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WITH THIS ISSUE, THE START OF THE NINTH VOLUME OF THE *STATE OF THE INTERNET REPORT*, we are introducing several changes, with several more planned to follow in subsequent issues.

The first notable change is within the regional breakout sections of the report. For the last several years, the report has included a “Geography: Europe, Middle East, and Africa (EMEA)” section, surveying a selected set of countries within those regions. Starting this quarter, we’ve broken that section apart, and the report will now include a “Geography: Europe” section, which includes all 28 member countries of the European Union plus three more non-members that have long been included within the EMEA section. The report will also now include a “Geography: Middle East and Africa (MEA)” section that surveys 13 countries from across that extended region. Given the increasing role the Internet is playing across multiple facets of life in this developing region and the ongoing improvements to both domestic and international Internet connectivity within these countries, we felt it was time to break out connection speeds and broadband adoption rates for Middle East and Africa countries into a distinct section, where surveyed countries can be compared with their local peers.

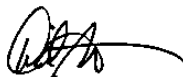
Back in October 2014, Akamai launched the *stateoftheinternet.com* website as a stand-alone home for both the Connectivity and Security reports as well as associated data visualizations and other related content. However, with the launch and evolution of an updated *akamai.com* website, the *stateoftheinternet.com* site was decommissioned in May 2016, with content transitioned to relevant sections of *akamai.com*. <https://www.akamai.com/stateoftheinternet/> is once again the primary home for both the Connectivity and Security *State of the Internet Reports*, as well as the associated data visualizations. Redirects were put into place, but if you notice anything amiss, please let us know.

We are still working hard on updating our data collection and calculations to allow us to shift away from average connection speed as a primary metric and also to begin including IPv6 connection speeds within the report. We plan to formally introduce both new metrics later this year, once we have finalized our methodology. In the meantime, stay apprised of the latest developments in both areas at <https://blogs.akamai.com/>.

Just weeks from now, the summer games in Brazil kick off, running from August 5th to August 21st. This year’s events are expected to be watched by more online viewers than ever before, with thousands of hours of live coverage being streamed by users around the world, consumed on connected devices large and small, from televisions down to cell phones, over both fixed and mobile connections. Global average and average peak connections are now more than double those seen at the time of the England 2012 summer games. This means that these streams can be encoded at a higher bit rate, resulting in higher-quality video, and that more users have Internet connections capable of consuming these high-quality streams of their favorite events. Given the ubiquity of mobile devices, many users will likely be watching multiple events simultaneously on second and even third screens.

As we noted last quarter, for readers who want to consume the *State of the Internet Report* on a tablet or e-reader device, we are now making the report available for download in ePub format from online bookstores including *amazon.com*, *Google Play*, *Apple iBooks*, *Barnes & Noble*, and *Kobo*. Specific download links are available after registration at <https://www.akamai.com/stateoftheinternet/>, and we encourage you to leave positive reviews of the report at your online bookstore of choice.

As always, if you have comments, questions, or suggestions regarding the *State of the Internet Report*, the website, or the mobile applications, please reach out to us via email at [stateoftheinternet@akamai.com](mailto:stateoftheinternet@akamai.com) or on Twitter at [@akamai\\_soti](https://twitter.com/akamai_soti). You can also interact with us in the *State of the Internet* subspace on the Akamai Community at <https://community.akamai.com/>.



—David Belson

<b>3</b>	<b>[EXECUTIVE SUMMARY]</b>	<b>39</b>	<b>[SECTION]<sup>7</sup> = GEOGRAPHY (MIDDLE EAST + AFRICA)</b>
		39	7.1 / MEA Average Connection Speeds (IPv4)
		40	7.2 / MEA Average Peak Connection Speeds (IPv4)
<b>5</b>	<b>[SECTION]<sup>1</sup> = INTERNET PENETRATION</b>	40	7.3 / MEA 4 Mbps Broadband Adoption (IPv4)
6	1.1 / Unique IPv4 Addresses	41	7.4 / MEA 10 Mbps Broadband Adoption (IPv4)
6	1.2 / IPv4 Exhaustion	41	7.5 / MEA 15 Mbps Broadband Adoption (IPv4)
8	1.3 / IPv6 Adoption		
<b>11</b>	<b>[SECTION]<sup>2</sup> = GEOGRAPHY (GLOBAL)</b>	<b>45</b>	<b>[SECTION]<sup>8</sup> = MOBILE CONNECTIVITY</b>
12	2.1 / Global Average Connection Speeds (IPv4)	46	8.1 / Connection Speeds on Mobile Networks
12	2.2 / Global Average Peak Connection Speeds (IPv4)	46	8.2 / Mobile Browser Usage Data
13	2.3 / Global 4 Mbps Broadband Adoption (IPv4)	48	8.3 / Mobile Traffic Growth Observed by Ericsson
14	2.4 / Global 10 Mbps Broadband Adoption (IPv4)		
15	2.5 / Global 15 Mbps Broadband Adoption (IPv4)	<b>51</b>	<b>[SECTION]<sup>9</sup> = SITUATIONAL PERFORMANCE</b>
15	2.6 / Global 25 Mbps Broadband Adoption (IPv4)		
<b>17</b>	<b>[SECTION]<sup>3</sup> = GEOGRAPHY (UNITED STATES)</b>	<b>55</b>	<b>[SECTION]<sup>10</sup> = INTERNET DISRUPTIONS + EVENTS</b>
17	3.1 / United States Average Connection Speeds (IPv4)	55	10.1 / Belgium
18	3.2 / United States Average Peak Connection Speeds (IPv4)	56	10.2 / South Africa
19	3.3 / United States 4 Mbps Broadband Adoption (IPv4)	56	10.3 / Syria
19	3.4 / United States 10 Mbps Broadband Adoption (IPv4)	56	10.4 / Uganda
20	3.5 / United States 15 Mbps Broadband Adoption (IPv4)		
20	3.6 / United States 25 Mbps Broadband Adoption (IPv4)	<b>59</b>	<b>[SECTION]<sup>10</sup> = APPENDIX</b>
<b>23</b>	<b>[SECTION]<sup>4</sup> = GEOGRAPHY (AMERICAS)</b>	<b>61</b>	<b>[SECTION]<sup>11</sup> = ENDNOTES</b>
23	4.1 / Americas Average Connection Speeds (IPv4)		
24	4.2 / Americas Average Peak Connection Speeds (IPv4)		
24	4.3 / Americas 4 Mbps Broadband Adoption (IPv4)		
25	4.4 / Americas 10 Mbps Broadband Adoption (IPv4)		
25	4.5 / Americas 15 Mbps Broadband Adoption (IPv4)		
<b>27</b>	<b>[SECTION]<sup>5</sup> = GEOGRAPHY (ASIA PACIFIC)</b>		
27	5.1 / Asia Pacific Average Connection Speeds (IPv4)		
28	5.2 / Asia Pacific Average Peak Connection Speeds (IPv4)		
28	5.3 / Asia Pacific 4 Mbps Broadband Adoption (IPv4)		
29	5.4 / Asia Pacific 10 Mbps Broadband Adoption (IPv4)		
29	5.5 / Asia Pacific 15 Mbps Broadband Adoption (IPv4)		
<b>33</b>	<b>[SECTION]<sup>6</sup> = GEOGRAPHY (EUROPE)</b>		
33	6.1 / European Average Connection Speeds (IPv4)		
34	6.2 / European Average Peak Connection Speeds (IPv4)		
34	6.3 / European 4 Mbps Broadband Adoption (IPv4)		
35	6.4 / European 10 Mbps Broadband Adoption (IPv4)		
38	6.6 / European 15 Mbps Broadband Adoption (IPv4)		

Akamai's globally distributed Intelligent Platform™ allows us to gather massive amounts of data on many metrics including Internet connection speeds, network connectivity/availability issues, and IPv6 adoption progress as well as traffic patterns across leading web properties and digital media providers. Each quarter, Akamai publishes the *State of the Internet Report* based on this data.

This quarter's report includes data gathered from across the Akamai Intelligent Platform™ during the first quarter of 2016, covering Internet connection speeds and broadband adoption metrics across both fixed and mobile networks as well as trends seen in this data over time. In addition, the report includes insight into the state of IPv4 exhaustion and IPv6 adoption, Internet events and disruptions that occurred during the quarter, mobile browser usage trends, and observations from Akamai partner Ericsson regarding data and voice traffic growth on mobile networks.

