Akamai

VOLUME 4, NUMBER 2

The State of the Internet

2ND QUARTER, 2011 REPORT

INCLUDES INSIGHT ON MOBILE TRAFFIC AND CONNECTED DEVICES FROM ERICSSON

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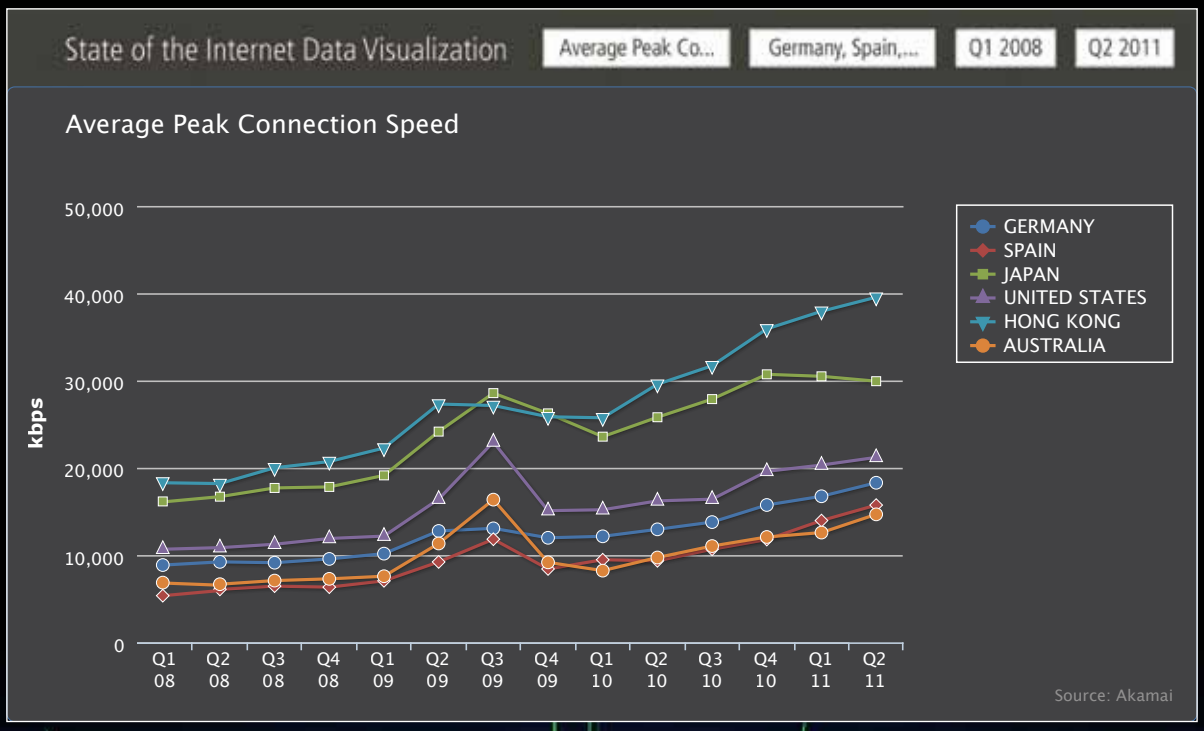

View trends over time for key metrics from the report across the top 100 countries/regions as well as U.S. states

Compare trends across geographies

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Letter From the Editor

With the publication of this edition of the *State of the Internet* report, we have taken steps to make the report more globally inclusive. We are now publishing a single report that incorporates the Asia Pacific-specific content that was previously published as part of a separate report, as well as Europe-specific content, which has not previously been broken out or published on its own. By including unique sections on the United States and selected countries within Europe and the Asia Pacific region, we hope to enable readers to more easily find information on their geographies of interest, as well as enabling them to more easily compare metrics across geographies.

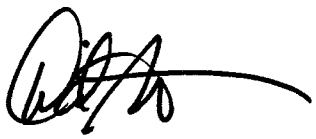
The data visualization tool launched in conjunction with the 1st Quarter, 2011 report, available at *www.akamai.com/stateoftheinternet,* has been updated to include data from the second quarter. As noted last quarter, the tool allows users to select metrics, time frames, and geographies of interest, and then generate and download graphs of the associated data. In addition, we have also added state-level data from the United States to the data visualization tool, and we hope to further enhance it in the future.

Unfortunately, Internet disruptions as a response to civil and political unrest continue to be used as a tool by governments in the Middle East. In this quarter's report, we look at the impact of a disruption of Internet connectivity in Syria that occurred in early June.

Security on the Internet and Web continues to be a hot topic, and issues around SSL have featured heavily in the industry press. This quarter, for the first time, we've mined data collected from Akamai's secure content delivery network to examine the use and distribution of the ciphers used by Web clients – in short, looking at just how secure browser-to-server connections are.

We are excited to once again feature data from Akamai partner Ericsson – in this quarter's report, they provide insight into smartphone usage and the impact of various factors on the volume of traffic that these connected devices generate.

In the upcoming 3rd Quarter, 2011 report, we will continue to track the growth of IPv6 usage across the Internet, as well as examining Internet disruptions, and other security- and mobile-related topics.



David Belson

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Executive Summary

Akamai's globally distributed network of servers allows us to gather massive amounts of information on many metrics, including connection speeds, attack traffic, and network connectivity/availability/latency problems, as well as traffic patterns on leading Web sites. Each quarter, Akamai publishes a "State of the Internet" report. This report includes data gathered from across Akamai's Intelligent Internet Platform during the second quarter of 2011 about attack traffic, broadband adoption, and mobile connectivity, as well as trends seen in this data over time. In addition, this quarter's report also includes insights into the state of IPv4 exhaustion, the impact of World IPv6 Day, the state of client-side SSL, and smartphone usage trends as observed by Akamai partner Ericsson.

Security

During the second quarter of 2011, Akamai observed attack traffic originating from 192 unique countries/regions around the world. Taiwan was the top attack traffic source, accounting for 10% of observed attack traffic in total. Myanmar and the United States held the second and third place spots, respectively, accounting for just over 17% of observed attack traffic combined. Attack traffic concentration remained consistent with the first quarter, with the top 10 ports seeing 64% of observed attack traffic. While not the top targeted port, Port 80 (WWW) remained a very popular target, especially among the attack traffic originating from Myanmar. Reviewing data collected over the past several years on client-side SSL ciphers, we note that SSL appears to be getting safer and more secure over time – that is, the trends are towards stronger ciphers, driven by the adoption of more modern Web browsers and encryption techniques.

Internet and Broadband Adoption

Akamai observed a 3.4% increase (from the first quarter of 2011) globally in the number of unique IPv4 addresses connecting to Akamai's network, growing to over 604 million. Looking at connection speeds, the global average connection speed was 2.6 Mbps, and the global average peak connection speed was 11.4 Mbps. At a country/region level, South Korea had the highest average connection speed, at 13.8 Mbps, and Hong Kong had the highest average peak connection speed, at 44.4 Mbps. At a city level, cities in Japan and South Korea continued to hold many of the top spots in the rankings of highest average and average peak connection speeds. Globally, high broadband (>5 Mbps) adoption grew to 27% in the second quarter, and the Netherlands had the highest level of high broadband adoption, at 68%. Broadband (>2 Mbps) adoption increased to 65% globally, with Bulgaria recording the highest level of broadband adoption. Narrowband (<256 kbps) adoption continued to decline, with the global average dropping to 2.9%; Lebanon's 56% narrowband adoption rate placed it as the country with the highest percentage of narrowband connections.

Mobile Connectivity

Reviewing second quarter observed attack traffic from known mobile networks, overall attack traffic concentration increased from the prior quarter, with the top 10 countries generating nearly 90% of the observed attacks. The targeted ports continued to be very similar to the overall port list, and Port 445 continued to be the target of a significantly higher percentage of attacks than the other ports in the top 10. In the second quarter of 2011, average connection speeds on known mobile providers ranged from 5.3 Mbps down to 209 kbps. Average peak connection speeds ranged from 23.4 Mbps down to 1.2 Mbps. In reviewing mobile content consumption, users on 10 mobile providers consumed, on average, more than one gigabyte (1 GB) of content from Akamai per month, while users on 74 additional providers downloaded more than 100 MB of content from Akamai per month during the second quarter. In addition, based on data collected by Ericsson, mobile data traffic has doubled over the past year.

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 layer protocol identifiers.) This section provides insight into attack traffic, as observed and measured by Akamai, during the second quarter of 2011.

1.1 Attack Traffic, Top Originating Countries

During the second quarter of 2011, Akamai observed attack traffic originating from 192 unique countries/regions, down from 199 in the first quarter of 2011. As shown in Figure 1, Myanmar remained on the top 10 list for a second consecutive quarter, though it fell to second place this quarter. Egypt returned to the top 10 list after last appearing in the fourth quarter of 2010, and Indonesia makes its first appearance on the list in recent memory. Among the countries/regions more frequently seen on the top 10 list, Taiwan, China, Brazil, and Romania were responsible for higher percentages of attack traffic as compared to the prior quarter, while the United States, Russia, and India all saw their percentages decline quarter-over-quarter.

When Myanmar first appeared on the list of top attack traffic sources in the first quarter, it was unclear whether this was simply a one-quarter anomaly, or whether the attacks would persist for a longer period of time. The latter appears to be the case, as attacks from Myanmar continued their assaults on Ports 80 and 443 in the second quarter. Of the attacks from Myanmar, 60% targeted Port 80, and the remaining 40% targeted Port 443 – in fact, nearly half of the observed attacks targeting Port 80 globally came from Myanmar. Port 80 was also the top target of observed attacks from top 10 list newcomer Indonesia, accounting for 66% of those attacks.

The continental distribution of attack traffic was very similar to that observed in the first quarter of 2011, with 47% of the observed attack traffic coming from the Asia Pacific/Oceania region, 30% from Europe, 20% from the Americas, and the remaining 3% from countries in Africa.

1.2 Attack Traffic, Top Ports

Attack traffic concentration among the top 10 ports increased slightly from the prior quarter, with the top 10 ports accounting for 70% of the observed attacks (up from 65% in the first quarter). Port 445 remained at the top of the list, unsurprisingly, and the percentage of attacks targeting Ports 80 and 443 remained consistent with the first quarter of 2011, as shown in Figure 2. The percentage of observed attacks targeting Port 25 (SMTP) and Port 21 (FTP) declined enough in the second quarter to drop them from the top 10 list, while Port 3389 (Microsoft Terminal Services) and Port 4899 (Remote Administrator) reappeared after a first quarter hiatus.

As noted above, nearly half of the attacks targeting Port 80 came from Myanmar, while Indonesia, Russia and the United States also saw it among the top targeted ports. Similar to Port 80, observed attacks targeting Port 1433 (Microsoft SQL Server) were also highly concentrated, with nearly 70% of them coming from China. Along these lines, the top five ports targeted by attacks originating in

	Country/Region	Q2 '11 % Traffic	Q1 '11 %
1	Taiwan	10%	9.1%
2	Myanmar	9.1%	13%
3	United States	8.3%	10%
4	China	7.8%	6.4%
5	Russia	7.5%	7.7%
6	Indonesia	7.4%	2.2%
7	Brazil	5.6%	5.5%
8	India	2.7%	3.8%
9	Egypt	2.7%	1.3%
10	Romania	2.7%	2.5%
–	Other	36%	36%

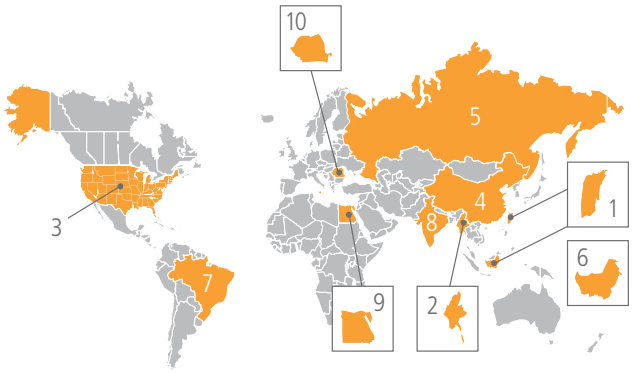
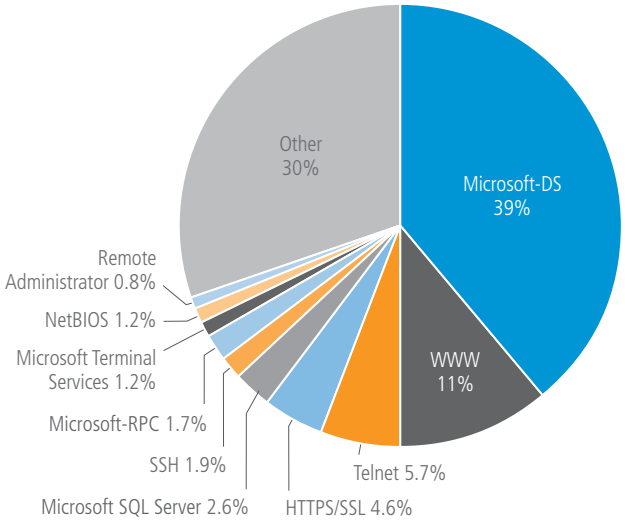


Figure 1: Attack Traffic, Top Originating Countries/Regions

Port	Port Use	Q2 '11 % Traffic	Q1 '11 %
445	Microsoft-DS	39%	34%
80	WWW (HTTP)	11%	11%
23	Telnet	5.7%	4.1%
443	HTTPS/SSL	4.6%	4.7%
1433	Microsoft SQL Server	2.6%	1.7%
22	SSH	1.9%	3.3%
135	Microsoft-RPC	1.7%	1.5%
3389	Microsoft Terminal Services	1.2%	0.9%
139	NetBIOS	1.2%	1.0%
4899	Remote Administrator	0.8%	0.7%
Various	Other	30%	–

Figure 2: Attack Traffic, Top Ports



China remained the same as in the first quarter, likely indicating continuing activity among compromised systems that are searching for unpatched Microsoft applications or weak passwords to exploit for the installation of malware or for use as members of a botnet.

In reviewing second quarter observed attack traffic data from a honeypot managed by a public/private sector security alliance (that preferred not to be named), we noted that seven of its top 10 targeted ports appeared in Akamai's top 10 list as well, though the percentage distributions were significantly different. Notably, this honeypot saw the highest concentration of attacks targeting Port 139 (NetBIOS), and its top 10 list also included Port 5900 (Virtual Network Computer), Port 27977 (Socks5 Proxy), and Port 9988 (Software Essentials Secure HTTP Server). In addition, an analysis of the malware binaries collected by the honeypot showed that the Conficker/Downadup/Kido worm is still out there and trying to spread – this is supported by the consistent appearance of Port 445 at the head of the top targeted ports list within the *State of the Internet* report.

1.3 SSL Insight, Client-Side Ciphers

In addition to the massive number of requests for content that Akamai services over HTTP (Port 80), the Akamai Intelligent Internet Platform also services millions of requests per second for secure content over HTTPS/SSL (Port 443). Customers of Akamai's Secure Content Delivery services include leading social networking providers, financial services companies, e-commerce sites, software & SaaS providers, and public sector agencies.

This massive volume of SSL-encrypted traffic provides Akamai with a unique perspective on the client-side SSL ciphers that are in popular use, as well their usage trends over time. The statistics presented in this section are for SSLv3 and TLSv1.

An SSL cipher is an encryption algorithm (cryptographic function) that, in combination with an exchanged key, is used to create a private encrypted connection between two networked computers, which blocks outsiders from snooping on the communications taking place over this connection.[1] As a cryptographic function, the SSL cipher creates an encrypted message, and the keys for each cipher vary in size and complexity, with larger keys (more bits) offering a greater level of security. The most commonly used SSL cipher algorithms are Rivest Cipher 4 (RC4), Data Encryption Standard (DES), and the Advanced Encryption Standard (AES). AES is considered more difficult to decipher because it uses larger encryption keys, and it is the first publicly accessible and open cipher approved by the United States National Security Agency (NSA) for top secret information.[2] Additionally, SSL uses an algorithm for a Message Authentication Code (MAC) – commonly called a Message Digest, checksum, or hash – that is used to validate the integrity of the traffic and to serve as the basis for digital signatures. The most common MAC algorithms are MD5, Secure Hash Algorithm (SHA, referred to as SHA-1), and SHA-2 (of which SHA-256 is a subset).

In some cases, government and industry regulations may specify the use of specific ciphers and/or MACs. For instance, the FIPS-140-2[3] standard specifies the use of DES and AES, and FIPS-186[4] specifies the use of SHA-1 or SHA-256. (However, most are migrating to use of SHA-256.) HIPAA regulations (governing the privacy

of health information) specify the use of "strong cryptography", but further guidance from the Department of Health and Human Services says, in essence, "Use FIPS-140".[5]

Figure 3 provides a historical perspective on the SSL ciphers presented by Web clients (generally browsers) to Akamai's Secure Content Delivery Network from the beginning of 2009 through the end of the second quarter of 2011. In examining the graph, several key trends are readily apparent:

- Use of AES 128-SHA-1 has nearly tripled over the last 10 quarters
- Use of RC4-MD5-128 has declined by almost two-thirds over the last 10 quarters

Interpreting these trends, as well as the data presented for other ciphers, we note that SSL appears to be getting safer and more secure over time – that is, the trends are towards stronger ciphers, driven by the older ciphers dropping lower on the priority lists of newer browsers, and an increase in the configured use of PCI and FIPS compatible ciphers. While the use of RC4-MD5-128 has declined, it is still a large enough percentage of overall traffic to make those in the security industry uneasy. However, extrapolating the trends seen in Figure 3 out another one to two years, we believe that the use of RC4-based ciphers will continue to decline, reaching near-zero levels.

Examining SSL cipher trends at a more micro level, Figure 4 illustrates the ciphers seen by Akamai's Secure Content Delivery Network during the second quarter of 2011. While the graph illustrates the top five ciphers seen, clients also presented other DES-, RC4-, and IDEA-based ciphers and MAC algorithms. However, so few of these cipher/MAC combinations were seen that they are, in essence, "noise" for the purposes of the graph. Similar to the longer-term trends discussed above, you can see that during the second quarter, use of RC4 ciphers continued to decline, while the use of AES ciphers continued to increase. Additionally, we do see a low percentage of DES-CBC3-SHA-168 (also known as "triple DES") in use, though this combination was largely superseded by AES before it could be deployed too widely into Web browsers and client software.

Customers can disable the use of weak ciphers if they are using Akamai's Secure Content Delivery network, or Akamai can negotiate a connection at a weak cipher strength and serve a "get well" page instead of the requested page – if this latter capability is used globally, it can help reduce the use of older/less capable Web browsers. By enabling customers to disable the use of weak ciphers, Akamai is able to provide increased security for customers' e-commerce sites and business-critical applications.

Additional information on Akamai's Security Solutions, including a white paper that explores Akamai's security capabilities, can be found at *www.akamai.com/security*.

