the prior four volumes of the *State of the Internet* report and have been updated to reflect a more current definition of broadband, as it is used by the United States,[13] China,[14] and by the European Commission,[15] as well as the overall trend toward greater availability of higher-speed connections. To this end, the *State of the Internet* report will no longer include "narrowband" data, as fewer and fewer countries over time have had the requisite unique IP address counts to qualify for inclusion.

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. All of these metrics are reported at country and state (U.S) levels. Note that the *State of the Internet* report will no longer include city-level data due to the level of manual review required to compile the data.

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.

3.1 Global Average Connection Speeds

Reversing the significant decline seen in the fourth quarter of 2011, the global average connection speed experienced a 14% quarter-over-quarter increase in the first three months of 2012, returning to 2.6 Mbps, as shown in Figure 7. Growth returned to

	Country	Q1 '12 Avg. Mbps	QoQ Change	YoY Change
–	Global	2.6	14%	25%
1	South Korea	15.7	-1.5%	9.4%
2	Japan	10.9	21%	35%
3	Hong Kong	9.3	5.4%	1.3%
4	Netherlands	8.8	6.5%	18%
5	Latvia	8.8	18%	38%
6	Switzerland	8.1	11%	30%
7	Ireland	7.3	3.4%	30%
8	Czech Republic	7.1	6.2%	9.7%
9	Belgium	7.1	13%	16%
10	Finland	6.9	16%	39%
…				
12	United States	6.7	17%	29%

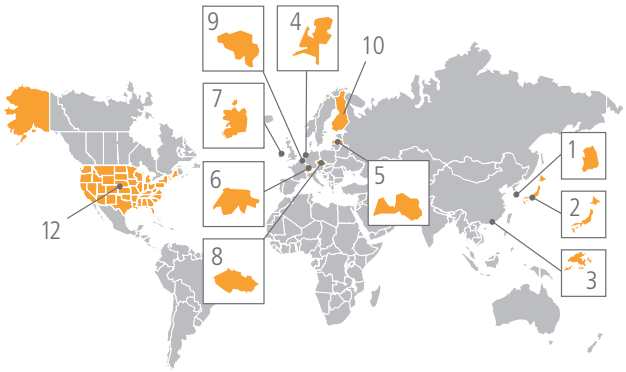


Figure 7: Average Measured Connection Speed by Country

most of the top 10 countries and the United States, after a number of these countries saw quarterly declines in the fourth quarter of 2011. Globally, 117 countries that qualified for inclusion saw average connection speeds increase quarter-over-quarter, with gains ranging from 0.2% in Montenegro (to 2.8 Mbps) to 75% in Libya (to 0.5 Mbps). South Korea was the lone standout among the top 10, with a 1.5% drop, though it remains nearly 5 Mbps faster than second place Japan. Globally, just 18 qualifying countries saw average connection speeds decline quarter-over-quarter, with losses ranging from 1.4% in Kuwait (to 1.8 Mbps) to a highly unusual, and unexpected, 35% decline in Australia (to 3.5 Mbps). (Further research appears to indicate that the decline in Australia was related to issues with a single large network provider.)

Long term trends were once again very positive, reflecting a continuing shift toward higher speed connectivity. All of the top 10 countries, as well as the United States, experienced positive year-over-year changes in average connection speeds. Particularly strong increases were seen in Japan, Latvia, Switzerland, Ireland, and Finland – all five countries had average connection speeds more than 30% higher than in the first quarter of 2011. Globally, a total of 125 countries saw year-over-year increases in average connection speeds in the first quarter, ranging from 195% in the small French territory of New Caledonia (to 3.6 Mbps) to Hong Kong increasing just 1.3% (to 9.3 Mbps). Declines in average connection speeds were seen in just 10 countries that qualified for inclusion.

In the first quarter, 24 countries had average connection speeds of 1 Mbps or less, down from 31 in the fourth quarter of 2011. Libya remained the country with the lowest average connection speed, up 75% from the prior quarter, to 0.5 Mbps.

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 measured 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.) Note that data from known mobile networks has been removed from the source data set for this metric.

The global average peak connection speed showed strong improvement in the first quarter, increasing nearly 10% to 13.5 Mbps. Figure 8 shows that this improvement was echoed across the top 10 countries, with Singapore's 20% increase (to 28.6 Mbps) the largest. Hong Kong bested perennial leader South Korea in the first quarter with an average peak connection speed that approached the 50 Mbps mark, though South Korea lags by only 1.5 Mbps; the country also had the smallest increase seen among the top 10 countries—a solid 4.6%. On a global basis, the vast majority of the countries that qualified for inclusion had higher average peak connection speeds quarter-over-quarter, with growth ranging from a meager 0.6%% in Mauritius (to 7.8 Mbps) to 56% growth in Sudan (to 8.5 Mbps). Quarterly growth of 10% or more was seen in 70 qualifying countries. Just 12 qualifying countries saw average peak connection speeds decline from the fourth quarter of 2011, with losses ranging from just 0.7% in Lithuania (to 23.3 Mbps) to a highly unusual,

	Country	Q1 '12 Peak Mbps	QoQ Change	YoY Change
–	Global	13.5	9.9%	25%
1	Hong Kong	49.3	7.1%	25%
2	South Korea	47.8	4.6%	52%
3	Japan	39.5	17%	32%
4	Romania	38.8	9.9%	19%
5	Latvia	33.5	14%	37%
6	Netherlands	29.4	13%	34%
7	Belgium	29.2	5.7%	18%
8	United States	28.7	14%	39%
9	Switzerland	28.7	12%	35%
10	Singapore	28.6	20%	47%

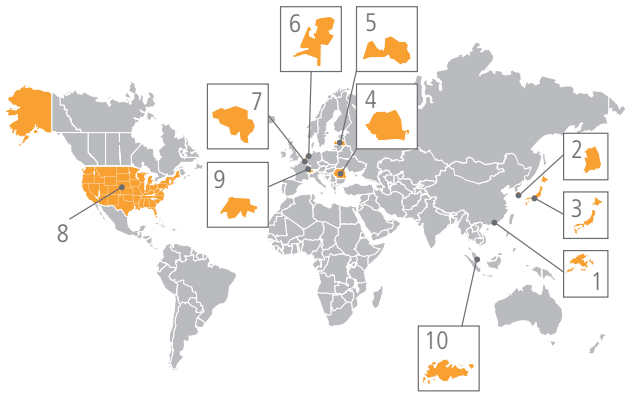


Figure 8: Average Peak Connection Speed by Country

and unexpected, 49% decline in Australia (to 16.6 Mbps). We do not believe that there has been a significant decline in the quality of Australian Internet connectivity that would explain the large quarterly declines in average and average peak connection speed—these observed losses are likely due to anomalies in the underlying data set related to issues with a single large network provider, as noted previously.

Looking at year-over-year changes, the global average peak connection speed was once again up by 25% as compared to the same period a year ago. Extremely strong yearly increases were seen across all of the top 10 countries, with Belgium having the lowest growth rate at 18%. Globally, nearly 130 qualifying countries saw year-over-year increases in average connection speeds, ranging from 3.8% growth in Pakistan (to 5.9 Mbps) to a 213% jump in Libya (to 3.8 Mbps). Only five countries saw a yearly decline in average peak connection speed, with the greatest loss in Tanzania, which dropped 21% (to 5.1 Mbps).

The positive short- and long-term trends for average peak connection speeds, and especially the very solid year-over-year growth numbers, indicate that the state of Internet connectivity has continued to improve around the world.

3.3 Global High Broadband Connectivity

As was noted in the introduction to Section 3, starting with the *1st Quarter, 2012 State of the Internet* report, "high broadband" is being redefined to include connections to Akamai of 10 Mbps or greater – this is up from the 5 Mbps baseline that was used within the report from 2008-2011. A general trend towards the greater availability of higher speed connectivity and the observed increases in average and peak connection speeds over time contributed to the decision to redefine the term as it is used within the report.

For the first quarter of 2012, the global level of high broadband adoption was 10%, up 19% quarter-over-quarter, as shown in Figure 9. (While we have not reported adoption levels using the 10 Mbps definition in the past, we have the ability to go back and reprocess historical data using the new definition.) Among the top 10 countries, high broadband adoption ranged from 53% in South Korea (meaning more than half of the connections to Akamai from that country were at 10 Mbps or greater) to 15% in the United States. Nine of the top 10 countries saw high broadband adoption levels increase quarter-over-quarter, ranging from a 7.6% increase in Hong Kong (to 28%) to a surprisingly large 63% jump in Denmark (to 15%). Because the adoption percentages are smaller than when the 5 Mbps definition was used, we expect that the quarter-over-quarter changes will likely be larger for the foreseeable future. However, these large quarterly growth figures also point to rapid adoption of higher speed Internet connections. Across the remainder of the world, eight additional countries that qualified for inclusion also had high broadband adoption rates of greater than 10%. Overall, 42 qualifying countries saw quarterly growth in high broadband adoption, from a massive 149% increase in South Africa (to 0.7%) to a 3.4% increase in Ireland (to 10%). Just four qualifying countries saw high broadband adoption levels decline quarter-over-quarter. The lowest level of high broadband adoption in the first quarter was seen in China, at 0.1%, though it was up 9.2% as compared to the fourth quarter of 2011.

	Country	% Above 10 Mbps	QoQ Change	YoY Change
–	Global	10%	19%	54%
1	South Korea	53%	-7.1%	97%
2	Japan	37%	21%	43%
3	Hong Kong	28%	7.6%	9.7%
4	Latvia	26%	22%	74%
5	Netherlands	24%	14%	33%
6	Switzerland	19%	29%	119%
7	Belgium	18%	60%	63%
8	Finland	16%	36%	127%
9	Denmark	15%	63%	104%
10	United States	15%	50%	95%

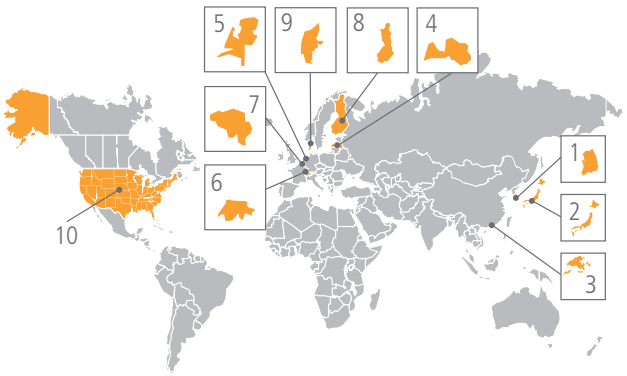


Figure 9: High Broadband (>10 Mbps) Connectivity

Looking at year-over-year changes, the global high broadband adoption level was up by more than half, increasing 54%. Among the top 10 countries, three (Switzerland, Finland, and Denmark) had adoption levels more than double year-over-year, highlighting the progress being made in bringing high-speed connectivity to Northern Europe. Hong Kong was the only country among the top 10 that did not see double-digit percentage growth on a yearly basis, falling just below with a 9.7% increase. Around the world, a total of 16 countries that qualified for inclusion saw high broadband adoption levels more than double year-over-year, led by South Africa, Israel, and Lithuania, which all grew by 190% or more. Yearly growth was seen in 41 qualifying countries around the world, with Hong Kong's 9.7% increase the smallest—having such a solid growth rate as the smallest one seen globally is an encouraging sign. Just five qualifying countries saw high broadband adoption levels decline as compared to the first quarter of 2011.