Data on attack traffic seen across the Akamai platform and insights into high-profile security vulnerabilities and attacks are now published in a separate *State of the Internet/Security Report*. The quarterly security report provides timely information about the origins, tactics, types, and targets of cyberattacks, including quarter-over-quarter and year-over-year attack traffic trends as well as case studies highlighting emerging cybersecurity issues. The *State of the Internet/Security Report* can be found at <https://www.akamai.com/stateoftheinternet-security>.

**INTERNET CONNECTIVITY** / In the first quarter of 2016, Akamai observed a 0.2% quarterly decrease in the number of unique IPv4 addresses connecting to the Akamai Intelligent Platform™, declining to just over 808 million — about 1.8 million fewer than were seen in the fourth quarter of 2015. Belgium remained the clear global leader in IPv6 adoption with 36% of its connections to Akamai occurring over IPv6, down 3.1% from the previous quarter.

**CONNECTION SPEEDS & BROADBAND ADOPTION** / The global average connection speed increased 12% quarter over quarter to 6.3 Mbps, while the global average peak connection speed increased 6.8% to 34.7 Mbps. At a country/region level, South Korea continued to have the highest average connection speed in the world at 29.0 Mbps, an 8.6% gain over the fourth quarter of 2015, while Singapore maintained its position as the country with the highest average peak connection speed at 146.9 Mbps, an 8.3% quarterly increase.

Globally, 4 Mbps broadband adoption came in at 73%, up 5.4% from the fourth quarter of 2015, with South Korea the country with the highest level of adoption at 97%. Unsurprisingly, South Korea also led the world across the 10 Mbps, 15 Mbps, and 25 Mbps broadband tiers once again, with adoption rates of 84%, 69%, and 42% respectively, after seeing robust quarterly gains across all three metrics. Global 10 Mbps, 15 Mbps, and 25 Mbps adoption also grew significantly in the first quarter of 2016, posting gains of 10%, 14%, and 19% and reaching adoption levels of 35%, 21%, and 8.5% respectively.

**MOBILE CONNECTIVITY** / Average mobile connection speeds (aggregated at a country/region level) ranged from a high of 27.9 Mbps in the United Kingdom to a low of 2.2 Mbps in Algeria in the first quarter of 2016, while average peak mobile connection speeds ranged from 171.6 Mbps in Germany to 11.7 Mbps in Ghana. Based on traffic data collected by Ericsson, the volume of mobile data traffic grew by 9.5% over the previous quarter.

Analysis of Akamai IO data collected during the first quarter from a sample of requests to the Akamai Intelligent Platform™ indicates that for traffic from mobile devices on cellular networks, Apple Mobile Safari accounted for roughly 33% of requests, while Android Webkit and Chrome Mobile (the two primary Android browser bases) accounted for 20% and 38% of requests respectively — giving a total of 58% for the Android platform. For traffic from mobile devices across all networks, Apple Mobile Safari was responsible for close to 41% of requests, while Android Webkit and Chrome Mobile made up approximately 19% and 32% of requests respectively, for a total of 51%.





# [SECTION]<sup>1</sup> INTERNET PENETRATION

Through its globally deployed Intelligent Platform™, and by virtue of the nearly 3 trillion requests for web content that it serves on a daily basis, Akamai has unique visibility into levels of Internet penetration around the world. In the first quarter of 2016, over 808 million unique IPv4 addresses from 243 unique countries/regions connected to the Akamai Intelligent Platform™.

Although we saw over 800 million unique IPv4 addresses, Akamai believes this count represents well over 1 billion web users. In some cases, multiple individuals may be represented by a single IPv4 address (or a small number of IPv4 addresses) because they access the web through a firewall or proxy server; in other cases, individual users may have multiple IPv4 addresses associated with them due to their use of multiple connected devices. Unless otherwise specified, the use of “IP address” within Section 1.1 refers to IPv4 addresses.

**1.1 UNIQUE IPV4 ADDRESSES** / The number of unique IPv4 addresses worldwide connecting to Akamai decreased by about 1.8 million in the first quarter of 2016. This is in line with our expectation that the number of unique global IPv4 addresses seen by Akamai may continue to level off or decline modestly in the future as carriers increase the availability of native IPv6 connectivity for subscribers and implement Carrier-Grade Network Address Translation (CGNAT) solutions more broadly in an effort to conserve limited IPv4 address space.

In the first quarter of 2016, 6 of the top 10 countries/regions saw modest quarterly decreases in unique IPv4 counts, ranging from 0.5% in China to 3.1% in India, as seen in Figure 1. The other four countries posted small increases, ranging from 0.2% in Russia to 2.5% in France. Across the world, close to 60% of the countries/regions saw a quarter-over-quarter increase in unique IPv4 address counts in the first quarter of 2016 compared with approximately 70% in the fourth quarter of 2015. Twenty-nine countries/regions saw IPv4 address counts grow 10% or more, while 22 saw counts decline 10% or more as compared with the previous quarter.

Looking at year-over-year changes among the top 10 countries/regions, South Korea again posted the largest increase with a gain of 8.3%. The other six gaining countries/regions saw more modest increases, ranging from 0.4% in Brazil to 4.2% in France. Among the three countries/regions to see yearly decreases in unique IPv4 address counts, the United States again had the largest decline with a drop of 8.1%, followed by India and China with losses of 5.5% and 0.5% respectively. As noted previously, the losses seen in these countries are not indicative of long-term declines in Internet usage but are more likely related to changes in IP address management/conservation practices and/or increased IPv6 adoption.

Globally, approximately two-thirds of the countries/regions surveyed had higher unique IPv4 address counts in the first quarter compared with one year ago. Yearly growth rates of 100% or more were seen in 10 countries/regions, although all of them had a relatively small number of unique IPv4 addresses—five of them had fewer than 2,000—so small changes can result in large

percentage shifts in these countries. In all, 27 countries saw yearly growth rates of at least 50%, while five countries saw IPv4 address counts decline at least 50%. These numbers are all similar to those seen in the preceding quarter.

**1.2 IPV4 EXHAUSTION** / As expected, in the first quarter of 2016, available IPv4 address space continued to dwindle as Regional Internet Registries (RIRs) assigned and allocated blocks of IPv4 address space to organizations within their respective territories. A reference table translating the /nn notations used below to identify unique IP address counts can be found at <https://www.arin.net/knowledge/cidr.pdf>.

Leveraging data<sup>1</sup> collected by Geoff Huston, Chief Scientist at APNIC,<sup>2</sup> the *State of the Internet Report* provides a perspective on the size of the available IPv4 address pool at each RIR and how the sizes of the available pools have been shrinking over time. In addition, the report uses data provided by the individual RIRs to highlight IPv4 address space delegation activity within each region over the course of the quarter.

Figure 2 illustrates how the size of available IPv4 address pools at each RIR changed during the first quarter of 2016 based on data made available by Mr. Huston. As noted in the *Third Quarter, 2015 State of the Internet Report*, ARIN fully depleted its pool of available addresses after allocating its final IPv4 address block on September 24, 2015. Its reported available pool has remained at zero since then. The other four registries all saw a lower level of activity in the first quarter compared with the preceding quarter. LACNIC handed out more than 380,000 addresses, or roughly a quarter of its available pool, and AFRINIC distributed nearly 5 million addresses, or 17% of its available pool. RIPE and APNIC handed out roughly 790,000 and 480,000 addresses respectively, representing about 5% of each of their available pools. In a blog post, RIPE notes that over the past couple of years, its available pool of addresses had been supplemented—by roughly 8.5 million addresses since September 2012—due to IANA allocations and reclaimed addresses within its regions. Both of these sources are starting to dry up, so RIPE predicts that we may start seeing an acceleration in depletion of its

	Country/Region	Q1 2016 Unique IPv4 Addresses	QoQ Change	YoY Change
–	Global	808,399,167	-0.2%	-0.5%
1	United States	140,060,201	-2.2%	-8.1%
2	China	126,496,759	-0.5%	-0.5%
3	Brazil	48,342,314	0.9%	0.4%
4	Japan	45,782,047	-1.2%	2.9%
5	Germany	36,339,015	-0.9%	2.0%
6	United Kingdom	31,095,823	-1.7%	1.8%
7	France	30,393,326	2.5%	4.2%
8	South Korea	24,506,931	0.9%	8.3%
9	Russia	19,473,367	0.2%	1.0%
10	India	17,016,708	-3.1%	-5.5%

Figure 1: Unique IPv4 Addresses Seen by Akamai



available pool in upcoming quarters, as allocation requests continue at a steady or increasing pace.<sup>3</sup> With just over 28 million addresses available at the end of the first quarter, AFRINIC was the RIR with the most substantial pool of IPv4 addresses remaining. At the end of the first quarter, RIPE and APNIC had roughly 15.5 million and 9.8 million available IPv4 addresses respectively, and LACNIC, with the smallest remaining pool, had just under 1.6 million available addresses remaining.