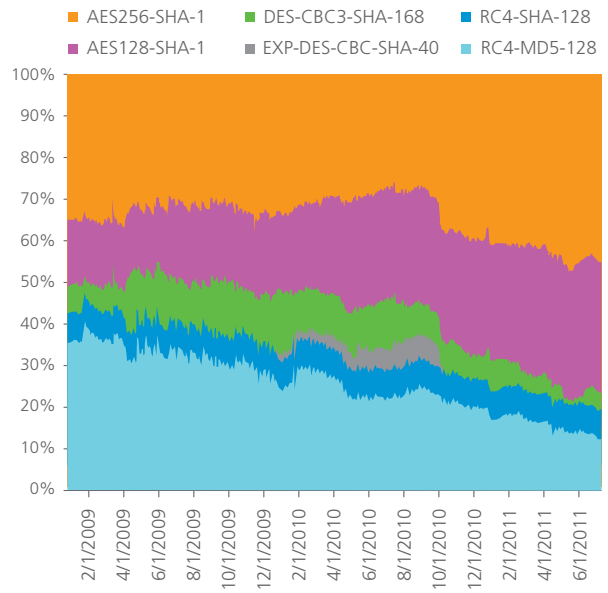


Figure 3: Client Side SSL Ciphers Observed By Akamai, Q1 '09 – Q2 '11

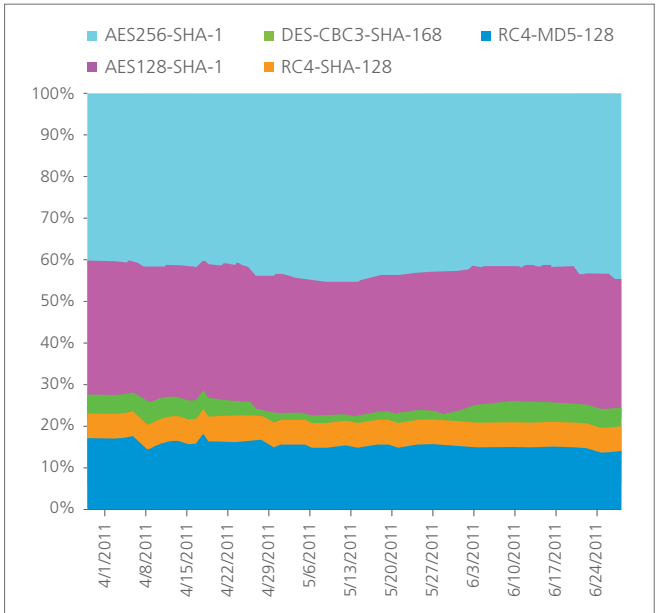


Figure 4: Client Side SSL Ciphers Observed By Akamai, Q2 2011

2.1 Unique IPv4 Addresses

Through a globally-deployed server network, and by virtue of the more than one trillion requests for Web content that it services on a daily basis, Akamai has unique visibility into levels of Internet penetration around the world. In the second quarter of 2011, over 604 million unique IP addresses, from 238 countries/regions connected to the Akamai network – 3.4% more IP addresses than in the first quarter of 2011, and 21% more than in the second quarter of 2010. Although we see more than 600 million unique IP 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 IP address (or small number of IP addresses), because they access the Web through a firewall or proxy server. Conversely, individual users can have multiple IP addresses associated with them, due to their use of multiple connected devices.

As shown in Figure 5, all of the top 10 countries saw quarterly increases in their unique IP address counts, with Brazil's 9% increase the largest of the group. The United States and Germany saw the lowest levels of growth among the top 10, both increasing less than one percent over the prior quarter. Globally, among countries/regions with more than 25,000 unique IP addresses making requests to Akamai during the quarter, 110 of them saw quarterly growth, while just 24 saw a quarterly decline. From a year-over-year perspective, the United States and France were the only two countries among the top 10 that saw growth below the 10% mark. Coming in at 9.2% this quarter, the rate of yearly change in the United States has been slowing over the last several quarters, from a high of 18% in the third quarter of 2010. China's year-over-year growth remained consistent with the first quarter, at 27%. Globally, among countries/regions with more than 25,000 unique IP addresses making requests to Akamai during the quarter, 130 saw yearly growth, with only Guadeloupe, Singapore and Montenegro experiencing a yearly decline in their unique IP address counts. (Curacao remained unchanged.)

The unique IP address count across the top 10 countries represented just over 68% of the global figure, a concentration level roughly consistent with the prior quarter. In looking at the "long tail", there were 186 countries/regions with fewer than one million unique IP addresses connecting to Akamai in the second quarter of 2011, 134 with fewer than 100,000 unique IP addresses, and 33 with fewer than 1,000 unique IP addresses. Only the sub-1,000 threshold count increased from the prior quarter.

	Country/Region	Q2 '11 Unique IP Addresses	QoQ Change	YoY Change
–	Global	604,578,592	3.4%	21%
1	United States	143,487,908	0.6%	9.2%
2	China	76,441,611	3.9%	27%
3	Japan	44,816,252	8.7%	29%
4	Germany	34,785,032	0.4%	12%
5	France	24,312,469	1.3%	6.9%
6	South Korea	23,104,975	3.5%	15%
7	United Kingdom	22,843,333	1.4%	36%
8	Brazil	15,427,943	9.0%	29%
9	Italy	14,370,098	5.4%	32%
10	Spain	13,136,538	1.7%	15%

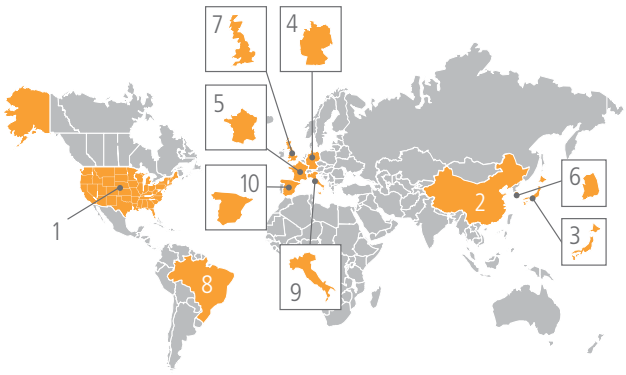


Figure 5: Unique IPv4 Addresses Seen By Akamai

2.2 IPv4 Address Space Exhaustion Update

As noted in last quarter's *State of the Internet* report, the Internet Assigned Numbers Authority exhausted its remaining "free pool" of IPv4 address blocks on February 3, 2011, distributing the remaining five "/8 blocks" (comprising 16.8 million IP addresses per block) to the five Regional Internet Registries (RIRs). On April 15, 2011, APNIC (the RIR for the Asia Pacific Region) reached its final /8 IPv4 address block, forcing it to implement "austerity measures", under which each new or existing APNIC account holder is only eligible to request and receive delegations totaling a maximum of 1,024 addresses (a "/22") from the APNIC IPv4 address pool, assuming that the request meets specific criteria.

In an effort to illustrate the impact that the impending exhaustion, and ultimate implementation of austerity measures, had on the allocation/assignment of IPv4 address space in the APNIC region, we thought it would be interesting to compare the number of IPv4 addresses allocated/assigned by APNIC during the first half of 2010 and first half of 2011.[6] During the first half of 2010, over 53 million IPv4 addresses were allocated/assigned by APNIC, with over 26 million of those during the second quarter. In contrast, during the first half of 2011, nearly 105 million IPv4 addresses were allocated/assigned by APNIC, with almost 18 million during the second quarter. As is illustrated by Figure 6, demand for IPv4 address space remained modest throughout the first half of 2010, though there were several notable spikes, including a couple during the second quarter. However, with the impending exhaustion of available IPv4 address space rapidly approaching, the picture is very different during the first half of 2011, with demand obviously much more aggressive during the first quarter (with over 9 million IPv4 addresses allocated/assigned on February 28, including 8.4 million to Japan). During the second quarter, though, the impact of the austerity measures are clearly seen – after a large spike on April 12, allocation/assignment counts nearly flatlined after austerity measures are implemented on April 15, with just thousands of IPv4 addresses allocated/assigned each day.

2.3 World IPv6 Day

On June 8, 2011 top Web sites and Internet service providers around the world joined together with more than 1,000 other participating Web sites in World IPv6 Day for a successful global-scale trial of IPv6.[7] Organized by the Internet Society, the coordinated 24-hour "test flight" of IPv6 helped demonstrate that major Web sites around the world are well-positioned for the move to a global IPv6-enabled Internet, enabling its continued exponential growth.

World IPv6 Day participants came together to help motivate organizations across the industry – Internet service providers, hardware manufacturers, operating system vendors and other web companies – to prepare their services for the transition. A key goal of World IPv6 Day was to expose potential issues with real-world IPv6 use under controlled conditions. Given the diversity of technology that powers the Internet, the global nature of the trial was crucial to identify unforeseen problems. According to industry reports, the vast majority of users were able to access services as usual. Figure 7 shows a graph for a period of time before, during, and after World IPv6 Day of the percentage of World IPv6 Day participants that were reachable (via HTTP) over IPv6.[8] As seen in the graph, a peak of roughly 92-93% was seen during the latter half of the day.

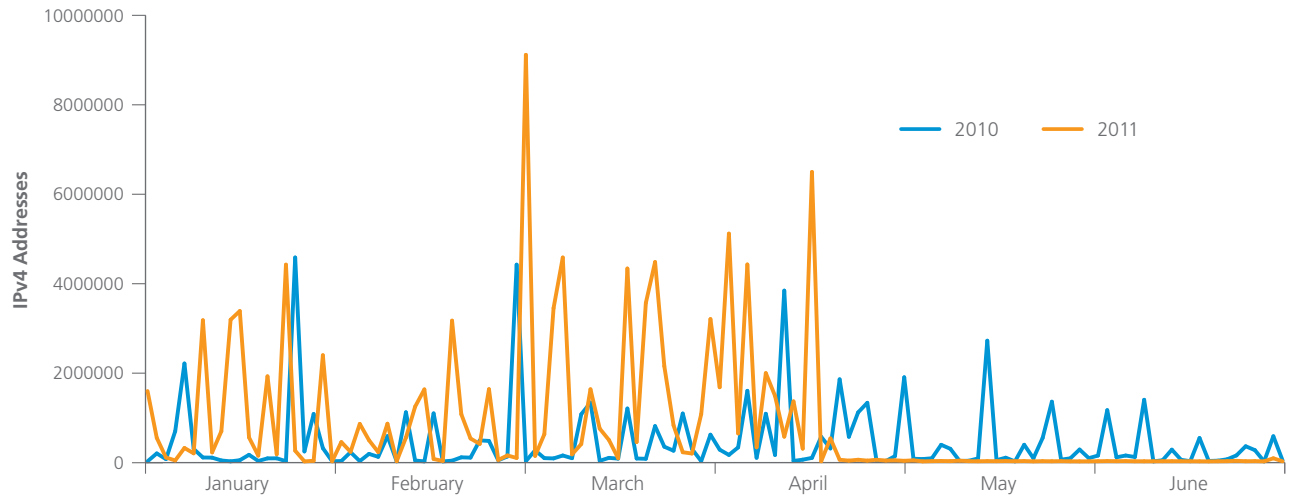


Figure 6: IPv4 Addresses Allocated/Assigned by APNIC, 1H 2010 & 2011

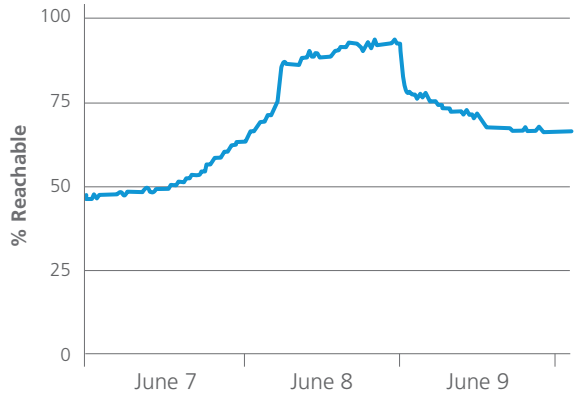


Figure 7: Percentage of IPv6-reachable World IPv6 Day Participants (Source: http://www.nanog.org/meetings/nanog52/presentations/Monday/roberts-20110613-ISOC-WorldIPv6Day-NANOG52.pdf)

Akamai also participated in World IPv6 Day, enabling IPv6 access to www.akamai.com, as well as to more than 50 Web properties belonging to over 20 enterprise customers. In addition, a data visualization was developed as a companion to Akamai's World IPv6 Day efforts, and made available at *www.akamai.com/ipv6*. As shown in Figure 8, the data visualization provided insight into the volume of IPv6 traffic on Akamai's network, as well as measurements of latency and packet loss over IPv6 between regions around the world. During World IPv6 Day, IPv6 traffic on the Akamai network hit a peak shortly after it started, at 12:30am GMT, and then moderated to between 250-350 hits per second for the balance of the day. Over 280,000 unique IPv6 addresses made content requests to Akamai over the course of the day, with roughly half over 6rd,[9] with most of those coming from Free, a French Internet Service Provider. Across the balance of requests, approximately 40% were over native IPv6 connections, with the remaining 10% split across 6to4[10] (~9%) and Teredo[11] (~1%).

As Akamai rolls out IPv6 support across our solution portfolio over the next several quarters, 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 network. Akamai's planned IPv6 enhancements are designed to enable customers to take advantage of high performance, high availability IPv6 delivery without making significant changes to their origin infrastructures. An IPv6-focused whitepaper published by Akamai, entitled *IPv6: What the Transition Means for Content and Application Delivery*, highlights the growing need for the adoption of IPv6, the challenges that content providers will face in transitioning to IPv6, and Akamai's phased plans for IPv6 support within our service portfolio. The whitepaper is available at *www.akamai.com/ipv6*.

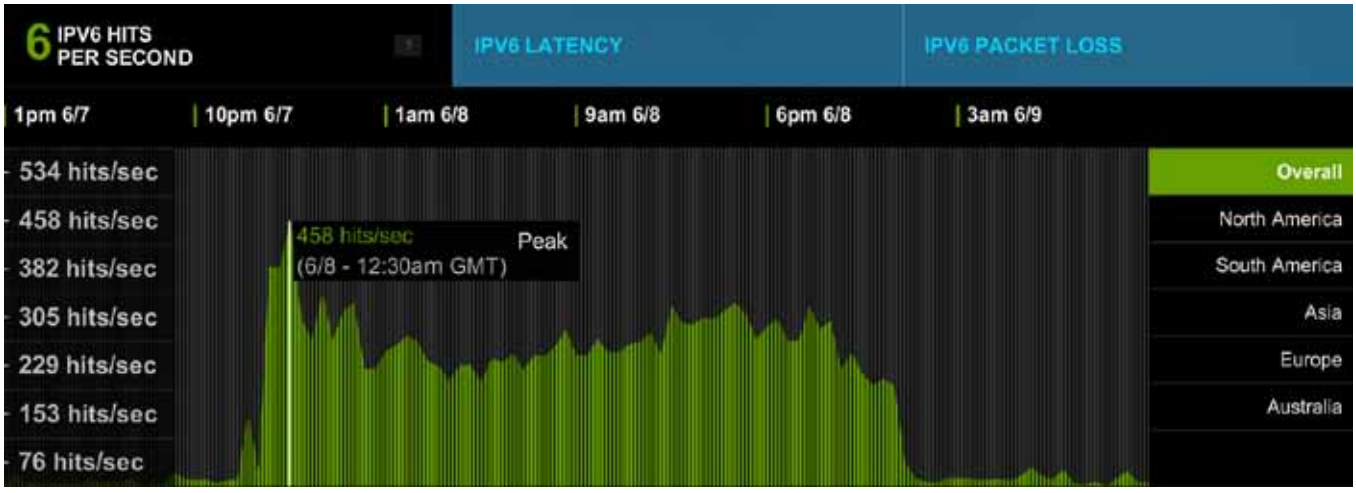


Figure 8: Akamai's World IPv6 Day Data Visualization

SECTION 3:
Geography – Global

By virtue of the approximately one trillion requests for Web content that it services on a daily basis through its globally-deployed server network, Akamai has a unique level of visibility into the connection speeds of end-user systems and, consequently, into broadband adoption around the globe. Because Akamai has implemented a distributed network model, deploying servers within edge networks, it can deliver content more reliably and consistently at those speeds, in contrast to centralized competitors 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 *www.akamai.com/whytheedge.*

The data presented within this section was collected during the second quarter of 2011 through Akamai's globally deployed server network and includes all countries/regions that had more than 25,000 unique IP addresses make requests to Akamai's network during the second quarter. (Note that the 25,000 unique IP address threshold is a significant change from the 1,000 unique IP address threshold that was used from 2008-2010 – we believe that this new, higher threshold will enable us to better address the unfair comparison of extremely small countries with much larger countries.) For purposes of classification in this report, the "broadband" data included below is for connections greater than 2 Mbps, and "high broadband" is for connections of 5 Mbps or greater. In contrast to the "high broadband" and "broadband" classifications, the "narrowband" data included below is for connections to Akamai that are slower than 256 kbps. Note that the percentage changes reflected below are relative to the prior quarter(s). (That is, a Q1 value of 50% and a Q2 value of 51% would be reflected here as a 2% increase.) A quarter-over-quarter change is shown within the tables in several sections below in an effort to highlight general trends, and year-over-year changes are shown to illustrate longer-term trends.

As the quantity of HD-quality media increases over time, and the consumption of that media increases, end users are likely to require ever-increasing amounts of bandwidth. A connection speed of 2 Mbps is arguably sufficient for standard-definition TV-quality content, and 5 Mbps for standard-definition DVD quality video content, while Blu-Ray (1080p) video content has a maximum video bit rate of 40 Mbps, according to the Blu-Ray FAQ.[13] In addition to providing data on average connection speeds, we continue to report average peak connection speeds[14] around the world, from a country/region, state, and city perspective. This metric can provide insight into the peak speeds that users can likely expect from their Internet connections.

Finally, traffic from known mobile network providers 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

After growing nearly 10% in the first quarter of 2011, the global average connection speed once again saw another significant quarterly increase, growing 21% to 2.6 Mbps, as shown in Figure 9. In addition to the strong quarterly growth seen at the global level, seven of the countries/regions within the top 10 saw quarterly growth of 10% or more, with Latvia seeing the largest increase, at 29%. (While Ireland's quarterly growth in the first quarter enabled it to push Canada out of the top 10, Denmark's growth in the second quarter enabled it, in turn, to push Ireland out of the top 10 – though both grew more than 8% quarter-over-quarter, Ireland and Canada are now in thirteenth and fourteenth place respectively.) Globally, over 80 countries/regions saw average connection speeds increase by 10% or more within the second quarter – twice as many as in the first quarter. Of the countries/regions that qualified for inclusion, eleven saw quarterly declines, including South Korea. All of the countries/regions within the top 10, as well as the United States (placing sixteenth) and 15 other countries, maintained average connection speeds that exceeded the "high broadband" threshold of 5 Mbps.