3.4 Global Broadband Connectivity

As was noted in the introduction to Section 3, starting with the *1st Quarter, 2012 State of the Internet* report, "broadband" is being redefined to include connections to Akamai of 4 Mbps or greater—this is up from the 2 Mbps baseline that was used within the report from 2008–2011. A general trend towards the greater availability of higher speed connectivity and the observed increases in average and peak connection speeds over time contributed to the decision to redefine the term as it is used within the report. This redefinition is also aligned with the minimum download speed specified for "broadband" within the United States National Broadband Plan.

In the first quarter of 2012, global broadband adoption saw a solid 10% increase, with 40% of all connections to Akamai at speeds of 4 Mbps or more. Figure 10 shows that all of the top 10 countries, as well as the United States, saw positive quarter-over-quarter changes in broadband adoption levels in the first quarter, with South Korea growing just a tenth of a percent (to 86%) as compared to the 11% growth seen in both Switzerland and Canada (to 77% and 68% respectively). Globally, 67 countries that qualified for inclusion saw higher broadband adoption levels than in the prior quarter, with levels in six countries more than doubling. Sixty countries around the world had broadband adoption levels greater than 10%, while China and India had the lowest levels of adoption among countries on the list, at 3.0% and 1.2% respectively.

Looking at year-over-year changes, global broadband adoption increased 21%, while increases were also seen in all of the top 10 countries, as well as the United States. Yearly growth among the top 10 countries ranged from a 4.0% increase in Romania to South Korea's impressive 46% jump. All but two (Taiwan and Syria) of the countries that qualified for inclusion had higher broadband adoption levels in the first quarter than in the same period a year ago. The greatest growth was seen in Kazakhstan, which was up nearly 10x year-over-year, and Egypt was up over 5x during the same period. Including these two countries, 15 countries around the world saw broadband adoption more than double year-over-year, while another 44 experienced double-digit percentage growth.

	Country	% Above 4 Mbps	QoQ Change	YoY Change
–	Global	40%	10%	21%
1	South Korea	86%	0.1%	46%
2	Netherlands	83%	2.7%	20%
3	Switzerland	77%	11%	29%
4	Belgium	73%	3.5%	5.6%
5	Hong Kong	72%	5.3%	4.5%
6	Japan	72%	6.7%	16%
7	Latvia	68%	10%	17%
8	Canada	68%	11%	15%
9	Czech Republic	68%	7.2%	6.4%
10	Romania	63%	3.3%	4.0%
…				
14	United States	60%	9.4%	19%

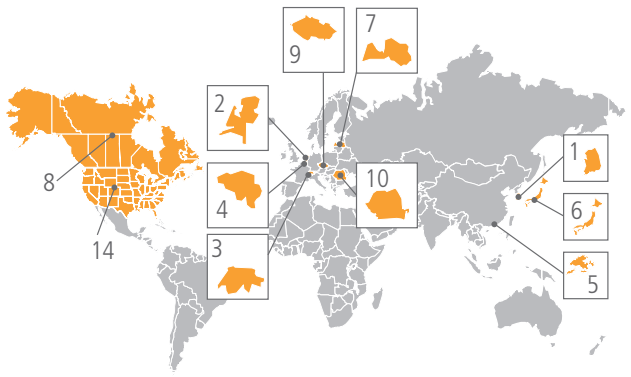


Figure 10: Broadband (>4 Mbps) Connectivity

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 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.

4.1 United States Average Connection Speeds

In the first quarter of 2012, Delaware remained the fastest state in the union, with an average connection speed that improved 24% quarter-over-quarter to just over 10 Mbps, as shown in Figure 11. New Hampshire remained the second fastest state, improving 15% to 9.4 Mbps. All of the top 10 states joined Delaware and New Hampshire in having quarterly changes that exceeded 10%, as did 38 other states across the country. Only Minnesota, California, and Nebraska improved by less than 10% as compared to the fourth quarter of 2011, though they did not trail very far behind, with average growth rates around 9%. Arkansas remained the state with the lowest average connection speed, though it increased 14% quarter-over-quarter to 3.6 Mbps.

Looking at year-over-year trends, all of the top 10 states saw average connection speeds increase, and significantly so. The lowest growth rate among the group was seen in Rhode Island, at an extremely strong 26%; New Hampshire's 58% yearly increase was the largest of the group. Across the country, all states saw yearly increases in average connection speeds, and all of the increases were in excess of 10%. Kansas, New Hampshire, and Vermont all improved by more than 50% year-over-year, while another 34 states had growth rates higher than 20%.

The strong growth seen across both the short- and long-term is extremely encouraging, and hopefully bodes well for the continued adoption of high speed Internet connections across the United States throughout 2012. In a January speech at the 2012 International Consumer Electronics Show in Las Vegas, FCC Chairman Julius Genachowski made the point that the United States needs ubiquitous broadband and universal broadband adoption, which he said means world-class wired and wireless infrastructure. To that end, he also noted that the FCC has removed barriers to wired and wireless broadband buildout.[16] In February, however, a posting on technology industry blog GigaOm[17] noted that some states are working to advance legislation that would restrict community/municipal broadband efforts, which could effectively limit consumer choice to the service tiers and speeds that the incumbent telecom and cable providers have made available to that market, slowing the progress towards ubiquitous broadband and universal broadband adoption.

	State	Q1 '12 Avg. Mbps	QoQ Change	YoY Change
1	Delaware	10.2	24%	35%
2	New Hampshire	9.4	15%	58%
3	Vermont	9.1	16%	54%
4	District Of Columbia	8.9	19%	32%
5	Utah	8.5	14%	28%
6	Rhode Island	8.5	14%	26%
7	Connecticut	8.4	19%	43%
8	Massachusetts	8.2	14%	31%
9	Maryland	8.1	24%	47%
10	Washington	7.9	19%	40%

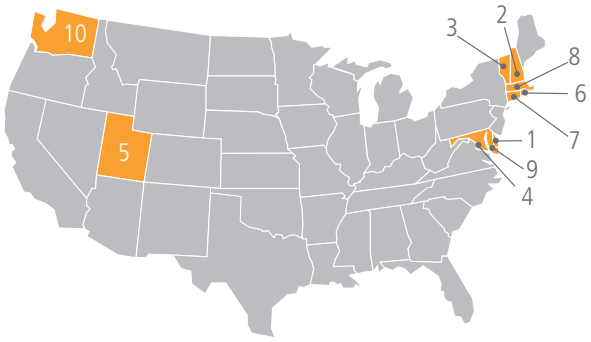


Figure 11: Average Measured Connection Speed by State

4.2 United States Average Peak Connection Speeds

Delaware remained solidly in first place for the average peak connection speed metric as well, with an average peak speed 8 Mbps higher than second place Vermont. As shown in Figure 12, very strong quarterly growth across the top 10 states propelled them all to average peak connection speeds above 30 Mbps in the first quarter. Across the country, eight additional states also had average peak connection speeds above 30 Mbps, while another 31 had average peak connection speeds above 20 Mbps. Missouri and Arkansas were the only two states in the union with average peak speeds below 20 Mbps in the first quarter, at 18.2 Mbps and 16.6 Mbps respectively. In line with the top 10 states, all of the other states also saw quarterly increases for the first quarter, with 44 experiencing growth of 10% or more, and five of those growing 20% or more. The lowest level of quarterly growth was seen in New Mexico, which increased 8.1% (to 23.2 Mbps.)

Year-over-year changes among the top 10 were all very strong as well, with half of them over 40%. The lowest level of change among these states was seen in Rhode Island, which increased by "only" 24% year-over-year. Across the whole country, all of the states in the U.S. saw yearly improvement in average peak connection speeds, with Maine's 15% increase the smallest. Six states improved by 50% or more as compared to the first quarter of 2011, while an additional 44 states improved by 20% or more.

The recent *Measuring Broadband America*[18] report published by the FCC noted that consumers today are experiencing performance more closely aligned with what is advertised than they experienced one year ago. The report's findings noted that the average ISP delivers 96% of advertised download speeds during peak usage periods, up from 87% in 2011. The report also noted that analysis showed that the improvements of ISPs in meeting their advertised speeds were largely driven by improvements in network performance and not downward adjustments to the speed tiers offered. We believe that the FCC's findings on the improving quality of broadband connectivity in the United States are supported by the strong year-over-year growth presented within the *1st Quarter, 2012 State of the Internet* report.

DID YOU KNOW?

Among the 20 states with fewer than one million unique IP addresses connecting to Akamai, average peak connection speeds ranged from 43.4 Mbps in Delaware down to 20.0 Mbps in Idaho. California was the only state that had more than ten million unique IP addresses connecting to Akamai, and had an average peak connection speed of 30.6 Mbps in the first quarter.

	State	Q1 '12 Peak Mbps	QoQ Change	YoY Change
1	Delaware	43.4	17%	44%
2	Vermont	35.4	11%	46%
3	District Of Columbia	34.4	9.8%	35%
4	Virginia	33.9	13%	37%
5	New Hampshire	33.8	12%	46%
6	Rhode Island	33.5	13%	24%
7	Massachusetts	32.8	12%	37%
8	New York	32.5	13%	31%
9	Indiana	32.4	17%	44%
10	New Jersey	32.2	17%	48%

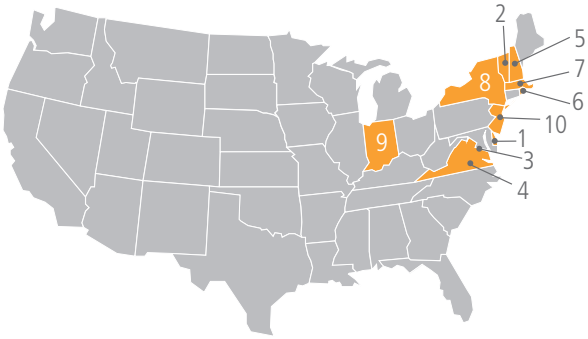


Figure 12: Average Peak Connection Speed by State

4.3 United States High Broadband Connectivity

As was noted in the introduction to Section 4, starting with the *1st Quarter, 2012 State of the Internet* report, "high broadband" is being redefined to include connections to Akamai of 10 Mbps or greater – this is up from the 5 Mbps baseline that was used within the report from 2008-2011.