Figure 3 illustrates the IPv4 allocation/assignment activity across each of the RIRs during the first quarter of 2016. Overall, there was a significant decrease in activity, as 9.0 million addresses were allocated in the first quarter, compared with 21.9 million in the fourth quarter of 2015. Note that like the previous two quarters, sizeable portions of these transactions — including ARIN’s assignment/allocation of 2.1 million addresses — are likely to have been third-party transfers instead of direct RIR allocations.

In the first quarter, the most significant transaction at ARIN occurred on March 17, when a /13, /14, and several smaller IP address blocks — totaling over a million addresses — were assigned to Chinese e-commerce company *Alibaba.com*.<sup>4</sup> This transaction, while appearing from this data to be an ARIN assignment, is most likely an IP address block transfer between third-party companies. As noted in previous *State of the Internet* reports, when a third-party address block transfer takes place, the source organization’s resources are first returned to ARIN and then, within hours, reissued to the recipient organization. The newly assigned IP addresses get captured in the data used to generate Figure 3 but do not show up in ARIN’s available pool (i.e., the data used to generate Figure 2). As available IPv4 address space becomes scarce and transfers become more frequent, we expect to see this phenomenon more often and possibly at other RIRs as well.

ARIN did report fulfilling some smaller requests during the first quarter of 2016.<sup>5</sup> On March 1, it received a total of /15 of address space (made up of smaller blocks) based on IANA’s allocation policy for post-exhaustion IPv4 allocations. Using this allocation, it was

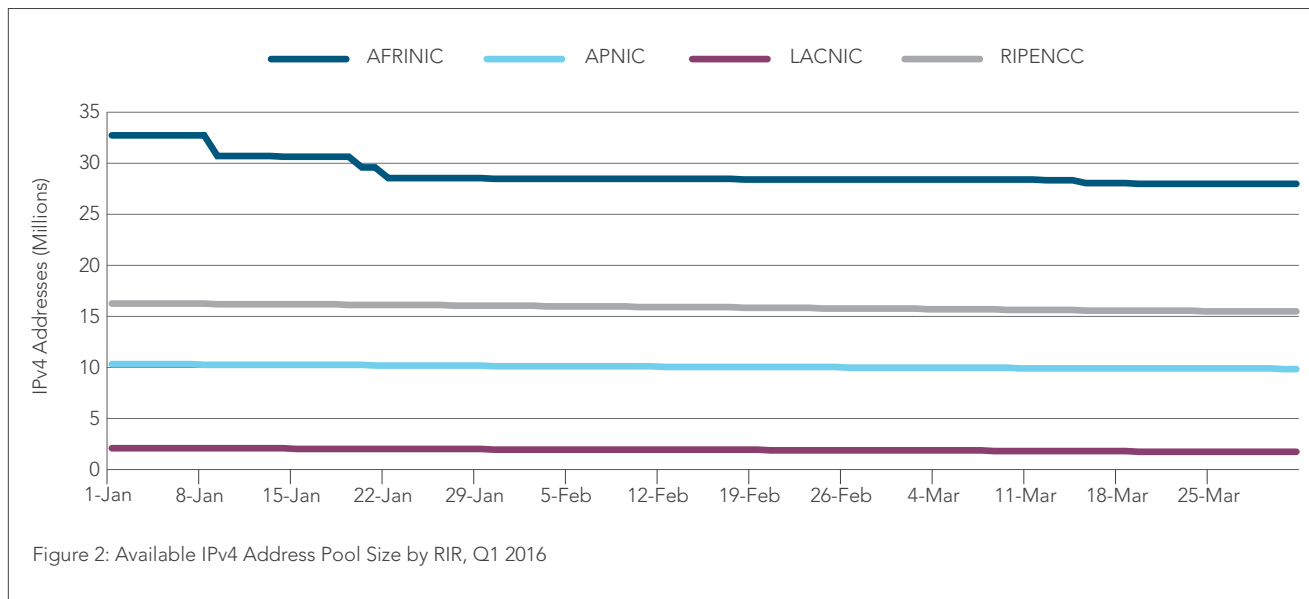


Figure 2: Available IPv4 Address Pool Size by RIR, Q1 2016

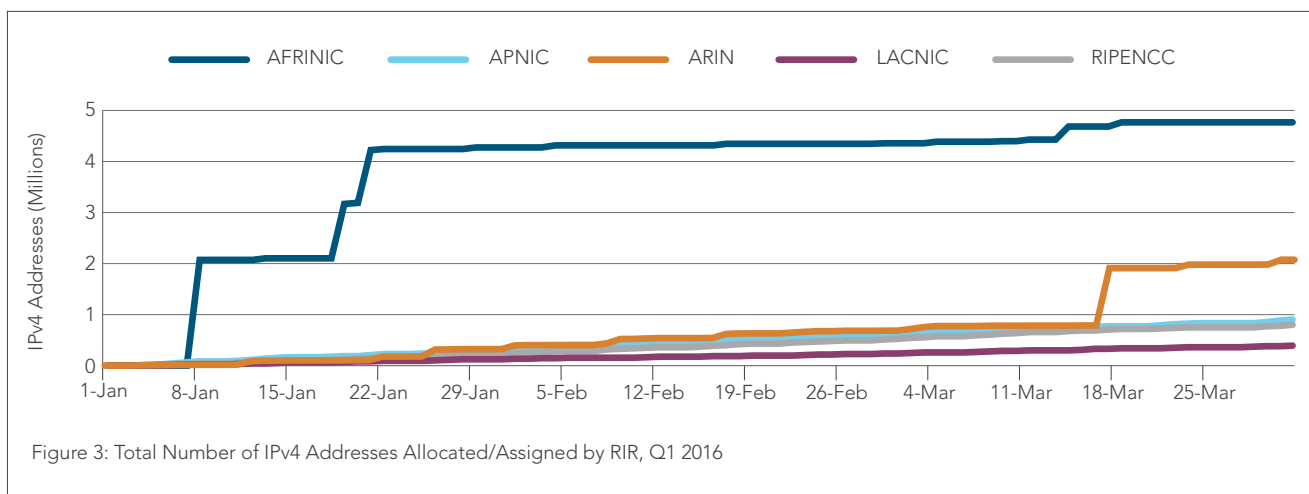


Figure 3: Total Number of IPv4 Addresses Allocated/Assigned by RIR, Q1 2016

able to fulfill six IPv4 requests from its waiting list. It is also worth noting that while ARIN is officially out of available addresses, it does still hold some addresses in reserve status for uses specifically defined by policy, such as facilitating IPv6 deployments or enabling small allocations for critical Internet infrastructure.

APNIC, RIPE, and LACNIC all saw slow, consistent delegation activity once again in the first quarter, with no specific days seeing unusually sizeable allocations. Among these three RIRs, there were no assignments or allocations larger than a /20 in the first quarter. At AFRINIC, the largest delegation during the first quarter was a /11, allocated to Moroccan provider Maroc Telecom<sup>6</sup> on January 8. The other most significant allocations during the quarter were two /12s, allocated one each to Kenyan telecommunications provider Safaricom Limited<sup>7</sup> and Moroccan provider Méditel<sup>8</sup> on January 19 and 21 respectively.