	Country/Region	Q2 '11 Avg. Mbps	QoQ Change	YoY Change
–	Global	2.6	21%	43%
1	South Korea	13.8	-4.2%	-17%
2	Hong Kong	10.3	12%	21%
3	Japan	8.9	10%	11%
4	Netherlands	8.5	14%	31%
5	Latvia	8.2	29%	31%
6	Czech Republic	7.4	13%	39%
7	Switzerland	7.3	17%	43%
8	Romania	6.8	2.3%	-0.1%
9	Belgium	6.4	4.8%	22%
10	Denmark	6.4	13%	23%
…				
12	United States	5.8	9.0%	26%

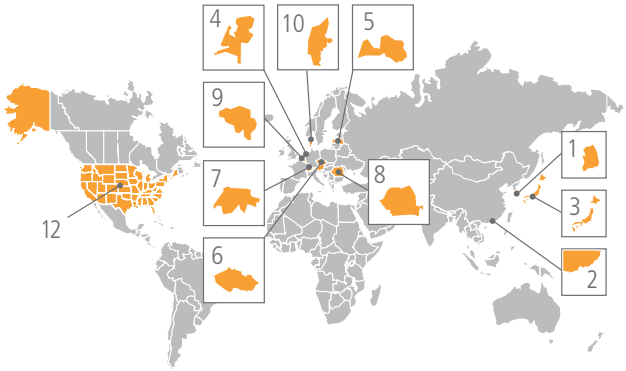


Figure 9: Average Measured Connection Speed by Country/Region

The global average connection speed grew significantly year-over-year as well, increasing 43%, nearly double the level of yearly growth seen in the first quarter. Yearly growth of 10% or more was seen in eight of the top 10 countries, as well as the United States, with only South Korea and Romania seeing year-over-year declines. Globally, year-over-year increases in average connection speed were seen in 128 countries/regions, with yearly growth of over 100% seen in 17 countries, while an additional 102 grew 10% or more over the prior year. Curacao saw no change from the second quarter of 2010, and only seven countries saw yearly declines, ranging from the 0.1% loss in Romania to a 46% decline in Tunisia.

During the second quarter, 29 countries/regions had average connection speeds of 1 Mbps or less. The slowest of this set was Lebanon, at 379 kbps. The first quarter's slowest country, Libya, did not have enough unique IP addresses making requests to Akamai in the second quarter to qualify for inclusion.

3.2 Global Average Connection Speeds, City View

As we have done in previous editions of the *State of the Internet* report, in examining average measured connection speeds at a city level, we have applied filters for unique IP address count (50,000 or more seen by Akamai in the second quarter of 2011) and academic institutions (removing data from known academic networks). As with the other data sets used in Section 3 of this report, traffic from known mobile networks has been removed as well.

As shown in Figure 10, South Korean cities Taegu and Taejon returned to the top of the list of the fastest cities in the second quarter, with average connection speeds of 15.8 Mbps. (Strictly speaking, Taegu's average connection speed was just above 15.8 Mbps, while Taejon's was just below 15.8 Mbps.) San Jose's 13.7 Mbps average connection speed placed the United States into the top 10 fastest cities globally for the first time since this metric has been tracked in the *State of the Internet* report – at least since data from academic networks has been filtered out. Brno, Czech Republic was the fastest city in Europe, with an average connection speed in the second quarter of 8.3 Mbps. Twenty-nine cities among the top 100 achieved average connection speeds in excess of 10 Mbps in the second quarter, up from 13 cities in the prior quarter – in addition to the strong growth at the country level discussed in Section 3.1, it is clear that average connection speeds saw significant increases at the city level as well during the second quarter.

Cities in Asia once again dominated the top 100 list in the second quarter, holding 71 of the spots on the list, including Hong Kong, one in Australia, 10 in South Korea, and 59 in Japan. Twenty cities from North America made the list, including 18 in the United States and two in Canada. The remaining nine cities were from eight countries in Europe, with only Switzerland contributing two countries to the list.

In reviewing the full global list of nearly 900 cities that qualified for inclusion in this section, the fastest cities in other geographies included Johannesburg, South Africa (Africa), with an average connection speed of 1.7 Mbps, and Munro, Argentina (South America) with an average connection speed of 3.7 Mbps.

	Country/Region	City	Q2 '11 Avg. Mbps
1	South Korea	Taegu	15.8
2	South Korea	Taejon	15.8
3	Japan	Shimotsuma	15.2
4	Japan	Kanagawa	15.0
5	Japan	Tokai	14.2
6	Japan	Asahi	14.0
7	Japan	Urawa	13.9
8	Japan	Yokohama	13.7
9	United States	San Jose, CA	13.7
10	South Korea	Sangamdong	13.7
11	Japan	Tochigi	13.4
12	Japan	Hiroshima	13.0
13	South Korea	Kimchon	12.9
14	South Korea	Anyang	12.9
15	Japan	Nagano	12.5
16	South Korea	Seocho	12.3
17	Japan	Ibaraki	12.1
18	Japan	Shizuoka	12.0
19	Japan	Toyonaka	11.6
20	South Korea	Ilsan	11.5
21	Japan	Nagoya	11.3
22	Japan	Chiba	11.1
23	Japan	Gifu	10.7
24	South Korea	Suwon	10.7
25	Japan	Kyoto	10.6
26	Japan	Kobe	10.4
27	Japan	Osaka	10.4
28	South Korea	Seoul	10.2
29	Japan	Marunouchi	10.0
30	Japan	Sendai	9.9
31	Japan	Nara	9.9
32	Japan	Hyogo	9.7
33	Japan	Wakayama	9.6
34	Japan	Fukuoka	9.5
35	Hong Kong	Hong Kong	9.4
36	South Korea	Yongsan	9.2
37	Japan	Yokkaichi	9.2
38	Japan	Tokyo	9.1
39	Japan	Hakodate	9.1
40	Japan	Otsu	9.0
41	Japan	Fukushima	8.9
42	Japan	Niho	8.8
43	Japan	Matsuyama	8.8
44	Japan	Tokushima	8.7
45	Japan	Hamamatsu	8.7
46	Japan	Niigata	8.7
47	Japan	Kochi	8.6
48	Australia	Canberra	8.6
49	Japan	Soka	8.5
50	Japan	Hodogaya	8.5
51	United States	Fredericksburg, VA	8.5
52	Japan	Okayama	8.5
53	Japan	Fukui	8.3
54	Japan	Yamagata	8.3
55	Czech Republic	Brno	8.3
56	United States	Monterey Park, CA	8.2
57	Japan	Kumamoto	8.2
58	Japan	Utsunomiya	8.2
59	Japan	Saga	8.2
60	Japan	Mito	8.2
61	Switzerland	Geneva	8.2
62	Japan	Kanazawa	8.2
63	United States	Fremont, CA	8.2
64	Japan	Aomori	8.2
65	Latvia	Riga	8.1
66	Netherlands	Amsterdam	8.1
67	Japan	Kokuryo	8.1
68	Japan	Miyazaki	8.0
69	Canada	Oakville, ON	8.0
70	Japan	Yosida	8.0
71	Japan	Kofu	7.9
72	Romania	Constanta	7.9
73	Japan	Yamaguchi	7.9
74	Switzerland	Zurich	7.9
75	Japan	Tottori	7.9
76	Japan	Kagoshima	7.7
77	United States	Staten Island, NY	7.6
78	United States	Columbia, MD	7.5
79	United States	Jersey City, NJ	7.5
80	United States	Riverside, CA	7.5
81	United States	Oakland, CA	7.5
82	Belgium	Liege	7.4
83	Japan	Nagasaki	7.3
84	United States	Fairfield, CA	7.3
85	United States	Spartanburg, SC	7.3
86	United States	Hayward, CA	7.3
87	United States	San Mateo, CA	7.2
88	Austria	Salzburg	7.2
89	Canada	Victoria, BC	7.2
90	United States	Federal Way, WA	7.2
91	United States	Union, NJ	7.2
92	Japan	Oita	7.1
93	Japan	Sapporo	7.1
94	Japan	Okidate	7.1
95	Portugal	Porto	7.1
96	Japan	Akita	7.1
97	United States	Traverse City, MI	7.1
98	Japan	Naha	7.0
99	United States	Anaheim, CA	6.9
100	United States	Santa Barbara, CA	6.9

Figure 10: Average Connection Speed, Top Global Cities

3.3 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 also been removed from the source data set for this metric.

After surpassing 10 Mbps for the first time in the first quarter of 2011, the global average connection speed saw another quarter of strong growth in the second quarter, surpassing 11 Mbps, as shown in Figure 11. Quarterly increases were seen in nine of the top 10 countries/regions, with growth of more than 10% seen in four countries/regions. More modest quarterly growth was also seen in the United States, where the average peak connection speed grew by 1 Mbps from the prior quarter.

Looking at year-over-year changes, the global average connection speed grew by approximately two-thirds as compared to the second quarter of 2010. Solid growth was also seen in nine of the top 10 countries/regions and the United States, with only South Korea seeing a slight yearly decline. Continuing their recent pace of torrid growth, the average peak connection speed in the United Arab Emirates (UAE) was up 265% year-over-year – yearly growth in the UAE was nearly 400% in the first quarter.

Hong Kong remained the country/region with the highest average peak connection speeds, at 44.4 Mbps. South Korea, Romania, and Japan also had average peak connection speeds above 30 Mbps. The remaining countries in the top 10, as well as the United States, saw average peak connection speeds above 20 Mbps in the second quarter. Globally, 12 additional countries/regions also had average peak connection speeds above 20 Mbps, while an additional 46 exceeded 10 Mbps. Guinea-Bissau's T-1 level 1.5 Mbps average peak connection speed ranked that country as the slowest among those that qualified for consideration.

	Country/Region	Q2'11 Peak Mbps	QoQ Change	YoY Change
–	Global	11.4	7.4%	67%
1	Hong Kong	44.4	12%	40%
2	South Korea	35.7	-1.5%	-6.0%
3	Romania	33.7	2.9%	25%
4	Japan	31.6	5.5%	13%
5	Latvia	29.4	21%	47%
6	United Arab Emirates	26.8	3.5%	265%
7	Belgium	26.8	8.5%	41%
8	Portugal	26.2	5.2%	55%
9	Netherlands	25.3	15%	58%
10	Hungary	24.4	14%	72%
…				
16	United States	22.1	4.3%	35%

Figure 11: Average Peak Connection Speed by Country/Region

3.4 Global Average Peak Connection Speeds, City View

As we have done in previous editions of the *State of the Internet* report, in examining average peak connection speeds at a city level, we have applied filters for unique IP address count (50,000 or more seen by Akamai during the second quarter of 2011) and academic institutions (removing data from known academic networks). As with the other data sets used in Section 3 of this report, traffic from known mobile networks has been removed as well.

As shown in Figure 12, eight of the top 10 cities with the highest average peak connection speeds were in Japan, with five of those eight cities recording average peak connection speeds of 50 Mbps or above. Taegu, South Korea fell just 150 kbps of 50 Mbps, and joined Taejon as the two cities from South Korea that rounded out the top 10. Including Taegu, 19 cities achieved average peak connection speeds of more than 40 Mbps in the second quarter, while an additional 50 had average peak connection speeds in excess of 30 Mbps. The remaining 25 cities of the top 100 all had average peak connection speeds above 20 Mbps.

Cities in the Asia Pacific region once again held the majority of the top 100 spots for this metric, with the top 100 list including 10 cities in South Korea, 58 cities in Japan, as well as Hong Kong and Canberra, Australia. The top European city remained Constanta, Romania, and it was joined by seven other European cities, including Timosoara, Romania, as well as two from Switzerland, and one each from the Czech Republic, Latvia, Portugal, and Belgium. In North America, 22 cities from the United States made the top 100 list.

In reviewing the full global list of nearly 900 cities that qualified for inclusion in this section, the fastest cities in other geographies included Casablanca, Morocco (Africa) with an average peak connection speed of 13.8 Mbps, and Munro, Argentina (South America) with an average peak connection speed of 22.4 Mbps.

DID YOU **KNOW?**

- *A developing neighborhood in Toronto, Canada will offer speeds of up to 10 gigabits a second for businesses or 100 megabits a second for residential use.*

  [Source: http://reut.rs/qz12Wq]

- *Google announced that Kansas City, Kansas would be the inaugural site for its "Fiber for Communities" program, which it says will be capable of delivering Internet connections of 1 gigabit per second to as many as 500,000 people. The service will initially be offered in early 2012.*

  [Source: http://bit.ly/pJer8t]

- *According to research published by Informa Telecoms & Media, South Korea and Japan both enjoy the fastest broadband speeds in the world, and Informa predicts that by 2015, the Asia Pacific region will account for 42% of global Internet traffic by virtue of the sheer growth in user numbers that this region will see over the next several years.* *[Source: http://bit.ly/qg7JTX]*

	Country/Region	City	Q2 '11 Peak Mbps
1	South Korea	Taejon	55.3
2	Japan	Kanagawa	52.3
3	Japan	Marunouchi	51.6
4	Japan	Tokai	51.3
5	Japan	Shimotsuma	50.8
6	Japan	Nagano	50.0
7	South Korea	Taegu	49.9
8	Japan	Yokohama	49.8
9	Japan	Urawa	49.3
10	Japan	Asahi	46.9
11	Japan	Hodogaya	46.0
12	Japan	Chiba	45.3
13	Japan	Tochigi	45.3
14	Romania	Constanta	45.2
15	Japan	Soka	43.8
16	Japan	Hiroshima	43.2
17	Japan	Shizuoka	42.4
18	South Korea	Seocho	42.3
19	Japan	Ibaraki	42.0
20	Hong Kong	Hong Kong	41.6
21	South Korea	Sangamdong	41.3
22	South Korea	Anyang	41.3
23	South Korea	Kimchon	40.9
24	South Korea	Ilsan	40.6
25	Japan	Nagoya	40.4
26	Japan	Kokuryo	39.6
27	Romania	Timisoara	38.8
28	South Korea	Suwon	38.7
29	United States	San Jose, CA	38.7
30	Japan	Gifu	38.7
31	Japan	Kyoto	38.4
32	Japan	Fukuoka	38.4
33	Japan	Kobe	38.3
34	Japan	Utsunomiya	38.2
35	Japan	Mito	38.0
36	Japan	Sendai	37.7
37	Japan	Osaka	37.2
38	Japan	Niigata	36.9
39	Japan	Yosida	36.5
40	Japan	Yokkaichi	35.7
41	South Korea	Seoul	35.5
42	Japan	Hakodate	35.5
43	United States	North Bergen, NJ	35.4
44	United States	Monterey Park, CA	35.2
45	Japan	Niho	34.8
46	Japan	Nara	34.6
47	Japan	Otsu	34.3
48	Japan	Wakayama	34.2
49	United States	Staten Island, NY	33.8
50	Japan	Kofu	33.6
51	Australia	Canberra	33.4
52	Japan	Fukui	33.1
53	United States	Fairfield, CA	33.0
54	South Korea	Yongsan	32.8
55	United States	Hayward, CA	32.8
56	United States	Fredericksburg, VA	32.6
57	Japan	Hamamatsu	32.6
58	Japan	Matsuyama	32.6
59	Japan	Toyonaka	32.4
60	Japan	Fukushima	32.3
61	Japan	Yamagata	32.1
62	Japan	Okayama	31.7
63	Japan	Tokushima	31.6
64	United States	Oakland, CA	31.5
65	Czech Republic	Brno	31.4
66	Japan	Sapporo	31.4
67	Japan	Kanazawa	31.3
68	United States	San Mateo, CA	31.2
69	United States	Riverside, CA	31.2
70	United States	Santa Barbara, CA	30.9
71	Japan	Okidate	30.9
72	Japan	Kochi	30.3
73	United States	Fremont, CA	30.2
74	Japan	Yamaguchi	30.2
75	United States	Spartanburg, SC	30.1
76	United States	Arvada, CO	29.9
77	Japan	Kumamoto	29.9
78	Japan	Tokyo	29.8
79	United States	Aurora, CO	29.8
80	United States	Union, NJ	29.8
81	United States	Jersey City, NJ	29.8
82	United States	Columbia, MD	29.6
83	Latvia	Rigo	29.2
84	Japan	Miyazaki	29.1
85	Portugal	Porto	29.0
86	United States	Cherry Hill, NJ	28.9
87	Japan	Akita	28.7
88	Japan	Hyogo	28.7
89	Switzerland	Zurich	28.7
90	Japan	Iwaki	28.5
91	United States	Muncie, IN	28.2
92	Japan	Naha	28.2
93	Japan	Aomori	28.0
94	Japan	Saga	28.0
95	United States	Federal Way, WA	27.9
96	Japan	Kagoshima	27.7
97	Japan	Tottori	27.7
98	United States	Traverse City, MI	27.2
99	Belgium	Liege	26.9
100	Switzerland	Geneva	26.3

Figure 12: Average Peak Connection Speed, Top Global Cities

3.5 Global High Broadband Connectivity

In the second quarter of 2011, the level of growth in global high broadband adoption got even stronger, as it increased 11% quarter-over-quarter, with 27% of all connections to Akamai occurring at speeds of 5 Mbps or more. As shown in Figure 13, the Netherlands took the top spot, with an impressive 22% quarterly increase pushing high broadband adoption levels in the country to 68%. This was well ahead of second-place Hong Kong, which fell just shy of 60% adoption, even with nearly 7% quarterly growth. South Korea, which topped the list in the first quarter, fell back to third place, seeing a slight quarterly decline. Among the remaining countries in the top 10, Japan was the only other country to experience a quarterly decline, shedding a slight 0.1%. Growth rates were strong in the remaining countries in the list, except for Romania, which grew slightly more than a percent quarter-over-quarter. The United States, ranked thirteenth globally, saw a respectable increase of just over 7% and ended the quarter at a high broadband adoption rate of 42%, breaking the 40% threshold for the first time.

On a year-over-year basis, global high broadband adoption was up by just over 25%, and strong yearly growth was seen in eight of the top 10 countries/regions, as well as the United States. Once again, only South Korea and Japan declined year-over-year, while growth in the other geographies in the top 10 ranged from just 7.7% in Romania to Switzerland more than doubling from the second quarter of 2010, with an increase of 107%. Across the rest of the world, 22 countries/regions saw high broadband rates more than double year-over-year, including the 561% increase seen in Argentina and the 391% growth seen in Malaysia. Sweden and India were the only two other countries that saw yearly declines, with Sweden dropping to 30% high broadband adoption with an 11% year-over-year loss, and India's 14% yearly loss dropping them to a 0.4% high broadband adoption rate.

Looking at high broadband adoption on a global basis, 10 countries/regions had more than half of their connections to Akamai in the second quarter at speeds greater than 5 Mbps – this is up from six in the first quarter of 2011, and four at the end of 2010. There were an additional 19 countries/regions (consistent with the prior two quarters) where more than a quarter of connections were at high broadband rates, and 15 more (down from 17 in the prior quarter) where at least one in 10 connections was faster than 5 Mbps. Of the 59 countries/regions that qualified for inclusion in this section, India and China continued to be the only two with high broadband rates below 1% - India was at 0.4%, as noted above, and China grew to 0.6% adoption in the second quarter.