As shown in Figure 13, quarter-over-quarter changes in high broadband adoption rates among the top 10 states were all overwhelmingly positive in the first quarter. Two states (Delaware & New Jersey) saw high broadband adoption levels double from the fourth quarter of 2011—this helped drive Delaware's high broadband adoption rate to 33%. All of the other states in the top 10 saw quarter-over-quarter changes above 40%, and they all ended the quarter with high broadband adoption rates above 20%—at least one of every five requests to Akamai from all of the states in the top 10 list were at speeds of 10 Mbps or more. Across the balance of the United States, 25 additional states also had high broadband adoption rates above 10%, with 16 states seeing adoption levels below that threshold. However, quarter-over-quarter changes across the country were generally strong, with three additional states (Kansas, South Dakota, and Montana) also seeing high broadband adoption double quarter-over-quarter. Nebraska's quarterly growth was the smallest, at 17%, while Arkansas had the lowest high broadband adoption rate in the nation, at 2.7%

The levels of year-over-year change in high broadband adoption rates across the top 10 states were extremely significant as well, with all but one growing more than 100%. (The District of Columbia was the lone holdout, falling just short with a 91% yearly increase.) New Hampshire led the top 10 with respect to the size of the year-over-year change, growing 373%. Vermont, Maryland, and New Jersey also turned in increases in excess of 200%. Across the whole country, including five of the top 10 states, 19 total states saw high broadband adoption increase between 100% and 200% year-over-year. Only two states (Nebraska and Idaho) saw year-over-year increases below 20%, with Idaho's 2.9% growth the smallest across the country, and surprisingly low in comparison to the growth seen in other states.

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	Delaware	33%	100%	156%
2	New Hampshire	29%	47%	373%
3	District Of Columbia	27%	52%	91%
4	Vermont	27%	50%	226%
5	Rhode Island	24%	54%	136%
6	Massachusetts	24%	41%	128%
7	Maryland	23%	86%	213%
8	New Jersey	23%	106%	256%
9	Connecticut	22%	61%	186%
10	Washington	21%	56%	168%

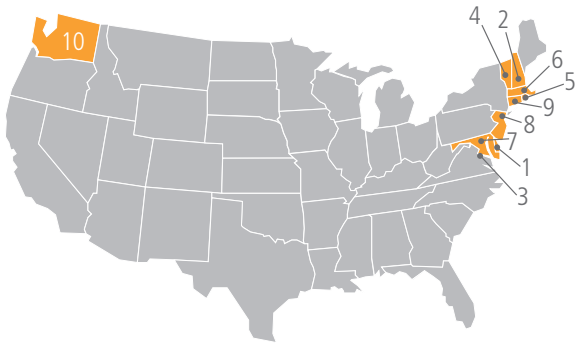


Figure 13: High Broadband (>10 Mbps) Connectivity, U.S. States

4.4 United States Broadband Connectivity

As was noted in the introduction to Section 4, starting with the *1st Quarter, 2012 State of the Internet* report, "broadband" is being redefined to include connections to Akamai of 4 Mbps or greater—this is up from the 2 Mbps baseline that was used within the report from 2008-2011.

In previous issues of the report, using the 2 Mbps definition of broadband, Delaware led the top 10 list, with an adoption level that had leveled off around 98%. Under the new 4 Mbps definition, Delaware remains the state with the highest level of broadband adoption, at 92%. (The fact that it remains so high, coupled with Delaware's high broadband adoption rate, highlights that a very large percentage of Delaware's connections to Akamai are at speeds between 4-10 Mbps.) Broadband adoption levels among the remainder of the top 10 states remained strong in the first quarter, with all of them seeing quarterly growth albeit at rates significantly smaller than those seen for high broadband adoption. Although Delaware had the highest level of broadband adoption in the United States, it also had the smallest quarterly change, at just 2.4%. Twenty-one other states joined it in having quarterly changes below 10%, while 29 saw growth of 10% or more quarter-over quarter.

Looking at year-over-year changes, Delaware and Rhode Island were the only states among the top 10 to improve by less than 10%, though there were four states (Vermont, New Jersey, Maryland, and Connecticut) that improved by more than 20%. Similar growth rates were seen by 26 additional states across the country, including in four states (Kansas, Mississippi, Wyoming, and New Mexico) that saw broadband adoption increase by more than 50%. Hawaii joined Delaware and Rhode Island as the only other state that grew broadband adoption by less than 10% year-over-year, increasing 4.7% (to 15% adoption).

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	Delaware	92%	2.4%	7.2%
2	New Hampshire	84%	3.1%	14%
3	Rhode Island	81%	4.3%	3.5%
4	Vermont	80%	5.2%	21%
5	New Jersey	75%	8.5%	21%
6	Maryland	72%	8.5%	22%
7	New York	71%	9.6%	17%
8	Connecticut	71%	7.9%	28%
9	Massachusetts	69%	4.2%	14%
10	District Of Columbia	68%	4.7%	11%

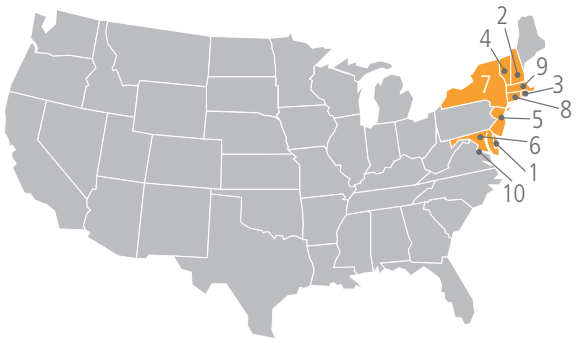


Figure 14: Broadband (>4 Mbps) Connectivity, U.S. States

DID YOU KNOW?

The *Measuring Broadband America* report published by the U.S. Federal Communications Commission notes that the increase in the availability and adoption of faster speed tiers is a positive indicator that the U.S. market is moving toward the goal, set out in the National Broadband Plan, that at least 100 million homes should have affordable access to actual download speeds of at least 50 Mbps by 2015, and 100 Mbps by 2020.

[Source: http://transition.fcc.gov/cgb/measuringbroadbandreport/2012/Measuring-Broadband-America.pdf]

SECTION 5:

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 first quarter of 2012, the top three countries in the Asia Pacific region remained South Korea, Japan, and Hong Kong, as shown in Figure 15. Despite a slight quarterly decline, South Korea remained nearly 5 Mbps ahead of Japan—the 21% quarterly increase seen in Japan helped close the 8 Mbps gap between the two countries seen in the fourth quarter of 2011. As we saw globally, and in the other regions, quarterly changes were generally positive, with fairly solid increases observed among the surveyed countries. In addition to Japan's 21% increase, Singapore, New Zealand, Malaysia, and India also improved by more than 10% quarter-over-quarter. The 16% jump in India's average connection speed pushed the country back up to the 1 Mbps mark, after falling just below it last quarter. China continues to see improvement as well, reaching 1.5 Mbps in the first quarter. Aside from South Korea, the only other quarter decline among the surveyed Asia Pacific countries was seen in Australia. As noted in Section 3.1, Australia's decline was unusually, and unexpectedly, large, and we believe that it is related to issues seen with a single large network provider within the country.

Similar to the long-term trends seen globally, and in the other regions, year-over-year changes among Asia Pacific countries were generally positive in the first quarter. Aside from a 5.7% loss in Taiwan, the other surveyed countries within the region showed higher average connection speeds as compared to the same period a year ago. Growth was extremely strong in China, which improved by 46% year-over-year, as well as in Japan, Singapore, Malaysia, and India, which all delivered yearly growth in excess of 20% in the first quarter. Despite the unusually large quarterly loss, Australia's average connection speed continued to grow on a yearly basis, up 4.8%. Hong Kong and the Philippines joined Australia in having year-over-year changes below 5%.

Global Rank	Country	Q1 '12 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	15.7	-1.5%	9.4%
2	Japan	10.9	21%	35%
3	Hong Kong	9.3	5.4%	1.3%
25	Singapore	5.3	15%	25%
44	Taiwan	3.9	4.1%	-5.7%
46	New Zealand	3.9	11%	10%
48	Australia	3.5	-35%	4.8%
51	Thailand	3.3	7.4%	16%
74	Malaysia	2.0	15%	40%
93	China	1.5	9.0%	46%
110	Philippines	1.2	8.3%	2.3%
112	India	1.0	16%	24%

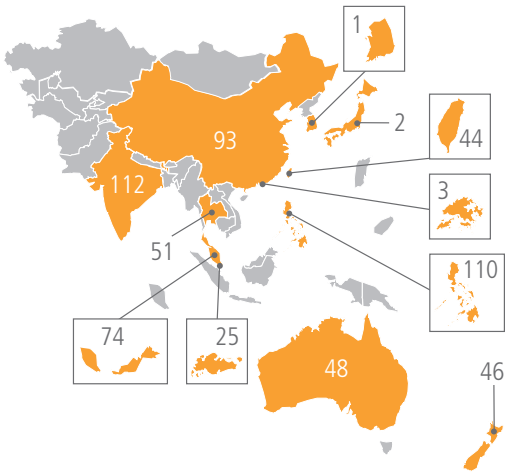


Figure 15: Average Measured Connection Speed by Asia Pacific Country

The first quarter of 2012 saw only two countries (South Korea & Japan) with average connection speeds that exceeded the newly redefined "high broadband" (10 Mbps) threshold, while only two more (Hong Kong & Singapore) had average connection speeds that exceeded the newly redefined "broadband" (4 Mbps) threshold. India remains the country with the lowest average connection speed in the region, at 1 Mbps.