**1.3 IPV6 ADOPTION** / Starting with the *Third Quarter, 2013 State of the Internet Report*, Akamai began including insight into IPv6 adoption across a number of vectors based on data gathered from the Akamai Intelligent Platform™. The traffic percentages cited in Figure 4 and Figure 5 are calculated by dividing the number of content requests made to Akamai over IPv6 by the total number of requests made to Akamai (over both IPv4 and IPv6) for customer web properties that have enabled Akamai edge delivery via IPv6—in other words, for dual-stacked hostnames. This reporting methodology provides something of a lower bound for IPv6 adoption, as some dual-stacked clients—such as Safari on Mac OS X Lion and Mountain Lion—will only use IPv6 for a portion of possible requests. While new versions of Mac OS X have addressed this issue, we are now finding that lack of IPv6 support in some consumer electronics (such as smart TVs and stand-alone digital media player devices) is presenting a barrier to growth in adoption, especially as the amount of content consumed on these devices grows over time. While not all of Akamai’s customers have chosen to implement IPv6 delivery yet, the data set used for this section includes traffic from a number of leading web properties and software providers, so we believe it is sufficiently representative. Note that in compiling the data for the figures in this section, a minimum of 90 million total requests to Akamai during the first quarter was required to qualify for inclusion.

	Country/Region	Q1 2016 IPv6 %	QoQ Change
1	Belgium	36%	-3.1%
2	Greece	22%	13%
3	Switzerland	21%	2.3%
4	Germany	21%	9.1%
5	Portugal	20%	2.2%
6	United States	17%	0.7%
7	Ecuador	13%	17%
8	Malaysia	13%	44%
9	France	9.4%	-12%
10	Japan	8.6%	-0.7%

Figure 4: IPv6 Traffic Percentage, Top Countries/Regions

A regularly updated view into the metrics discussed below can be found in the “IPv6 Adoption Trends by Country and Network” visualization on the *State of the Internet* website at <https://www.akamai.com/us/en/our-thinking/state-of-the-internet-report/state-of-the-internet-ipv6-adoption-visualization.jsp>.

Figure 4 highlights the 10 countries/regions with the largest percentage of content requests made to Akamai over IPv6 in the first quarter. Despite a 3.1% quarter-over-quarter decline in IPv6 adoption, Belgium again maintained a clear global lead, with 36% of content requests being made over IPv6. Two other countries also saw quarterly declines: France posted a 12% drop after a tremendous increase of 113% in the previous quarter, and Japan—a newcomer to the top 10 in the first quarter—saw a slight 0.7% decrease. The remaining countries in the top 10 all saw IPv6 adoption rise, with quarterly increases ranging from 0.7% in the United States to 44% in Malaysia.

Figure 5 lists the top 20 network providers by the number of IPv6 requests made to Akamai during the first quarter. Once again, cable and wireless/mobile providers continued to drive the largest volumes of IPv6 requests, as many are leading the way for IPv6 adoption in their respective countries. In the first quarter, Verizon Wireless again led the pack with 68% of its requests to Akamai being made over IPv6, up from 67% in the fourth quarter of 2015, while Belgium’s Telenet, which had the second-highest percentage


Country/Region	Network Provider	Q1 2016 IPv6 %
United States	Comcast Cable	40%
United States	AT&T	41%
Brazil	NET Serviços de Comunicação S.A.	16%
Brazil	Global Village Telecom	14%
United States	Time Warner Cable	18%
United States	Verizon Wireless	68%
Malaysia	Telekom Malaysia	16%
Germany	Deutsche Telekom	27%
Pan-European	Liberty Global B.V. (UPC)	16%
Ecuador	CNT Ecuador	29%
United States	T-Mobile	50%
Canada	Telus Communications	40%
Japan	KDDI Corporation	34%
United Kingdom	Sky	12%
France	Proxad/Free	24%
Germany	Kabel Deutschland	48%
Australia	Telstra Direct	4.5%
France	Orange	9.4%
United States	Cox Communications	5.8%
Brazil	Telefonica Data S.A.	3.0%

Figure 5: IPv6 Traffic Percentage, Top Network Providers by IPv6 Request Volume

(53%) in the previous quarter, was just edged out of the top 20 providers due to other providers having higher volumes of requests. In the first quarter, eight providers in the top 20 had at least one in four requests for dual-stacked content to Akamai take place over IPv6 — down from nine providers in the preceding quarter. Sixteen of the top 20 — down from 18 in the previous quarter — had at least 10% of their requests to Akamai occur over IPv6. Note, however, that this trend does not mean IPv6 adoption is falling, as the make-up of the top 20 has changed to include larger providers (with lower adoption percentages).

As of the beginning of 2016, roughly 10% of Google's users (a reasonably broad sampling of Internet traffic) were using IPv6, approximately double the percentage of a year ago.<sup>9</sup> Additional IPv6 deployments and developments are tracked in the World IPv6 Launch blog (<http://www.worldipv6launch.org/blog/>).



A person with long brown hair, wearing a dark jacket, is seen from behind, holding a smartphone up to take a photo of a city street at night. The street is illuminated with warm lights, and there are cars and buildings visible in the background. The image is partially obscured by a large, semi-transparent blue geometric shape that covers the right side of the page.

## [SECTION]<sup>2</sup> GEOGRAPHY GLOBAL

The data presented within this section was collected during the first quarter of 2016 through Akamai's globally deployed Intelligent Platform™ and includes all countries/regions that had more than 25,000 unique IPv4 addresses request content from Akamai during the quarter. This report features data on average and average peak connection speeds—the latter provides insight into the peak speeds that users can likely expect from their Internet connections. In addition, it also provides insight into adoption levels at different broadband threshold speeds. References to broadband tiers throughout this report refer to speeds greater than or equal to the specified threshold. Note that connection speeds published within the *State of the Internet Report* are guidance based on the reach of Akamai's platform. (See the blog post at <http://akamai.me/sotimetrics> for more information on how these metrics are calculated.)

Traffic from known mobile networks is analyzed and reviewed in Section 8 of the report. Therefore, mobile network data has been removed from the data set used to calculate the metrics in the present

section as well as subsequent regional “Geography” sections. Also, beginning with the *Second Quarter, 2015 State of the Internet Report*, we have removed traffic identified as coming from major cloud hosting providers, as cloud-services data centers typically have extremely fast Internet connections that can skew connection speed metrics. We believe that removing this data from our calculations provides a more accurate picture of the end-user experience. To calculate consistent year-over-year results in the current report, we have reprocessed connection speed data from the first quarter of 2015 with traffic from cloud hosting providers removed as well, thus giving a true apples-to-apples comparison of the changes in connection speeds over time. As such, yearly percentage changes may not line up with the numbers published in previous reports, which did not have the cloud hosting provider traffic removed.

**2.1 GLOBAL AVERAGE CONNECTION SPEEDS (IPv4)** / In the first quarter of 2016, the global average connection speed was 6.3 Mbps, a 12% increase from the fourth quarter of 2015. Like the previous quarter, in the first quarter, all of the top 10 countries/regions saw gains in average connection speed, as shown in Figure 6. Hong Kong saw the largest quarterly increase at 19%, but South Korea remained in the lead globally with an average connection speed of 29.0 Mbps, an 8.6% increase over the preceding quarter. The remaining countries/regions saw quarter-over-quarter gains ranging from 4.6% in Japan to 14% in Norway. The Czech Republic’s 12% increase allowed it to regain its position in the top 10 after losing out to Denmark in the previous quarter. Once again, average connection speeds among the top 10 countries/regions were all above 15 Mbps, while South Korea was the only country/region with an average connection speed above 25 Mbps.

Globally, 142 out of 146 qualifying countries/regions saw quarterly increases in average connection speeds, compared with 131 countries/regions in the fourth quarter. Growth rates ranged from a modest 0.1% in Suriname (to 2.5 Mbps) to a substantial 91% in Nepal (to 3.8 Mbps). Ninety countries/regions enjoyed double-digit gains. Quarter-over-quarter losses were seen in 4 qualifying

countries/regions, compared with 17 countries/regions in the fourth quarter. Declines in connection speeds ranged from 0.7% in Macao (to 10.1 Mbps) to 9.3% in Côte d’Ivoire (to 1.9 Mbps).