	Country/Region	% Above 5 Mbps	QoQ Change	YoY Change
–	Global	27%	11%	26%
1	Netherlands	68%	22%	40%
2	Hong Kong	59%	6.7%	27%
3	South Korea	58%	-3.5%	-22%
4	Belgium	57%	9.9%	43%
5	Latvia	56%	27%	30%
6	Japan	55%	-0.1%	-8.9%
7	Czech Republic	55%	13%	63%
8	Romania	52%	1.2%	7.7%
9	Denmark	52%	21%	39%
10	Switzerland	50%	25%	107%
…				
13	United States	42%	7.3%	38%

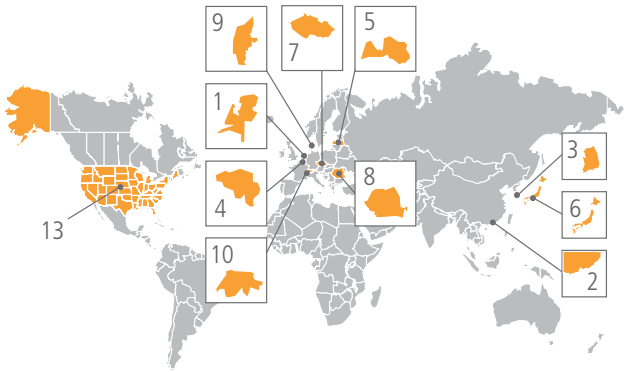


Figure 13: High Broadband Connectivity, Fastest Countries/Regions

3.6 Global Broadband Connectivity

In the second quarter of 2010, global broadband adoption saw nominal growth, increasing 4.0% from the previous quarter, to reach 65%. As shown in Figure 14, all of the countries/regions among the top 10 had 90% or more of their connections to Akamai occurring at speeds above 2 Mbps in the second quarter. Europe remains firmly entrenched as a broadband stronghold, with nine of the top 10 countries – Hong Kong continues to be the interloper. Despite strong average and average peak connection speeds, Asia Pacific countries/regions are ranked in the 30's and 40's globally.

Nine of the top 10 countries/regions, as well as the United States, once again saw increased broadband adoption rates quarter-over-quarter – Luxembourg was the only country in the top 10 to see a decline. Quarterly growth was modest, ranging from just under 2% in Switzerland and Hong Kong to just over 4% in the Netherlands and Latvia. Globally, three countries (Morocco, the Dominican Republic, and Palestine) more than doubled their levels of broadband adoption from the first quarter of 2011.

On a year-over-year basis, global broadband adoption grew 9.5% – a rate just slightly higher than that seen in the previous quarter. Among the top 10 countries/regions, Hungary had the highest yearly growth rate, at 13%, but it was followed closely by Romania (12% yearly growth), Germany, and Luxembourg (both at 11% yearly growth). The lowest yearly growth rate among the top 10 was again seen in Switzerland, at 3.9% – double the yearly growth rate seen in the first quarter. None of the countries/regions among the top 10 saw a year-over-year decline in broadband adoption rates. Globally, 16 countries more than doubled their levels of broadband adoption from the second quarter of 2010, including Oman's continued massive growth of over 1,700% to Morocco's 137% increase. In fact, Oman, the Dominican Republic, and Palestine were the only three countries/regions that saw more than 1,000% year-over-year growth in the second quarter.

In the second quarter of 2011, 19 countries/regions (up from 11 in the first quarter) saw broadband adoption levels of 90% or more. Another 43 (up from 42 in the first quarter) had at least half of their connections to Akamai at 2 Mbps or better; 13 additional countries/regions had broadband adoption of at least 25%, and another 8 countries/regions had at least one in ten connections to Akamai at speeds of at least 2 Mbps. Of the countries/regions that qualified for inclusion, Venezuela once again had the lowest level of broadband adoption, at 2.0%, though it was up 20% from the first quarter.

	Country/Region	% Above 2 Mbps	QoQ Change	YoY Change
–	Global	65%	4.0%	10%
1	Bulgaria	97%	2.0%	6.3%
2	Czech Republic	95%	1.9%	8.2%
3	Romania	95%	2.4%	12%
4	Switzerland	95%	1.8%	3.9%
5	Netherlands	95%	4.1%	7.9%
6	Hungary	94%	3.3%	13%
7	Hong Kong	94%	1.8%	1.8%
8	Germany	94%	2.7%	11%
9	Latvia	92%	4.4%	3.0%
10	Luxembourg	92%	-0.9%	11%
…				
35	United States	80%	4.1%	11%

Figure 14: Broadband Connectivity, Fast Countries/Regions

3.7 Global Narrowband Connectivity

When the change in the threshold for inclusion was increased to 25,000 unique IP addresses starting with last quarter's report, it radically changed the list of countries that qualified for inclusion in the narrowband adoption list, with most of the countries that had appeared in the top 10 over the prior three years no longer eligible. However, it appears that the list of countries now appearing in among the top 10 is relatively stable, at least over the first and second quarters of 2011.

As shown in Figure 15, the global level of narrowband adoption continued its rapid decline, losing 14% quarter-over-quarter, to drop to just below 3% of all connections to Akamai at speeds below 256 kbps. All of the top 10 countries saw quarterly declines, ranging from a 0.7% loss in Nigeria to Iran's 23% drop. These losses are encouraging, because they point to, at the very least, a short-term trend towards higher speed connectivity. In the first quarter 2011 report, Libya had placed third on the top 10 list, with a massive 252% quarterly increase. It was suggested that this growth was related to the multi-day government imposed Internet shutdowns that took place during the quarter. We believe that this was likely the case, as during the second quarter, fewer than 100 unique IP addresses from Libya made requests to Akamai, and a review of Akamai's traffic into the country showed it at extremely low levels during the second quarter.

From a year-over-year perspective, eight of the top 10 countries saw healthy yearly declines, indicating a longer-term trend towards higher speed connectivity in these countries. India and Kazakhstan were the only two countries in the top 10 that saw year-over-year increases in narrowband adoption. Given that it was one-tenth of the year-over-year change seen last quarter, coupled with a nice quarterly decline, it appears that the connectivity situation in India may finally be improving – we will continue to watch the trends over the coming quarters. Kazakhstan's 137% yearly increase is surprising, but it isn't clear what caused an increase of that magnitude, especially as the country's Ministry of Communication and Information has announced that it intends to achieve 100% broadband population coverage by 2013, as part of its ongoing 'Program on Information and Communication Technologies Development in Kazakhstan for 2010-2014', aiming to increase average broadband speeds across Kazakhstan to 16 Mbps by 2015.[15]

Of the countries/regions that qualified for inclusion in this section, 18 recorded narrowband adoption levels below the global figure of 2.9% for the second quarter of 2011. Of those, half saw narrowband adoption below 1%, with France continuing to maintain the lowest level, at 0.3%. Additionally, of the qualifying countries/regions, only six saw quarter-over-quarter increases, and only four saw year-over-year increases, so it is reasonable to suggest that, by and large, the national initiatives around the world to improve broadband connectivity appear to be having a positive impact.

	Country/Region	% Below 256 kbps	QoQ Change	YoY Change
–	Global	2.9%	-14%	-37%
1	Lebanon	56%	-7.5%	-19%
2	Bolivia	46%	-10%	-30%
3	Uzbekistan	44%	-18%	-46%
4	Nigeria	40%	-0.7%	-30%
5	Nepal	35%	-3.8%	-42%
6	India	31%	-12%	3.2%
7	Indonesia	31%	-18%	-13%
8	Iran	30%	-23%	-35%
9	Syria	19%	-1.7%	-30%
10	Kazakhstan	19%	-4.6%	137%
…				
27	United States	1.8%	-7.8%	-33%

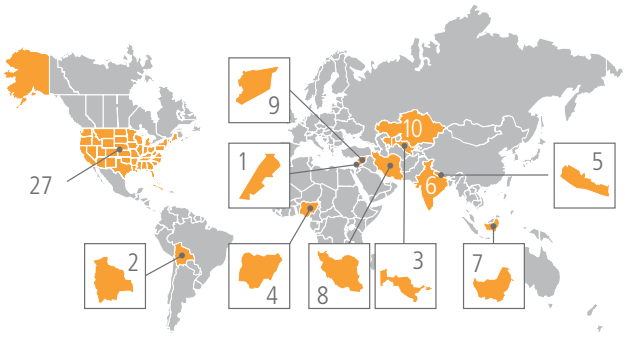


Figure 15: Narrowband Connectivity, Slowest Countries/Regions

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 the section. (The subset used for this section includes connections identified as coming from networks in the United States, based on classification by Akamai's EdgeScape geolocation tool.)

4.1 United States Average Connection Speeds

The second quarter of 2011 saw, for the first time in recent memory, Delaware no longer being the fastest state in the union, as strong quarterly growth in Rhode Island drove the state's average connection speed up to 8.2 Mbps, just slightly ahead of Delaware's 8.1 Mbps average connection speed, as shown in Figure 16. While Delaware's 21% quarterly increase was particularly strong, among the top 10 states, Vermont's grew 30% quarter-over-quarter, and New Hampshire, Virginia, and Washington all grew in excess of 10%. Across the whole country, 23 states in total saw quarterly increases in excess of 10%, and all states saw quarterly increases. In addition to those in the top 10, 27 other states had average connection speeds in the "high broadband" (>5 Mbps) range, and Arkansas ranked as the slowest state, with an average connection speed of 3.3 Mbps.

From a yearly perspective, growth was extremely strong with all states but West Virginia increasing 10% or more as compared to the second quarter of 2010 – West Virginia only grew 3.8%. Five states grew more than 40% year-over-year, another nine grew more than 30%, and an additional 26 grew more than 20%. It does not appear that there was any meaningful geographical clustering of year-over-year changes – that is, there were no regions of the country that had a grouping of states that all saw higher or lower levels of yearly growth.

	State	Q2 '11 Avg. Mbps	QoQ Change	YoY Change
1	Rhode Island	8.2	21%	34%
2	Delaware	8.1	7.7%	12%
3	District Of Columbia	7.5	6.9%	33%
4	Utah	7.0	4.9%	34%
5	Vermont	6.7	30%	28%
6	California	6.7	6.5%	28%
7	New Hampshire	6.6	11%	12%
8	Virginia	6.6	14%	41%
9	Washington	6.5	15%	27%
10	New York	6.4	9.2%	27%

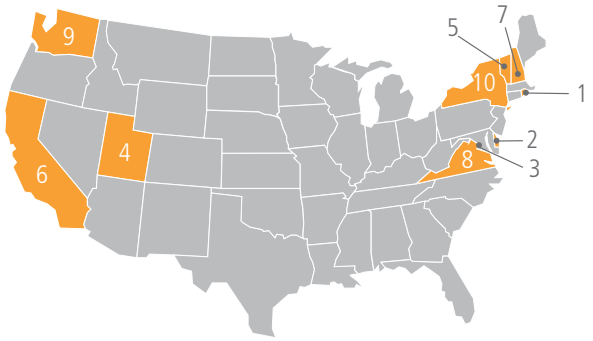


Figure 16: Average Measured Connection Speed by State

DID YOU KNOW?

In May 2011, work began in Rhode Island on "Beacon 2.0", 385 miles of new fiber optic broadband infrastructure that will reach nearly every city and town in the state. *[Source: http://bo.st/orV95H]*

4.2 United States Average Connection Speeds, City View

As with the Global Average Connection Speeds, City View presented in Section 3.2, connections from known mobile and academic networks were removed from the underlying data set for this metric, and the 50,000 unique IP address filter was used for this view as well.

As shown in Figure 17, San Jose, CA topped the list in the second quarter at 13.7 Mbps, moving up from third place in the prior quarter, thanks to an unusually large increase of nearly 6 Mbps quarter-over-quarter. The remaining cities in the top 10 saw quarterly increases as well, but none quite as significant. While there is some clustering of speeds portrayed in the top 10 list, this is due to rounding, as the calculated speeds for those cities fall just above or below the listed value. All of the top 10 cities recorded average connection speeds in the second quarter that exceeded the "high broadband" threshold of 5 Mbps.

Cities in California regained a majority of spots on the list, taking six of the top 10 spots (after holding only four in the first quarter). Cities on the East Coast held the balance of the spots, distributed across Maryland, Virginia, New Jersey, and New York. Similar to the average connection speed metric, it does not appear that there was any meaningful geographical clustering of year-over-year changes.

	City	Q2 '11 Avg. Mbps
1	San Jose, CA	13.7
2	Fredericksburg, VA	8.5
3	Monterey Park, CA	8.2
4	Fremont, CA	8.2
5	Staten Island, NY	7.6
6	Columbia, MD	7.5
7	Jersey City, NJ	7.5
8	Riverside, CA	7.5
9	Oakland, CA	7.5
10	Fairfield, CA	7.3

Figure 17: Average Measured Connection Speed, Top United States Cities by Speed

4.3 United States Average Peak Connection Speeds

Consistent with its position as the state with the highest average connection speed, Rhode Island was also the state with the highest average peak connection speed in the second quarter. As shown in Figure 18, Rhode Island's 16% quarter-over-quarter growth to 31.3 Mbps propelled it past Delaware, which has held the top spot in the past. Rhode Island joins Delaware as the only two states with average peak connection speeds above 30 Mbps.

Among the top 10 states, quarterly changes were all positive, ranging from New York's 2.2% increase to Rhode Island's 16% increase. Across the whole country, quarterly growth was seen in 43 states, ranging from a 0.2% increase in Minnesota (to 20.1 Mbps) to a 19% increase in New Mexico (to 19.1 Mbps). Eight states saw average peak connection speeds decline in the second quarter – losses ranged from 0.8% in Massachusetts (to 23.4 Mbps) up to an 8.3% decline in North Dakota (to 17.7 Mbps).

From a year-over-year perspective, growth among the top 10 states was very strong, with only New Hampshire seeing yearly growth of less than 20%. North Carolina's impressive yearly increase of 56% was the largest among the top 10. Across the whole country, yearly growth was seen in all states. Increases ranged from 62% in Idaho (to 14.4 Mbps) down to 12% in Arkansas (to 11.6 Mbps)

	State	Q2 '11 Peak Mbps	QoQ Change	YoY Change
1	Rhode Island	31.3	16%	46%
2	Delaware	30.8	2.5%	29%
3	District Of Columbia	27.6	5.1%	39%
4	New York	25.6	2.2%	42%
5	California	25.3	4.5%	33%
6	Virginia	25.3	6.8%	47%
7	Vermont	24.7	15%	36%
8	North Carolina	24.2	9.1%	56%
9	New Hampshire	24.2	4.0%	14%
10	Maryland	23.5	5.0%	29%

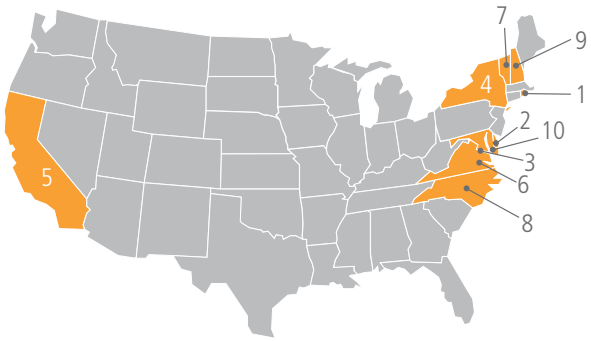


Figure 18: Average Peak Connection Speed by State

4.4 United States Average Peak Connection Speeds, City View

Consistent with the average connection speed metric, San Jose, California also topped the list of United States cities with the highest average peak connection speeds, as shown in Figure 19. It appears that the quarter-over-quarter changes among the top 10 cities was mixed in the second quarter, as San Jose and Monterey Park gained enough to get onto the list, while North Bergen and Staten Island both declined by a few Mbps each. In contrast with the top 10 list from the first quarter, none of the cities this quarter achieved an average peak connection speed in excess of 40 Mbps. However, all of the top 10 cites saw speeds above 30 Mbps this quarter, as compared to only four last quarter. Cities in California held seven of the top 10 spots this quarter, with three East Coast cities (in New Jersey, New York, and Virginia) rounding out the list.

	City	Q2 '11 Peak Mbps
1	San Jose, CA	38.7
2	North Bergen, NJ	35.4
3	Monterey Park, CA	35.2
4	Staten Island, NY	33.8
5	Fairfield, CA	33.0
6	Hayward, CA	32.8
7	Fredericksburg, VA	32.6
8	Oakland, CA	31.5
9	San Mateo, CA	31.2
10	Riverside, CA	31.2

Figure 19: Average Peak Connection Speed, Top United States Cities by Speed

4.5 United States High Broadband Connectivity

In line with the positive quarterly growth trends seen for average and average peak connection speeds across the United States, quarterly changes among the nine of top 10 states for high broadband adoption were positive in the second quarter. (Interestingly, Massachusetts was unchanged quarter-over-quarter.) Several states saw strong growth, with Rhode Island, New York, Vermont, and Washington all increasing more than 10%. As shown in Figure 20, Delaware remained the state with the highest level of high broadband adoption, followed closely by Rhode Island. (However, both are listed at 74% adoption due to rounding.) Across the whole country, only three states (Maine, North Dakota, and California) saw high broadband adoption rates drop quarter-over-quarter, though the declines were rather modest (losses of 1.0%, 3.6%, and 3.7%, respectively). Quarterly growth ranged from a slight 1.3% increase in Utah to Hawaii's 56% jump.

As compared to the second quarter of 2010, high broadband adoption rates among the top 10 states saw strong growth, with all seeing an increase of 10% or more. In fact, just among the top 10 states, four (Rhode Island, New York, Vermont, and Washington) saw yearly growth in excess of 40%. Year-over-year increases were seen across all of the states in the country. Growth ranged from just 2.2% in Arkansas to New Mexico more than doubling high broadband adoption, gaining 112% over the last year.

	State	% Above 5 Mbps	QoQ Change	YoY Change
1	Delaware	74%	3.0%	11%
2	Rhode Island	74%	12%	40%
3	New Hampshire	63%	8.6%	20%
4	District Of Columbia	56%	2.0%	28%
5	New Jersey	55%	6.3%	23%
6	Maryland	54%	6.2%	22%
7	New York	54%	11%	46%
8	Vermont	51%	32%	42%
9	Washington	50%	15%	43%
10	Massachusetts	49%	–	16%

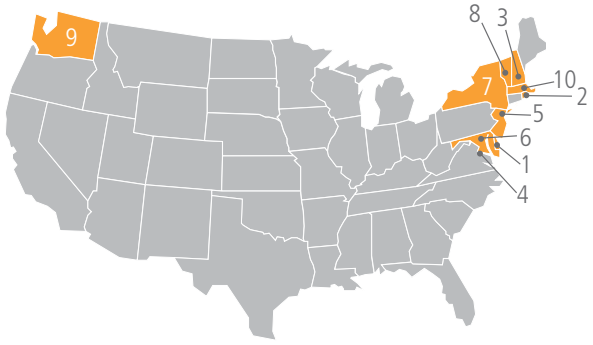


Figure 20: High Broadband Connectivity, Fastest U.S. States

4.6 United States Broadband Connectivity

As Figure 21 illustrates, broadband adoption rates among the top 10 countries continued to grow at a nominal rate, with quarterly increases among the group ranging from 0.4% in Delaware to 9.1% in Vermont. Vermont's comparatively strong growth here is consistent with the strong growth also seen for the high broadband metric, while Delaware's meager increase is due to its extremely high level of broadband adoption. In the second quarter, Hawaii and Connecticut joined Delaware, New Hampshire, and Rhode Island in having broadband adoption rates of 90% or more. Across the whole country, Iowa had the lowest level of broadband adoption, at 56%. Quarterly increases were seen in all but two states, with Maryland losing 1.9% (to 81%) and Missouri losing 6.5% (to 68%).