5.2 Asia Pacific Average Peak Connection Speeds

As shown in Figure 16, quarterly improvements for average peak connection speeds were fairly solid across surveyed countries in the Asia Pacific region during the first quarter. India had the largest increase, at 21%, improving its average peak connection speed to 6.9 Mbps, followed closely by Singapore's 20% increase, to 28.6 Mbps. Japan was the only other country to see quarterly growth in excess of 10%, growing 17% to reach 39.5 Mbps in the first quarter. With just a small increase in the next quarter, Japan will join South Korea and Hong Kong as the only countries regionally, and in the world, with average peak connection speeds above 40 Mbps. To that end, another quarter of solid growth in Hong Kong will push the country's average peak connection speed above 50 Mbps. As noted previously, Australia's massive quarterly decline was likely due to issues related to a single large network provider within the country.

In looking at year-over-year changes in average peak connection speeds, very strong improvements were seen across all of the surveyed countries. Malaysia's massive 84% yearly increase (to 15.4 Mbps) led the region, with South Korea the only other country to see a yearly increase higher than 50%. Although India and China have the lowest average peak connection speeds in the region, these speeds have continued to increase over the long-term, as they grew 33% and 46% respectively from the first quarter of 2011. Year-over-year changes above 20% were seen in all but two of the rest of the countries in the region—New Zealand grew 17%, while Australia increased 13% on a yearly basis, despite the unusually large, and unexpected, quarterly loss.

Global Rank	Country	Q1 '12 Peak Mbps	QoQ Change	YoY Change
1	Hong Kong	49.3	7.1%	25%
2	South Korea	47.8	4.6%	52%
3	Japan	39.5	17%	32%
10	Singapore	28.6	20%	47%
16	Taiwan	24.8	8.7%	36%
40	Thailand	19.4	7.8%	38%
49	Australia	16.6	-49%	13%
53	New Zealand	16.1	4.7%	17%
54	Malaysia	15.4	9.6%	84%
85	Philippines	10.0	5.7%	22%
114	India	6.9	21%	33%
121	China	5.9	8.8%	46%

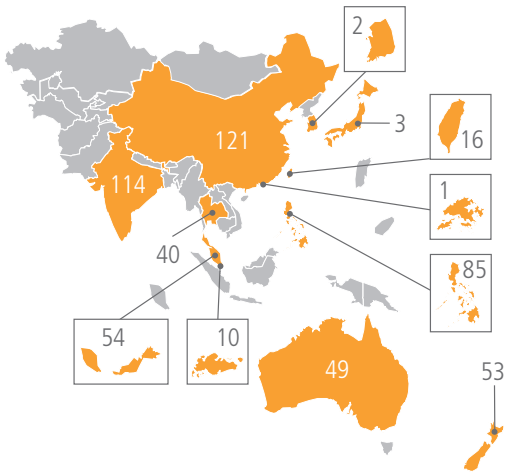


Figure 16: Average Peak Connection Speed by Asia Pacific Country

DID YOU KNOW?

China is expected to have 20 million new broadband Internet subscribers this year and a total of 250 million subscribers by the end of 2015, and is aiming to install fiber-to-the-home (FTTH) broadband connections for 35 million families this year.

[Source: http://news.xinhuanet.com/english/china/2012-03/31/c_131500466.htm]

5.3 Asia Pacific High Broadband Connectivity

As was noted in the introduction to Section 5, starting with the *1st Quarter, 2012 State of the Internet* report, "high broadband" is being redefined to include connections to Akamai of 10 Mbps or greater—this is up from the 5 Mbps baseline that was used within the report from 2008-2011.

With the redefinition of "high broadband," fewer of the surveyed countries qualified for inclusion in the list—in other words, Akamai saw fewer than 25,000 unique IP addresses from India, Malaysia, and the Philippines make requests to Akamai at speeds above 10 Mbps in the first quarter. (However, high broadband adoption rates for those countries are still listed in Figure 17 for the sake of completeness.)

Within the Asia Pacific region, the range of high broadband adoption rates among qualifying countries was extremely wide, ranging from 53% in South Korea to just 0.1% in China. Quarter-over-quarter changes were mixed, with seven countries seeing increases, while South Korea and Australia saw decreases. Extremely strong quarter-over-quarter growth was seen in Singapore, Taiwan, and New Zealand, which all grew in excess of 50% from the fourth quarter of 2011. Japan's 21% increase was also strong, and although Hong Kong, Thailand, and China all grew less than 10%, their growth rates were solid.

Only two countries saw year-over-year declines in high broadband adoption, with minor losses in Taiwan and Thailand. Otherwise, the year-over-year changes among qualifying countries in the Asia Pacific region were generally very strong. Singapore and China more than doubled adoption rates from the first quarter of 2011, while South Korea almost did so, with a 97% yearly increase. Japan, Australia, and New Zealand all saw high broadband adoption grow by more than 20% year-over-year, while the lowest rate of growth was seen in Hong Kong, which delivered a still very respectable 9.7% increase. In India, Malaysia, and the Philippines, there is a clear need for high speed Internet connectivity to be more widely deployed—over time, with increased availability of such connections, these countries will qualify for inclusion within the list and will ideally be able to drive adoption rates up above the 1% mark.

Global Rank	Country	% Above 10 Mbps	QoQ Change	YoY Change
1	South Korea	53%	-7.1%	97%
2	Japan	37%	21%	43%
3	Hong Kong	28%	7.6%	9.7%
21	Singapore	7.9%	58%	146%
35	Australia	3.5%	-59%	29%
36	Taiwan	3.0%	57%	-9.6%
38	New Zealand	2.4%	62%	39%
41	Thailand	0.9%	3.8%	-3.2%
46	China	0.1%	9.2%	178%
–	India	0.1%	87%	19%
–	Malaysia	0.7%	46%	94%
–	Philippines	0.1%	43%	36%

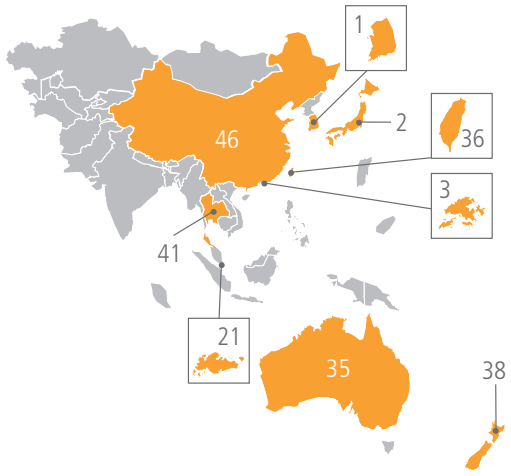


Figure 17: High Broadband (>10 Mbps) Connectivity, Asia Pacific Countries

5.4 Asia Pacific Broadband Connectivity

As was noted in the introduction to Section 5, starting with the *1st Quarter, 2012 State of the Internet* report, "broadband" is being redefined to include connections to Akamai of 4 Mbps or greater – this is up from the 2 Mbps baseline that was used within the report from 2008–2011.

Even with the redefinition of "broadband", there continued to be a very wide spread in adoption rates across the Asia Pacific region, as evidenced by Figure 18. Adoption ranges from 86% in top-ranked South Korea to just 1.2% in India. Broadband adoption was also 1.2% in the Philippines in the first quarter, but it did not have enough unique IP addresses connecting to Akamai at speeds above 4 Mbps to be officially included in the list. Although India and China were the only two countries in the region with broadband adoption levels below 10%, they both saw extremely strong quarterly growth, indicating that the state of connectivity has continued to improve in both countries. Double-digit quarterly percentage growth was also seen in Singapore, New Zealand, Thailand, and Malaysia, which grew adoption rates to 51%, 34%, 23%, and 11% respectively. The smallest change among Asia Pacific countries was the 0.1% increase in South Korea, though its adoption rate remains significantly ahead of Hong Kong and Japan.

Year-over-year changes were overwhelmingly positive, with growth seen in all but one of the surveyed Asia Pacific countries. Yearly increases ranged from just 3.1% in Australia and 4.5% in Hong Kong to 176% in Malaysia and 209% in China. India, which ranked just below China, also saw extremely strong yearly growth, increasing 85%. The only country to show a year-over-year decline in broadband adoption was Taiwan, which lost 6.6%.

In examining broadband adoption levels for the old (>2 Mbps) and new (>4 Mbps) definitions, we find that there are some striking differences. In South Korea, the adoption rate under the new definition is only 10% below that for the old definition. However, in countries including New Zealand, Taiwan, Thailand, Australia, and Malaysia, the difference is approximately 2x—the new adoption rates are half, or just slightly less than half, of the old adoption rates. The most striking differences, however, were seen in India and China, where the difference between old and new was more than 6x. For many of these countries, this highlights that the 2-4 Mbps tier is a "sweet spot" with high numbers of connections in that range.

Global Rank	Country	% Above 4 Mbps	QoQ Change	YoY Change
1	South Korea	86%	0.1%	46%
5	Hong Kong	72%	5.3%	4.5%
6	Japan	72%	6.7%	16%
20	Singapore	51%	13%	11%
39	Taiwan	36%	1.2%	-6.6%
42	New Zealand	34%	20%	27%
45	Australia	27%	-15%	3.1%
47	Thailand	23%	24%	69%
60	Malaysia	11%	57%	176%
68	China	3.0%	23%	209%
69	India	1.2%	62%	85%
–	Philippines	1.2%	45%	18%

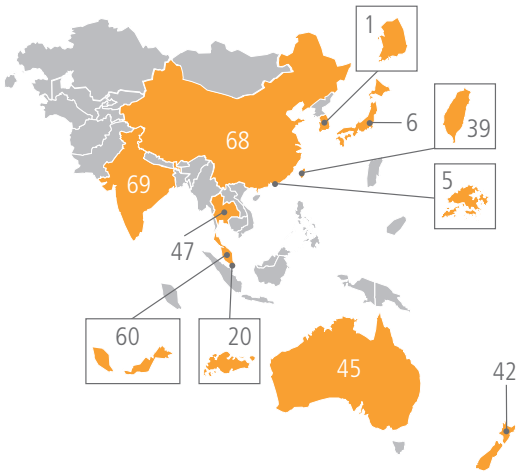


Figure 18: Broadband (>4 Mbps) Connectivity, Asia Pacific Countries

SECTION 6:
Geography–EMEA

Previously titled "Europe", this section has been renamed "EMEA" to reflect the inclusion of the United Arab Emirates and Israel. 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.