Year over year, all of the top 10 countries/regions saw increases in the first quarter of 2016, compared with 9 of 10 in the previous quarter. Like the previous quarter, all of the gains were double-digit, ranging from 19% in Hong Kong to 68% in Norway. On a global basis, the average connection speed increased 23% year over year in the first quarter of 2016 — a repeat of the performance seen in the fourth quarter of 2015. Increases were seen in 138 qualifying countries (same as the preceding quarter), with growth rates ranging from 0.5% in Suriname to 298% in Kenya (to 7.3 Mbps). Kenya saw large quarterly and yearly improvements across many metrics in this quarter’s report; these are likely due at least in part to improved Akamai connectivity to key network providers in the country. Three other countries — Congo, Mauritius, and Indonesia — also saw average connection speeds more than double from the prior year, with increases of 133%, 115%, and 110% to 3.5 Mbps, 5.6 Mbps, and 4.5 Mbps respectively. Yearly declines were seen in eight countries/regions, with drops ranging from 1.5% in Gabon (to 1.8 Mbps) to 23% in Syria (to 1.4 Mbps).

Two countries, Libya and Yemen, saw average connection speeds below 1.0 Mbps in the first quarter of 2016, with speeds of 0.7 Mbps and 0.9 Mbps respectively.

**2.2 GLOBAL AVERAGE PEAK CONNECTION SPEEDS (IPv4)** / After seeing a modest 1.0% increase in the fourth quarter of 2015, the global average peak connection speed increased 6.8% to 34.7 Mbps in the first quarter of 2016, as shown in Figure 7. Like the preceding quarter, average peak speeds increased across the board among the countries/regions in the top 10. Indonesia again saw the largest gain with a 38% rise over the fourth quarter of 2015. Remaining gains were more modest, ranging from 2.0% in Mongolia and Japan to 15% in Qatar. Singapore retained its position as the country/region with the highest average peak connection speed at 146.9 Mbps in the first quarter, and for the first time, all of the top 10 qualifying

	Country/Region	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
–	Global	6.3	12%	23%
1	South Korea	29.0	8.6%	24%
2	Norway	21.3	14%	68%
3	Sweden	20.6	8.3%	32%
4	Hong Kong	19.9	19%	19%
5	Switzerland	18.7	12%	25%
6	Latvia	18.3	9.8%	33%
7	Japan	18.2	4.6%	20%
8	Netherlands	17.9	5.5%	20%
9	Czech Republic	17.8	12%	31%
10	Finland	17.7	6.9%	30%

Figure 6: Average Connection Speed (IPv4) by Country/Region

	Country/Region	Q1 2016 Peak Mbps	QoQ Change	YoY Change
–	Global	34.7	6.8%	14%
1	Singapore	146.9	8.3%	49%
2	Hong Kong	110.3	4.9%	19%
3	Indonesia	110.2	38%	535%
4	South Korea	103.6	8.7%	32%
5	Qatar	89.2	15%	27%
6	Macao	85.9	3.3%	48%
7	Japan	84.6	2.0%	21%
8	Taiwan	83.1	5.4%	20%
9	Romania	82.4	12%	20%
10	Mongolia	80.4	2.0%	17%

Figure 7: Average Peak Connection Speed (IPv4) by Country/Region

countries/regions worldwide saw average peak speeds of at least 80 Mbps, with the next eight countries/regions in the global list enjoying average peak speeds of more than 70 Mbps.

Looking across the world, 123 of the 146 qualifying countries/regions saw quarterly increases in average peak connection speeds, compared with 115 in the previous quarter. Growth rates ranged from 0.9% in Colombia (to 23.8 Mbps) to 69% in Uzbekistan (to 38.6 Mbps) — more than compensating for its 38% loss in the prior quarter. In all, 18 countries posted double-digit growth. On the declining side, 23 qualifying countries/regions saw lower average peak connection speeds in the first quarter, compared with 33 in the preceding quarter. Declines ranged from 0.2% in Fiji (to 36.9 Mbps) to 49% in El Salvador (to 16.6 Mbps).

Looking at year-over-year numbers, average peak connection speeds increased 14% on a global basis in the first quarter of 2016, compared with 21% in the prior quarter. All of the top 10 countries/regions saw increases in average peak connection speed, with Indonesia leading the pack with a 535% increase. As noted in last quarter's report, Indonesia's recent large gains in this and other broadband metrics are likely due in part to improved Akamai connectivity to a leading network provider within the country. Remaining gains among the top 10 ranged from 17% in Mongolia to 49% in Singapore.

Across all of the qualifying countries/regions, a total of 135 saw yearly increases in average peak connection speeds, as compared with 134 in the preceding quarter. Growth ranged from a mere 1.0% in Nigeria (to 23.3 Mbps) to an impressive 234% in Kenya (to 24.2 Mbps). A total of five qualifying countries/regions saw average peak connection speeds more than double compared with the previous year, while an additional 11 saw speeds increase by at least 50%. Ten countries/regions saw a yearly decline in average peak speeds, with Haiti again experiencing the largest drop at 70% (to 15.8 Mbps), while Panama had the smallest at 0.1% (to 19.1 Mbps). Lithuania saw no year-over-year change in average peak speed, holding steady at 50.2 Mbps.

In the first quarter of 2016, Zambia was the country/region with the lowest average peak connection speed (at 8.0 Mbps after a 1.2% quarterly gain), followed by Libya (at 8.6 Mbps after a 9.6% quarterly gain). A total of five countries, all in Africa, saw average peak connection speeds below 10 Mbps in the first quarter, up from four countries in the previous quarter.

**2.3 GLOBAL 4 MBPS BROADBAND ADOPTION (IPv4)** / In the first quarter of 2016, the global percentage of unique IPv4 addresses connecting to Akamai that met the 4 Mbps broadband speed threshold increased by 5.4% to 73%. As shown in Figure 8, among the top 10 countries/regions, quarterly changes were muted but mostly positive, just as in the prior quarter. The Netherlands posted a 0.2% loss, while the remaining nine countries/regions saw gains, ranging from 0.4% in South Korea to 4.2% in Romania. Romania's gain enabled it to regain its position in the top 10 after ceding it to Hong Kong in the previous quarter. Malta, Isle of Man, and Bulgaria all joined South Korea in leading the world in 4 Mbps adoption,

with 97% of their unique IPv4 addresses connecting to Akamai at average speeds exceeding the threshold. The other countries/regions in the top 10 remained close behind, with all 10 meeting the 4 Mbps average connection speed threshold for at least 95% of their unique IP addresses connecting to Akamai.

Globally, a total of 116 countries/regions qualified for inclusion within this metric, up from 110 in the preceding quarter. Of these, 109 saw quarterly growth in 4 Mbps broadband adoption rates, up from 99 in the previous quarter. Increases ranged from 0.2% in Jamaica (to 43% adoption) to 486% in Egypt (to 9.7% adoption). Egypt's large increase was likely due in part to significant investments, reportedly made by Telecom Egypt, into local infrastructure and deployment as well as in submarine connectivity to the European Union. Eleven additional countries also saw 4 Mbps broadband adoption rates more than double in the first quarter, while 33 more saw double-digit gains. Quarter-over-quarter declines were seen in just six qualifying countries/regions, compared with 11 in the previous quarter. Decreases ranged from 0.2% in the Netherlands to 31% in El Salvador (to 16% adoption). The 4 Mbps adoption rate stayed unchanged in Moldova at 81%.

Year over year, the percentage of unique IP addresses connecting to Akamai at average speeds of at least 4 Mbps increased by 16%, continuing the positive trend of the previous few quarters. Like the fourth quarter of 2015, adoption rates of 4 Mbps broadband were up on a yearly basis across all of the top 10 countries/regions in the first quarter of 2016 except Bulgaria, which saw a negligible 0.1% decline. Yearly increases were fairly modest, as can be expected with such high adoption rates. Gains ranged from 1.4% in South Korea to 15% in Thailand.

Across the globe, 112 of the qualifying countries/regions saw 4 Mbps broadband adoption levels increase year over year, compared with 102 in the prior quarter. Growth rates ranged from 1.4% in South Korea to an incredible 1,784% in Kenya (to 63% adoption). Indonesia saw the second-largest annual increase at 674% (to 46% adoption), while 22 additional countries/regions posted 4 Mbps adoption-rate

	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
–	Global	73%	5.4%	16%
1	South Korea	97%	0.4%	1.4%
2	Malta	97%	1.4%	4.5%
3	Isle Of Man	97%	1.8%	4.6%
4	Bulgaria	97%	2.4%	-0.1%
5	Thailand	96%	0.8%	15%
6	Switzerland	96%	2.3%	2.8%
7	Denmark	96%	1.6%	2.3%
8	Israel	96%	1.9%	2.9%
9	Netherlands	95%	-0.2%	3.0%
10	Romania	95%	4.2%	5.7%

Figure 8: 4 Mbps Broadband Adoption (IPv4) by Country/Region

gains of 100% or more. Only four countries/regions saw adoption rates fall, with declines ranging from 0.1% in Bulgaria to 8.9% in Kuwait (to 54% adoption).