Looking at year-over-year changes, all of the top 10 states saw broadband adoption levels increase as compared to the second quarter of 2010, with growth ranging from just 0.3% in first-place Delaware to 16% in Vermont. Across the whole country, Missouri was the only state to see a yearly decline, and just barely at that, dropping 0.4%. Year-over-year growth ranged from 0.3% in Delaware up to 41% in Wyoming (to 69%). The overwhelmingly positive trends seen across the United States for both broadband and high broadband adoption levels are a good sign, and point, in part, to improved last mile connectivity, and greater availability (and consumption of) high-speed Internet connections.

	State	% Above 2 Mbps	QoQ Change	YoY Change
1	Delaware	98%	0.4%	0.3%
2	New Hampshire	94%	1.7%	4.0%
3	Rhode Island	94%	0.8%	5.4%
4	Hawaii	93%	3.4%	6.7%
5	Connecticut	90%	5.8%	7.0%
6	Vermont	88%	9.1%	16%
7	Nevada	86%	1.7%	4.3%
8	Maine	86%	1.8%	8.6%
9	Florida	85%	3.0%	10%
10	New York	85%	3.1%	8.1%

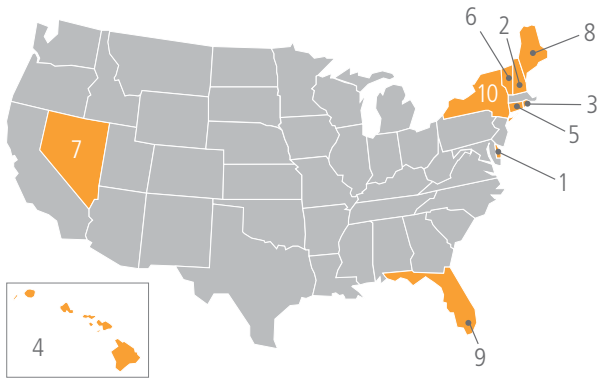


Figure 21: Broadband Connectivity, Fast U.S. States

4.7 United States Narrowband Connectivity

For the most part, the short- and long-term trends in the percentage of connections to Akamai at speeds below 256 kbps among the top 10 states, as shown in Figure 22, indicate an ongoing move to higher-speed connectivity among these states. (Arkansas' unusual 47% increase is the lone standout among this group, and it isn't clear exactly what caused this unusual level of growth, though it may be related to changes in underlying IP geolocation data.) The District of Columbia continues to have the highest level of narrowband adoption, though it has now fallen below 5%. The quarterly declines among the top 10 were relatively modest in the second quarter, as compared to the first quarter, when double-digit percentage declines were seen in all of the top 10 states. Across the whole country, 42 states saw narrowband adoption levels decline quarter-over-quarter, from Idaho's 2.1% drop (to 1.3%) to an impressive 37% drop in Maine (to 0.5%). Interestingly, nine states saw narrowband adoption increase in the second quarter, from a 0.9% increase in Utah (to 0.8%), to an unexpected doubling seen in Vermont (to 0.7%). (However, with such a low adoption rate, and just over 1,000 unique IP addresses seen in this speed band, shifts of a small number of IP addresses can translate into large percentage changes.)

Looking across the whole country, the yearly trend clearly supports an ongoing move to higher speed connections, with only Virginia seeing a year-over-year increase. (This, again, may be related to changes in underlying IP geolocation data.) Year-over-year declines were fairly strong, ranging from 9.4% in Mississippi (to 1.0%) to 62% in Hawaii (to 0.3%).

In the second quarter, 20 states saw narrowband adoption of 1% or less. Delaware remained the state with the lowest percentage of connections to Akamai below 256 kbps, with just 0.1% at that speed. However, with just a few hundred unique IP addresses connecting to Akamai at that speed, shifts of a small number of IP addresses can translate into large percentage changes.

	State	% Below 256 kbps	QoQ Change	YoY Change
1	District Of Columbia	4.7%	-12%	-27%
2	Missouri	3.8%	-17%	-33%
3	Alaska	3.8%	-3.0%	-50%
4	Iowa	3.6%	-5.9%	-34%
5	Georgia	3.1%	-8.4%	-32%
6	Colorado	2.9%	-8.2%	-25%
7	Illinois	2.7%	-9.3%	-32%
8	Ohio	2.7%	-9.9%	-30%
9	Arkansas	2.5%	47%	-12%
10	Washington	2.5%	-3.4%	-23%

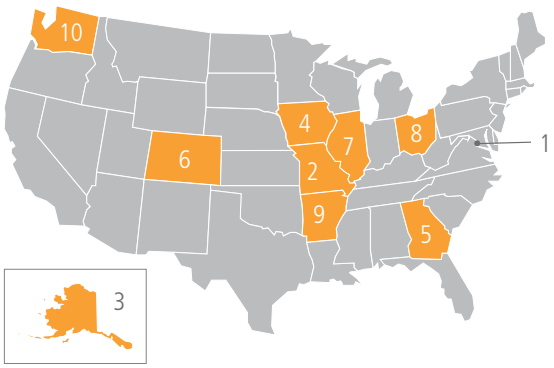


Figure 22: Narrowband Connectivity, Slowest U.S. States

DID YOU **KNOW?**

"While we have made significant progress, the report shows that approximately 28 percent of rural residents still lack access to the kind of broadband that most Americans take for granted." – FCC Chairman Julius Genachowski

[Source: http://fcc.us/p1o0zO]

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 the 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.)

5.1 Asia Pacific Average Connection Speeds

In the Asia Pacific region, South Korea continued to have the highest average connection speed, followed again by Hong Kong and Japan. As shown in Figure 23, relatively solid quarterly growth was seen in most of the countries listed, the exceptions being Taiwan, which grew a scant 0.2% (after a significant decline in the first quarter), and South Korea, which declined just over 4%. Quarterly growth of 10% or more was seen in five countries/regions.

Except for the decline seen in South Korea, year-over-year changes were strong in most of the listed countries, with growth of 10% or more seen in eight of the countries/regions. Yearly increases ranged from 3.2% in India to an impressive 60% in Malaysia. It is encouraging to see the growth in India as a long-term trend, though to break the 1 Mbps threshold, it needs to post more aggressive growth rates.

The second quarter of 2011 once again saw three countries/regions with average connection speeds that exceeded the "high broadband" (5 Mbps) threshold, while an additional five once again had average connection speeds that exceeded the "broadband" (2 Mbps) threshold. China and India remained the slowest of the listed countries, with China finally exceeding 1.0 Mbps, while India appears to be stuck at 0.8 Mbps.

5.2 Asia Pacific Average Connection Speeds, City View

As with the Global Average Connection Speeds, City View presented in Section 3.2, connections from known academic and mobile networks were removed from the underlying data set for this metric, and the 50,000 unique IP address filter was used as well.

In reviewing the top 10 cities in the Asia Pacific region with the highest average connection speeds, as shown in Figure 24, we see that cities in South Korea have regained the top slots, while cities in Japan hold the majority of the slots on the list. The average connection speeds seen in these cities saw strong growth quarter-over-quarter, with some of it being significant enough to vault cities back onto the list after dropping off in the first quarter. These reverse nominal quarterly declines seen in many of these cities in the first quarter.

From a global perspective, the majority of the fastest cities were in the Asia Pacific region, with the top 100 list including 59 in Japan, 10 in South Korea, one in Australia, and Hong Kong. Additionally, the full list of nearly 900 cities that qualified for inclusion in this metric included cities in Singapore, Taiwan, New Zealand, Thailand, Malaysia, China, India, and the Philippines.

Global Rank	Country/Region	Q2 '11 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	13.8	-4.2%	-17%
2	Hong Kong	10.3	12%	21%
3	Japan	8.9	10%	11%
29	Singapore	4.5	8.5%	47%
35	Taiwan	4.2	0.2%	1.9%
40	New Zealand	3.8	9.6%	18%
43	Australia	3.5	4.6%	24%
49	Thailand	3.2	11%	9.1%
73	Malaysia	1.9	23%	60%
103	Philippines	1.2	4.5%	31%
105	China	1.1	13%	33%
112	India	0.8	7.1%	3.2%

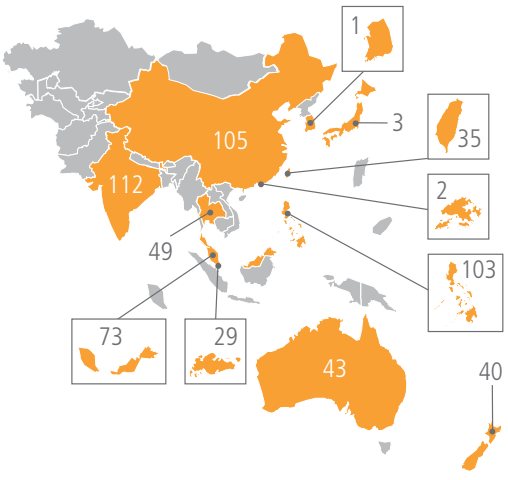


Figure 23: Average Measured Connection Speed by Asia Pacific Country/Region

	City	Q2 '11 Avg. Mbps
1	Taegu, South Korea	15.8
2	Taejon, South Korea	15.8
3	Shimotsuma, Japan	15.2
4	Kanagawa, Japan	15.0
5	Tokai, Japan	14.2
6	Asahi, Japan	14.0
7	Urawa, Japan	13.9
8	Yokohama, Japan	13.7
9	Sangamdong, South Korea	13.7
10	Tochigi, Japan	13.4

Figure 24: Average Measured Connection Speed, Top Asia Pacific Cities by Speed

5.3 Asia Pacific Average Peak Connection Speeds

Consistent with the prior two quarters, Hong Kong continued to have the highest average peak connection speed across the Asia Pacific region, at 44.4 Mbps. As shown in Figure 25, quarterly growth was seen in 11 of the 12 listed countries/regions, ranging from just 2.1% in the Philippines to 30% in Malaysia, echoing that country's impressive average connection speed growth. South Korea's minor quarterly loss saw the average peak connection speed in the country slip back below 36 Mbps.

Again, except for South Korea, yearly changes were extremely positive in the listed countries/regions. The largest yearly increase was seen in Malaysia, at 72%, followed by Singapore at 62%. The smallest year-over-year growth was seeing in Japan, though it was still a very respectable 13% increase.

China and India both posted solid gains for this metric, likely indicating an improvement in the quality of high-speed Internet connectivity within the countries.

5.4 Asia Pacific Average Peak Connection Speeds, City View

Similar to the list of top Asia Pacific cities by average connection speed, eight of the top 10 cities by average peak connection speed were located in Japan in the second quarter. Figure 26 shows that Taejon, South Korea held the top spot, at 55.3 Mbps, and was joined by five other cities in having average peak connection speeds of 50 Mbps or more. (In the first quarter, only Shimotsuma, Japan exceeded 50 Mbps.) With continued growth within these cities going forward, we may see all of the top 10 cities by average peak connection speed exceed 50 Mbps.

From a global perspective, the majority of the fastest cities were in the Asia Pacific region, with the top 100 list including 58 cities in Japan, 10 in South Korea, one in Australia, and Hong Kong. Additionally, the list of nearly 900 cities that qualified for inclusion in this metric included cities in Singapore, Taiwan, New Zealand, Thailand, Malaysia, China, India, and the Philippines.

	City	Q2 '11 Peak Mbps
1	Taejon, South Korea	55.3
2	Kanagawa, Japan	52.3
3	Marunouchi, Japan	51.6
4	Tokai, Japan	51.3
5	Shimotsuma, Japan	50.8
6	Nagano, Japan	50.0
7	Taegu, South Korea	49.9
8	Yokohama, Japan	49.8
9	Urawa, Japan	49.3
10	Asahi, Japan	46.9

Figure 26: Average Peak Connection Speed, Top Asia Pacific Cities by Speed

Global Rank	Country/Region	Q2 '11 Peak Mbps	QoQ Change	YoY Change
1	Hong Kong	44.4	12%	40%
2	South Korea	35.7	-1.5%	-6.0%
4	Japan	31.6	5.5%	13%
19	Singapore	20.7	6.9%	62%
21	Taiwan	20.3	11%	45%
36	Thailand	16.8	20%	22%
45	Australia	15.2	3.6%	38%
47	New Zealand	15.0	9.4%	18%
60	Malaysia	11.6	30%	72%
82	Philippines	8.3	2.1%	31%
109	India	5.5	6.4%	19%
118	China	4.6	13%	36%

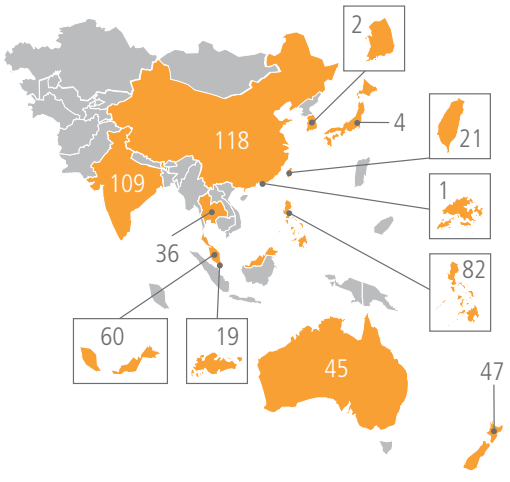


Figure 25: Average Peak Connection Speed by Asia Pacific Country/Region

5.5 Asia Pacific High Broadband Connectivity

In the second quarter of 2011, 10 of the 12 Asia Pacific countries/regions surveyed saw higher levels of high broadband adoption than in the first quarter, as shown in Figure 27. Though in the first quarter South Korea had achieved a 60% adoption rate, a minor decline this quarter dropped it back to 58%, and allowed Hong Kong to move to the top of the list, with a 59% adoption rate. Rather strong quarterly growth was seen in many countries/regions, with six posting gains of 10% or more, with the impressive 77% growth in Thailand of particular note. China's 25% quarter-over-quarter increase is very solid, but it remains below 1% high broadband adoption, as does India, whose 3.2% quarterly increase is encouraging, but not significant enough to drive noticeable changes in adoption rate.

On a year-over-year basis, nine of the 12 listed countries/regions saw higher levels of high broadband adoption than in the same period a year earlier. Adoption grew an astonishing 391% year-over-year in Malaysia, while China more than doubled its adoption rate as well. Growth rates among the other countries were strong as well, with Singapore nearly doubling, and Taiwan the lowest at 12%. Despite minor quarterly growth, India's level of high broadband adoption continues to show a year-over-year decline. This continues to be of concern, as high broadband adoption in the country remains under half a percent.

(Note that once again this quarter, the Philippines is included in the list for the sake of completeness, but is not ranked, as it did not have the requisite 25,000 unique IP addresses for this metric.)

5.6 Asia Pacific Broadband Connectivity

As shown in Figure 28, quarterly changes in broadband adoption in the Asia Pacific region were mixed in the second quarter, with half of the listed countries seeing quarter-over-quarter growth, while the other half declined quarter-over-quarter. Broadband adoption is fairly strong across the Asia Pacific region, with eight of the 12 listed countries/regions seeing at least half of their connections to Akamai at speeds of 2 Mbps or more. Hong Kong continued to top the list, with a broadband adoption rate of 94% in the second quarter. China's solid 12% growth finally pushed it above 10% adoption, while India's impressive 45% quarterly increase is certainly encouraging.

While year-over-year declines were seen in South Korea and Japan, the remaining countries/regions saw relatively strong growth. Of this group, Hong Kong was the only one to see an increase of less than 10%. In contrast, broadband adoption in Malaysia grew a massive 276% from the second quarter of 2010. Similar to the encouraging short-term growth, long-term growth of broadband adoption in India was very strong as well in the second quarter – if India can keep up these solid growth rates, it should quickly see broadband adoption surpass 10%.

Global Rank	Country/Region	% Above 5 Mbps	QoQ Change	YoY Change
2	Hong Kong	59%	6.7%	27%
3	South Korea	58%	-3.5%	-22%
6	Japan	55%	-0.1%	-8.9%
20	Singapore	33%	18%	94%
29	Taiwan	25%	3.5%	12%
37	Australia	19%	16%	54%
38	New Zealand	19%	29%	56%
45	Thailand	7.0%	77%	78%
50	Malaysia	3.7%	53%	391%
58	China	0.6%	25%	127%
59	India	0.4%	3.2%	-14%
–	Philippines	0.5%	9.5%	22%

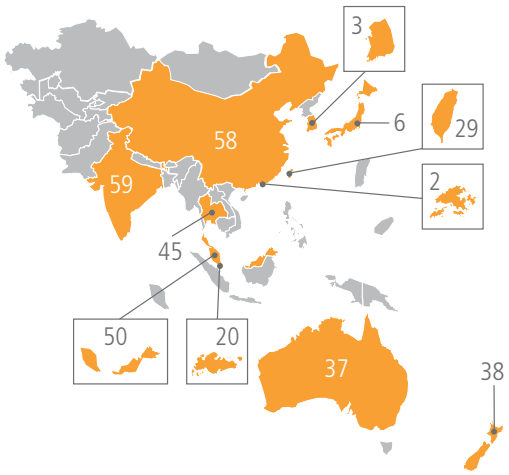


Figure 27: High Broadband Connectivity, Fastest Asia Pacific Countries/Regions

Global Rank	Country/Region	% Above 2 Mbps	QoQ Change	YoY Change
7	Hong Kong	94%	1.8%	1.8%
34	South Korea	80%	-7.9%	-14%
37	New Zealand	79%	6.4%	11%
39	Japan	76%	-2.8%	-12%
41	Taiwan	74%	-1.2%	12%
48	Singapore	67%	-2.4%	23%
49	Thailand	65%	6.1%	8.5%
56	Australia	55%	-2.8%	11%
76	Malaysia	22%	51%	276%
83	China	12%	28%	79%
85	Philippines	9.3%	-7.8%	58%
87	India	7.1%	45%	63%

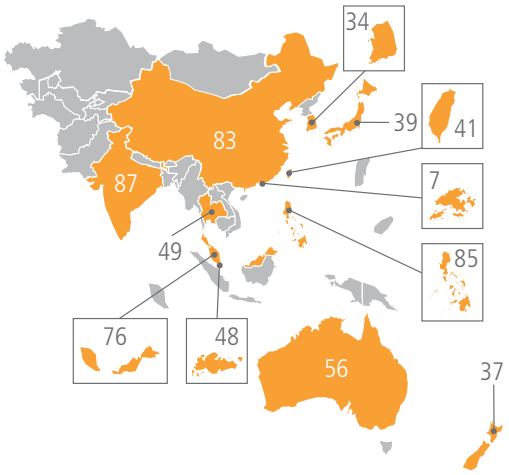


Figure 28: Broadband Connectivity, Fast Asia Pacific Countries/Regions

5.7 Asia Pacific Narrowband Connectivity

In reviewing Figure 29, we see that, with the exception of India, narrowband adoption among Asia Pacific countries/regions remains below 10%. While the 12% quarterly decline shows that things are heading in the right direction in the near-term, the country needs to keep heading in that direction, so that it is no longer posting year-over-year growth for this metric. Among the remaining countries/regions, South Korea and Taiwan both saw non-trivial quarter-over-quarter increases, but with only half a percent of their connections to Akamai at speeds below 256 kbps, this growth isn't of significant concern. Similar to the parenthetical note in Section 5.5 above, Singapore and Hong Kong are included within this list for the sake of completeness, but are not ranked because Akamai saw fewer than 25,000 unique IP addresses from these geographies for this metric.

