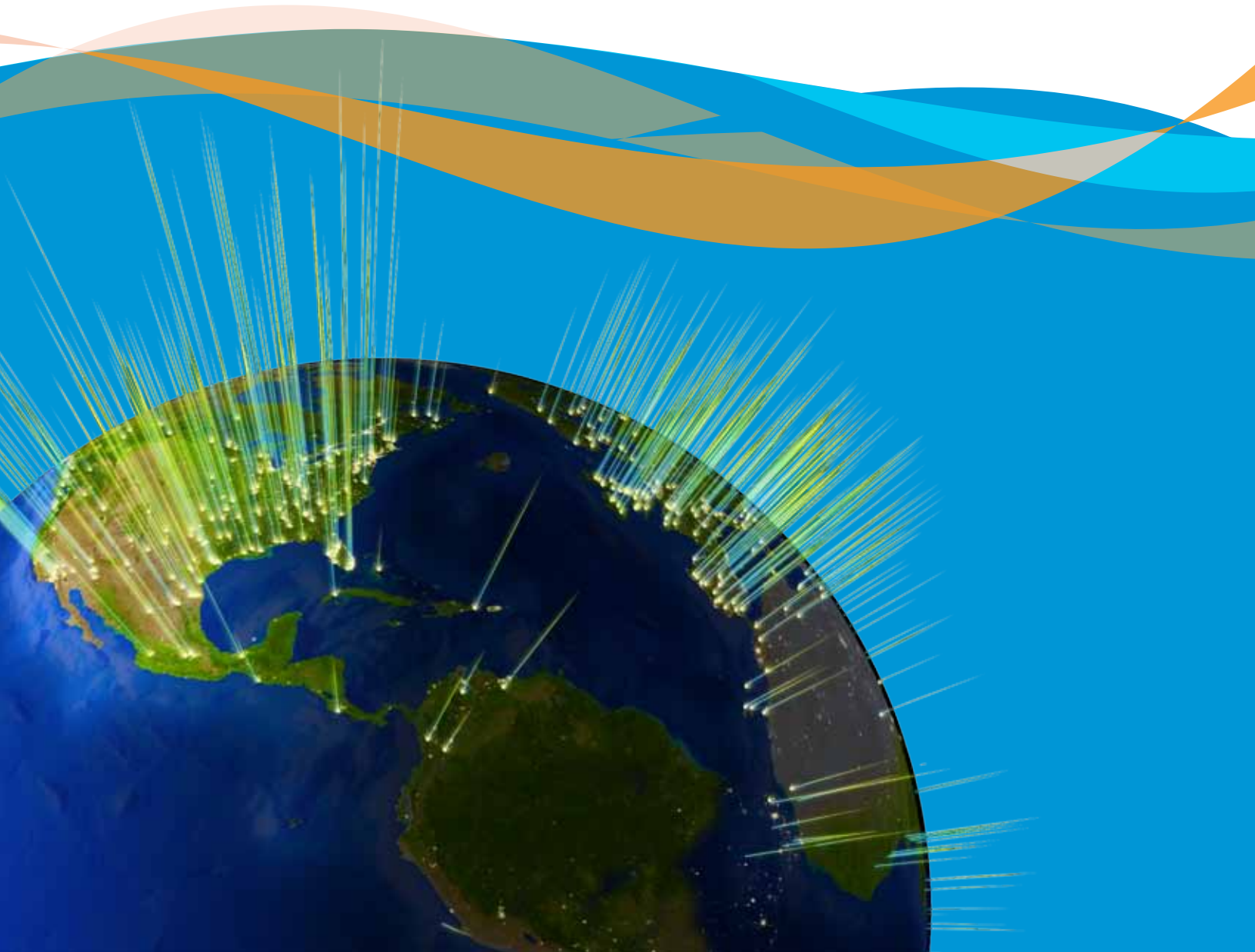
Akamai

Volume 3, Number 3

The State of the Internet

3rd Quarter, 2010 Report



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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 global server network during the third quarter of 2010 about attack traffic, broadband adoption, and mobile connectivity, as well as trends seen in this data over time.

Attack Traffic

During the third quarter of 2010, Akamai observed attack traffic originating from 209 unique countries around the world. The United States was the top attack traffic source, accounting for 12% of observed attack traffic in total. Russia and China held the second and third place spots respectively, accounting for just over 20% of observed attack traffic combined. Attack traffic concentration was slightly higher than in the second quarter, with the top 10 ports seeing 87% of the observed attack traffic. Aggregated at a continental level, Europe was responsible for the highest percentage of attacks seen in the third quarter. Port 445 continued to be the most highly targeted port for observed attacks, though the percentage of attacks targeted at Port 23 (Telnet) grew significantly during the third quarter.

Broadband Adoption

Akamai observed a 6.6% increase (from the second quarter of 2010) globally in the number of unique IP addresses connecting to Akamai's network, growing to over 530 million. From a global connection speed perspective, South Korea continued to have the highest level of "high broadband" (>5 Mbps) connectivity, with 72% of connections to Akamai at speeds above 5 Mbps. South Korea also maintained the highest average connection speed, at 14 Mbps (down from 17 Mbps in the second quarter), and recorded the highest average peak connection speed, at 39 Mbps, where the per-IP address maximum connection speed was averaged across the IP addresses seen from each country. Cities in South Korea and Japan continued to hold many of the top spots in the rankings of highest average and average peak connection speeds by city as well. In the United States, Delaware remained in the top position, with 64% of connections to Akamai occurring at 5 Mbps or greater. Delaware also maintained the highest average connection speed in the United States, though it declined to 7.1 Mbps, and once again recorded the highest average peak connection speed across the United States, at 28 Mbps. San Jose, CA was the United States city with the highest average connection speed (8.3 Mbps) and highest average peak connection speed (34 Mbps).

Mobile Connectivity

Third quarter attack traffic from known mobile networks was more concentrated than overall observed attack traffic, with slightly less than half of the observed mobile attacks coming from the top three countries. Ports targeted by mobile attack traffic were similar to the overall port list, though a higher percentage of attacks targeting Port 445 was observed when looking at only known mobile networks. In the third quarter of 2010, average measured connection speeds on mobile network providers around the world ranged from 6 Mbps down to 143 Kbps. Of the 111 mobile network providers listed in the report, 86 saw average connection speeds increase in the third quarter. Average peak connection speeds on mobile providers around the world ranged from over 20 Mbps down to just under 400 Kbps. In reviewing content consumption metrics, we found that the amount of content downloaded from Akamai per month per unique IP address showed quarterly growth on 101 of 111 providers, and yearly growth on 89 of those providers.

Akamai maintains a distributed set of agents deployed across the Internet that monitor attack traffic. Based on the 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 third quarter of 2010.

The United States was responsible for nearly one-eighth of observed attack traffic in the third quarter of 2010, and attack traffic targeting Port 445 continues a steady decline after peaking a year ago.

1.1 Attack Traffic, Top Originating Countries

During the third quarter of 2010, Akamai observed attack traffic originating from 209 unique countries/regions, up from 200 in the second quarter. The United States remained in first place during this period, responsible for nearly one-eighth of the observed attack traffic – slightly more than in the prior quarter. As shown in Figure 1, Russia and China swapped places, now ranking second and third respectively, with both countries generating less attack traffic, percentage-wise, than in the second quarter. Among the top 10, Germany's percentage also declined quarter-over-quarter, while Brazil, Taiwan, Egypt, and Peru saw a quarterly increase in their attack traffic percentage. Along those lines, Egypt and Peru are newcomers to the list of top originating countries, displacing Japan and Romania this quarter. Attack concentration among the top 10 countries/regions remained consistent from the second quarter at 58%.

Aggregating observed attack traffic at a continental level, we find quarterly changes split – more attack traffic came from Africa and South America, while less came from Europe and the Asia Pacific region. (North America's percentage remained flat quarter-over-quarter.) Africa's contribution doubled from the second quarter (from 2% to 4%), while South America grew 25% (from 12% to just over 15%). The Asia Pacific region declined slightly (from 33% to just over 32%), while Europe shed just over 11%, accounting for nearly 35% of observed attack traffic, down from 39% in the second quarter.

	Country/Region	% Traffic	Q2 '10 %
1	United States	12%	11%
2	Russia	8.9%	10%
3	China	8.2%	11%
4	Brazil	7.9%	6.0%
5	Taiwan	7.1%	6.0%
6	Egypt	3.3%	1.6%
7	Italy	3.0%	3.0%
8	Turkey	3.0%	3.0%
9	Peru	2.8%	1.5%
10	Germany	2.6%	3.0%
–	Other	42%	42%

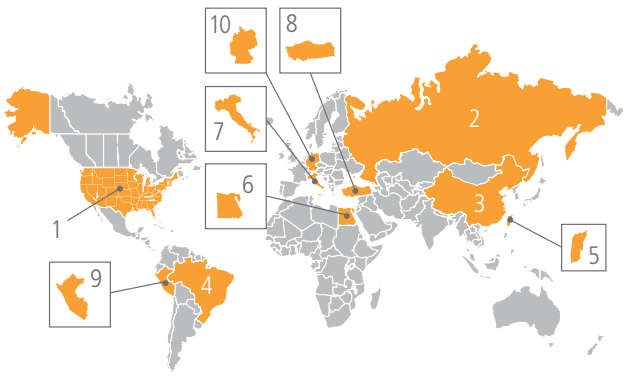


Figure 1: Attack Traffic, Top Originating Countries/Regions

1.2 Attack Traffic, Top Ports

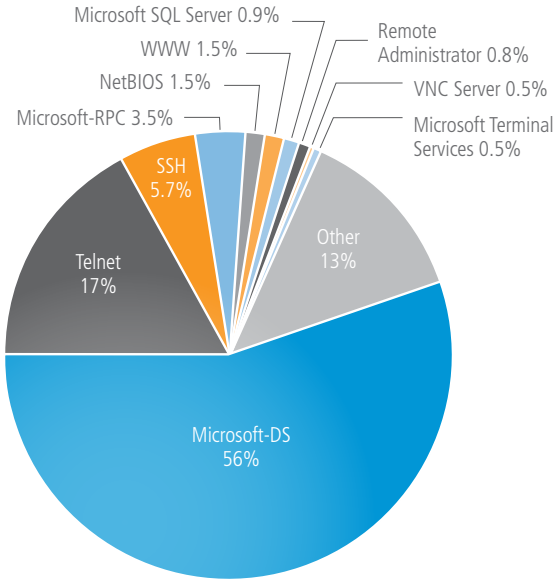
Attack traffic concentration among the top 10 targeted ports remained fairly consistent from the prior quarter, with the top 10 ports responsible for 87% of the observed attacks. Port 445 remained the most targeted port, though the percentage of attack traffic targeting it declined approximately 10% from the prior quarter. Looking back, the percentage of observed attacks targeting Port 445 has steadily declined each quarter since reaching a peak of 78% back in the third quarter of 2009 – one quarter after frenzy around the Conficker worm (which targeted Port 445 in its attempts to propagate) peaked. While the percentages are still fairly significant, this decline may signal ongoing efforts by network service providers to identify and isolate infected systems, as well as ongoing efforts to patch and/or upgrade infected systems.