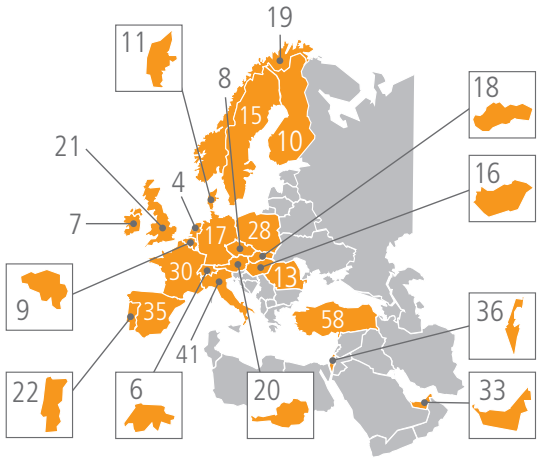
As was noted in the introduction to Section 3, this section will no longer include city-level data, nor data on narrowband (<256 kbps), and the "new" definitions of high broadband (>10 Mbps) and broadband (>4 Mbps) are used here as well.

6.1 EMEA Average Connection Speeds

After finishing 2011 as the EMEA country with the highest average connection speed, the Netherlands topped the list going into 2012, leading the region with an average connection speed of 8.8 Mbps. Similar to the trends seen globally, and across the other regions, quarterly changes were overwhelmingly positive in the first quarter, as shown in Figure 19. Quarter-over-quarter increases ranged from 3.4% in Ireland (to 7.3 Mbps) and Turkey (to 2.9 Mbps) to 20% in Denmark (to 6.7 Mbps) and France (to 4.9 Mbps). Nine other countries within the region saw average connection speeds improve by 10% or more during the first quarter. Among the surveyed countries, only Turkey's average connection speed fell below the new "broadband" definition of 4 Mbps, and only the United Arab Emirates had a lower average connection speed than in the first quarter, losing 2.0% (to 4.7 Mbps).

Year-over-year changes were extremely strong as well, with the Czech Republic and Portugal the only two countries within the EMEA region that saw average connection speeds increase less than 10% year-over-year. (Though they weren't that far below 10%, experiencing increases of 9.7% and 9.1%, respectively.) The 39% year-over-year increases in Finland and Poland were the highest in the region, although five additional countries also saw yearly growth of 30% or more.

Although the United Kingdom fell roughly in the middle of the pack from an average connection speed perspective, efforts announced by BT Openreach may help push the country further up the list in the future. In January, Openreach said it was looking for around 1,000 apartment buildings that are within the company's current fiber deployment footprint to take part in a pilot project that will eventually bring download speeds of up to 300Mbps to residents.[19] The UK government is also offering



Global Rank	Country	Q1 '12 Avg. Mbps	QoQ Change	YoY Change
4	Netherlands	8.8	6.5%	18%
6	Switzerland	8.1	11%	30%
7	Ireland	7.3	3.4%	30%
8	Czech Republic	7.1	6.2%	9.7%
9	Belgium	7.1	13%	16%
10	Finland	6.9	16%	39%
11	Denmark	6.7	20%	24%
13	Romania	6.6	3.6%	-0.3%
15	Sweden	6.3	12%	26%
16	Hungary	5.9	5.9%	15%
17	Germany	5.8	13%	22%
18	Slovakia	5.7	7.6%	20%
19	Norway	5.7	12%	22%
20	Austria	5.7	7.0%	30%
21	United Kingdom	5.6	9.8%	20%
22	Portugal	5.4	8.3%	9.1%
28	Poland	5.0	18%	39%
30	France	4.9	20%	35%
33	United Arab Emirates	4.7	-2.0%	15%
35	Spain	4.6	16%	35%
36	Israel	4.6	14%	27%
41	Italy	4.1	4.7%	13%
58	Turkey	2.9	3.4%	15%

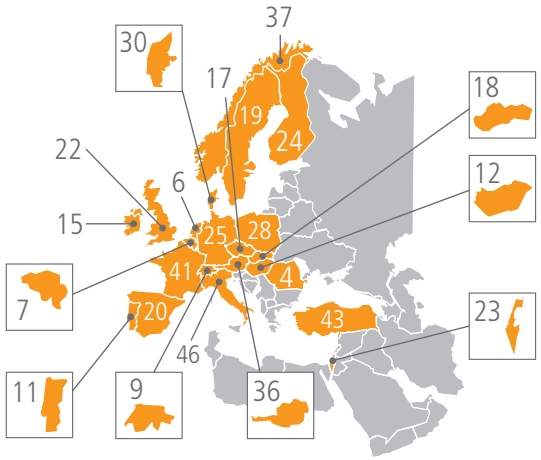
Figure 19: Average Measured Connection Speed by EMEA Country

cash to local councils — that can secure matched funding — for broadband infrastructure improvements through its Broadband Delivery UK scheme, though the UK's culture secretary proposed take back funding for the plan if broadband contracts are not in place before the end of the year.[20]

6.2 EMEA Average Peak Connection Speeds

As shown in Figure 20, the average peak connection speed across all of the surveyed EMEA countries improved in the first quarter of 2012. Quarter-over-quarter increases ranged from 4.6% in Ireland (to 25.2 Mbps) to 20% in Spain (to 24.0 Mbps). Across the region, 13 additional countries joined Spain in having quarterly increases greater than 10%. At 38.8 Mbps, Romania's average peak connection speed is over 9 Mbps faster than the Netherlands' average peak connection speed, and more than 20 Mbps faster than Italy's, which had the region's lowest speed, at 17.7 Mbps. (As has been the case over the last several quarters, the United Arab Emirates is not included in Figure 20 due to anomalies in the data we believe are related to the network architecture within the country.)

Similar to last quarter, year-over-year changes remained extremely positive, with double-digit percentage increases seen in all of the surveyed countries. Yearly growth ranged from a 13% increase in Portugal (to 28.2 Mbps) to the 58% increase seen in Poland (to 22.0 Mbps). Both Poland and Spain grew more than 50% year-over-year, while Israel and Finland saw average peak connection speeds increase by more than 40% over the same period. Only five of the surveyed countries had yearly growth rates below 20%. Coupled with the strong yearly increases in average connection speeds, these long-term trends point towards increases in availability and quality of high speed Internet connectivity across countries in the EMEA region.



Global Rank	Country	Q1 '12 Peak Mbps	QoQ Change	YoY Change
4	Romania	38.8	9.9%	19%
6	Netherlands	29.4	13%	34%
7	Belgium	29.2	5.7%	18%
9	Switzerland	28.7	12%	35%
11	Portugal	28.2	10%	13%
12	Hungary	28.0	13%	31%
15	Ireland	25.2	4.6%	36%
17	Czech Republic	24.5	8.3%	19%
18	Slovakia	24.2	11%	31%
19	Sweden	24.1	8.4%	24%
20	Spain	24.0	20%	52%
22	United Kingdom	23.7	12%	37%
23	Israel	23.5	13%	48%
24	Finland	23.5	15%	43%
25	Germany	23.4	10%	28%
28	Poland	22.0	18%	58%
30	Denmark	21.5	13%	29%
36	Austria	20.2	8.6%	29%
37	Norway	20.1	8.0%	24%
41	France	19.1	12%	34%
43	Turkey	18.5	11%	37%
46	Italy	17.7	7.8%	19%

Figure 20: Average Peak Connection Speed by EMEA Country

6.3 EMEA High Broadband Connectivity

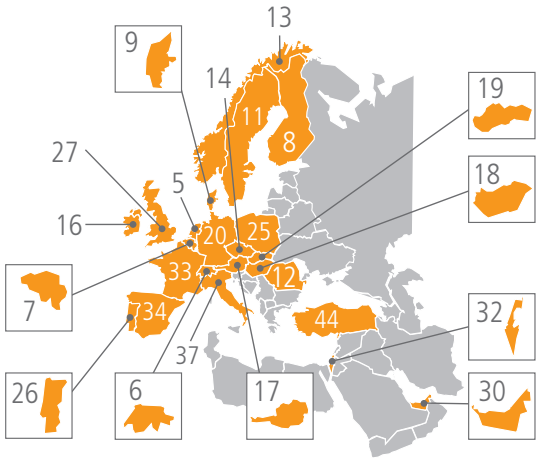
As expected, high broadband adoption levels under the new 10 Mbps definition are significantly lower than were seen with the 5 Mbps threshold. As shown in Figure 21, none of the countries within the EMEA region had even a quarter of their connections to Akamai at speeds above 10 Mbps; just under half of them didn't even have 10% of their connections at those speeds. However, quarter-over-quarter changes among the surveyed countries were generally rather strong, with only the United Arab Emirates seeing a slight decline. Quarterly increases of over 50% were seen across six countries, while another six countries saw growth of 30% or more. Across the region, increases ranged from 3.4% in Ireland (to 10%) to a massive 83% increase in Spain (to 4.2%).

Looking at year-over-year changes, three countries (Romania, United Arab Emirates, and Turkey) saw high broadband adoption drop year over year, with the United Arab Emirates and Turkey seeing fairly significant declines. In contrast, eight countries (Switzerland, Finland, Denmark, Austria, Poland, Israel, France, and Spain) all saw high broadband adoption levels of double or more as compared to the first quarter of 2011, while eight more countries had year-over-year increases above 50%. The 18% increase in the Czech Republic was the lowest level of yearly growth seen in the region.

DID YOU KNOW?

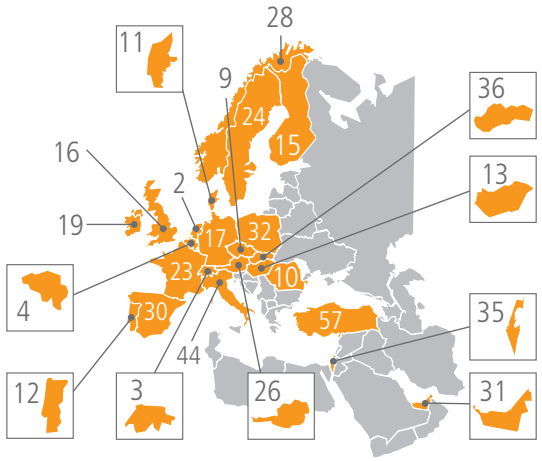
In February, industry analyst firm Point Topic announced that they had joined with the European Commission to launch "the most detailed broadband coverage mapping survey ever made across Europe."