As noted above, India saw a slight year-over-year increase in narrowband adoption, while South Korea saw a surprisingly large 137% increase. However, with South Korea's low adoption rate, and the otherwise positive trends seen in India, these increases are not of significant concern. Otherwise, the yearly losses seen for this metric were very strong across the Asia Pacific region, ranging from a 29% decline in Japan to a 68% decline in the Philippines (and 90% in Singapore if we include non-ranked countries).

Global Rank	Country/Region	% Below 256 kbps	QoQ Change	YoY Change
6	India	31%	-12%	3.2%
15	China	5.9%	-25%	-55%
20	New Zealand	4.1%	-8.7%	-35%
23	Philippines	2.5%	-26%	-68%
25	Malaysia	2.2%	-19%	-67%
26	Australia	2.1%	-4.4%	-57%
28	Thailand	1.8%	-9.1%	-62%
31	Japan	1.0%	-9%	-29%
36	South Korea	0.5%	8.6%	137%
39	Taiwan	0.5%	63%	-60%
–	Singapore	0.5%	6.6%	-90%
–	Hong Kong	0.2%	-21%	-50%

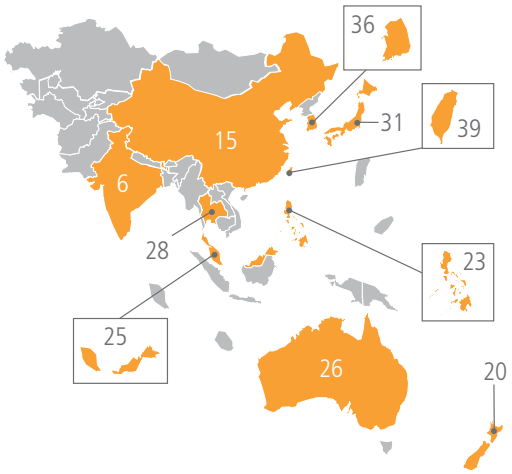


Figure 29: Narrowband Connectivity, Slowest Asia Pacific Countries/Regions

Geography – Europe

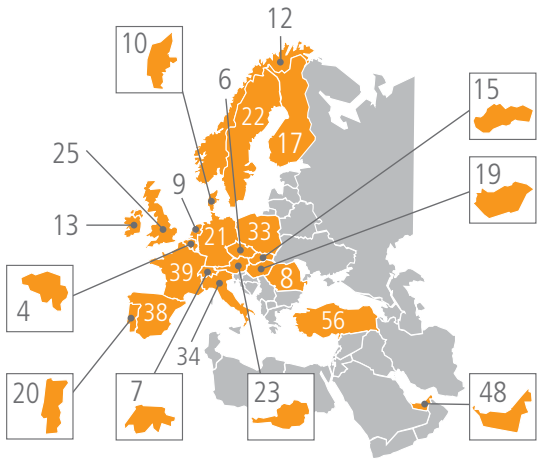
With this issue of the *State of the Internet* report, we will also begin to examine connection speed and adoption metrics for a selected set of countries within Europe. The metrics presented here for Europe are based on a subset of data used for Section 3 and are subject to the same thresholds and filters discussed within the section. (The subset used for this section includes connections identified as coming from networks in Europe, based on classification by Akamai's EdgeScape geolocation tool.) In addition, for the purposes of this report, we are including the United Arab Emirates as part of the selected set of countries within Europe.

6.1 Europe Average Connection Speeds

Within Europe, the Netherlands had the highest average connection speed in the second quarter, reaching 8.5 Mbps. As shown in Figure 30, quarterly growth was overwhelmingly positive, with only the United Arab Emirates seeing a quarterly decline, and 14 countries growing 10% or more quarter-over-quarter. Among the listed countries, quarterly increases ranged from 2.3% in Romania to Austria and Poland seeing growth of 20% or more.

Year-over-year trends were also largely positive with only Romania and Sweden seeing minor yearly declines. Yearly growth in the remaining countries was extremely strong, with the lowest level of growth seen in France, at a still respectable 17%. Turkey grew their average connection speed by more than half as compared to the second quarter of 2010, while it more than doubled in the United Arab Emirates.

In the second quarter of 2011, sixteen of the listed countries had average connection speeds that exceeded the "high broadband" (5 Mbps) threshold, while the remaining six had average connection speeds that exceeded the "broadband" (2 Mbps) threshold.



Global Rank	Country/Region	Q2 '11 Avg. Mbps	QoQ Change	YoY Change
4	Netherlands	8.5	14%	31%
6	Czech Republic	7.4	13%	39%
7	Switzerland	7.3	17%	43%
8	Romania	6.8	2.3%	-0.1%
9	Belgium	6.4	4.8%	22%
10	Denmark	6.4	13%	23%
12	Norway	6.3	18%	35%
13	Ireland	6.1	8.4%	19%
15	Hungary	5.8	13%	31%
17	Finland	5.7	16%	39%
19	Slovakia	5.5	15%	33%
20	Portugal	5.4	9.3%	37%
21	Germany	5.3	11%	28%
22	Sweden	5.3	6.2%	-4.2%
23	Austria	5.3	20%	40%
25	United Kingdom	5.0	9.0%	28%
33	Poland	4.3	21%	47%
34	Italy	4.2	15%	40%
38	Spain	3.9	15%	42%
39	France	3.9	8.8%	17%
48	United Arab Emirates	3.2	-18%	117%
56	Turkey	2.7	10%	54%

Figure 30: Average Measured Connection Speed by European Country

6.2 Europe Average Connection Speeds, City View

As with the Global Average Connection Speeds, City View presented in Section 3.2, connections from known academic and mobile networks were removed from the underlying data set for this metric, and the 50,000 unique IP address filter was used for this view as well.

In reviewing the top 10 cities in Europe with the highest average connection speeds, as shown in Figure 31, we see that Brno, Czech Republic tops the list at 8.3 Mbps. Brno is followed closely by Geneva, one of two cities in Switzerland to make the top 10 list. Romania is the only other country in Europe to have more than a single city on the top 10 list. The average connection speeds among these top 10 cities are, obviously, all well above the 5 Mbps "high broadband" threshold.

The full list of nearly 900 cities that qualified for inclusion in this metric also included cities in Denmark, Norway, Ireland, Hungary, Finland, Slovakia, Germany, Sweden, Austria, the United Kingdom, Poland, Italy, Spain, France, the United Arab Emirates, and Turkey.

	City	Q2 '11 Avg. Mbps
1	Brno, Czech Republic	8.3
2	Geneva, Switzerland	8.2
3	Riga, Latvia	8.1
4	Amsterdam, Netherlands	8.1
5	Constanta, Romania	7.9
6	Zurich, Switzerland	7.9
7	Liege, Belgium	7.4
8	Salzburg, Austria	7.2
9	Porto, Portugal	7.1
10	Timosoara, Romania	6.9

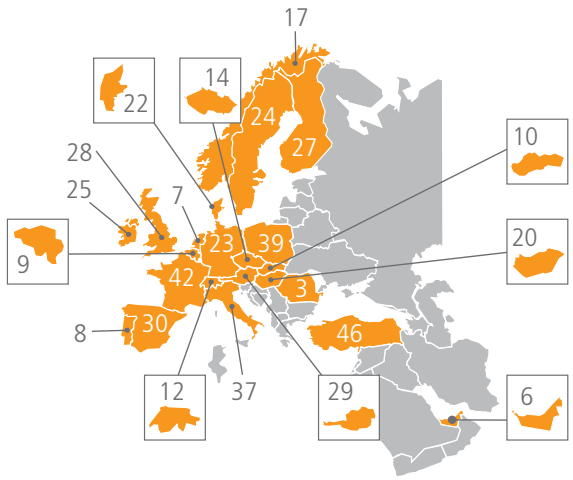
Figure 31: Average Measured Connection Speed, Top European Cities by Speed

6.3 Europe Average Peak Connection Speeds

As shown in Figure 32, average peak connection speeds across the listed European countries all exceeded 15 Mbps in the second quarter, with the highest (33.7 Mbps) seen in Romania. Quarterly changes across the region were all positive in the second quarter as well. Quarterly growth ranged from an increase of 2.9% in Romania to an increase of 19% in Austria. Thirteen of the listed countries saw average peak connection speeds increase by more than 10% in the second quarter.

Year-over-year changes among the listed European countries were overwhelmingly positive, with Sweden's respectable 7.8% growth the lowest of the group. Half of the countries saw yearly growth in excess of 50%, including a massive 265% increase as compared to the second quarter of 2010 in the United Arab Emirates.

Many countries in Europe are already recognized as leaders in high-speed Internet connectivity, with some having successfully implemented the equivalent of a national broadband plan, and others continuing to deploy fiber at a local level. The positive short-term and long-term trends for average peak connection speeds across European countries point to a continued improvement in high-speed Internet connectivity within these countries.



Global Rank	Country/Region	Q2 '11 Peak Mbps	QoQ Change	YoY Change
3	Romania	33.7	2.9%	25%
6	United Arab Emirates	26.8	3.5%	265%
7	Belgium	26.8	8.5%	41%
8	Portugal	26.2	5.2%	55%
9	Netherlands	25.3	15%	58%
10	Hungary	24.4	14%	72%
12	Switzerland	23.9	13%	55%
14	Czech Republic	22.6	9.6%	56%
17	Norway	21.2	15%	56%
20	Slovakia	20.5	11%	44%
22	Denmark	20.3	17%	45%
23	Germany	20.1	9.9%	46%
24	Sweden	19.9	4.4%	7.8%
25	Ireland	19.8	6.5%	44%
27	Finland	19.3	17%	68%
28	United Kingdom	18.9	10%	41%
29	Austria	18.6	19%	63%
30	Spain	18.6	18%	74%
37	Italy	16.6	11%	44%
39	Poland	16.4	18%	81%
42	France	15.6	9.5%	32%
46	Turkey	15.1	11%	69%

Figure 32: Average Peak Connection Speed by European Country

6.4 Europe Average Peak Connection Speeds, City View

As with the Europe Average Connection Speeds, City View metric reviewed above, Romania and Switzerland are the only two countries to have multiple cities within the top 10 list for the European cities with the highest average peak connection speeds. As shown in Figure 33, Constanta and Timosoara, Romania took the top two spots, both posting average peak connection speeds significantly higher than the other cities in the top 10; along with Brno, Czech Republic, they were the only cities to achieve average peak connection speeds above 30 Mbps in the second quarter.

The full list of nearly 900 cities that qualified for inclusion in this metric also included cities in Denmark, Norway, Ireland, Hungary, Finland, Slovakia, Germany, Sweden, Austria, Poland, Italy, Spain, France, the United Arab Emirates, and Turkey.

	City	Q2 '11 Peak Mbps
1	Constanta, Romania	45.2
2	Timisoara, Romania	38.8
3	Brno, Czech Republic	31.4
4	Riga, Latvia	29.2
5	Porto, Portugal	29.0
6	Zurich, Switzerland	28.7
7	Liege, Belgium	26.9
8	Geneva, Switzerland	26.3
9	Amsterdam, Netherlands	24.6
10	Bradford, England	23.5

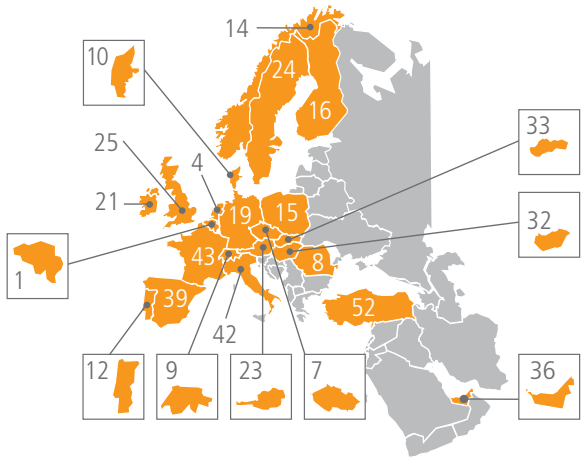
Figure 33: Average Peak Connection Speed, Top European Cities by Speed

6.5 Europe High Broadband Connectivity

In the second quarter of 2011, six countries in Europe had more than half of their connections to Akamai at speeds of 5 Mbps or above. As shown in Figure 34, strong high broadband adoption is fairly prevalent throughout Europe, with only four countries seeing adoption rates below 20%, and only one (Turkey) seeing less than 10% high broadband adoption, at a surprisingly low 2.9%

Quarterly changes across Europe were positive in the second quarter, with only the United Arab Emirates losing ground. Quarterly increases ranged from mere 1.2% in Romania to an impressive 65% in Spain. While Spain was the only country to grow in excess of 50% quarter-over-quarter, Italy grew more than 40%, Poland grew more than 30%, and seven other countries grew 20% or more.

Yearly changes in Europe were positive as well, with six countries growing high broadband adoption rates more than 100% as compared to the second quarter of 2010. The United Arab Emirates saw 379% growth in broadband adoption year-over-year, and Spain saw a nearly 200% increase. Ten additional countries saw yearly changes of 50% or more and only one (Romania) saw a yearly change below 10%.



Global Rank	Country/Region	% Above 5 Mbps	QoQ Change	YoY Change
1	Netherlands	68%	22%	40%
4	Belgium	57%	9.9%	43%
7	Czech Republic	55%	13%	63%
8	Romania	52%	1.2%	7.7%
9	Denmark	52%	21%	39%
10	Switzerland	50%	25%	107%
12	Portugal	44%	18%	88%
14	Norway	41%	17%	70%
15	Hungary	41%	17%	51%
16	Finland	36%	18%	58%
19	Germany	34%	27%	70%
21	Ireland	32%	11%	111%
23	Austria	30%	28%	66%
24	Sweden	30%	4.5%	-11%
25	United Kingdom	30%	18%	70%
32	Poland	23%	37%	93%
33	Slovakia	23%	13%	72%
36	United Arab Emirates	21%	-26%	379%
39	Spain	17%	65%	198%
42	Italy	16%	41%	166%
43	France	15%	20%	34%
52	Turkey	2.9%	29%	134%

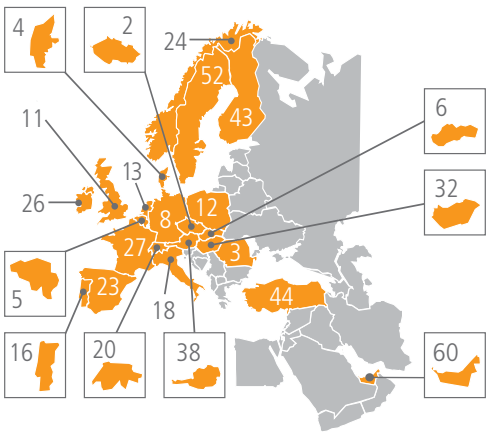
Figure 34: High Broadband Connectivity, Fastest European Countries

6.6 Europe Broadband Connectivity

As Figure 35 illustrates, broadband adoption is extremely strong across Europe, with all of the listed countries seeing more than half of their connections to Akamai at speeds of 2 Mbps or greater in the second quarter. While four countries are listed as having 95% broadband adoption rates, this is due to rounding – the Czech Republic and Romania are both just slightly higher than 95%, while Switzerland and the Netherlands are just below 95%. It is worth noting that half of the listed countries had broadband adoption rates above 90%, with another six seeing more than 80% broadband adoption – as noted previously, this speaks to the success of initiatives to make higher speed Internet connectivity more widely available in countries across Europe.

Broadband adoption grew quarter-over-quarter in 20 of the listed countries, though the growth rates were not nearly as significant as those seen for high broadband adoption. (This is likely due, in part, to the fact that broadband adoption rates are commensurately higher.) Quarterly increases among European countries ranged from 1.2% in Belgium to 24% in Poland – along with Poland, Turkey was the only other country that saw a quarter-over-quarter change of more than 10%.

Year-over-year, broadband adoption grew in 21 of the listed countries, and similar to the quarterly changes, the rates of change were more muted here as well as compared to high broadband adoption. Yearly growth of 10% or more was seen in 14 countries across Europe, with both Turkey and the United Arab Emirates growing in excess of 100% year-over-year. Turkey's 228% increase was the largest seen across the listed set of countries, while the lowest level of growth was seen in Belgium, which increased just a tenth of a percent year-over-year.



Global Rank	Country/Region	% Above 2 Mbps	QoQ Change	YoY Change
2	Czech Republic	95%	1.9%	8.2%
3	Romania	95%	2.4%	12%
4	Switzerland	95%	1.8%	3.9%
5	Netherlands	95%	4.1%	7.9%
6	Hungary	94%	3.3%	13%
8	Germany	94%	2.7%	11%
11	United Kingdom	91%	2.9%	10%
12	Slovakia	91%	1.9%	4%
13	Belgium	91%	1.2%	0.1%
16	Portugal	90%	3.1%	15%
18	Italy	90%	6.3%	18%
20	Denmark	89%	2.3%	2%
23	Spain	85%	7.4%	35%
24	Norway	85%	3.9%	6.5%
26	Ireland	84%	4.7%	30%
27	France	84%	5.4%	15%
32	Poland	81%	24%	82%
38	Austria	77%	8.9%	18%
43	Finland	74%	9.1%	33%
44	Turkey	72%	16%	228%
52	Sweden	64%	-3.7%	-12%
60	United Arab Emirates	51%	-4.1%	184%

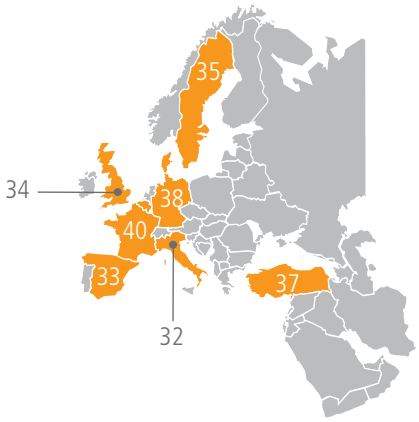
Figure 35: Broadband Connectivity, Fast European Countries

6.7 Europe Narrowband Connectivity

In reviewing Figure 36, it is clear that two thirds of the listed countries in Europe did not qualify for inclusion in this metric because Akamai did not see the requisite 25,000 or more unique IP addresses making requests for content at speeds below 256 kbps. This is not entirely unexpected, given the extremely strong broadband adoption highlighted above.

Of the seven countries that qualified for inclusion, and were ranked globally, all saw narrowband adoption rates below one percent. Both quarter-over-quarter and year-over-year changes among this set of countries were mixed in the second quarter. Ideally, both the short- and long-term trends here would be negative (that is, an ongoing decline in the percentage of narrowband connections), but with such low adoption rates to start with, observed growth levels will have little meaningful impact.

Among the countries that didn't qualify for inclusion, narrowband adoption rates were also extremely low, with Slovakia's 1.8% the highest, and three countries seeing narrowband of just a tenth of a percent. Negative quarter-over-quarter and year-over-year changes were prevalent among this set of countries, though Slovakia did see unusually large increases.