As shown in Figure 2, beyond Port 445, the remainder of the list of ports among the top 10 was consistent from the second quarter. Attacks targeted at Port 23 (Telnet) saw the largest quarter-over-quarter increase with a near doubling on top of a nearly 4x increase from the first to second quarters of 2010. Online research did not uncover any specific reports of increased attack or scanning activity targeted at Port 23 during the third quarter.

In looking at the port distribution among the top 10 countries, it is interesting to note that Port 23 was overwhelmingly the top targeted port for attacks sourced in Egypt, Peru, and Turkey, responsible for 3.5x to 33x the number of attacks as the second-most targeted port (445, in all three countries). It is not clear if there is a common thread that connects these three countries, nor whether these observed attacks were brute-force login attempts, or some other botnet-related traffic. In six of the other countries/regions in the top 10 (Brazil, Germany, Italy, Russia, Taiwan, and the United States), attacks targeting Port 445 were responsible for anywhere from 5x to 38x as much observed attack traffic as the next most targeted port. China was the lone standout among the top 10, with attacks targeting Port 22 (SSH) responsible for just 12% more attacks than the next most targeted port, which was Port 445.

Port	Port Use	% Traffic	Q2 '10 %
445	Microsoft-DS	56%	62%
23	Telnet	17%	9.2%
22	SSH	5.7%	6.1%
135	Microsoft-RPC	3.5%	3.0%
139	NetBIOS	1.5%	1.9%
80	WWW	1.5%	1.1%
1433	Microsoft SQL Server	0.9%	1.2%
4899	Remote Administrator	0.8%	1.2%
5900	VNC Server	0.5%	0.7%
3389	Microsoft Terminal Services	0.5%	0.4%
Various	Other	13%	–

Figure 2: Attack Traffic, Top Ports



SECTION 2:

Internet Penetration

Through a globally-deployed server network, and by virtue of the billions of requests for Web content that it services on a daily basis, Akamai has unique visibility into the levels of Internet penetration around the world. In the third quarter of 2010, over 533 million unique IP addresses, from 235 countries/regions, connected to the Akamai network – 6.6% more IP addresses than in the second quarter of 2010, and over 20% more than in the same quarter a year ago. Although we see more than half a billion unique IP addresses, Akamai believes that it sees 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), as they access the World Wide Web through a fire-wall or proxy server. Conversely, individual users can have multiple unique IP addresses associated with them, due to their use of mobile devices, personal/home computers, business computers, Internet-connected video/gaming systems, etc. (Mobile connectivity metrics are covered in more detail in Section 5.)

As shown in Figure 3, the top 10 countries remained the same quarter over quarter. The United States and China were once again responsible for a combined 38% of observed IP addresses in the third quarter. Despite strong quarterly and yearly growth seen in both countries, this level has remained rather consistent over the last year. In the third quarter, all of the countries in the top 10 saw quarterly growth, with South Korea's 11% increase leading the way, up from a meager 0.5% increase in the prior quarter. The United Kingdom and Canada reversed declines observed in the second quarter, posting solid 8% and 5% increases respectively. Yearly growth was strong as well, with seven of the top 10 countries experiencing double digit percentage increases. China's count grew by over 30% during the last year, adding approximately 15 million unique IP addresses.

Concentration among the top 10 remained consistent from the second quarter, accounting for approximately 70% of the observed IP addresses. In looking at the "long tail," there were once again 186 countries/regions with fewer than one million unique IP addresses connecting to Akamai in the third quarter of 2010, 138 with fewer than 100,000 unique IP addresses, and 31 with fewer than 1,000 unique IP addresses. The counts for the 100,000 and 1,000 thresholds were down slightly quarter-over-quarter, while the one million IP address threshold was unchanged.

	Country/Region	Q3 '10 Unique IP Addresses	QoQ Change	YoY Change
–	Global	533,866,117	6.6%	20%
1	United States	141,098,737	7.4%	18%
2	China	64,309,649	7.1%	31%
3	Japan	37,535,068	7.8%	19%
4	Germany	31,501,123	0.9%	5.9%
5	France	22,958,984	1.0%	9.9%
6	United Kingdom	21,665,959	8.1%	12%
7	South Korea	18,715,476	11%	22%
8	Brazil	13,040,480	8.6%	21%
9	Canada	12,214,437	4.9%	8.9%
10	Spain	11,952,365	4.4%	15%

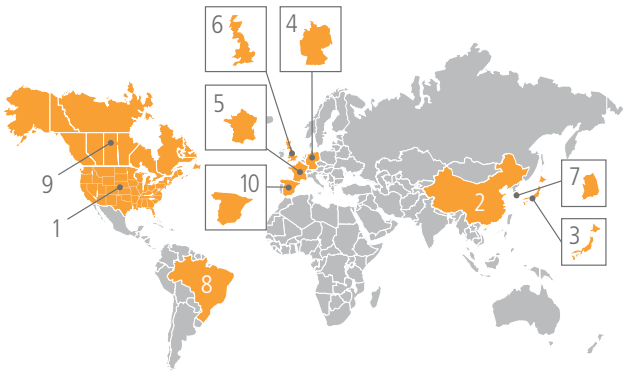


Figure 3: Unique IP Addresses Seen By Akamai

SECTION 3:

Geography – Global

By virtue of the billions of 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, of 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 more 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[1] or the video explanation at *www.akamai.com/whytheedge.*

The data presented within this section was collected during the third quarter of 2010 through Akamai's globally-deployed server network and includes all countries/regions that had more than 1,000 unique IP addresses make requests to Akamai's network during the second quarter. For the purposes of classification in this report, the "broadband"[2] 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 slower than 256 Kbps. Note that the percentage changes reflected below are relative to the prior quarter(s). (That is, a Q2 value of 50% and a Q3 value of 51% would be reflected here as a 2% change.) 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 video 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.[3] In addition to average connection speeds, we continue to report average peak[4] connection speeds 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, as has been done in prior quarters, 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 reported in the present section.

3.1 Global Average Connection Speeds

Globally, average connection speeds once again increased, both quarter-over-quarter and year-over-year, as the global average connection speed gradually closes in on the 2 Mbps "broadband" threshold. However, as shown in Figure 4, changes among the top 10 countries/regions were mixed. Though it remains solidly at the top of the list, South Korea also appears to be locked in a quarterly cycle of gains and losses – in the third quarter, the country's average connection speed saw a quarterly decline of 15% to 14 Mbps. The Netherlands, Latvia, and Denmark also saw negative quarter-over-quarter changes, though they were much more muted than South Korea's. The other six countries among the top 10 saw quarterly growth in their average connection speeds, as did the United States, in twelfth place globally. Taiwan's 24% quarterly growth was the most significant, enabling it to achieve a "high broadband" level average connection speed. In fact, in the third quarter, all of the top 10 countries, as well as the United States, achieved average connection speeds that met or exceeded the "high broadband" threshold of 5 Mbps. On a global basis, many African countries saw the largest quarterly increases, with many increases above 50%, and a couple in excess of 100%. Of course, as these countries also generally had average connection speeds below 1 Mbps, comparatively small shifts in average connection speeds can translate into large percentage changes. Overall, five countries globally increased more than 100% quarter-over-quarter, with another eleven growing 50% or more.

Yearly changes among the listed countries were more positive in the third quarter, with only South Korea seeing a minor decline. Strong double-digit percentage increases were seen in the year-over-year figures for Hong Kong, Romania, the Netherlands, Latvia, and the United States, while increases of approximately 5-10% were seen in the other countries. On a global basis, 23 countries/regions saw year-over-year growth in excess of 100%, though again, the vast majority of these geographies had average connection speeds below 1 Mbps. These countries/regions were predominantly from Asia and Africa, with a couple of small South American nations and a few small island nations in the Pacific Ocean.

During the third quarter, 86 countries/regions had average connection speeds below 1 Mbps, six fewer than in the second quarter. Akamai measured average connection speeds below 100 Kbps in only two countries (Cuba and Mayotte) in the third quarter, down from three the quarter before. (The third country, Tonga, increased its average connection speed to 110 Kbps in the third quarter.) Cuba's average connection speed fell just below the threshold at 93 Kbps, while Mayotte remained the country with the lowest average connection speed, at 51 Kbps.

	Country/Region	Q3 '10 Avg. Mbps	QoQ Change	YoY Change
–	Global	1.9	8.2%	14%
1	South Korea	14	-15%	-3.2%
2	Hong Kong	9.2	7.5%	19%
3	Japan	8.5	5.3%	6.8%
4	Romania	7.0	2.9%	12%
5	Netherlands	6.3	-2.7%	14%
6	Latvia	6.0	-3.4%	27%
7	Czech Republic	5.4	2.2%	4.8%
8	Switzerland	5.3	5.2%	9.9%
9	Taiwan	5.0	24%	9.9%
10	Denmark	5.0	-2.6%	5.9%
…				
12	United States	5.0	8.6%	11%

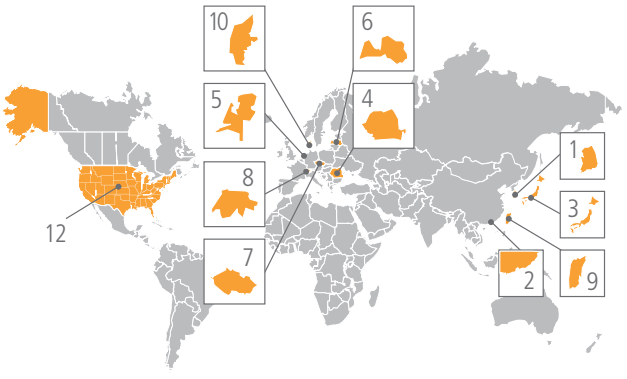


Figure 4: Average Measured Connection Speed by Country/Region

3.2 Global Average Connection Speeds, City View

This edition of the *State of the Internet* report marks a complete year of examining average measured connection speeds at a city level. Throughout these four quarterly reports, we have evolved our aggregation and analysis methodologies, applying filters for unique IP address count (50,000 or more seen by Akamai during the quarter), academic institutions (removing usage from known academic networks), and mobile network traffic (as with the other data sets used in Section 3 of this report).