[Source: http://www.ispreview.co.uk/story/2012/02/27/point-topic-begins-major-digital-agenda-mapping-survey-of-eu-broadband-cover.html]



Global Rank	Country	% Above 10 Mbps	QoQ Change	YoY Change
5	Netherlands	24%	14%	33%
6	Switzerland	19%	29%	119%
7	Belgium	18%	60%	63%
8	Finland	16%	36%	127%
9	Denmark	15%	63%	104%
11	Sweden	14%	30%	50%
12	Romania	13%	4.5%	-8.7%
13	Norway	12%	40%	81%
14	Czech Republic	12%	9.9%	18%
16	Ireland	10%	3.4%	35%
17	Austria	10%	13%	100%
18	Hungary	10%	17%	78%
19	Slovakia	8.9%	16%	56%
20	Germany	8.3%	37%	98%
25	Poland	7.0%	77%	140%
26	Portugal	6.8%	31%	63%
27	United Kingdom	6.5%	30%	86%
30	United Arab Emirates	5.9%	-6.8%	-26%
32	Israel	5.6%	57%	191%
33	France	4.5%	66%	140%
34	Spain	4.2%	83%	181%
37	Italy	2.6%	10%	25%
44	Turkey	0.4%	7.2%	-32%

Figure 21: High Broadband (>10 Mbps) Connectivity, EMEA Countries



Global Rank	Country	% Above 4 Mbps	QoQ Change	YoY Change
2	Netherlands	83%	2.7%	20%
3	Switzerland	77%	11%	29%
4	Belgium	73%	3.5%	5.6%
9	Czech Republic	68%	7.2%	6.4%
10	Romania	63%	3.3%	4.0%
11	Denmark	62%	15%	11%
12	Portugal	61%	10%	4.3%
13	Hungary	60%	8.9%	16%
15	Finland	59%	15%	42%
16	United Kingdom	58%	14%	35%
17	Germany	57%	17%	30%
19	Ireland	52%	6.8%	32%
23	France	49%	47%	99%
24	Sweden	48%	11%	23%
26	Austria	46%	7.1%	33%
28	Norway	45%	10%	11%
30	Spain	44%	31%	99%
31	United Arab Emirates	44%	-2.5%	22%
32	Poland	44%	22%	73%
35	Israel	40%	36%	97%
36	Slovakia	40%	13%	33%
44	Italy	32%	16%	50%
57	Turkey	12%	36%	132%

Figure 22: Broadband (>4 Mbps) Connectivity, EMEA Countries

6.4 EMEA Broadband Connectivity

As shown in Figure 22, broadband adoption levels remained strong in the first quarter of 2012, even as the speed used as the broadband cutoff was higher than in the prior quarter. The Netherlands had the highest level of broadband adoption in the EMEA region, at 83%, up 2.7% from the prior quarter. An additional 11 countries had more than half of their connections to Akamai at speeds above 4 Mbps. Quarter-over-quarter changes ranged from moderate to significant, ranging from a 2.7% increase in the Netherlands to a 47% increase in France. Fifteen countries across the region saw broadband adoption levels grow by more than 10% from the fourth quarter of 2011, including Turkey, which had the lowest level of broadband adoption (12%) in the region. The United Arab Emirates was the only country in the EMEA region where broadband adoption declined quarter-over-quarter – it lost 2.5%.

All of the countries in the EMEA region saw broadband adoption levels increase year-over-year, with extremely strong growth seen in several countries. France, Spain, and Israel all fell just short of doubling broadband adoption year-over-year, while Turkey saw broadband adoption more than double. Only four countries in the region (Belgium, Czech Republic, Romania, and Portugal) saw adoption levels increase less than 10%—the lowest level of growth was Romania's 4.0% increase.

As noted in the Asia Pacific section above, in examining broadband adoption levels for the old (>2 Mbps) and new (>4 Mbps) definitions, we find that there are some striking differences among the countries in EMEA as well. The smallest difference was seen in the Netherlands, where broadband adoption under the new definition was 11% lower than under the old definition. The largest difference was seen in Turkey, where the broadband adoption figure is now one-sixth of what it was under the 2 Mbps definition. The remainder of the countries now sees broadband adoption levels that are generally on the order of 30-50% lower. Again, for many of these countries, this highlights that the 2-4 Mbps tier is a "sweet spot" with high numbers of connections in that range.

Mobile Connectivity

Building on the data presented in previous editions of the *State of the Internet* report, Akamai continues to attempt to identify additional 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 first 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 first quarter of 2012, German mobile provider DE-2 continued to have the highest average connection speed, increasing 7.4% to just under 6.0 Mbps. In reviewing the full list of providers listed in Figure 25, we find that there are five providers (DE-2, GR-1, CZ-3, ES-1, and UA-1) that had average connection speeds in the newly redefined "broadband" (>4 Mbps) range. An additional 65 mobile providers had average connection speeds greater than 1 Mbps in the first quarter. The mobile provider with the lowest average connection speed was NG-1 in Nigeria, at 322 kbps. Only three providers had average connection speeds below 500 kbps in the first quarter: NG-1, South African provider ZA-1 and Bolivian provider BO-1. Thai mobile provider TH-1, which was ranked as the slowest provider in the last several reports, saw its average connection speed rebound in the first quarter of 2012, growing over 450% quarter-over-quarter to just shy of 1 Mbps.

Examining the average peak connection speed data for the first quarter of 2012, we find that Hong Kong mobile provider HK-1 tops the list, with an average peak connection speed of 32.2 Mbps. However, as this represents an increase of over 250% from the prior quarter, it may be indicative of a change in network architecture within the provider, such as the installation of caching servers or gateways. A German provider had the highest average peak connection speed last quarter, and placed second this quarter, at 31.2 Mbps, up almost 19% quarter-over-quarter. Six mobile providers had average peak connection speeds above 20 Mbps in the first quarter, double the number in the prior quarter—provider GR-1 missed the 20 Mbps mark by just 64 kbps. Average peak connection speeds above 10 Mbps were seen in an additional 31 mobile providers. All mobile providers had average peak connection speeds above 2 Mbps, though last place South African provider ZA-1 was just above the threshold, losing over 13% from the prior quarter, at 2.2 Mbps. Thai mobile provider TH-1 rebounded very well for this section too, seeing a nearly 400% increase in average peak connection speed to 8.6 Mbps.

Note that starting with this issue, the *State of the Internet* report will no longer include per-provider average MB per month consumption data.

Country	ID	Q1 '12 Avg. kbps	Q1 '12 Peak kbps
AFRICA			
Egypt	EG-1	592	3914
Morocco	MA-1	996	9579
Nigeria	NG-1	322	5674
South Africa	ZA-1	496	2172
ASIA			
China	CN-1	2020	5125
Hong Kong	HK-2	1997	11187
Hong Kong	HK-1	2382	32172
Indonesia	ID-1	742	10085
Israel	IL-1	1506	7947
Kuwait	KW-1	1323	7115
Malaysia	MY-3	1117	8518
Malaysia	MY-1	550	7040
Pakistan	PK-1	1144	6246
Qatar	QA-1	1289	3568
Saudi Arabia	SA-1	1351	4688
Singapore	SG-3	1477	8575
Sri Lanka	LK-1	817	7237
Taiwan	TW-1	1717	8322
Taiwan	TW-2	1084	6558
Thailand	TH-1	979	8584
EUROPE			
Austria	AT-1	2558	11171
Belgium	BE-1	3731	14549
Belgium	BE-3	945	4545
Belgium	BE-2	1976	5323
Czech Republic	CZ-1	1799	9714
Czech Republic	CZ-3	4656	14550
Czech Republic	CZ-2	1273	7199
Estonia	EE-1	1637	8223
France	FR-2	2862	10900
Germany	DE-1	1122	4665
Germany	DE-2	5976	31224
Germany	DE-3	1828	8137
Greece	GR-1	4928	19934
Hungary	HU-2	2422	12483
Hungary	HU-1	1785	8899
Ireland	IE-1	3017	14895
Ireland	IE-2	2077	16679
Ireland	IE-3	2303	18228
Italy	IT-2	3481	18004
Italy	IT-3	3367	16700
Italy	IT-4	1977	12226
Lithuania	LT-2	2185	16320
Lithuania	LT-1	3284	19081
Moldova	MD-1	1850	8496
Netherlands	NL-2	2239	5827
Netherlands	NL-1	1820	4133
Netherlands	NL-3	1830	8102
Norway	NO-1	2458	9074
Poland	PL-1	3615	17929
Poland	PL-2	1765	9054
Poland	PL-3	1709	10385
Romania	RO-1	937	5330
Russia	RU-4	3631	16588
Russia	RU-3	825	4550
Russia	RU-2	1094	6250
Slovakia	SK-1	605	4173
Slovenia	SI-1	2228	8402
Spain	ES-1	4527	21979
Turkey	TR-1	1875	9191
Ukraine	UA-1	4239	14092
United Kingdom	UK-3	3502	14143
United Kingdom	UK-2	3433	12378
United Kingdom	UK-1	2691	27869
NORTH AMERICA			
Canada	CA-2	1018	2485
El Salvador	SV-2	1932	11932
El Salvador	SV-1	1548	9203
El Salvador	SV-3	631	3172
Guatemala	GT-2	1590	10236
Nicaragua	NI-1	1826	11962
United States	US-1	2515	7388
United States	US-2	1118	4613
United States	US-3	1222	3884
OCEANIA			
Australia	AU-3	1881	12262
Australia	AU-1	1498	14167
New Zealand	NZ-2	1785	10411
SOUTH AMERICA			
Argentina	AR-1	1051	7979
Argentina	AR-2	2699	20543
Bolivia	BO-1	473	4604
Brazil	BR-1	827	8013
Brazil	BR-2	1417	7911
Chile	CL-3	1487	12828
Chile	CL-4	1255	13932
Colombia	CO-1	1010	6801
Paraguay	PY-2	684	5627
Uruguay	UY-1	1497	11222
Venezuela	VE-1	983	7334

Figure 23: Average and Average Peak Connection Speed per Month by Mobile Provider

7.2 Mobile Traffic Growth As Observed By Ericsson

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

These measurements have been performed for several years and the seasonal slowdown in growth observed in Q2 2011 has been replaced by continued strong growth in the last 3 quarters. However, 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 24, the volume of mobile data traffic almost doubled from the first quarter of 2011 to the first quarter of 2012, and grew 19% between the fourth quarter of 2011 and the first quarter of 2012.

DID YOU KNOW?