Global Rank	Country/Region	% Above 256 kbps	QoQ Change	YoY Change
32	Italy	0.8%	-7.9%	-44%
33	Spain	0.7%	6.7%	-36%
34	United Kingdom	0.6%	-11%	-47%
35	Sweden	0.5%	-26%	-65%
37	Turkey	0.5%	7.5%	51%
38	Germany	0.5%	-11%	-36%
40	France	0.3%	-6.7%	-67%
–	Netherlands	0.4%	-21%	-39%
–	Ireland	1.6%	-13%	-51%
–	Poland	0.3%	-31%	-63%
–	Norway	0.7%	-13%	-8.9%
–	United Arab Emirates	1.5%	-21%	-79%
–	Slovakia	1.8%	35%	255%
–	Switzerland	0.4%	-8.9%	-33%
–	Finland	0.4%	-8.3%	-73%
–	Belgium	0.3%	-30%	-13%
–	Austria	0.3%	-21%	-72%
–	Denmark	0.2%	-3.6%	-68%
–	Portugal	0.2%	0.5%	-42%
–	Romania	0.1%	-3.9%	-63%
–	Hungary	0.1%	-28%	-58%
–	Czech Republic	0.1%	-23%	-76%

Figure 36: Narrowband Connectivity, Slowest European Countries

Building on the data presented in previous editions of the *State of the Internet* report, Akamai continues 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.[16]

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

- A minimum of 1,000 unique IP addresses connecting to Akamai from the network in the second quarter of 2011 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 Attack Traffic from Mobile Networks, Top Originating Countries

In reviewing the data presented in Figure 37, we find that there was some significant movement in the distribution of attack traffic sourced in mobile networks in the second quarter of 2011. Most notably, the United States vaulted to the top of the list, generating 42% of the observed traffic. The percentage of observed attack traffic from Italy was a little more than half that seen in the first quarter, pushing it down into second place, and Russia re-entered the list in third place, responsible for 13% of observed attack traffic from mobile networks. However, in examining the underlying data in more detail, it appears that there were a significant number of port scans that were generated from systems connected to mobile networks in the United States and Russia in the second quarter, which likely accounts for their placement and percentages within the top 10 list. Russia's re-entry into the top 10 list pushed Argentina off the list – aside from that, the remaining countries were the same as in the first quarter. Attack traffic was clearly more concentrated than in prior quarters, with the top three countries responsible for almost 70% of observed attacks, and the top 10 countries the source of nearly 90% of the observed attacks.

	Country/Region	Q2 '11 % Traffic
1	United States	42%
2	Italy	14%
3	Russia	13%
4	Chile	4.3%
5	Malaysia	3.6%
6	Australia	3.5%
7	Poland	2.5%
8	China	2.3%
9	Hungary	1.8%
10	Lithuania	1.4%
–	Other	11%

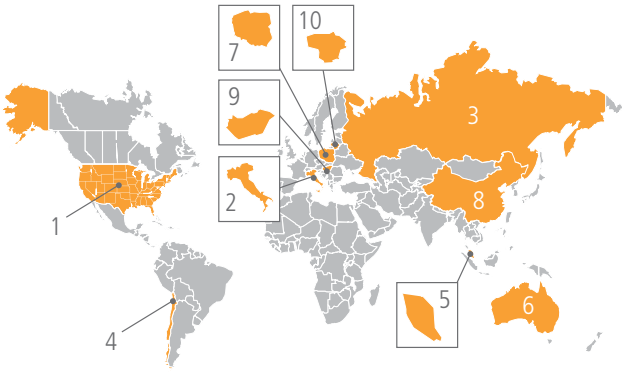


Figure 37: Attack Traffic from Mobile Networks, Top Originating Countries

7.2 Attack Traffic from Mobile Networks, Top Ports

In the second quarter of 2011, nine of the top 10 ports targeted by attack traffic sourced in mobile networks were the same as in the first quarter of 2011. In the second quarter, Port 5900 (VNC Server) returned to the list, replacing Port 443 (HTTPS/SSL) – this is the reverse of the swap seen in the first quarter. As shown in Figure 38, attack traffic remained fairly consistent with that seen in the first quarter, with Port 445 responsible for 79% of the observed attacks (down from 80% in the first quarter), and the top 10 ports were once again responsible for just over 97% of observed attacks. Digging in a little more deeply to look at the top ports targeted by the top 10 countries, we find that China was the only country where Port 445 was not the most targeted port (it was Port 1433), and that the vast majority of attacks from Italy were clustered on Port 445 and Port 23.

As we have noted in prior reports, we believe that the observed attack traffic originating from known mobile networks is likely being generated by infected PC-type clients connecting to wireless networks through mobile broadband technologies, and not by infected smartphones or similar mobile connected devices.

Port	Port Use	Q2 '11 % Traffic
445	Microsoft-DS	79%
23	Telnet	8.1%
135	Microsoft-RPC	2.3%
1433	Microsoft SQL Server	1.8%
80	WWW	1.5%
22	SSH	1.2%
5900	VNC Server	1.0%
139	NetBIOS	0.9%
4899	Remote Administrator	0.9%
3389	Microsoft Terminal Services	0.5%
Various	Other	2.6%

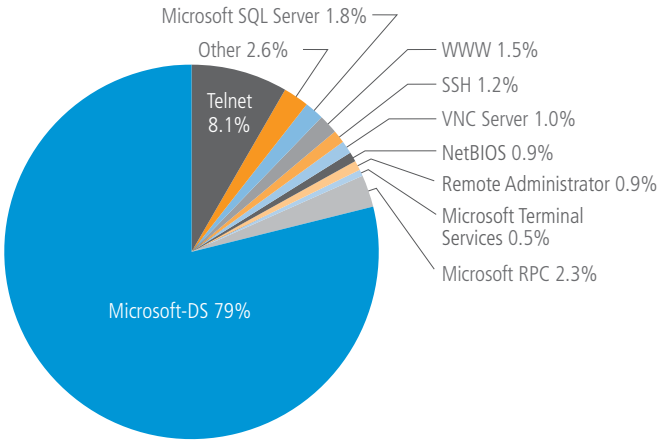


Figure 38: Attack Traffic from Mobile Networks, Top Ports

7.3 Connection Speeds & Data Consumption on Mobile Networks

In the second quarter of 2011, mobile provider GR-1 in Greece regained its position as the provider with the highest average connection speed, at 5.3 Mbps. (Mobile provider PL-4 in Poland, which was the fastest provider in the first quarter, actually achieved an average connection speed of 6.9 Mbps in the second quarter, but it did not qualify for inclusion based on the guidelines highlighted above, since the three listed providers from Poland all had higher unique IP address counts in the second quarter.) In reviewing the average connection speeds of the 103 mobile providers listed in Figure 39, we find that GR-1 was the only provider with an average connection speed in the "high broadband" (>5 Mbps) range, while 25 additional providers had average connection speeds in the "broadband" (>2 Mbps) range. Another 49 providers posted average connection speeds of 1 Mbps or more. The mobile provider with the slowest average connection speed remained SK-1 in Slovakia, with an average connection speed of 209 kbps – though slow, it is up 28% quarter-over-quarter, and up 81% year-over-year.

In reviewing quarterly changes, it appears that only one provider (AR-2 in Argentina) saw its average connection speed grow more than 100% quarter-over-quarter – it grew 154% to 1.9 Mbps. Just two providers (NO-1 in Norway and SV-3 in El Salvador) increased their average connection speeds by 50% or more as compared to the first quarter. Quarterly growth of less than 1% was seen at two providers, while another two remained unchanged. In contrast, looking at yearly trends, we find that average connection speeds increased by more than 100% year-over-year at 22 providers, with the 338% growth experienced by GR-1 in Greece the largest. Four of the listed providers saw their average connection speeds remain consistent as compared with the same period a year ago.

Examining the average peak connection speed data for the second quarter of 2011, we find that a mobile provider in Austria (AT-2) had the highest average peak connection speed, at 23.4 Mbps. Of the listed mobile providers, three had average peak connection speeds in excess of 20 Mbps, while an additional 27 had average peak connection speeds above 10 Mbps. Average peak connection speeds of more than 5 Mbps were observed in 47 more providers, and all but one of the remaining providers had average peak connection speeds above 2 Mbps. Provider ZA-1 in South Africa once again had the lowest average peak connection speed in the second quarter, at 1.2 Mbps.

In looking at quarterly changes, we find that three providers (ES-2 in Spain, AR-2 in Argentina, and MY-1 in Malaysia) saw their average peak connection speeds grow by more than 100% quarter-over-quarter. However, while ES-2 was up nearly 200%, the unique IP count from the provider was around just 2% of the counts seen by the other two providers, so the increase should be considered from that perspective.) Quarterly increases in average peak connection speeds were seen at 78 additional providers, while two more providers saw no change from the first quarter. On a year-over-year basis, growth in average peak connection speeds of 100% or more was seen at 29 providers, with the 391% growth at German provider DE-1 the largest. An additional 60 providers saw yearly increases, while four providers saw average peak connection speeds unchanged as compared with the second quarter of 2010.

For the second quarter of 2011, we found that users on 10 mobile providers consumed, on average, one gigabyte (1 GB) or more of content from Akamai per month. (Once again, this does not include provider CA-1, which has been confirmed to be using a proxy architecture.) Users on an additional 74 mobile providers around the world downloaded more than 100 MB of content from Akamai per month during the second quarter, while users at 20 other providers (excepting BE-3, as discussed in last quarter's report) downloaded fewer than 100 MB. Consumption grew more than 100% quarter-over-quarter on two providers (MY-1 and MY-2 in Malaysia), and quarterly growth was seen at 61 providers in total. The largest year-over-year increase was seen in Germany, at provider DE-3, which gained over 887% from the second quarter of 2010. Twenty-four other providers globally more than doubled their levels of monthly content consumption from Akamai year-over-year.

Country/Region	ID	Q2 '11 Avg. kbps	Q2 '11 Peak kbps	Q2 '11 Avg. MB/ month
AFRICA				
Egypt	EG-1	521	3231	202
Morocco	MA-1	1258	11996	313
Nigeria	NG-1	233	5179	528
South Africa	ZA-1	427	1191	178
ASIA				
China	CN-1	1437	3731	225
Hong Kong	HK-2	1971	10609	464
Hong Kong	HK-1	2454	14244	3597
India	IN-1	1189	2448	8
Indonesia	ID-1	518	7139	3981
Israel	IL-1	1406	6122	57
Kuwait	KW-1	1510	5724	135
Malaysia	MY-3	1003	6917	380
Malaysia	MY-1	787	7730	435
Malaysia	MY-2	1423	8729	2749
Pakistan	PK-1	951	5869	486
Qatar	QA-1	1327	3272	19
Saudi Arabia	SA-1	1745	6644	113
Singapore	SG-3	1312	6675	514
Singapore	SG-5	567	3795	91
Singapore	SG-4	1378	4501	102
Sri Lanka	LK-1	726	6658	322
Taiwan	TW-1	1232	6514	126
Taiwan	TW-2	916	6086	147
Thailand	TH-1	553	4729	99
EUROPE				
Austria	AT-1	3041	13387	152
Austria	AT-2	3712	23405	690
Belgium	BE-1	2934	10656	529
Belgium	BE-2	1875	5033	21
Croatia	HR-1	6890	42044	5837
Czech Republic	CZ-1	1791	9222	90
Czech Republic	CZ-3	3519	11045	287
Czech Republic	CZ-2	1199	5782	186
Estonia	EE-1	1373	6778	280
France	FR-2	2286	8511	1639
Germany	DE-1	841	2966	80
Germany	DE-2	4285	14558	1984
Germany	DE-3	1982	7792	158
Greece	GR-2	1094	6367	140
Greece	GR-1	5284	20007	656
Hungary	HU-2	2563	14563	132
Hungary	HU-1	1853	9486	125
Ireland	IE-1	3030	13957	717
Ireland	IE-2	2038	15430	769
Ireland	IE-3	2168	16075	1000
Italy	IT-3	3346	13447	544
Italy	IT-2	3871	19430	490
Italy	IT-4	1289	8504	224
Italy	IT-1	1882	12408	328
Lithuania	LT-2	1871	11063	385
Lithuania	LT-1	2511	14143	527
Moldova	MD-1	1945	7975	161
Netherlands	NL-2	2460	6740	31
Netherlands	NL-1	1663	4915	40

Figure 39: Average and Average Peak Connection Speed, Average Megabytes Downloaded per Month by Mobile Provider

DID YOU **KNOW?**

According to a May 2011 survey of American adults by the Pew Internet Project, "Some 87% of smartphone owners access the internet or email on their handheld, including two-thirds (68%) who do so on a typical day. When asked what device they normally use to access the internet, 25% of smartphone owners say that they mostly go online using their phone, rather than with a computer."

[Source: http://bit.ly/pOxDXQ]

Country/Region	ID	Q2 '11 Avg. kbps	Q2 '11 Peak kbps	Q2 '11 Avg. MB/ month
Norway	NO-2	1893	6518	55
Norway	NO-1	2040	8749	62
Poland	PL-1	4053	15372	173
Poland	PL-2	1622	9002	84
Poland	PL-3	1661	9529	134
Portugal	PT-1	911	4548	201
Romania	RO-1	750	3907	86
Russia	RU-3	1181	4369	118
Russia	RU-4	3270	12122	411
Slovakia	SK-1	209	2174	36
Slovakia	SK-2	2471	10653	1781
Slovenia	SI-1	2127	8131	48
Spain	ES-3	1078	5357	115
Spain	ES-2	1264	9602	123
Turkey	TR-1	1832	8715	184
Ukraine	UA-1	1489	4601	93
Ukraine	UA-2	1917	7127	118
United Kingdom	UK-3	3985	19062	90
United Kingdom	UK-2	2580	11302	1215
United Kingdom	UK-1	2037	14161	790
NORTH AMERICA				
Canada	CA-2	1105	2757	553
Canada	CA-1	4017	21011	25853
Curacao	CW-1	646	3774	256
El Salvador	SV-2	1968	8655	562
El Salvador	SV-1	1108	6584	330
El Salvador	SV-3	951	4598	368
Guatemala	GT-2	1147	6954	752

Country/Region	ID	Q2 '11 Avg. kbps	Q2 '11 Peak kbps	Q2 '11 Avg. MB/ month
Guatemala	GT-1	1140	6308	317
Mexico	MX-1	946	7114	223
Mexico	MX-2	2246	15180	4953
Nicaragua	NI-1	1506	8123	724
Puerto Rico	PR-1	2604	10601	2990
United States	US-2	1036	4198	41
United States	US-1	1600	4475	123
United States	US-3	1021	3034	588
OCEANIA				
Australia	AU-3	1601	8705	268
Australia	AU-1	1258	11610	2307
Guam	GU-1	597	3405	83
New Caledonia	NC-1	585	2141	541
New Zealand	NZ-2	1546	8445	633
SOUTH AMERICA				
Argentina	AR-1	702	5380	140
Argentina	AR-2	1916	10388	157
Bolivia	BO-1	306	5125	209
Brazil	BR-1	806	4594	149
Brazil	BR-2	940	4110	241
Chile	CL-4	908	9711	483
Chile	CL-3	1560	11207	133
Colombia	CO-1	1003	6541	156
Paraguay	PY-2	356	4452	399
Paraguay	PY-1	643	5850	163
Uruguay	UY-1	1984	17042	276
Uruguay	UY-2	542	4712	63
Venezuela	VE-1	911	6146	178

DID YOU **KNOW?**

"It is very clear that mobile will be at the center of human evolution for years to come. Mobile collapses time and distance and as such impacts every facet of our lives. While we have come to know the mobile phone as a communications device, their role in our daily lives has been expanding."

[Source: http://slidesha.re/oO7Ew4]

7.4 Mobile Traffic Growth As Observed By Ericsson

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

These measurements have been performed for several years, pointing at a stable trend of traffic growth with some seasonal variations. 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 40, the volume of mobile data traffic doubled from the second quarter of 2010 to the second quarter of 2011, and grew 8% between the first and second quarters of 2011. This comparatively smaller quarterly growth rate may be related to seasonal variations in traffic levels, as Ericsson notes that they have observed such variations in the past. (Note that this quarterly growth rate is based on revised/recalculated first quarter mobile data traffic figures. Additionally, note that due to an error, the y-axis in Figure 40 was previously labeled as Exabytes – the correct metric is Petabytes.)

7.5 Smartphone Usage As Observed by Ericsson

This section investigates the impact of several different factors on weekly smartphone traffic usage. The findings presented here are based on Ericsson mobile broadband measurements during the second quarter of 2011 at four different operators in mature markets in Europe, Asia and North America.

Figures 41 and 42 compare smartphone usage for the most popular handset models from each of these measurements. Handset models in Figures 41 and 42 are characterized by operating system, global release date (year), screen size in pixels (320x480 or smaller = small, 480x800 or higher = large) and customer segment ($$$ = expensive model, lack of this mark means smartphone model & subscription at a price level of feature phones). (Note that iPhones and Android smartphones are not specifically distinguished in the charts in order to allow operators to remain anonymous.)

Figure 41 compares for each model the ratio of "active" smartphone users generating more than 1 MB traffic per day on average. The ratio of active smartphone users is the highest for new Android and iPhone models: 50% - 75% of subscribers are generating more than 1 MB traffic per day on average. They are followed by older or inexpensive Android and iPhone models and Windows Mobile phones (30% - 55%) and finally by Symbian and Blackberry smartphones (only 5% - 35%). It is interesting to note the striking difference between the ratio seen by active Blackberry users in North America as compared to those outside North America. (Blackberry devices have several limitations in many countries, including app store availability.)