After several quarters in the first place slot, Masan, South Korea fell to third place globally, bested by South Korean cities Taegu and Taejon. While Masan was the only city with an average connection speed above 20 Mbps in the second quarter, no city surpassed that mark in the third quarter. However, 29 cities achieved average connection speeds in excess of 10 Mbps. These cities were all in Asia, with 13 in South Korea and 16 in Japan.

Regular readers may notice two key differences in Figure 5 as compared to the same table in prior editions of the *State of the Internet* report, with both related to the 50,000 unique IP address threshold. The first is the "sudden" appearance of Taejon, South Korea as the city with the second highest average connection speed, despite not having been listed in prior editions of the report.

It appears that the merger of several local telecom providers and subsequent shifting of IP address blocks pushed the number of unique IP addresses seen from Taejon above the 50,000 address threshold, enabling it to join other cities in South Korea on the list of fastest cities. The second difference is that Umea, Sweden is no longer listed as the fastest European city – an honor that goes to Constanta, Romania this quarter. Unfortunately, the number of unique IP addresses seen from Umea dropped below 50,000 in the third quarter, eliminating it from consideration in the list.

Cities in Asia overwhelmingly continued to dominate the top 100 list, once again accounting for three-quarters of the list, as shown in Figure 5. This included 61 cities in Japan, 13 in South Korea, and Hong Kong. Europe accounted for only ten cities across five countries, down from 15 cities across eight countries in the second quarter. The remaining 15 cities were in North America, with two in Canada and 13 in the United States. Within the United States, five of those 15 were in California.

In looking at the full global list of over 800 cities that qualified for inclusion, the fastest cities in other geographies included Tunis, Tunisia (Africa) with an average connection speed of 3.0 Mbps; Riverwood, New South Wales, Australia (Oceania) with an average connection speed of 5.8 Mbps; and Curitaba, Brazil (South America) with an average connection speed of 2.6 Mbps.

Average connection speeds in excess of 10 Mbps were seen in 13 cities in South Korea and 16 cities in Japan.

	Country/Region	City	Q3 '10 Avg. Mbps
1	South Korea	Taegu	18.3
2	South Korea	Taejon	18.2
3	South Korea	Masan	16.7
4	South Korea	Poryong	15.8
5	South Korea	Seocho	15.5
6	South Korea	Ilsan	15.4
7	South Korea	Samchok	15.3
8	South Korea	Milyang	14.4
9	South Korea	Seoul	14.4
10	South Korea	Anyang	14.1
11	South Korea	Kimchon	13.9
12	Japan	Kanagawa	13.3
13	Japan	Tokai	13.0
14	Japan	Shimotsuma	12.8
15	Japan	Urawa	12.0
16	South Korea	Suwon	11.9
17	Japan	Asahi	11.9
18	Japan	Yokohama	11.7
19	Japan	Tochigi	11.7
20	Japan	Shizuoka	11.4
21	Japan	Hiroshima	11.0
22	South Korea	Yongsan	10.5
23	Japan	Kyoto	10.5
24	Japan	Ibaraki	10.5
25	Japan	Chiba	10.5
26	Japan	Kobe	10.3
27	Japan	Gifu	10.2
28	Japan	Marunouchi	10.0
29	Japan	Wakayama	10.0
30	Japan	Nagoya	9.9
31	Japan	Nara	9.9
32	Japan	Niho	9.7
33	Japan	Yokkaichi	9.6
34	Japan	Hyogo	9.6
35	Japan	Otsu	9.5
36	Japan	Sendai	9.4
37	Japan	Nagano	9.4
38	Japan	Fukuoka	9.3
39	Japan	Fukushima	9.3
40	Japan	Kanazawa	9.2
41	Japan	Matsuyama	9.1
42	Japan	Hakodate	9.1
43	Japan	Hodogaya	9.0
44	Japan	Hamamatsu	9.0
45	Japan	Tokushima	9.0
46	Hong Kong	Hong Kong	8.9
47	Japan	Fukui	8.9
48	Romania	Constanta	8.8
49	Japan	Yamaguchi	8.8
50	Japan	Kochi	8.8
51	Japan	Soka	8.7
52	France	Asnieres	8.5
53	Japan	Mito	8.4
54	Japan	Niigata	8.4
55	Japan	Utsunomiya	8.3
56	Japan	Kokuryo	8.3
57	United States	San Jose, CA	8.3
58	Japan	Okayama	8.3
59	Japan	Miyazaki	8.2
60	Japan	Yamagata	8.2
61	Japan	Toyama	8.1
62	Japan	Tokyo	8.0
63	Japan	Yosida	7.9
64	Japan	Osaka	7.9
65	Japan	Kumamoto	7.9
66	Japan	Kagoshima	7.8
67	Japan	Kofu	7.8
68	Japan	Tottori	7.7
69	Japan	Saga	7.7
70	Romania	Timisoara	7.7
71	Japan	Iwaki	7.6
72	Romania	Iasi	7.5
73	Japan	Nagasaki	7.5
74	Germany	Baden-Baden	7.4
75	Japan	Kagawa	7.4
76	Canada	Victoria	7.4
77	Norway	Lyse	7.3
78	Canada	Oakville	7.3
79	Japan	Oita	7.3
80	Japan	Okidate	7.2
81	Netherlands	Amsterdam	7.1
82	Netherlands	Joure	7.1
83	United States	Fremont, CA	7.0
84	Netherlands	's-Hertogenbosch	7.0
85	Netherlands	Hengelo	7.0
86	Japan	Akita	6.9
87	Japan	Naha	6.9
88	United States	Boston Metro, MA	6.8
89	United States	Oakland, CA	6.8
90	United States	Riverside, CA	6.8
91	United States	Jersey City, NJ	6.8
92	Japan	Sapporo	6.7
93	United States	Saint Paul, MN	6.7
94	United States	Traverse City, MI	6.6
95	United States	Union, NJ	6.6
96	United States	Staten Island, NY	6.5
97	United States	Aurora, CO	6.5
98	Japan	Morioka	6.4
99	United States	Arvada, CO	6.4
100	United States	Garden Grove, CA	6.4

Figure 5: Average Measured 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.

As shown in Figure 6, average peak connection speeds demonstrated both quarterly and yearly growth on a global basis for all countries within the top 10. Quarterly increases of 10% or more were seen in seven of the top 10 countries, while year-over-year increases were even more significant. Sweden had the most modest year-over-year increase in the third quarter, at just under 4%, while Monaco and Latvia increased 65% and 64% respectively. Portugal and Belgium increased their average peak connection speeds in excess of 40% more than in the same period a year before, and the United States, Romania, and Hong Kong experienced yearly growth in excess of 30%, as did the global metric.

South Korea, Hong Kong, and Japan continued to hold the top three slots, all with average peak connection speeds above 30 Mbps. The United States moved back into the top 10, with an average connection speed of 20 Mbps, with countries in Western Europe rounding out the top 10.

In examining the average peak speed distribution around the world, only four countries/regions had speeds of 30 Mbps or more, with another four achieving average peak connection speeds of 20 Mbps or more, and an additional 54 in excess of 10 Mbps. Only two countries/regions saw average peak connection speeds below 1 Mbps (down from six countries in the second quarter) – both Tonga and the British Indian Ocean Territory recorded speeds of just 0.9 Mbps.

	Country/Region	Q3 '10 Peak Mbps	QoQ Change	YoY Change
–	Global	8.1	18%	35%
1	South Korea	39	3.8%	18%
2	Hong Kong	36	13%	39%
3	Japan	31	10%	17%
4	Romania	30	11%	34%
5	Latvia	23	15%	64%
6	Belgium	20	6.7%	45%
7	United States	20	19%	30%
8	Monaco	20	11%	65%
9	Portugal	19	13%	42%
10	Sweden	19	2.6%	3.9%

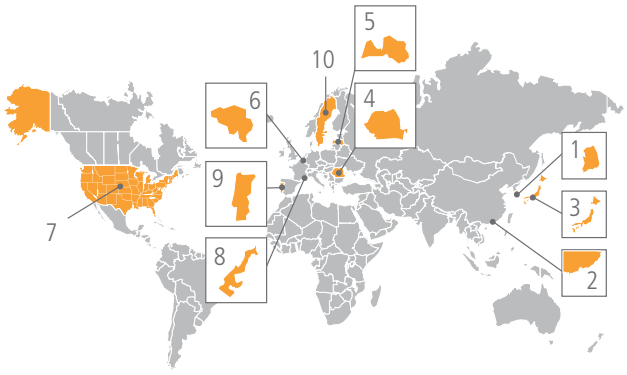


Figure 6: Average Peak Connection Speed by Country/Region

3.4 Global Average Peak Connection Speeds, City View

As we have done in the prior two 2010 editions of the *State of the Internet* report, we again examine average peak connection speeds at a city level, applying filters for unique IP address count (50,000 or more seen by Akamai in the third quarter) and academic institutions (removing data from known academic networks). In addition, as with the other data sets used in Section 3 of this report, traffic from known mobile networks has been removed.

As shown in Figure 7, newcomer Taejon, South Korea topped the list with an average peak connection speed of nearly 58 Mbps. (See Section 3.2 above for a discussion on Taejon's "sudden" appearance at the top of the city view lists.) Second place city Taegu, South Korea also recorded an average peak connection speed of over 50 Mbps in the third quarter. Former first place city Masan, South Korea saw a 1 Mbps speed increase (to 45.4 Mbps) from the second quarter, but fell to sixth place. Overall, 19 cities recorded average peak connection speeds in excess of 40 Mbps, including Taejon and Taegu – this is up from eight cities in the second quarter, and just three in the first quarter of 2010. Among the balance of the top 100 cities, 44 more have average peak connection speeds in excess of 30 Mbps (up from 32 in the second quarter), and the remaining 37 were all above 20 Mbps.