- The traffic generated by mobile PC users differs significantly between individuals and markets. The global average is estimated to be around 2 GB per month, based on Ericsson measurements. *[Source: http://www.ericsson.com/res/docs/2012/tmd_report_feb_web.pdf]*
- Mobile PCs dominate traffic in most mobile networks today, but smartphone traffic is growing faster, due to high growth in subscriptions. *[Source: http://www.ericsson.com/res/docs/2012/traffic_and_market_report_june_2012.pdf]*

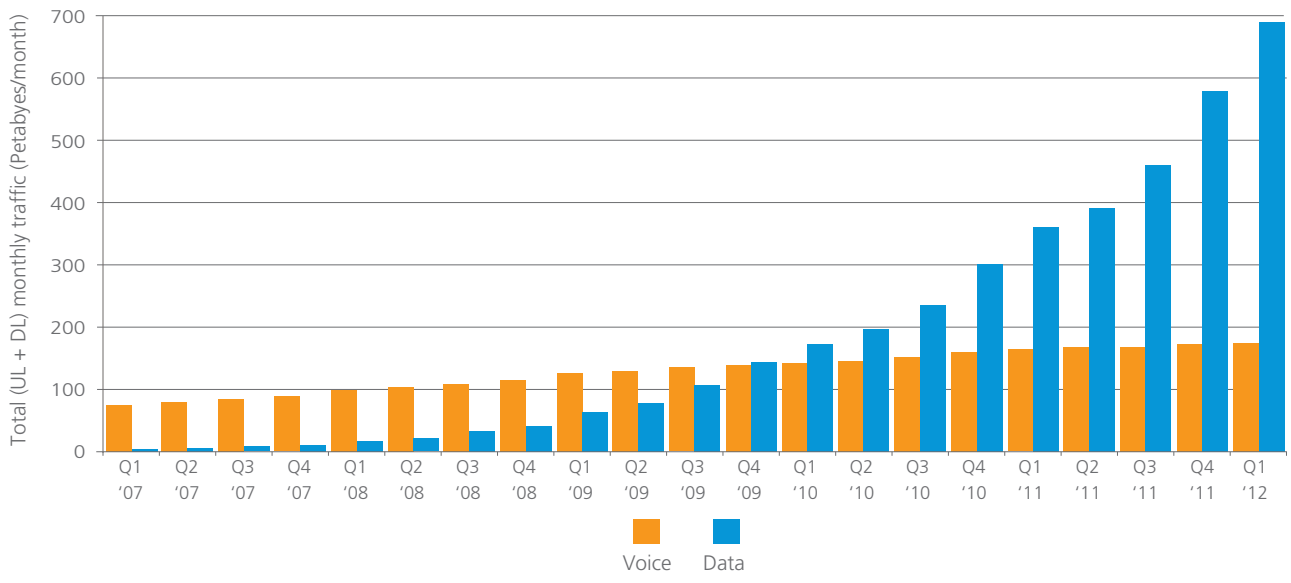


Figure 24: Total Monthly Mobile Voice and Data as Measured by Ericsson

7.3 Traffic Variation By Application And Data Plan As Observed By Ericsson

Figure 25 shows the variation of a subscriber's average monthly traffic volume for different applications for mobile PC devices. It is measured at two different occasions during 2011 in one selected network. As an example, a user on a data plan of around 15 GB consumed on average 2-3 GB per month of HTTP video in Q1, while in Q4 this figure was 3-4 GB per month. In this study, the majority of users are on medium data plans between 2-5 GB/month. In Q4, higher data plans were available.

The first observation one can make is that the monthly subscriber traffic from applications such as HTTP video and web browsing both reach saturation points, although at different levels. At the same time, P2P file sharing increases with the monthly data plan (at least for the range of currently available data plans).

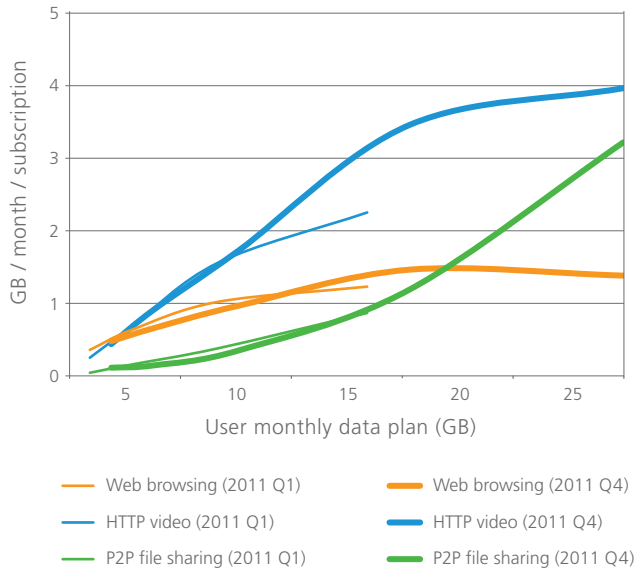


Figure 25: Average per subscription monthly traffic volume per application as a function of *data plan*

The second observation one can make is that both web browsing and P2P file sharing usage remain fairly constant within the same data plan between Q1 and Q4, while HTTP video has increased dramatically.

Web browsing has not increased because it is a low bandwidth application and there are limitations on the time an individual can spend browsing the web. There are several reasons to that HTTP video is increasing and has likely not yet reached its peak. One reason is that bit rates from video applications such as YouTube, Netflix and Hulu continue to increase as they gradually improve quality by offering content in increasingly higher resolution (e.g. "Full HD"). Another reason is increasing screen resolution, which means viewers tend to look at longer clips, or that they keep watching for a longer time. The increasing availability of quality content also has an impact.

DID YOU KNOW?

- Global mobile penetration reached 87 percent in Q1 2012 and mobile subscriptions now total around 6.2 billion. However, the actual number of subscribers is around 4.2 billion, since many have several subscriptions.
- The data plan is one of the most important factors determining level of traffic usage. *[Source: http://www.ericsson.com/res/docs/2012/traffic_and_market_report_june_2012.pdf]*

8.1 Iran

In February, Reuters reported[21] that millions of Iranians had recently suffered serious disruptions in accessing e-mail and Internet social networking sites, which raised concerns that authorities within the country were stepping up censorship of opposition supporters ahead of parliamentary elections scheduled to take place in March. According to the report, the disruptions appeared to target all international Web sites outside Iran that depend on SSL encryption and took place from Friday, February 10, through the following Monday.

Figure 26 illustrates the traffic patterns for HTTP (non-secure) traffic delivered by Akamai to Iran between February 7 and February 14. The graph clearly shows that traffic peaks for the three-day period of February 9th to 11th were lower than the previous several days, potentially indicative of some sort of traffic filtering. However, Figure 27 clearly illustrates the reported disruption in access to SSL-encrypted content (known as HTTPS traffic) during the time period in question. As the figure shows, HTTPS traffic delivered by Akamai to Iran dropped precipitously to near-zero levels on February 9th and started to recover somewhat on the 11th and 12th. HTTPS traffic peaks had returned to near-normal levels by February 13th.

The following week, Reuters again reported[22] that a second and more extensive disruption of Internet access had taken place on Monday, February 20, again targeting international Web sites outside Iran that depend on SSL encryption. The report also highlighted claims that virtual private networking (VPN) traffic was blocked during this disruption as well. Figure 28 illustrates the traffic patterns for HTTPS (secured) traffic delivered by Akamai to Iran between February 17 and February 21. Once again, a significant decline in traffic is evident on February 20, in line with the date of the reported disruption.

8.2 Australia

According to a published report,[23] on February 23, Australian network provider Dodo revealed a "minor hardware issue" was behind a Telstra outage that impacted multiple service providers and Internet services across the country. The report noted that the 35-minute outage impacted an international link used by major service providers Telstra, Optus and iiNet for ADSL, cable and 3G data services. Because the disruption affected multiple service providers, it also briefly disrupted the ability of users in Australia to retrieve content from Akamai. Figure 29 illustrates the traffic patterns for HTTP traffic delivered by Akamai to Australia on the morning (Eastern Time) of February 23. There is a clear dip in traffic concurrent with the reported outage, with traffic patterns returning to normal thereafter.