In the first quarter of 2016, Venezuela, Pakistan, and Algeria were the only three countries with 4 Mbps broadband adoption rates below 5%—although each enjoyed healthy quarterly gains of 59%, 102%, and 141% to adoption levels of 4.3%, 4.8%, and 4.9% respectively. Egypt, the country with the lowest level of 4 Mbps broadband adoption in the fourth quarter of 2015, posted a 486% quarter gain to reach an adoption rate of 9.7% in the first quarter.

While many countries across the globe have continued to make measurable gains in broadband adoption, the goal of universal access is still elusive for all but a few countries. As reported in the *Fourth Quarter, 2015 State of the Internet Report*, the British government is currently working toward a Universal Service Obligation to give every U.K. resident and business the right to access the Internet at speeds of at least 10 Mbps. In the first quarter of 2016, it announced that it had finally achieved its prior Universal Service Commitment, established in 2009, to enable every residence and business in the U.K. access to the Internet at speeds of at least 2 Mbps. It did so by enabling those with slow Internet to receive a highly subsidized satellite dish with a year of broadband service included.<sup>10</sup>

The continued development of satellite and other aerial technologies appears to be playing a key role in delivering Internet access to hard-to-reach places. In February, American satellite broadband provider ViaSat and aeronautics company Boeing announced joint plans to deliver three new satellites that, within a few years, could double the total capacity of the 400-plus commercial communications satellites that are currently in use. The companies claim this would enable 100 Mbps satellite-based residential broadband service as well as offer affordable broadband to billions, including those in emerging markets and other underserved areas.<sup>11</sup>

**2.4 GLOBAL 10 MBPS BROADBAND ADOPTION (IPv4)** / In the first quarter of 2016, 35% of unique IP addresses globally connected to Akamai at average speeds above 10 Mbps, a 10% quarter-over-quarter increase, as shown in Figure 9. Like the previous quarter, all of the top 10 countries/regions saw increases in adoption in the first quarter. Bulgaria had the largest quarterly gain at 22%, while Japan posted the smallest at 3.9%. South Korea remained the world leader with an adoption rate of 84%—a full 16 percentage points higher than second-place Switzerland. With a 14% quarterly gain, Iceland joined the top 10 in the first quarter, pushing Denmark out. All of the top 10 countries/regions enjoyed 10 Mbps adoption rates of at least 65%.

In the first quarter, 82 countries/regions qualified for this metric, up from 76 in the preceding quarter. Among these, all but one saw quarter-over-quarter increases. Gains ranged from 2.5% in Georgia (to 28% adoption) to 1,883% in Egypt (to 1.6% adoption). Note that both Egypt's 10 Mbps adoption rate and the number of unique IPv4 addresses being counted in Egypt are quite small, which can result in large percentage changes such as those seen here. However, as previously mentioned, Telecom Egypt has apparently made several

infrastructure investments that have boosted Egypt's broadband speeds this quarter, so it is not surprising to see significant advances in broadband adoption metrics as well. Ten additional countries/regions saw adoption rates more than double compared with the fourth quarter of 2015, while Trinidad and Tobago was the only country to see a quarterly decline, as its 10 Mbps adoption rate fell 2.9% to 23%.

Looking at year-over-year changes, there was a 34% increase globally in the percentage of unique IP addresses connecting to Akamai at average speeds above 10 Mbps. Like the previous quarter, all of the top 10 countries/regions enjoyed yearly growth in adoption rates in the first quarter. These ranged from 9.5% in South Korea to 103% in Iceland. Across the globe, 80 qualifying countries/regions saw year-over-year increases in 10 Mbps broadband adoption in the first quarter, up from 70 in the fourth quarter. Israel and South Korea were the only countries/regions to see single-digit growth with gains of 8.1% and 9.5% (to 51% and 84% adoption) respectively. On the other hand, 29 countries/regions saw adoption rates more than double year over year, and Kenya once again led the pack with a massive 5,507% increase (to 18% adoption). Again, Kenya's large quarterly and yearly improvements across many metrics in this quarter's report are likely due in part to improved Akamai connectivity to key network providers in the country. Only two countries—Colombia and Uruguay—saw yearly declines, with drops of 47% and 2.6% to adoption rates of 2.3% and 17% respectively.

With just 0.3% of its IPv4 addresses connecting to Akamai at average speeds of 10 Mbps or more, Iran was the qualifying country with the lowest 10 Mbps broadband adoption rate in the first quarter. (Iran was not a qualifying country previously, as it had fewer than 25,000 unique IPv4 addresses connecting to Akamai.) Tunisia, Morocco, and Egypt rounded out the bottom four with adoption rates below 2.0%, though all four of these countries enjoyed strong quarterly growth, with adoption more than doubling compared with the prior quarter. Vietnam, which held the lowest spot globally in the fourth quarter of 2015, posted a 412% quarterly increase to 4.9%, raising it out of the bottom 10.

	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
–	Global	35%	10%	34%
1	South Korea	84%	4.0%	9.5%
2	Switzerland	68%	9.8%	16%
3	Netherlands	67%	4.2%	14%
4	Belgium	66%	8.9%	40%
5	Bulgaria	66%	22%	20%
6	Hong Kong	66%	7.8%	10%
7	Norway	65%	5.8%	69%
8	Iceland	65%	14%	103%
9	Japan	65%	3.9%	17%
10	Singapore	65%	9.9%	40%

Figure 9: 10 Mbps Broadband Adoption (IPv4) by Country/Region



**2.5 GLOBAL 15 MBPS BROADBAND ADOPTION (IPv4)** / As Figure 10 shows, 21% of unique IP addresses globally connected to Akamai at average connection speeds of 15 Mbps or above in the first quarter of 2016, up 14% from the fourth quarter of 2015. Like the preceding quarter, all of the top 10 countries/regions saw quarter-over-quarter gains in the first quarter. Singapore and Iceland posted the strongest quarterly increases, at 33% and 29% respectively, pulling them into the top 10 this quarter. This pushed Denmark and Finland out of the top 10, though both countries still had respectable quarterly gains. With a 69% adoption rate, up 9.8% quarter over quarter, South Korea remained solidly in the lead worldwide for 15 Mbps broadband adoption. Second-place Norway posted a 50% adoption rate, up 12% from the previous quarter. Japan had the smallest quarterly increase among the top 10 with an 8.1% rise to 44% adoption.

In the first quarter of 2016, 68 countries/regions qualified for inclusion in this metric, up from 61 in the fourth quarter of 2015. Quarterly gains were seen in 66 qualifying countries/regions compared with 60 in the prior quarter, and overall, increases were larger. Lithuania had the smallest rate of growth at 7.1% (to 33% adoption), while Egypt and Kenya enjoyed the biggest quarter-over-quarter increases at 1,851% and 958% (to adoption rates of 0.7% and 8.9% respectively). In total, over nine countries/regions more than doubled their 15 Mbps adoption rates compared with the fourth quarter. Kazakhstan and Macao had the only declines, with quarterly decreases of 15% and 4.8% to adoption levels of 2.5% and 17% respectively. China again had the lowest 15 Mbps broadband adoption rate at 0.4% despite a healthy 41% quarterly increase. Colombia, Egypt, and Vietnam all had adoption rates below 1.0% as well.

Year over year, the global 15 Mbps adoption rate grew a sizeable 58%, with strong gains all across the top 10. Iceland had the largest yearly increase at 249%, followed by Norway at 104%. The remaining eight countries/regions in the top 10 all posted double-digit gains, ranging from 20% in South Korea to 76% in Singapore. When looking across all of the qualifying countries, only three countries saw a yearly decrease in the first quarter. Losses ranged from 5.7% in Turkey (to 4.2% adoption) to 41% in Colombia (to 0.6% adoption).