Cities in Asia continued to dominate this metric, with the top 100 list including Hong Kong, 60 cities in Japan, and 13 in South Korea. The top European city for this metric remained Constanta, Romania, and it was joined by seven other European cities, including three others from Romania, as well as one each from France, Germany, Norway, and Portugal. The United States rounded out the top 100 list with 18 cities, including eight from California.

In looking at the full global list of over 800 cities that qualified for inclusion, the fastest cities in other geographies included Tunis, Tunisia (Africa) with an average peak connection speed of 16.6 Mbps; Riverwood, New South Wales, Australia (Oceania) with an average peak connection speed of 18.2 Mbps; and Curitaba, Brazil (South America) with an average peak connection speed of 11.3 Mbps.

Cities in Asia dominated the Global Average Peak Connection Speed metric, with 60 cities in Japan and 13 cities in South Korea among the top 100.

	Country/Region	City	Q3 '10 Peak Mbps
1	South Korea	Taejon	57.6
2	South Korea	Taegu	52.5
3	Japan	Tokai	47.1
4	Japan	Marunouchi	46.5
5	Japan	Kanagawa	46.5
6	South Korea	Masan	45.4
7	Japan	Shimotsuma	45.2
8	South Korea	Samchok	43.6
9	South Korea	Poryong	43.3
10	Japan	Yokohama	43.0
11	Japan	Urawa	42.9
12	South Korea	Seocho	42.1
13	Japan	Chiba	41.4
14	Japan	Tochigi	41.2
15	South Korea	Kimchon	41.1
16	South Korea	Ilsan	40.9
17	Japan	Hiroshima	40.8
18	Japan	Shizuoka	40.5
19	Japan	Asahi	40.1
20	Japan	Hodogaya	39.9
21	South Korea	Seoul	39.8
22	Romania	Constanta	39.2
23	South Korea	Milyang	39.1
24	South Korea	Anyang	38.8
25	Japan	Soka	38.7
26	South Korea	Suwon	38.6
27	Japan	Kobe	38.0
28	Japan	Fukuoka	37.2
29	Japan	Nagano	37.2
30	South Korea	Yongsan	37.1
31	Japan	Kyoto	36.8
32	Japan	Nagoya	36.3
33	Romania	Timisoara	36.3
34	Japan	Gifu	36.1
35	Japan	Ibaraki	36.1
36	Japan	Niho	35.5
37	Japan	Yokkaichi	35.3
38	Hong Kong	Hong Kong	35.2
39	France	Asnieres	35.2
40	Japan	Sendai	35.2
41	Japan	Wakayama	34.8
42	Japan	Nara	34.7
43	Japan	Kokuryo	34.6
44	Japan	Otsu	34.5
45	Japan	Mito	34.5
46	United States	San Jose, CA	34.3
47	Romania	Iasi	34.2
48	Japan	Kanazawa	34.0
49	Japan	Utsunomiya	33.5
50	Japan	Yosida	33.5
51	Japan	Hamamatsu	33.2
52	Japan	Hakodate	33.0
53	Japan	Niigata	32.5
54	Japan	Fukui	32.5
55	Japan	Yamaguchi	32.3
56	Japan	Tokushima	32.2
57	Japan	Fukushima	32.0
58	Japan	Matsuyama	31.8
59	Japan	Iwaki	31.1
60	Japan	Toyama	30.8
61	Japan	Kofu	30.6
62	Japan	Kochi	30.5
63	Japan	Okayama	30.2
64	Germany	Baden-Baden	29.9
65	Japan	Yamagata	29.9
66	Japan	Osaka	29.5
67	United States	Federal Way, WA	28.8
68	United States	Oakland, CA	28.8
69	United States	Garden Grove, CA	28.7
70	United States	Fremont, CA	28.6
71	Japan	Okidate	28.5
72	United States	Salem, OR	28.3
73	Japan	Sapporo	28.2
74	Japan	Tokyo	28.0
75	Romania	Bucharest	27.8
76	United States	Vancouver, WA	27.8
77	United States	Boston Metro, MA	27.7
78	Japan	Kumamoto	27.7
79	United States	Hayward, CA	27.5
80	Norway	Lyse	27.4
81	Japan	Hyogo	27.3
82	Japan	Akita	27.2
83	Japan	Miyazaki	27.2
84	Japan	Kagawa	27.2
85	United States	Fairfield, CA	27.2
86	Japan	Kagoshima	27.0
87	Portugal	Coimbra	26.9
88	Japan	Tottori	26.7
89	United States	San Mateo, CA	26.7
90	United States	Hollywood, FL	26.7
91	Japan	Saga	26.6
92	United States	Saint Paul, MN	26.6
93	United States	Tacoma, WA	26.4
94	Japan	Morioka	26.3
95	United States	Staten Island, NY	26.3
96	United States	Arvada, CO	26.2
97	Japan	Nagasaki	26.2
98	United States	Jersey City, NJ	26.2
99	Japan	Naha	26.1
100	United States	Riverside, CA	26.0

Figure 7: Average Peak Connection Speed, Top Global Cities

3.5 Global High Broadband Connectivity

In the third quarter of 2010, global high broadband adoption remained essentially flat, gaining just 3% but staying (due to rounding) at the 22% level. As shown in Figure 8, despite a 3.7% quarterly decline, South Korea remained the country with the highest level of high broadband adoption, at 72%, staying far ahead of second-place Japan, which once again saw 60% high broadband adoption. In addition to the slight quarterly declines seen in South Korea and Japan, the Netherlands, Latvia, Denmark, and Belgium also had lower levels of high broadband adoption in the third quarter. Hong Kong and the United States, however, saw strong increases in high broadband adoption quarter-over-quarter, growing 15% and 11% respectively. Romania and Canada increased as well, both posting quarterly growth of just over 4%. Yearly changes were generally positive, with significant double-digit percentage growth seen in five countries/regions, while the year-over-year declines seen in South Korea and Japan were fairly minor.

Looking at high broadband adoption on a global basis, there are now four countries/regions where more than half of the connections to Akamai are at speeds greater than 5 Mbps, up from just two in the second quarter. Beyond that, there are 15 additional countries/regions where more than a quarter of the connections are at high broadband rates and 22 more where one in ten connections to Akamai are faster than 5 Mbps. On the other end of the spectrum, there were 18 countries/regions, with high broadband adoption rates below 1% – Egypt and Venezuela recorded the lowest rates, at just 0.2%.

As part of the National Broadband Plan initiative, the United States Federal Communications Commission published a report[5] in August 2010 entitled *Broadband Performance*. Figure 18 of the report illustrates "Distribution of Users by Actual Download Speed", based in part on data from the *3rd Quarter, 2009 State of the Internet* report. Within Figure 18 of the FCC report, we note that 28% of the connections were at speeds between 5-10 Mbps, while just 6% were at speeds above 10 Mbps.

	Country/Region	% Above 5 Mbps	QoQ Change	YoY Change
–	Global	22%	3.0%	7.8%
1	South Korea	72%	-3.7%	-2.4%
2	Japan	60%	-0.4%	-0.7%
3	Hong Kong	53%	15%	33%
4	Romania	50%	4.4%	8.5%
5	Netherlands	49%	-0.6%	27%
6	Latvia	42%	-1.1%	68%
7	Denmark	35%	-5.2%	6.4%
8	Belgium	35%	-13%	6.0%
9	United States	34%	11%	17%
10	Canada	32%	4.1%	33%

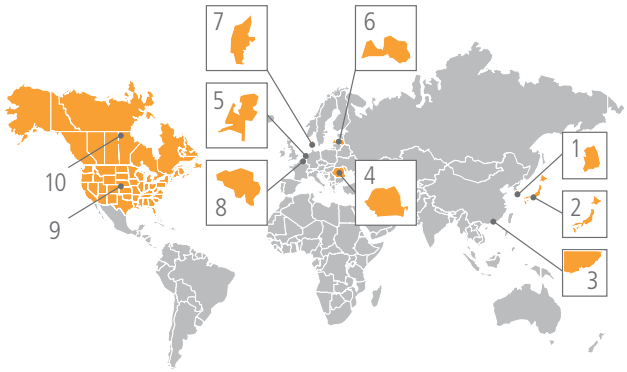


Figure 8: High Broadband Connectivity, Fastest Countries/Regions

In examining the speed distribution for the third quarter of 2010, we find that there has been a slight shift to higher speed connections, as 27% of connections were between 5-10 Mbps, while 7% are now above 10 Mbps. Globally, the Netherlands had the highest percentage of their connections to Akamai at speeds between 5-10 Mbps, while at the high end; South Korea had the largest percentage of connections to Akamai at speeds above 25 Mbps. In fact, South Korea was the only country with more than 10% of their connections exceeding that level.

3.6 Global Broadband Connectivity

As shown in Figure 9, with the exception of a 46% increase in Tunisia, quarter-over-quarter changes for global broadband connectivity were fairly minor in the third quarter. It is not immediately clear what drove this major growth in Tunisia's broadband adoption rate, though a Tunisian cabinet meeting in May appeared to focus on increasing Internet bandwidth to the country, as well as "Generalizing the use of the Internet through fixed and mobile telecommunications networks while improving services" and "Increas[ing] Internet access in public places, schools, universities, public libraries and youth houses."[6] Other than the slight 0.4% declines seen in South Korea and Latvia, broadband adoption grew in the third quarter on a global basis, in the United States, and in eight of the top 10 countries.

Aside from Tunisia's near-doubling, year-over-year changes globally, among the other top 10 countries, and in the United States were fairly modest. On a global basis, however, the yearly changes were more pronounced, with nearly 100 countries/regions seeing greater than 10% growth, including 45 with 100% or greater yearly increases, and four (Réunion, Angola, Syria, and Botswana) that grew 1000% or more. In looking at the list of countries/regions that grew broadband adoption more than 100% over the course of the year, there do not appear to be definitive patterns that necessarily explain the change. While there are some where Akamai saw just over 1000 unique IP addresses for the metric, or some that have very low levels of broadband adoption (where relatively small changes in adoption can translate to large percentage changes over time), there are a number of others with millions of unique IP addresses seen by Akamai, or with broadband adoption levels in excess of 20%.

In the third quarter, only seven (down from eight in the second quarter) countries/regions saw adoption levels of 90% or better, though Croatia, Latvia, and the Czech Republic could all surpass that threshold with just minor quarterly growth going forward. In addition, in the third quarter, 61 countries/regions had broadband adoption levels in excess of 50% – up from 55 countries/regions in the second quarter, and just 40 in the same period a year earlier.