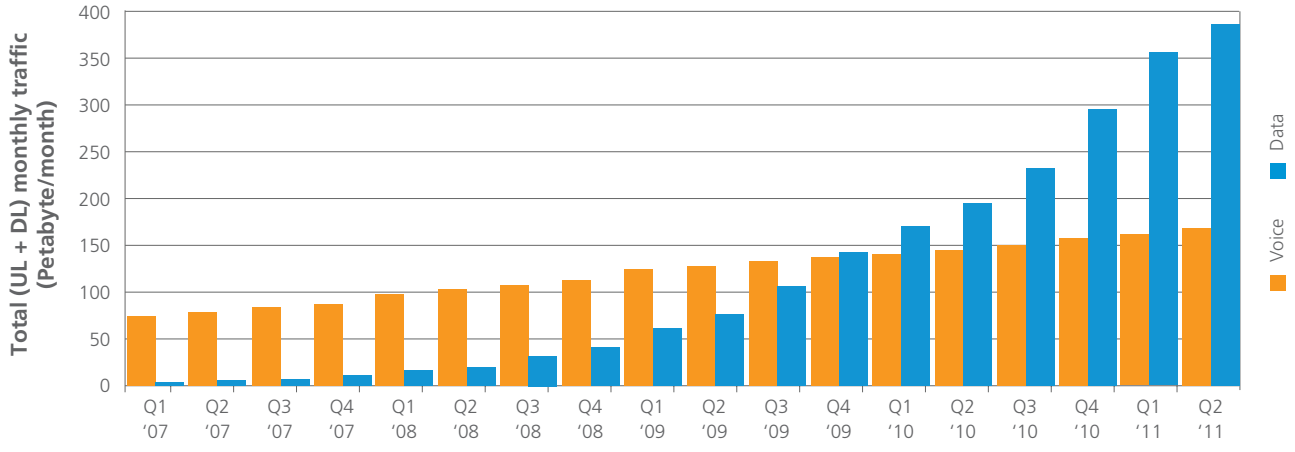


Figure 40: Total Monthly Mobile Voice and Data as Measured by Ericsson [Source: Ericsson]

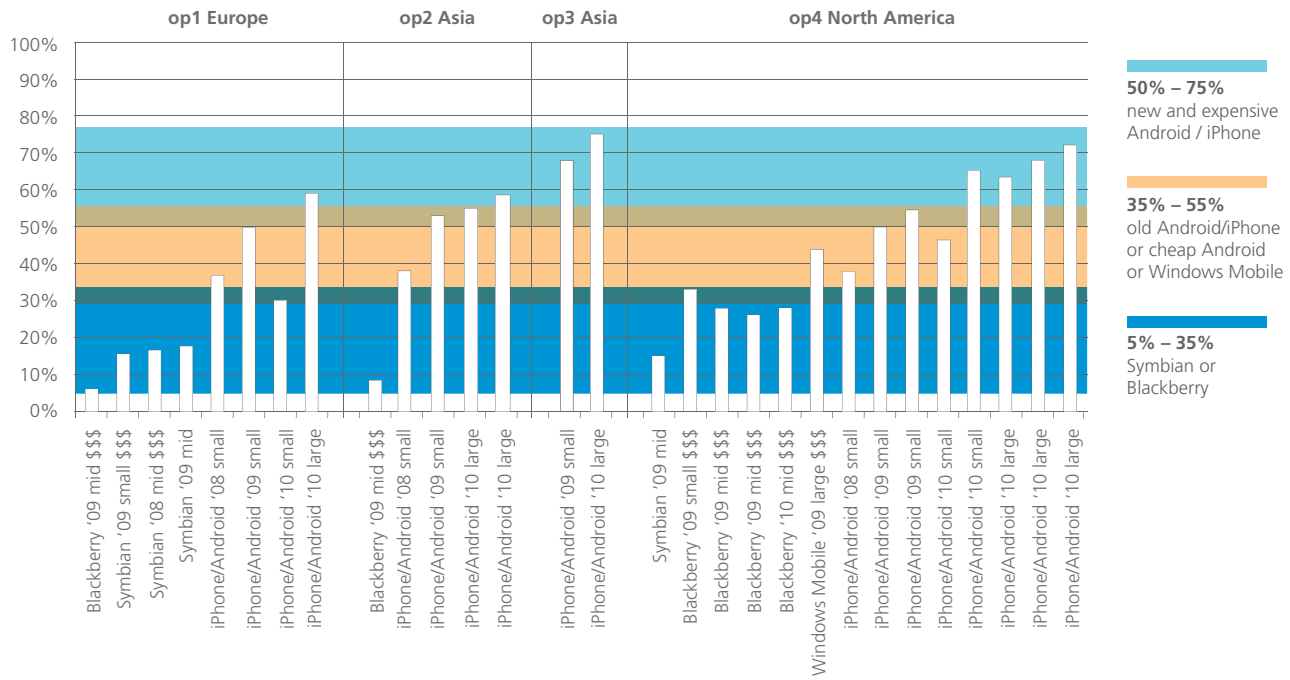


Figure 41: Ratio of active smartphone users (> 1 MB / day on average) [Source: Ericsson]

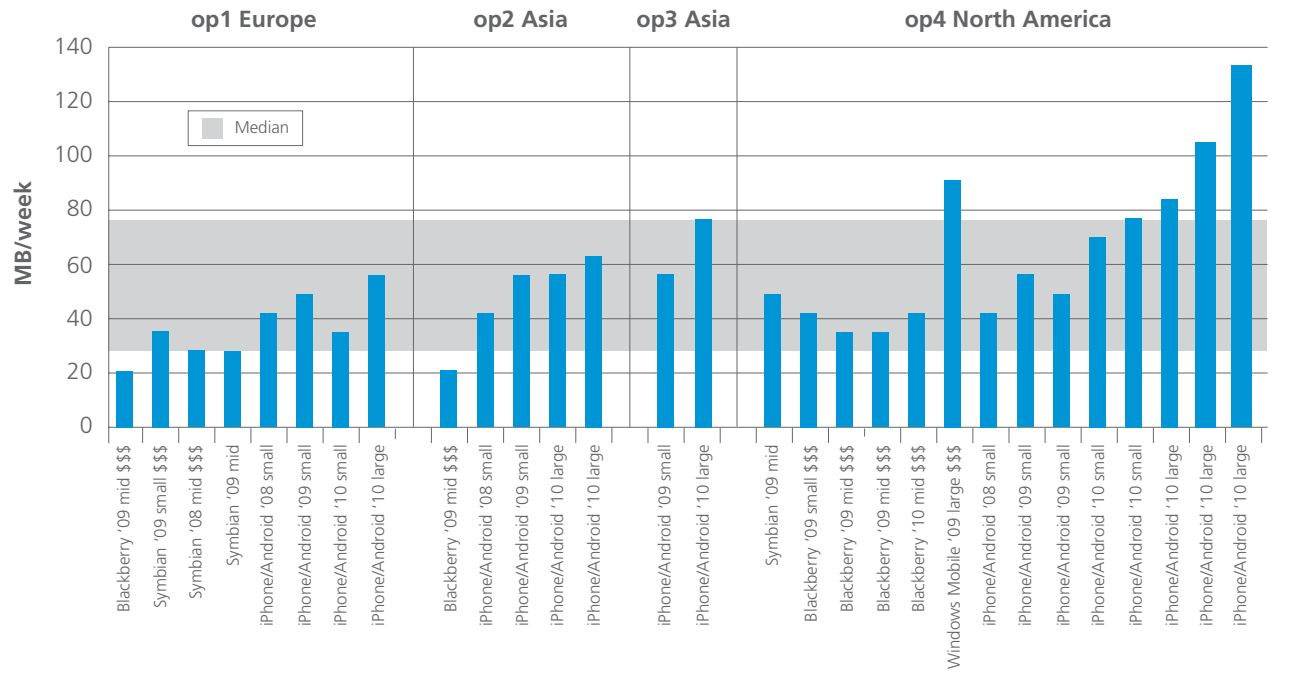


Figure 42: Median of weekly smartphone traffic volumes for active users (>1 MB/day) [Source: Ericsson]

For active smartphone users who actually use their devices as smartphones, the difference in median weekly traffic volume is less significant across OS, price, screen size, etc. Figure 42 shows median weekly traffic volume (50th percentile) for active smartphone users generating more than 1 MB traffic per day. This value varies between the 30 MB – 80 MB range for most smartphone models.

While the percentage of users that are active data users differs significantly by OS, release date, customer segment, etc. (as seen in Figure 41), taking only active users with more than 1 MB traffic per day on average, usage levels are very similar for different smartphone models (as seen in Figure 42).

One notable difference is that in North America, new and expensive smartphones with large screens generate about two times more traffic than smartphones at the operators analyzed in Asia and Europe. Another notable difference is that Blackberry devices (especially outside North America) send a significant share of their traffic through a tunnel with compression.

Figure 43 further drills down into usage for one single smartphone model (new high-end Android model with large screen) at one specific operator and shows average weekly application traffic for different subscriber clusters. Subscriber clusters have been created based on total per subscriber traffic volumes, e.g., the 95-100% cluster denotes the heaviest 5% of subscribers.

Application usage in different subscriber cluster differs significantly per application, e.g., social networking and app store download traffic increases nearly linearly in heavier subscriber clusters. In contrast, online video usage can explode and can become extreme for the top 5-10% of smartphone users. Heavy users are willing to spend two orders of magnitude more time with watching online video on their smartphones than median users (~40 minutes / day on average for the heaviest 5% users as opposed to ~ 0.5 minutes / day for the median smartphone user).

Similar application usage characteristics can be observed for most new high-end Android and iPhone models as well.

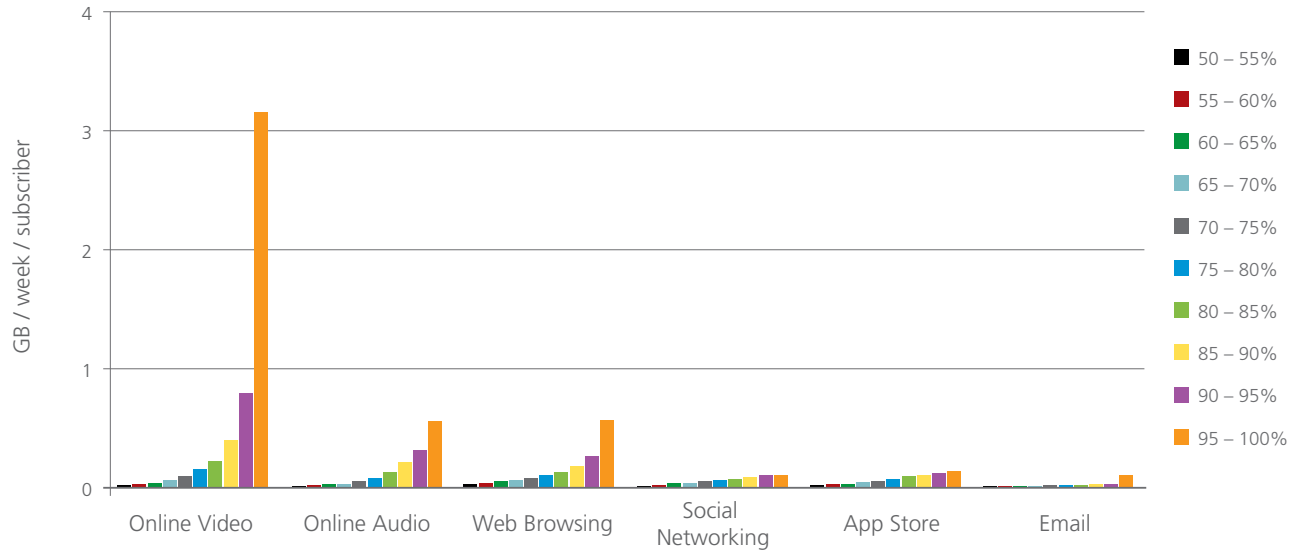


Figure 43: Average weekly application traffic for different subscriber clusters of a new Android smartphone model

Network Outages & Disruptions

Starting on June 3, Internet users in Syria experienced an Internet disruption that lasted between one to one and a half days. As shown in Figure 45, Akamai traffic being delivered into Syria dropped precipitously early in the morning (Eastern Time) of June 3, reaching near-zero levels by mid-day. Around 6 am (Eastern Time) on June 4, Akamai traffic levels to Syria returned to levels similar to those seen prior to the shutdown.

According to a blog post[17] from Internet monitoring firm Renesys, Internet connectivity in Syria depends primarily on one domestic provider, state-owned Syrian Telecom Establishment. Renesys noted that the networks that became unreachable included those belonging to SyriaTel's 3G mobile data networks, as well as smaller downstream ISPs including Sawa, INET, and Runnet; networks belonging to the Syrian government remained reachable, however.

It does not appear that this was a complete and total Internet outage in Syria, but rather, it was more similar to the Internet disruptions seen in Libya in the first quarter, both in terms of impact, as well as cause (response to protests and political unrest).

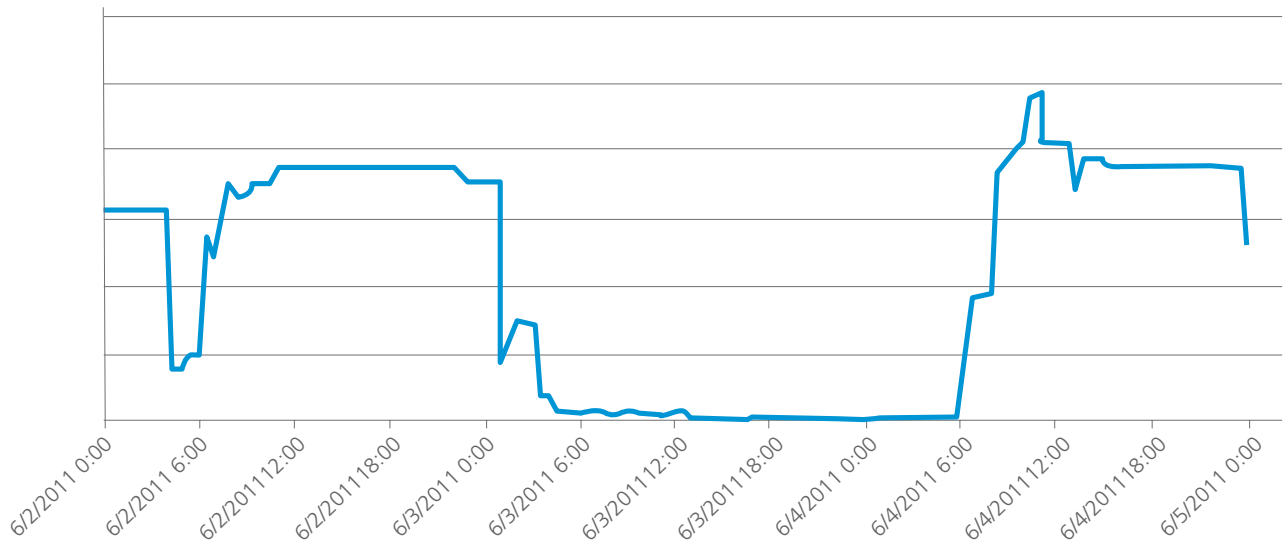


Figure 44: An Internet shutdown in Syria occurred in early June

Country/Region	% Attack Traffic	Unique IP Addresses	Avg. Connection Speed (Mbps)	Peak Connection Speed (Mbps)	% Above 5 Mbps*	% Above 2 Mbps*	% Below 256 kbps*
EUROPE							
Austria	0.1%	3,000,038	5.3	18.6	30%	77%	—
Belgium	<0.1%	3,950,876	6.4	26.8	57%	91%	—
Czech Republic	0.3%	2,095,901	7.4	22.6	55%	95%	—
Denmark	<0.1%	2,545,633	6.4	20.3	52%	89%	—
Finland	<0.1%	2,815,374	5.7	19.3	36%	74%	—
France	1.1%	24,312,469	3.9	15.6	15%	84%	0.3%
Germany	2.1%	34,924,624	5.3	20.1	34%	94%	0.5%
Greece	0.1%	2,541,031	3.8	18.2	12%	86%	—
Hungary	1.8%	2,172,489	5.8	24.4	41%	94%	—
Iceland	<0.1%	135,009	6.3	22.7	31%	90%	—
Ireland	<0.1%	1,523,707	6.1	19.8	32%	84%	—
Italy	2.5%	14,370,098	4.2	16.6	16%	90%	0.8%
Luxembourg	<0.1%	166,806	4.7	16.1	24%	92%	—
Netherlands	0.3%	8,295,862	8.5	25.3	68%	95%	—
Norway	<0.1%	3,295,283	6.3	21.2	41%	85%	—
Poland	1.9%	6,812,121	4.3	16.4	23%	81%	—
Portugal	0.2%	2,684,046	5.4	26.2	44%	90%	—
Romania	2.7%	2,453,480	6.8	33.7	52%	95%	—
Slovakia	<0.1%	828,570	5.5	20.5	23%	91%	—
Spain	0.9%	13,136,538	3.9	18.6	17%	85%	0.7%
Sweden	0.2%	6,560,657	5.3	19.9	30%	64%	0.5%
Switzerland	0.2%	3,057,022	7.3	23.9	50%	95%	—
United Kingdom	0.7%	23,104,975	5.0	18.9	30%	91%	0.6%
ASIA/PACIFIC							
Australia	0.4%	12,000,757	3.5	15.2	19%	55%	2.1%
China	7.8%	76,441,611	1.1	4.6	0.6%	12%	5.9%
Hong Kong	0.5%	2,642,627	10.3	44.4	59%	94%	—
India	2.7%	8,177,282	0.8	5.5	0.4%	7.1%	31%
Japan	1.8%	44,816,252	8.9	31.6	55%	76%	1.0%
Malaysia	0.6%	1,835,196	1.9	11.6	3.7%	23%	2.2%
New Zealand	0.2%	1,685,275	3.8	15.0	19%	79%	4.1%
Singapore	0.2%	1,443,665	4.5	20.7	33%	67%	—
South Korea	1.1%	22,843,333	13.8	35.7	58%	80%	0.5%
Taiwan	10%	8,541,297	4.2	20.3	25%	74%	0.5%
MIDDLE EAST							
Egypt	2.7%	1,391,166	0.9	7.8	—	6.3%	4.2%
Israel	0.7%	2,458,927	4.5	22.3	17%	83%	—
Kuwait	0.2%	486,970	1.7	9.0	—	25%	—
Saudi Arabia	0.2%	2,506,083	2.2	8.6	1.1%	53%	—
Sudan	<0.1%	37,838	0.8	6.6	—	—	—
Syria	<0.1%	290,001	1.4	3.1	—	27%	19%
United Arab Emirates (UAE)	0.3%	999,583	3.2	26.8	21%	51%	—
LATIN & SOUTH AMERICA							
Argentina	1.6%	5,057,124	2.0	11.6	4.4%	34%	2.4%
Brazil	5.6%	15,427,943	1.9	10.6	3.6%	33%	7.9%
Chile	0.5%	2,995,057	3.0	16.1	6.8%	82%	—
Colombia	0.6%	3,088,498	2.2	11.0	1.6%	51%	—
Mexico	0.3%	9,242,549	2.2	10.9	1.7%	48%	1.0%
Peru	1.0%	853,665	1.4	9.3	—	13%	1.0%
Venezuela	0.4%	2,348,711	0.8	4.9	—	2.0%	9.4%
NORTH AMERICA							
Canada	0.9%	12,563,040	6.0	21.0	48%	91%	1.2%
United States	8.3%	143,487,908	5.8	22.1	42%	80%	1.8%

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

SECTION 10:
Endnotes

[1] http://www.wisegeek.com/what-is-an-ssl-cipher.htm

[2] http://en.wikipedia.org/wiki/Advanced_Encryption_Standard

[3] http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf

[4] http:// csrc.nist.gov/publications/fips/fips186-3/fips_186-3.pdf

[5] http://www.hhs.gov/ocr/privacy/hipaa/understanding/coveredentities/hitechrfi.pdf

[6] ftp://ftp.apnic.net/apnic/stats/apnic/delegated-apnic-extended-latest

[7] http://isoc.org/wp/newsletter/?p=3861

[8] http://www.nanog.org/meetings/nanog52/presentations/Monday/roberts-20110613-ISOC-WorldIPv6Day-NANOG52.pdf

[9] http://en.wikipedia.org/wiki/IPv6_rapid_deployment

[10] http://en.wikipedia.org/wiki/6to4

[11] http://en.wikipedia.org/wiki/Teredo_tunneling

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

[13] http://www.blu-ray.com/faq/

[14] 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 what many end-user Internet connections are capable of. (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.)

[15] http://www.telegeography.com/products/commsupdate/articles/2011/05/03/kazakhstan-aims-to-achieve-100-broadband-coverage-by-2013/

[16] http://www.akamai.com/ericsson/index1.html

[17] http://www.renesys.com/blog/2011/06/syrian-internet-shutdown.shtml

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