	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
–	Global	21%	14%	58%
1	South Korea	69%	9.8%	20%
2	Norway	50%	12%	104%
3	Hong Kong	48%	26%	21%
4	Sweden	46%	8.4%	35%
5	Switzerland	44%	18%	38%
6	Japan	44%	8.1%	31%
7	Latvia	43%	16%	37%
8	Singapore	43%	33%	76%
9	Netherlands	42%	9.1%	34%
10	Iceland	41%	29%	249%

Figure 10: 15 Mbps Broadband Adoption (IPv4) by Country/Region

The remaining countries/regions saw increases that were stronger overall than those in the fourth quarter of 2015, as gains ranged from 15% in Lithuania (to 33% adoption) to an incredible 15,532% in Kenya (to 8.9% adoption). Twenty-nine countries/regions saw adoption levels more than double year over year in the first quarter compared with 19 in the fourth quarter, and an additional 19 countries/regions saw gains of at least 50%.

**2.6 GLOBAL 25 MBPS BROADBAND ADOPTION (IPv4)** / Globally, 8.5% of unique IP addresses connected to Akamai at average connection speeds of at least 25 Mbps—a 19% increase over the previous quarter, as shown in Figure 11. All of the top 10 countries/regions enjoyed double-digit quarterly gains in adoption rates, ranging from 10% in Japan to 56% in Hong Kong. With its 15% quarterly increase, South Korea retained its position well above the rest of the world with a 42% adoption rate, 15 percentage points above second-place Norway. Boosted by a 28% gain over the previous quarter, Switzerland regained its position among the top 10, squeezing Lithuania out. Thirteen countries/regions had 25 Mbps adoption rates of at least 15%, up from nine in the fourth quarter of 2015 and just three in the third quarter.

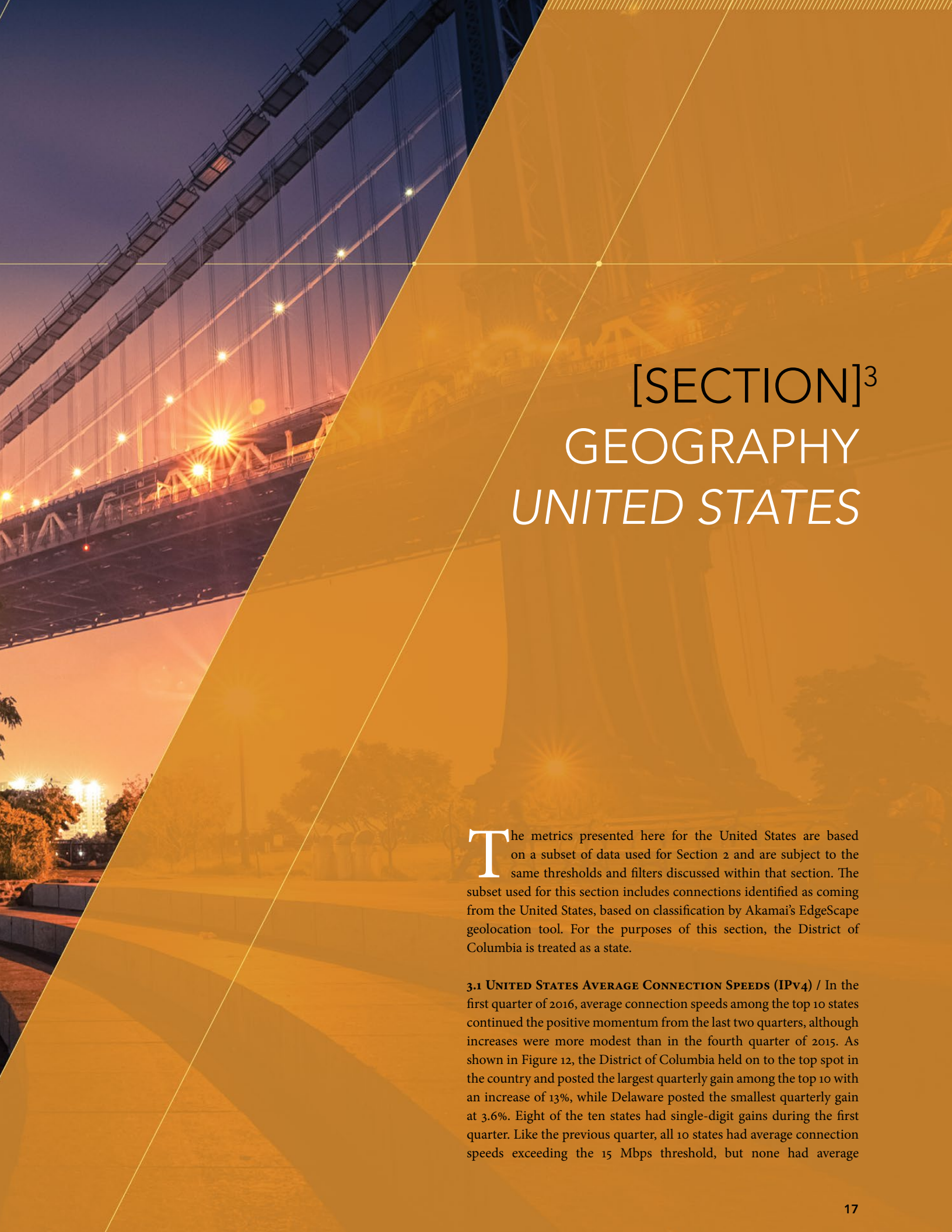
The first quarter of 2016 saw the number of countries/regions that qualified for inclusion in this metric rise from 47 to 50. All 50 saw strong quarterly gains in adoption, ranging from 9.4% in Russia (to 6.0% adoption) to 2,055% in Kenya (to 3.1% adoption). South Africa also more than doubled its adoption rate with quarterly growth of 305% (to 3.6% adoption), while nine additional countries/regions saw adoption increase by more than 50%.

Year over year, the global 25 Mbps broadband adoption rate increased by a sizeable 86%. Among the top 10, gains ranged from 36% in South Korea to 186% in Norway, and yearly increases were robust across the remaining qualifying countries/regions as well. Lithuania posted the smallest increase of 31% (to 16% adoption), while Kenya enjoyed an incredible 24,100% gain (to 3.1% adoption). Twenty-six other countries/regions saw 25 Mbps adoption rates more than double compared with a year ago.

	Country/Region	% Above 25 Mbps	QoQ Change	YoY Change
–	Global	8.5%	19%	86%
1	South Korea	42%	15%	36%
2	Norway	27%	28%	186%
3	Sweden	26%	15%	72%
4	Hong Kong	23%	56%	42%
5	Latvia	21%	15%	72%
6	Japan	19%	10%	41%
7	Finland	18%	14%	70%
8	Switzerland	18%	28%	85%
9	Denmark	17%	16%	170%
10	Netherlands	16%	12%	74%

Figure 11: 25 Mbps Broadband Adoption (IPv4) by Country/Region





# [SECTION]<sup>3</sup> GEOGRAPHY *UNITED STATES*

The metrics presented here for the United States are based on a subset of data used for Section 2 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from the United States, based on classification by Akamai's EdgeScape geolocation tool. For the purposes of this section, the District of Columbia is treated as a state.

**3.1 UNITED STATES AVERAGE CONNECTION SPEEDS (IPv4)** / In the first quarter of 2016, average connection speeds among the top 10 states continued the positive momentum from the last two quarters, although increases were more modest than in the fourth quarter of 2015. As shown in Figure 12, the District of Columbia held on to the top spot in the country and posted the largest quarterly gain among the top 10 with an increase of 13%, while Delaware posted the smallest quarterly gain at 3.6%. Eight of the ten states had single-digit gains during the first quarter. Like the previous quarter, all 10 states had average connection speeds exceeding the 15 Mbps threshold, but none had average

	State	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
1	District Of Columbia	24.0	13%	48%
2	Delaware	21.2	3.6%	21%
3	Rhode Island	20.0	4.6%	30%
4	Massachusetts	19.9	7.1%	29%
5	Utah	19.7	10%	26%
6	New Jersey	18.5	7.3%	39%
7	Maryland	18.4	4.4%	40%
8	New York	18.0	7.6%	34%
9	Virginia	18.0	4.7%	-1.8%
10	Washington	17.4	3.9%	14%

Figure 12: Average Connection Speed (IPv4) by State

connection speeds reaching the FCC's new 25 Mbps broadband threshold. This may change in the near future, as the District of Columbia was within striking distance of the 25 Mbps threshold.