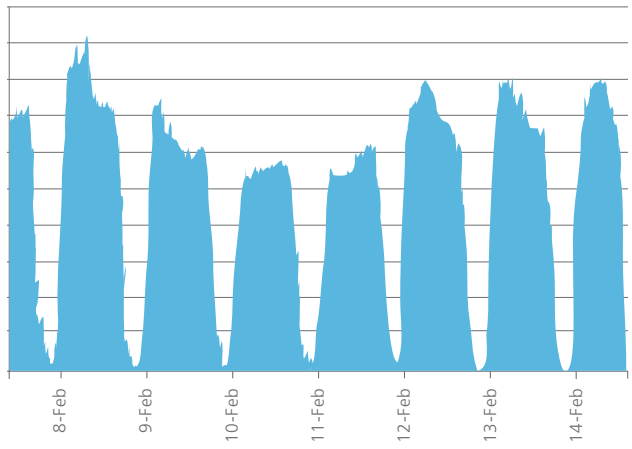


Figure 26: HTTP Traffic Served to Iran, February 7 – 14, 2012

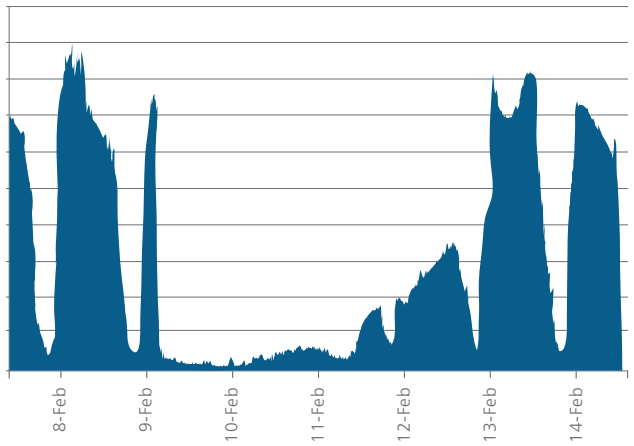


Figure 27: HTTPS Traffic Served to Iran, February 7–14, 2012

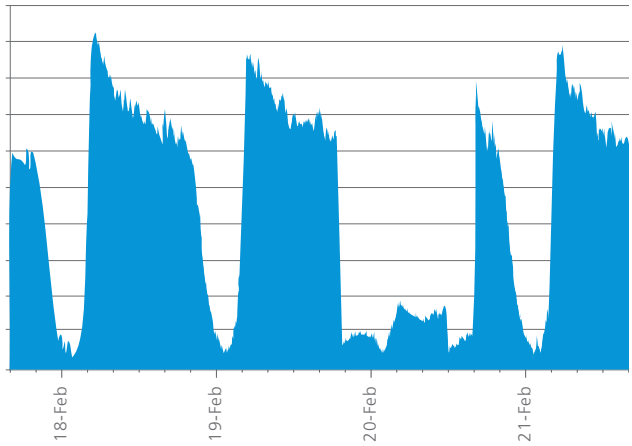


Figure 28: HTTPS Traffic to Iran, February 17–21, 2012

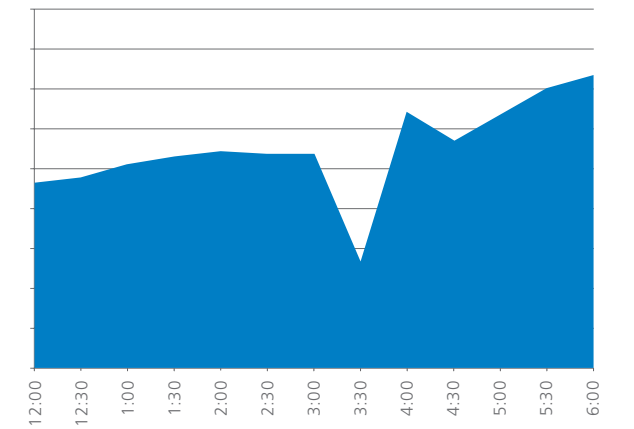


Figure 29: HTTP Traffic Served to Australia, February 23, 2012

Region	% Attack Traffic	Unique IP Addresses	Avg. Connection Speed (Mbps)	Peak Connection Speed (Mbps)	% Above 10 Mbps*	% Above 4 Mbps*
EUROPE						
Austria	0.2%	3,091,940	5.7	20.2	10%	46%
Belgium	0.1%	4,320,174	7.1	29.2	18%	73%
Czech Republic	0.5%	2,231,060	7.1	24.5	12%	68%
Denmark	0.1%	3,146,650	6.7	21.5	15%	62%
Finland	0.1%	3,082,796	6.9	23.5	16%	59%
France	1.0%	25,531,678	4.9	19.1	4.5%	49%
Germany	1.9%	36,042,604	5.8	23.4	8.3%	57%
Greece	0.2%	2,795,843	4.0	20.9	1.6%	34%
Hungary	1.7%	2,599,912	5.9	28.0	10%	60%
Iceland	<0.1%	152,764	5.4	23.9	6.0%	45%
Ireland	0.1%	1,600,721	7.3	25.2	10%	52%
Italy	1.9%	16,916,226	4.1	17.7	2.6%	32%
Luxembourg	<0.1%	175,955	4.7	16.7	3.1%	50%
Netherlands	0.6%	8,183,991	8.8	29.4	24%	83%
Norway	0.1%	3,708,569	5.7	20.1	12%	45%
Poland	1.8%	8,016,244	5.0	22.0	7.0%	44%
Portugal	0.2%	3,022,278	5.4	28.2	6.8%	61%
Romania	3.2%	2,676,118	6.6	38.8	13%	63%
Slovakia	0.1%	903,926	5.7	24.2	8.9%	40%
Spain	0.8%	13,990,828	4.6	24.0	4.2%	44%
Sweden	0.3%	6,457,731	6.3	24.1	14%	48%
Switzerland	0.3%	3,208,453	8.1	28.7	19%	77%
United Kingdom	0.8%	25,720,814	5.6	23.7	6.5%	58%
ASIA/PACIFIC						
Australia	0.4%	13,859,005	3.5	16.6	3.5%	27%
China	16%	92,385,739	1.5	5.9	0.1%	3.0%
Hong Kong	0.9%	2,870,568	9.3	49.3	28%	72%
India	3.1%	11,498,812	1.0	6.9	0.1%	1.2%
Japan	1.8%	40,510,336	10.9	39.5	37%	72%
Malaysia	1.1%	2,156,957	2.0	15.4	0.7%	11%
New Zealand	0.3%	2,022,538	3.9	16.1	2.4%	34%
Singapore	0.2%	1,349,758	5.3	28.6	7.9%	51%
South Korea	4.4%	19,808,619	15.7	47.8	53%	86%
Taiwan	5.5%	10,494,010	3.9	24.8	3.0%	36%
MIDDLE EAST						
Egypt	0.7%	2,256,682	1.3	7.6	0.1%	4.6%
Israel	1.8%	2,835,458	4.6	23.5	5.6%	40%
Kuwait	0.2%	728,398	1.8	13.4	0.6%	3.7%
Saudi Arabia	0.3%	3,409,894	2.3	9.8	0.1%	3.6%
Sudan	<0.1%	71,305	0.9	8.5	<0.1%	0.2%
Syria	<0.1%	529,987	1.7	5.4	0.1%	4.8%
United Arab Emirates (UAE)	0.2%	1,185,060	4.7	n/a	5.9%	44%
LATIN & SOUTH AMERICA						
Argentina	1.3%	6,217,745	2.2	14.4	0.4%	12%
Brazil	4.1%	19,202,853	2.2	15.1	0.5%	12%
Chile	0.5%	3,245,647	3.4	19.7	1.0%	22%
Colombia	0.6%	4,193,378	2.7	14.4	0.4%	11%
Mexico	0.6%	10,835,278	2.8	13.5	0.4%	12%
Peru	0.4%	938,240	1.6	11.6	0.1%	0.9%
Venezuela	0.5%	2,335,262	0.9	6.8	<0.1%	0.6%
NORTH AMERICA						
Canada	1.0%	13,544,437	6.5	25.4	11%	68%
United States	11%	146,463,059	6.7	28.7	15%	60%

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

SECTION 10:
Endnotes

[1] http://www.pcadvisor.co.uk/news/security/3354324/obstinate-conficker-worm-infests-millions-of-pcs-years-later/?olo=rsst

[2] http://www.cvedetails.com/cve/CVE-2011-5049/

[3] http://technet.microsoft.com/en-us/security/bulletin/ms12-020

[4] http://laws.qualys.com/2012/03/march-patch-tuesday-2012.html

[5] https://www.arin.net/knowledge/rirs.html

[6] 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

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[7] http://www.networkworld.com/news/2012/052412-ipv4-resales-259588.html

[8] http://he.net/about_us.html

[9] http://bgp.he.net/going-native.pdf

[10] http://www.circleid.com/posts/20120305_networks_announcing_ipv6_one_year_later/

[11] http://www.lightreading.com/document.asp?doc_id=218942

[12] http://www.akamai.com/dl/whitepapers/How_will_the_internet_scale.pdf

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[14] http://www.techinasia.com/state-councils-plan-china-2015-3g-100-mbps-broadband/

[15] http://broadbandtrends.com/blog1/2012/04/09/european-commission-updates-on-national-broadband-plans/

[16] http://www.forbes.com/sites/ericsavitz/2012/01/11/ces-live-fcc-chair-genachowski-wants-uniquitous-broadband/

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[18] http://www.fcc.gov/measuring-broadband-america/2012/july

[19] http://www.zdnet.com/bt-plan-puts-300mbps-in-apartment-blocks-4010025296/

[20] Ibid.

[21] http://www.reuters.com/article/2012/02/14/iran-internet-idUSL5E8DE26N20120214

[22] http://www.reuters.com/article/2012/02/20/us-iran-internet-idUSTRE81J0ML20120220

[23] http://www.itnews.com.au/News/291364,dodo-cops-blame-for-national-internet-outages.aspx

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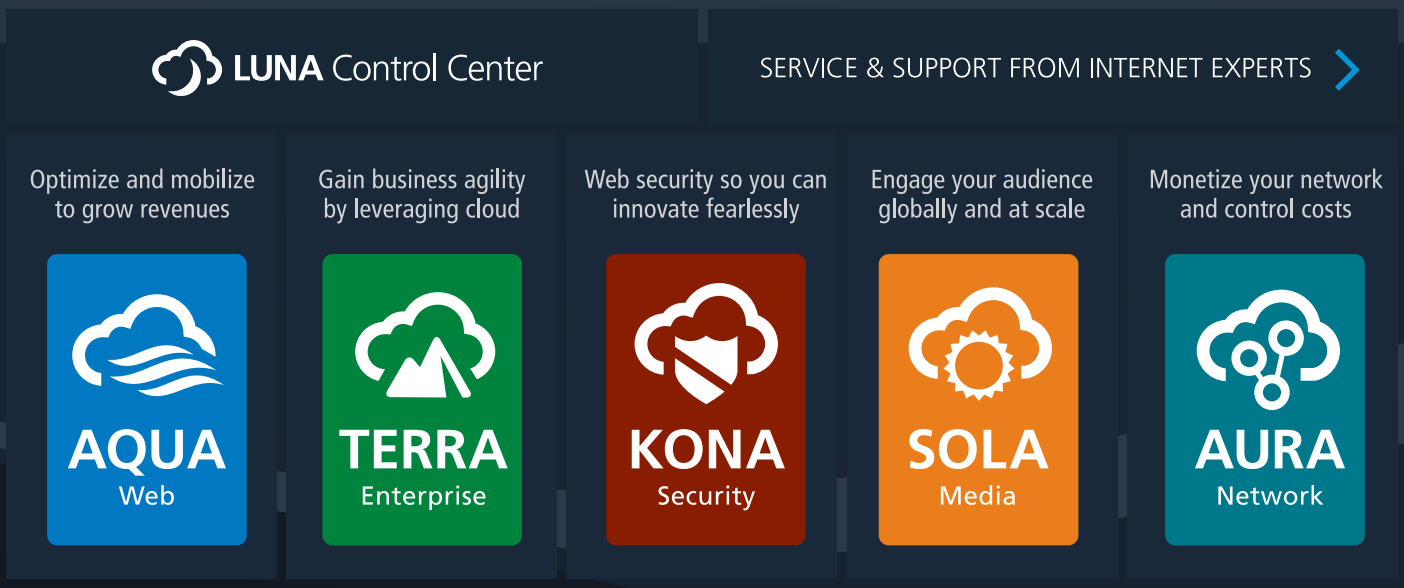

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7,000,000+
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Household Energy Saved
6,500,000+
DNS Requests to Global
Traffic Management
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HTTP Data Delivered
AKAMAI IN
60
SECONDS
1,800,000,000
Log Lines Written
2 TB
Secure HTTP
Data Delivered
NEWS
3,400,000+
News Page Views
13+TB
Video Streamed
800,000+
Gaming Page Views
74 TB+
of Data Served to Users
7,600+
Hours of Video Streamed
125,000+
Mobile Apps Delivered
12,500+
Hours Saved by Akamai
vs. Public Internet
60,000,000+
Server Mapping Updates
Akamai
FASTER FORWARD
Stats current as of 07.24.2012
1.1 TB+
Live HD Video for
iPhone Delivered
36,000,000+
IPv6 Content
Requests Served

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