	Country/Region	% Above 2 Mbps	QoQ Change	YoY Change
–	Global	60%	2.5%	6.5%
1	Monaco	96%	0.8%	12%
2	Tunisia	95%	46%	97%
3	Isle Of Man	95%	1.9%	3.2%
4	South Korea	93%	-0.4%	-1.2%
5	Hong Kong	93%	0.8%	6.4%
6	Switzerland	92%	0.3%	0.2%
7	Romania	91%	7.2%	6.7%
8	Croatia	89%	1.7%	2.0%
9	Latvia	89%	-0.4%	12%
10	Czech Republic	89%	1.2%	5.8%
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39	United States	74%	3.3%	7.8%

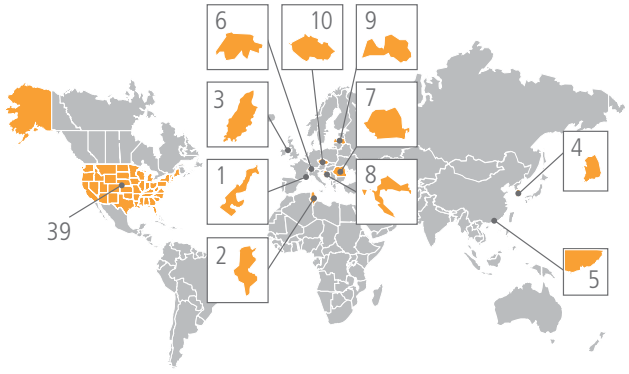

Figure 9: Broadband Connectivity, Fast Countries/Regions

3.7 Global Narrowband Connectivity

As shown in Figure 10, the global level of narrowband adoption dropped below 4% in the third quarter, due to strong declines on both a quarterly and yearly basis. However, among countries in the top 10, the percentage of connections to Akamai at speeds below 256 Kbps remains fairly high, with a mix of quarterly and yearly changes. Though seeing slight quarterly and yearly declines, Mayotte remains at the top of the list, with 98% of connections to Akamai in the narrowband range. Mayotte is joined by five other countries that also have narrowband adoption rates above 90%.

However, a September announcement[7] from France Telecom regarding a planned submarine cable noted, "Extending the LION cable to Kenya via the island of Mayotte, the 3,000 km LION2 cable will provide Mayotte with access to a broadband Internet network with 1.28 Tbps of total capacity." While the eventual presence of this high-capacity international connection won't necessarily equate to improved network infrastructure in this small island nation, such a significant improvement in outbound capacity may potentially help to drive Mayotte's narrowband adoption levels down going forward. In addition to general availability, an additional key driver of increased adoption of broadband connectivity is cost. According to data published by the International Telecommunications Union (ITU) in September, the price of a fixed line broadband connection as a percentage of monthly income exceeded 1000% in four African countries, with connections in the Central African Republic costing a staggering 3891% of monthly income.[8]

The United States continued to have lower levels of broadband adoption as well, shedding over 5% on a quarterly basis, and 27% on a yearly basis. This trend is in line with ongoing growth in both broadband and high broadband adoption levels. Survey results reported in an August 2010 report[9] from the Pew Internet & American Life Project entitled *Home Broadband 2010* noted that 5% of American adults go online using a dial-up connection. While this rate is nearly double the 2.6% narrowband adoption figure observed by Akamai, the levels of dial-up use have steadily declined year-over-year since 2001.

Nearly 60 countries/regions around the world recorded broadband adoption levels below the global figure of 3.7% in the third quarter. Romania, Bulgaria, South Korea, and Israel all recorded the lowest levels, at 0.2%. Globally, 133 countries/regions saw lower quarter-over-quarter levels of narrowband adoption, from Mayotte's 0.5% decline to Suriname's 78% loss, while 148 recorded lower levels year-over-year, ranging from Lebanon being 0.2% lower than in the third quarter of 2009 to Armenia coming in 93% lower than the same period a year ago.

	Country/Region	% Below 256 Kbps	QoQ Change	YoY Change
–	Global	3.7%	-19%	-19%
1	Mayotte	98%	-0.5%	-1.6%
2	Wallis And Futuna	96%	-0.6%	-2.7%
3	Tonga	95%	-3.1%	0.7%
4	Solomon Islands	94%	20%	-4.1%
5	Cuba	93%	-2.3%	-2.2%
6	Congo	90%	3.5%	-4.4%
7	Niger	84%	-2.0%	-6.0%
8	British Indian Ocean Territory	84%	3.3%	-16%
9	Cameroon	83%	29%	-9.3%
10	Uzbekistan	83%	0.6%	4.5%
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116	United States	2.6%	-5.4%	-27%

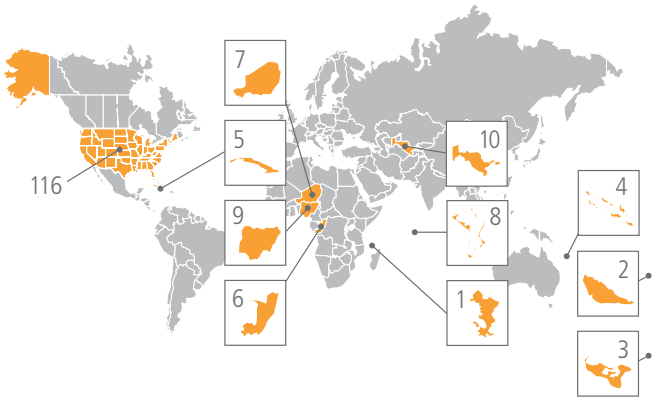

Figure 10: Narrowband Connectivity, Slowest Countries/Regions

SECTION 4:

Geography–United States

The metrics for the United States presented here are based on a subset of the data used for Section 3, and are subject to the same thresholds and filters discussed within the prior 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[10] geolocation tool.)

4.1 United States Average Connection Speeds

The overall average connection speed for the United States as a whole in the third quarter of 2010 was 5.0 Mbps. Consistent with the prior two quarters, this average connection speed was exceeded by 21 states and the District of Columbia. Despite minor quarterly and yearly declines, Delaware continued to maintain its standing as the fastest state. However, the remainder of the top 10 list all experienced positive quarter-over-quarter and year-over year growth, as shown in Figure 11. Among the top 10, quarterly growth was particularly strong in Utah, the District of Columbia, Vermont, California, and Minnesota, which all recorded growth in excess of 10%. Across the whole country, 18 states and the District of Columbia had greater than 10% quarterly growth. From a yearly perspective, among the top 10, Utah, the District of Columbia, Rhode Island, California, and Minnesota all grew 10% or more year-over-year, while across the whole country, 30 states and the District of Columbia saw that level of yearly growth. Both quarterly and yearly losses were rather muted in the third quarter, with only Delaware (-0.9%) and West Virginia (-5.0%) declining quarter-over-quarter, and Maryland (-0.4%), New York (-0.4%), Delaware (-1.0%), and North Carolina (-1.5%) declining year-over-year.

	State	Q3 '10 Avg. Mbps	QoQ Change	YoY Change
1	Delaware	7.1	-0.9%	-1.0%
2	Utah	6.4	23%	13%
3	District Of Columbia	6.4	14%	12%
4	Rhode Island	6.3	2.2%	13%
5	Vermont	6.2	17%	7.5%
6	New Hampshire	6.1	2.9%	2.6%
7	Massachusetts	5.9	8.7%	2.2%
8	California	5.8	11%	17%
9	Nevada	5.6	2.8%	8.9%
10	Minnesota	5.5	21%	28%

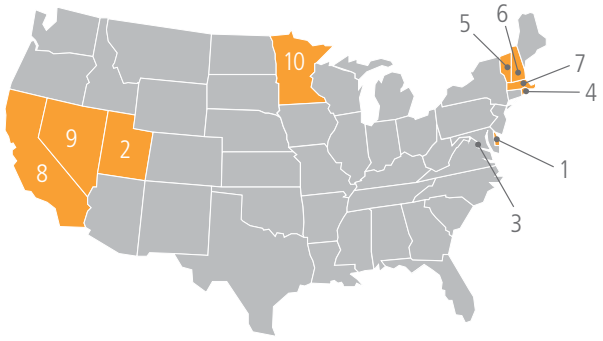

Figure 11: Average Measured Connection Speed by State

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 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.

It appears that there was a fair amount of improvement, and movement, within the top 10 United States cities with the highest average connection speeds during the third quarter. As shown in Figure 12, San Jose, CA topped the list, with an average connection speed of 8.3 Mbps, exceeding Monterey Park's 6.9 Mbps average connection speed, which topped the list in the second quarter. Even Staten Island's 6.5 Mbps average connection speed is higher than the average connection speeds that were recorded in eight of the top 10 cities in the second quarter.

In the second quarter, California dominated the list, with seven of the top 10 cities. However, in the third quarter, only four of the fastest United States cities are in California – the East Coast made a strong showing with four cities in Massachusetts, New York, and New Jersey, while cities in Minnesota and Michigan rounded out the top 10. It is not immediately clear what drove the large quarterly average speed increases seen in many cities in the third quarter.

	City	Q3 '10 Avg. Mbps
1	San Jose, CA	8.3
2	Fremont, CA	7.0
3	Boston Metro, MA	6.8
4	Oakland, CA	6.8
5	Riverside, CA	6.8
6	Jersey City, NJ	6.8
7	Saint Paul, MN	6.7
8	Traverse City, MI	6.6
9	Union, NJ	6.6
10	Staten Island, NY	6.5

Figure 12: Average Measured Connection Speed, Top United States Cities by Speed

4.3 United States Average Peak Connection Speeds

The overall average peak connection speed calculated by Akamai for the United States as a whole for the third quarter of 2010 was 20 Mbps. This was met or exceeded by 21 states and the District of Columbia. As shown in Figure 13, for the first time, all of the states in the top 10 achieved average peak connection speeds above 20 Mbps. In addition, extremely strong growth was seen among the top 10 on both a quarterly and yearly basis, with all of the listed states seeing growth in excess of 10% for both metrics. While the second quarter saw strong yearly growth for many of the states in the top 10, and modest mixed changes on a quarterly basis, in the third quarter improvements in average peak connection speeds clearly became more aggressive. For the first time since we began tracking this metric in the *1st Quarter, 2010 State of the Internet* report, increases in average peak connection speeds were seen in every state both quarter-over-quarter and year-over-year. In the third quarter, both trends were strongly positive, with quarterly growth ranging from 45% in Idaho to 8.7% in Missouri, and yearly growth ranging from 72% in Montana to 18% in New Hampshire.

As the average peak connection speed represents, in essence, the speed that end users' Internet connections are capable of, the strong growth seen over the last two quarters may represent greater availability, and increased adoption, of higher speeds tiers of consumer connectivity, as well as a potential increase in the integration of so-called "speed boosting" technologies within last mile networks.

	State	Q3 '10 Peak Mbps	QoQ Change	YoY Change
1	Delaware	28	17%	19%
2	Rhode Island	25	18%	27%
3	District Of Columbia	25	25%	32%
4	Hawaii	25	18%	27%
5	Vermont	24	35%	29%
6	New Hampshire	24	12%	18%
7	Massachusetts	23	21%	25%
8	California	23	20%	41%
9	Virginia	22	29%	32%
10	Washington	22	16%	27%

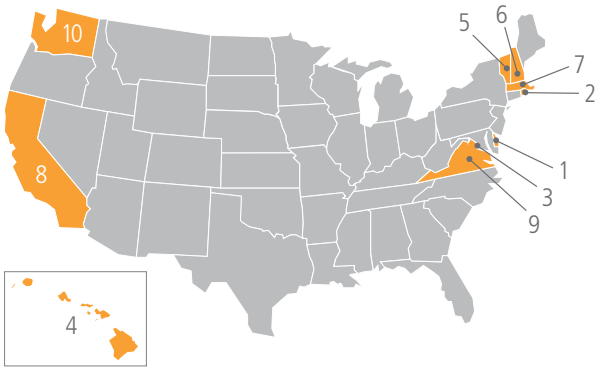

Figure 13: Average Peak Connection Speed by State

4.4 United States Average Peak Connection Speeds, City View

In the third quarter, the city view of average peak connection speeds continued to be dominated by cities on the West Coast, as illustrated in Figure 14. The Boston Metro area was the sole East Coast location to be included in the top 10. (Hickory, NC had that distinction in the second quarter.) Consistent with the average peak connection speed increases seen at a state level, and with the increases in average connection speeds seen at a city level, growth in average peak connection speeds at a city level was extremely aggressive in the third quarter as well. San Jose, CA topped the list at 34.2 Mbps, and the 27.2 Mbps average peak connection speed in Fairfield, CA was higher than any of the top 10 cities listed in the *2nd Quarter, 2010 State of the Internet* report.

In looking at the complete list of qualifying cities, we once again note that, for the third consecutive quarter, there were no cities from Delaware, North Dakota, or Vermont on the list. While this would normally seem unusual, it appears that for most of the cities within these three states, the estimated populations are sufficiently low that most would be challenged to have 50,000 unique IP addresses geolocated to those cities.

	City	Q3 '10 Peak Mbps
1	San Jose, CA	34.2
2	Federal Way, WA	28.8
3	Oakland, CA	28.8
4	Garden Grove, CA	28.7
5	Fremont, CA	28.6
6	Salem, OR	28.4
7	Vancouver, WA	27.8
8	Boston Metro, MA	27.7
9	Hayward, CA	27.5
10	Fairfield, CA	27.2

Figure 14: Average Peak Connection Speed, Top United States Cities by Speed

4.5 United States High Broadband Connectivity

In contrast to the strong growth seen in the United States for average and average peak connection speeds, changes among the top 10 states for high broadband adoption were mixed in the third quarter. As shown in Figure 15, five of the top 10 states had positive quarterly growth, while four declined slightly. (Oddly, New Jersey's level of high broadband adoption stayed flat quarter-over-quarter.) Looking at year-over-year changes, seven of the top 10 states had positive growth, including Rhode Island's massive 47% jump. Only two of the states in the top 10 saw high broadband adoption decrease since the same period a year ago.

Across the whole country, trending was, by and large, mostly positive. In looking at quarter-over-quarter changes, only seven states had lower levels of high broadband adoption than in the second quarter, with Delaware's modest 3.4% decline coming in as the largest loss. Quarterly increases in high broadband adoption of 10% or more were seen in 23 states and the District of Columbia, with New Mexico topping the list at 60% growth. In looking at year-over-year changes, only eight states had lower levels of high broadband adoption than in the third quarter of 2009, with New York's 11% decline coming in as the largest loss. Yearly increases in high broadband adoption of 10% or more were seen in 28 states and the District of Columbia. Included in that figure are four states (Alaska, Minnesota, Montana, and Alabama) that grew high broadband adoption more than 100% year-over-year, with Alaska's massive 191% growth leading the way.

Ideally, these positive trends in high broadband adoption will continue to increase over time, especially as additional funding for broadband programs is awarded by the United States government. In July, $795 million in "broadband expansion grants" was awarded[11] to projects in[12] 36 states and the District of Columbia. Additionally, $1.2 billion in funding was awarded by the Rural Utilities Service in August, mostly for rural DSL and wireless expansion.[13] However, the *Sixth Broadband Deployment Report*, published[14] by the United States FCC in July, estimated that 24 million Americans are living in areas considered to be "unserved by broadband", meaning that they don't have access at home to Internet connections of at least 4 Mbps for downloads and 1 Mbps for uploads, and noted that "Notwithstanding tremendous efforts by industry and government, those Americans will not gain such access in the near future absent changes in policy."

	State	% Above 5 Mbps	QoQ Change	YoY Change
1	Delaware	64%	-3.4%	2.2%
2	New Hampshire	54%	2.2%	1.5%
3	Rhode Island	51%	-1.9%	47%
4	District Of Columbia	47%	6.9%	13%
5	Massachusetts	45%	4.8%	3.0%
6	New Jersey	45%	0.0%	-1.5%
7	Maryland	43%	-2.3%	0.2%
8	New York	41%	12%	-11%
9	Vermont	40%	12%	-9.8%
10	Nevada	39%	-0.3%	4.9%

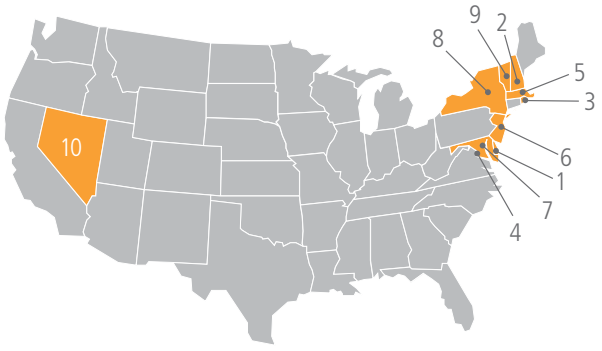

Figure 15: High Broadband Connectivity, Fastest U.S. States

4.6 United States Broadband Connectivity

Broadband adoption within the United States remained strong in the third quarter, with Delaware holding steady at 97%, and all of the top 10 states seeing broadband adoption of 80% or more, as shown in Figure 16. Four states within the top 10 (Delaware, Rhode Island, New Hampshire, and Hawaii) achieved 90% or greater adoption. Across the country, nearly all of the states saw broadband adoption of 50% or more, with only Idaho (49%) and Iowa (46%) falling just short. However, with both states posting quarterly gains of 11%, another quarter of similar growth could propel them above the 50% mark as well.

Among the top 10 states, Delaware was the only one to experience a quarterly decline, losing just 0.3%. Across the whole country, only two other states (Mississippi and Maryland) posted quarterly declines, also minor at 0.3% and 0.1% respectively. Vermont was the only state among the top 10, and across the whole country, to see a yearly decline, losing 3.7%.

Interestingly, Delaware's year-over-year change was flat in the third quarter, and has been relatively small in prior quarters, likely indicating that it has peaked at 97-98% broadband adoption. While the levels of quarterly and yearly growth were not as significant as those seen for high broadband adoption, the trends are still overwhelmingly positive, which likely bodes well for the long term.

	State	% Above 2 Mbps	QoQ Change	YoY Change
1	Delaware	97%	-0.3%	0.0%
2	Rhode Island	92%	2.9%	8.1%
3	New Hampshire	91%	0.9%	3.2%
4	Hawaii	90%	3.1%	5.3%
5	Connecticut	85%	0.8%	3.9%
6	Nevada	84%	2.3%	9.2%
7	Maine	83%	4.9%	0.9%
8	New York	81%	2.5%	2.7%
9	New Jersey	80%	2.5%	7.0%
10	Vermont	80%	5.3%	-3.7%

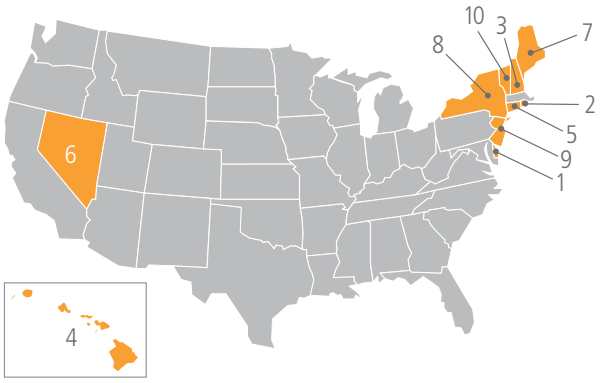

Figure 16: Broadband Connectivity, Fast U.S. States

4.7 United States Narrowband Connectivity

The percentage of connections to Akamai at speeds below 256 Kbps from U.S. states continues to drop, highlighting a trend over time to higher speed connectivity. As shown in Figure 17, nine of the top 10 states with the highest percentages of narrowband (<256 Kbps) connections saw quarter-over-quarter declines, with only Washington seeing an increase, and a barely perceptible one at that. Across the whole United States, 39 states and the District of Columbia saw narrowband adoption drop from second quarter levels. South Dakota saw the greatest decline, losing 43% quarter-over-quarter. Of the states that saw quarterly increases, Delaware's was the largest at 59%, but with narrowband adoption of only 0.3%, even extremely small changes can translate into large percentage swings.

All of the top 10 states with the highest percentages of narrowband connections saw year-over-year declines, as did 36 other states and the District of Columbia. Of the four states that grew their narrowband adoption levels on a yearly basis, Delaware also had the greatest increase at 35%, followed closely by Nebraska's 30%. Increases in West Virginia and Virginia were more modest, at 7.0% and 3.5% respectively.

In the third quarter, nine states (up from four in the second quarter) had narrowband adoption of 1% or less. Delaware remained the lowest, at 0.3%, which is in line with its standing as the state with the highest levels of broadband and high broadband adoption, as well as having the highest average and average peak connection speeds. Forty-eight states, inclusive of those nine, have narrowband adoption levels below 5%, and if the rate of change in Alaska continues at its current pace, it will likely pass that threshold soon as well.

	State	% Below 256 Kbps	QoQ Change	YoY Change
1	District Of Columbia	6.1%	-5.4%	-28%
2	Missouri	5.6%	-2.0%	-24%
3	Alaska	5.4%	-30%	-42%
4	Iowa	4.8%	-13%	-33%
5	Georgia	4.5%	-1.1%	-24%
6	Illinois	3.8%	-4.0%	-17%
7	Ohio	3.8%	-0.6%	-24%
8	Colorado	3.7%	-1.4%	-21%
9	Texas	3.5%	-4.3%	-25%
10	Washington	3.3%	0.2%	-23%

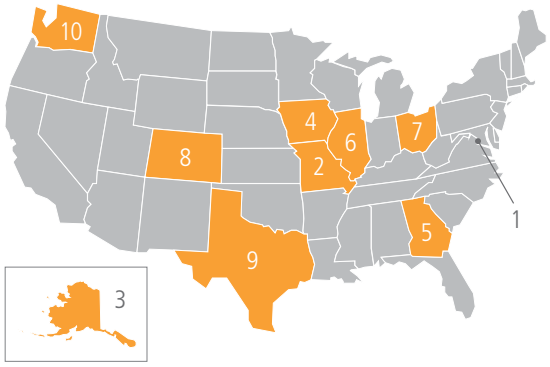

Figure 17: Narrowband Connectivity, Slowest U.S. States

SECTION 5:
Mobile Connectivity

Building on the data presented in the *State of the Internet* reports over the last several quarters, Akamai continues to identify additional mobile networks for inclusion in the report. The source data for this section encompasses usage not only from smartphones, but also laptops, tablets, and other devices that connect to the Internet through these mobile networks. 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 third quarter of 2010 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 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 continental assignments.

5.1 Attack Traffic From Mobile Networks, Top Originating Countries

In looking at attack traffic observed by Akamai during the third quarter of 2010 from known mobile network providers, we see that the top 10 countries are spread across North & South America, Eastern & Western Europe, and Asia, as shown in Figure 18. Nine of the top 10 countries are the same as in the second quarter, with Ireland ceding the tenth place slot to Lithuania in the third quarter. Italy remained the source of the largest amount of observed attack traffic from known mobile network providers, up about 10% quarter-over-quarter. Observed attack traffic from the United Kingdom grew nearly 80% from the second quarter, landing it in second place. Chile, Poland, China, and the United States also saw quarterly growth in observed attack traffic. Overall attack traffic concentration among the top 10 dropped slightly in the third quarter, with the top two countries responsible for just under 40% of observed attacks, and the top 10 countries for just over three-quarters of observed attacks.

	Country/Region	% Traffic
1	Italy	28%
2	United Kingdom	11%
3	Chile	9.1%
4	Brazil	7.4%
5	Poland	5.3%
6	Malaysia	4.5%
7	China	3.4%
8	United States	3.1%
9	Russia	2.6%
10	Lithuania	2.3%
–	Other	24%

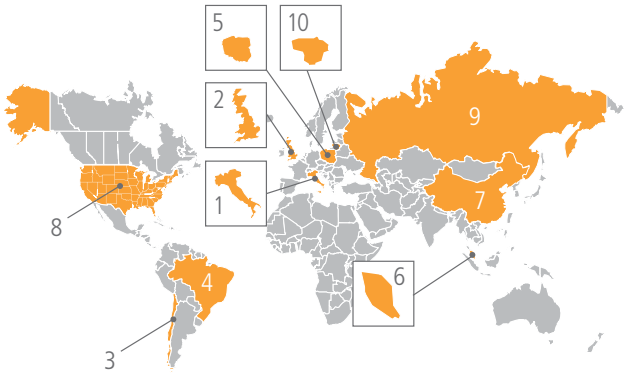

Figure 18: Attack Traffic from Mobile Networks, Top Originating Countries/Regions

5.2 Attack Traffic From Mobile Networks, Top Ports

In the third quarter, the top 10 ports targeted by attack traffic coming from mobile networks were largely similar to those seen in the prior quarter. The lone difference was the appearance of Port 6882 (BitTorrent), which replaced Port 2967 (Symantec System Center) at the bottom of the list. Concentration also dropped in the second quarter, as shown in Figure 19, with Port 445 responsible for 75% of observed attacks (down from 84% last quarter), and the top 10 ports responsible for nearly 95% of observed attacks, down from just over 98% in the second quarter. Attacks targeted at Port 23 (Telnet) doubled quarter-over-quarter, though most other ports were flat to slightly down. As noted previously, we believe that the observed attack traffic that is 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 devices.

Port	Port Use	% Traffic
445	Microsoft-DS	75%
23	Telnet	10%
22	SSH	3.4%
135	Microsoft-RPC	3.3%
1433	Microsoft SQL Server	0.6%
139	NetBIOS	0.6%
4899	Remote Administrator	0.5%
5900	VNC Server	0.5%
80	WWW	0.4%
6882	BitTorrent	0.2%
Various	Other	5.5%

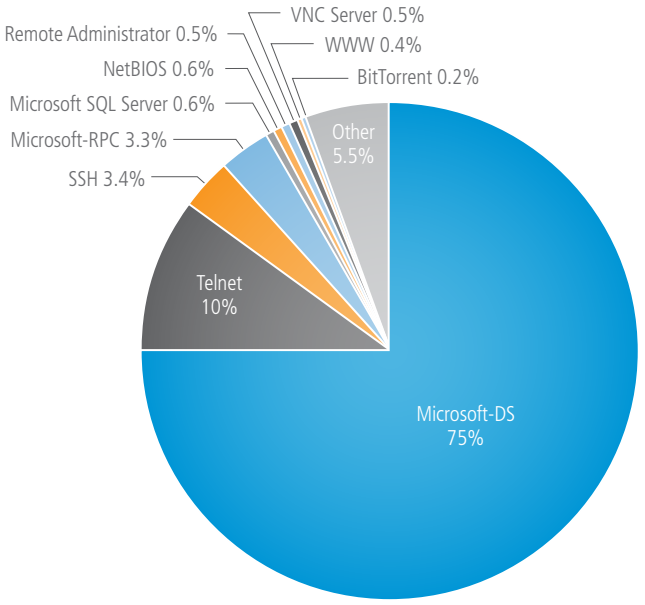

Figure 19: Attack Traffic from Mobile Networks, Top Ports

5.3 Connection Speeds & Data Consumption On Mobile Networks

In the third quarter, a mobile provider in Russia became the provider with the highest average connection speed, reaching nearly 6 Mbps after gaining approximately 700 Kbps quarter-over-quarter. The Slovakian mobile provider that was formerly the fastest saw its average connection speed decline approximately 900 Kbps from the second quarter, dropping it to second place. However, the slowest provider (143 Kbps) continued to be in Slovakia. As shown in Figure 20, of the 111 mobile providers listed, 23 had average connection speeds in the broadband (2 Mbps or above) range (up from 19 in the second quarter), while 34 more had average connection speeds of 1 Mbps or more (up from 29 in the second quarter). On a quarter-over-quarter basis, mobile connectivity continued to improve in many places, with users on 86 of the 111 listed mobile providers experiencing higher average connection speeds in the second quarter. Average connection speeds more than doubled on providers in Malaysia (MY-2) and Germany (DE-3), while providers in Singapore (SG-3) and Australia (AU-2) saw speeds gain less than a percent. Quarterly losses remained in roughly the same range as the second quarter, with the biggest decline (30%) seen on a provider in Thailand (TH-1). Year-over-year changes were aggressively positive in many places, with the Malaysian and German providers referenced above gaining over 700% and over 500% respectively. Yearly gains of more than 100 percent were seen on 21 additional providers. Only eight of the 111 listed providers had average connection speeds decline year-over-year.

In reviewing the average peak connection speed data, the Slovakian provider that topped the list in prior quarters once again remained on top, with an average peak connection speed of nearly 23 Mbps, gaining approximately 2.5 Mbps from the second quarter. Average peak connection speeds remained very strong in the third quarter, with fifteen providers achieving average peak connection speeds in excess of 10 Mbps, and all but two of the 111 listed providers achieving speeds of 1 Mbps or more. Looking at trends over time, six providers recorded greater than 100% quarterly growth, with 41 increasing 100% or more year-over-year. Eleven providers had lower average peak connection speeds than in the second quarter, with a provider in the United Kingdom (UK-3) seeing the greatest loss, dropping 58%. Ten providers had lower average peak connection speeds than in the same quarter a year ago, with the largest decline (78%) seen on that same provider in the United Kingdom.

Discounting two providers in Canada and Indonesia where we believe proxy/gateway architectures are in use, we found eight mobile providers in Slovakia, Puerto Rico, Germany, Hong Kong, Australia, France and Austria whose users, on average, consumed more than one gigabyte (1 GB) of content from Akamai per month during the third quarter. Users on an additional 79 mobile providers around the world downloaded more than 100 MB of content from Akamai per month during the third quarter, while users on 22 providers downloaded less than 100 MB. Consumption grew quarter-over-quarter on 101 of the listed providers, including five where it more than doubled on a quarterly basis. Yearly growth in consumption wasn't quite as widespread, as only 89 of the listed providers saw consumption of content from Akamai increase on a year-over-year basis, although 35 providers saw download volumes more than double.

Country/Region	ID	Q3 '10 Avg. Kbps	Q3 '10 Peak Kbps	Q3 '10 Avg. MB/ month
AFRICA				
Egypt	EG-1	594	3222	288
Morocco	MA-1	707	6872	568
Nigeria	NG-1	262	4576	402
South Africa	ZA-1	495	928	177
ASIA				
China	CN-1	1537	4157	144
Hong Kong	HK-1	2183	11667	1445
Hong Kong	HK-2	2018	9949	386
Indonesia	ID-1	379	8100	18510
Israel	IL-1	1271	6963	136
Kuwait	KW-1	2142	8686	520
Malaysia	MY-1	327	2580	254
Malaysia	MY-2	4887	156484	572
Malaysia	MY-3	728	4455	560
Pakistan	PK-1	852	5521	609
Saudi Arabia	SA-1	2012	8101	312
Singapore	SG-2	485	3725	78
Singapore	SG-3	1274	6917	533
South Korea	KR-1	1589	3703	56
Sri Lanka	LK-1	718	4460	255
Taiwan	TW-1	1124	5646	160
Taiwan	TW-2	481	3064	184
Thailand	TH-1	513	4420	88
EUROPE				
Austria	AT-1	2485	10720	236
Austria	AT-2	2646	16205	1154
Belgium	BE-1	2530	9259	404
Belgium	BE-2	1091	3226	30
Belgium	BE-3	449	1582	24
Croatia	HR-1	1276	5587	84
Czech Republic	CZ-1	1142	5075	104
Czech Republic	CZ-2	578	3570	251
Czech Republic	CZ-3	2737	10172	256
Estonia	EE-1	970	4910	342
France	FR-1	437	2443	179
France	FR-2	2026	6828	1234
France	FR-3	680	2857	45
Germany	DE-1	603	3103	86
Germany	DE-2	2865	9821	1616
Germany	DE-3	1182	4567	120
Greece	GR-1	2161	15355	710
Greece	GR-2	428	3491	176
Hungary	HU-1	1501	8127	243
Hungary	HU-2	1769	9687	161
Ireland	IE-1	2314	10366	563
Ireland	IE-2	1551	10380	557
Ireland	IE-3	1244	9841	802
Italy	IT-1	1326	8783	434
Italy	IT-2	2161	9197	489
Italy	IT-3	2909	11435	615
Lithuania	LT-1	1742	10002	462
Lithuania	LT-2	1222	6439	333
Moldova	MD-1	1163	4452	122
Moldova	MD-2	1462	6251	172
Netherlands	NL-1	979	3059	35
Netherlands	NL-2	1943	4614	24
Norway	NO-1	1126	4892	71

Figure 20: Average and Average Peak Connection Speed, Average Megabytes Downloaded per Month by Mobile Provider

The mobile Web isn't a novelty anymore-it's a mainstream way to engage consumers on the go. And in 2010, more companies have figured out how to effectively adapt content to those users and their devices and networks.

[http://blogs.yankeegroup.com/2010/10/26/webinar-best-of-the-anywhere-web/]

Country/Region	ID	Q3 '10 Avg. Kbps	Q3 '10 Peak Kbps	Q3 '10 Avg. MB/ month
Norway	NO-2	1342	4787	80
Poland	PL-1	3671	11685	170
Poland	PL-2	1146	4972	64
Poland	PL-3	994	6201	204
Portugal	PT-1	531	1914	43
Romania	RO-1	530	2867	107
Russia	RU-1	5991	19207	177
Russia	RU-2	824	3260	82
Russia	RU-3	607	2954	158
Slovakia	SK-1	143	1741	57
Slovakia	SK-2	2046	7881	2687
Slovakia	SK-3	5227	22886	1056
Slovenia	SI-1	1360	6929	103
Spain	ES-1	1413	9468	426
Spain	ES-2	1190	4006	879
Spain	ES-3	881	5528	223
Turkey	TR-1	1347	6575	303
Ukraine	UA-1	599	2075	53
United Kingdom	UK-1	1372	9062	626
United Kingdom	UK-2	2018	10192	819
United Kingdom	UK-3	3149	15371	87
NORTH AMERICA				
Canada	CA-1	3232	15566	20403
Canada	CA-2	910	2676	659
El Salvador	SV-1	601	4746	270
El Salvador	SV-2	1439	8096	767
El Salvador	SV-3	778	5049	987
Guatemala	GT-1	475	4166	166
Guatemala	GT-2	750	5339	786
Guatemala	GT-3	171	369	3.8
Mexico	MX-2	1346	7848	645
Mexico	MX-3	749	5395	601
Netherlands Antilles	AN-1	530	3667	293
Nicaragua	NI-1	1064	6743	562
Puerto Rico	PR-1	2126	8870	2598
United States	US-1	1083	3257	42
United States	US-2	1060	3663	37
United States	US-3	972	3647	647
OCEANIA				
Australia	AU-1	962	8705	1352
Australia	AU-2	970	1738	22
Australia	AU-3	1495	6738	178
Guam	GU-1	517	2611	129
New Caledonia	NC-1	569	3268	346
New Zealand	NZ-2	1301	7646	481
SOUTH AMERICA				
Argentina	AR-1	515	4957	172
Argentina	AR-2	622	4881	228
Bolivia	BO-1	208	3954	244
Brazil	BR-1	709	4067	144
Brazil	BR-2	613	4938	170
Chile	CL-3	685	6390	400
Chile	CL-4	802	6366	580
Colombia	CO-1	749	7430	346
Paraguay	PY-1	456	4413	179
Paraguay	PY-2	338	3482	287
Uruguay	UY-1	821	6688	350
Uruguay	UY-2	287	4144	118
Venezuela	VE-1	632	5163	548

The Cisco 2010 Global Mobile Data Traffic Forecast highlights the rapid growth of mobile broadband traffic by device category, where smartphones (3G speeds and higher) and portable computing devices (including notebooks, netbooks and tablets) with always-on, high-speed connections will contribute more than 90% of all mobile data traffic by 2013.

[http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html]

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	0.2%	2,343,403	3.7	13	17%	65%	0.8%
Belgium	0.1%	3,507,467	4.9	20	35%	86%	0.5%
Czech Republic	0.2%	1,797,299	5.4	16	32%	89%	0.3%
Denmark	0.1%	2,264,073	5.0	15	35%	86%	1.0%
Finland	0.1%	2,460,164	4.4	15	24%	60%	0.9%
France	1.7%	22,958,984	3.3	13	9.7%	75%	0.4%
Germany	2.6%	31,501,123	4.2	16	20%	88%	0.7%
Greece	0.3%	2,133,343	3.2	15	5.1%	79%	1.4%
Iceland	0.0%	127,210	4.3	17	15%	83%	—
Ireland	0.1%	1,403,633	4.5	14	18%	71%	3.1%
Italy	3.0%	11,380,947	3.3	13	7.7%	82%	1.3%
Luxembourg	0.0%	167,307	3.8	13	14%	82%	1.2%
Netherlands	0.4%	7,826,823	6.3	18	49%	88%	0.8%
Norway	0.1%	2,610,961	4.9	16	26%	82%	0.8%
Portugal	0.4%	2,455,734	4.0	19	22%	83%	0.3%
Spain	1.2%	11,952,365	2.8	12	5.4%	64%	0.9%
Sweden	0.3%	5,251,572	5.0	19	29%	66%	1.6%
Switzerland	0.1%	2,739,721	5.3	18	26%	92%	0.6%
United Kingdom	1.4%	21,665,959	4.0	15	17%	85%	0.9%
ASIA/PACIFIC							
Australia	0.4%	9,385,041	2.9	12	12%	51%	4.0%
China	8.2%	64,309,649	1.0	3.7	0.4%	7.7%	7.6%
Hong Kong	0.3%	2,317,263	9.2	36	53%	93%	0.5%
India	2.0%	5,332,825	0.8	5.1	0.5%	5.4%	33%
Japan	2.4%	37,535,068	8.5	31	60%	83%	1.3%
Malaysia	1.2%	1,745,132	1.4	8.4	1.3%	8.8%	5.4%
New Zealand	0.8%	1,420,650	3.2	13	9.6%	74%	5.4%
Singapore	0.2%	1,610,537	3.3	17	19%	59%	4.7%
South Korea	1.1%	18,715,476	14	39	72%	93%	0.2%
Taiwan	7.1%	6,499,980	5.0	18	28%	77%	0.7%
MIDDLE EAST							
Egypt	3.3%	1,072,339	0.8	5.7	0.2%	3.6%	7.8%
Israel	0.7%	1,979,988	3.5	12	6.4%	85%	0.2%
Kuwait	0.3%	248,382	1.6	10	2.1%	21%	4.1%
Saudi Arabia	0.4%	1,771,422	2.0	7.2	0.6%	44%	1.2%
Sudan	0.0%	25,028	0.5	3.6	—	—	15%
Syria	0.0%	164,988	1.5	3.1	3.1%	36%	34%
United Arab Emirates (UAE)	0.5%	785,693	2.4	16	11%	31%	4.3%
LATIN & SOUTH AMERICA							
Argentina	2.2%	4,297,628	1.6	7.7	0.5%	25%	3.1%
Brazil	7.9%	13,040,480	1.5	6.8	2.3%	22%	13%
Chile	0.6%	2,343,049	2.5	11	3.8%	54%	2.3%
Colombia	1.1%	2,526,704	1.8	8.2	0.6%	31%	1.7%
Mexico	0.4%	8,222,093	1.6	7.5	0.6%	19%	1.6%
Peru	2.8%	693,195	1.3	7.4	0.7%	9.5%	2.2%
Venezuela	0.2%	2,014,316	0.8	4.8	0.2%	2.3%	12%
NORTH AMERICA							
Canada	1.1%	12,214,437	5.0	17	32%	86%	1.8%
United States	12%	141,098,737	5.0	20	34%	74%	2.6%

SECTION 7:
Endnotes

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

[2] In July 2010, the United States Federal Communications Commission (FCC) revised its working definition of broadband from services in "excess of 200 kilobits per second (kbps) in both directions" – a standard adopted over a decade ago in the 1999 First Broadband Deployment Report (http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0720/FCC-10-129A1.pdf) – to "service offering actual download (i.e., to the customer) speeds of at least 4 Mbps". While we have not adopted this revised definition of broadband for this edition of the *State of the Internet* report, we may consider aligning our definition of broadband with the FCC's in future editions of this report.

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

[4] 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.)

[5] http://download.broadband.gov/plan/fcc-omnibus-broadband-initiative-(obi)-technical-paper-broadband-performance.pdf

[6] http://allafrica.com/stories/201005261338.html

[7] http://www.fiercetelecom.com/story/france-telecom-lion2-consortium-build-indian-ocean-submarine-cable/2010-09-27

[8] http://www.bbc.co.uk/news/technology-11162656

[9] http://pewinternet.org/Reports/2010/Home-Broadband-2010.aspx

[10] http://www.akamai.com/html/technology/products/edgescape.html

[11] http://www.dslreports.com/shownews/Obama-Announces-795-Million-In-Broadband-Expansion-Grants-109192

[12] http://www.whitehouse.gov/sites/default/files/Broadband_Award_Roster.pdf

[13] http://www.dslreports.com/shownews/12-Billion-In-Broadband-Stimulus-Funding-109774

[14] http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-129A1.pdf

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