Looking across the country, all 51 states saw average connection speeds above the 10 Mbps threshold in the first quarter of 2016, compared with 49 states in the fourth quarter. Kentucky, Idaho, and Alaska had the slowest speeds in the nation, connecting to Akamai at an average speed of 10.9 Mbps. Like the fourth quarter of 2015, all 51 states saw average connection speeds rise quarter over quarter, although gains were more modest in the first quarter of 2016. Increases ranged from 0.2% in Wisconsin (to 15.3 Mbps) to 13% in the District of Columbia. Only five states posted double-digit gains, compared with 45 in the preceding quarter.

On a year-over-year basis, Virginia saw a small decline of 1.8%, while the remaining 50 states enjoyed gains. Wisconsin had the smallest yearly increase in average connection speeds at 8.8%, while the other states enjoyed double-digit gains, led by the District of Columbia at 48%. Thirteen states saw gains of at least 30% compared with the preceding year.

Just as we saw variation in speeds across the 51 states, we also see variation in states' prioritization of broadband initiatives. In January, Minnesota's Blandin Foundation published a listing of state-sponsored broadband plans, revealing a diverse level of commitment and resources across the country.<sup>12</sup> Some states have lofty speed targets and others have made significant financial commitments, while still others have shuttered their initiatives entirely. Some noteworthy findings include Alaska's goal of 100 Mbps connectivity for every resident by 2020; Kentucky's ambitious \$300+ million Kentucky Wired project, aiming to lay more than 3,000 miles of "middle mile" fiber across the state; and New York's \$500 million investment towards its stated goals of bringing 100 Mbps connectivity to most areas in the state and 25 Mbps connectivity to remote and underserved areas.

### 3.2 UNITED STATES AVERAGE PEAK CONNECTION SPEEDS (IPv4) /

In the first quarter of 2016, the District of Columbia overtook Delaware to lead the nation in average peak connection speeds with a 13% quarterly increase to 93 Mbps. All of the top 10 states saw increases in average peak connection speeds, as seen in Figure 13, with Delaware posting the smallest gain at 4.4%, while Utah and the District of Columbia had the largest gains at 13%. Across the nation, Nebraska was the only state to see a quarterly decline, and its loss was negligible at 0.1% (to 55.0 Mbps). On the gaining side, Wisconsin posted the smallest increase at 1.3% (to 60.8 Mbps), while Alaska enjoyed a 13% gain (to 56.8 Mbps), joining Utah and the District of Columbia as the biggest first-quarter gainers across all of the states. Nine states posted double-digit growth, compared with four in the previous quarter.

Like the preceding quarter, year-over-year changes were positive across all 51 states in the first quarter of 2016. Among the top 10, increases ranged from 7.7% in Virginia to 32% in Maryland. Among the remaining states, Nebraska had the smallest growth at 5.4%, while Alaska had the largest at 38%. All but three states enjoyed double-digit growth over the first quarter of 2015.

Despite an 11% quarterly gain—one of the largest in the country—Kentucky once again held the spot for lowest average peak connection speed in the country at 44.4 Mbps. Mississippi took the second-to-last spot with an average peak speed of 46 Mbps, up 5.0% quarter over quarter.

Continuing the trend we have seen over the past several quarters, the first quarter of 2016 saw numerous announcements of new ultra-high-speed commercial broadband service rollouts across the country, from big cities to small towns. Among the gigabit Internet services that were either announced or launched in the first quarter of 2016 were Cox's GIGABLAST service in Tucson, Ariz.,<sup>13</sup> Comcast's Gigabit Pro in various areas across Minnesota,<sup>14</sup> Lumos Network in Botetourt County, Va.,<sup>15</sup> Ting in Sandpoint, Idaho,<sup>16</sup> Metronet in Bloomington-Normal, Ill.,<sup>17</sup> and NTS Communications in Hammond, La.<sup>18</sup> Comcast also announced Atlanta and Nashville would be getting gigabit Internet services in early 2016, followed by Chicago, Detroit, and Miami in the second half of the year.<sup>19</sup> These five regions will be the first to benefit commercially from the rollout of Comcast's DOCSIS3.1 technology, which purports to enable super-fast speeds over Comcast's existing network—so laying new fiber is not required.<sup>20</sup> Finally, Google Fiber announced additional expansion plans in the first quarter, adding Huntsville, Ala. and San Francisco to its list of cities. In Huntsville, Google Fiber will utilize part of the fiber network the city is already building, and in San Francisco, it will use the city's existing fiber to connect apartments and condos to its gigabit Internet services more rapidly.<sup>21, 21</sup>

In addition to the commercial announcements, there were updates on state and local government initiatives as well. As noted in last quarter's *State of the Internet Report*, LinkNYC began converting New York City payphone stands into Wi-Fi hotspots in the fourth quarter of 2015 as part of a public-private partnership. On January 20, 2016, LinkNYC began beta testing, turning on some hotspots

	State	Q1 2016 Peak Mbps	QoQ Change	YoY Change
1	District Of Columbia	93.0	13%	22%
2	Delaware	92.2	4.4%	15%
3	Massachusetts	86.8	6.8%	23%
4	Virginia	84.9	9.6%	7.7%
5	Maryland	84.5	5.9%	32%
6	Utah	84.0	13%	24%
7	Rhode Island	83.5	5.5%	20%
8	New Jersey	83.0	7.4%	31%
9	Washington	78.6	6.5%	16%
10	New York	78.2	7.6%	24%

Figure 13: Average Peak Connection Speed (IPv4) by State

and successfully delivering free public Wi-Fi at speeds of more than 300 Mbps. LinkNYC will not charge users or the city for its planned 7,500 hotspot installations or for the high-speed wireless service but is planning to recoup costs and generate revenue from ads shown on digital displays near the hotspots.<sup>22</sup> Elsewhere, as part of a municipal broadband pilot project, Holland, Mich. announced in March that it was successfully delivering gigabit-speed Internet via a fiber network built by the city more than 20 years ago. The pilot project is the first phase towards a municipally owned high-speed network that will service the entire area.<sup>23</sup>

### 3.3 UNITED STATES 4 MBPS BROADBAND ADOPTION (IPv4) /

In the first quarter of 2016, Delaware edged out Rhode Island to lead the country in 4 Mbps broadband adoption with an adoption rate of 98%, up 1.3% from the previous quarter. As seen in Figure 14, first-quarter changes among the top 10 states were again positive but muted across the board, with gains ranging from Maryland's 0.1% to New York's 1.8%. All of the top 10 states had 4 Mbps adoption levels of 90% or more compared with 8 states in the fourth quarter. Nationwide, 50 of the 51 states saw quarterly growth in adoption rates, compared with all 51 in the preceding quarter. Maryland saw the smallest quarter-over-quarter gain, while Alaska enjoyed the largest at 6.1% (to 82% adoption). Wisconsin was the sole declining state with a 0.3% drop (to 85% adoption).

Yearly changes were positive across all 51 states in the first quarter, and among the top 10, Maryland again saw the largest yearly increase with a gain of 16%, while Delaware posted the smallest at 1.2%. Across the country, Georgia, Missouri, and the District of Columbia led in year-over-year gains with an increase of 20% each (to adoption levels of 85%, 85%, and 89% respectively), while New Hampshire and Delaware had the smallest gains at 1.2% each (to adoption levels of 87% and 98% respectively). In total, 19 states saw double-digit year-over-year increases in 4 Mbps broadband adoption in the first quarter,

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	Delaware	98%	1.3%	1.2%
2	Rhode Island	97%	0.3%	1.3%
3	New Jersey	94%	0.9%	8.3%
4	Hawaii	94%	1.5%	4.4%
5	Massachusetts	92%	1.1%	4.9%
6	New York	92%	1.8%	6.4%
7	North Dakota	92%	1.4%	4.4%
8	Maryland	91%	0.1%	16%
9	Florida	91%	1.6%	5.8%
10	Utah	91%	1.5%	6.9%

Figure 14: 4 Mbps Broadband Adoption (IPv4) by State

down from 25 states in the preceding quarter. Forty-four states had 4 Mbps broadband adoption rates of at least 80%, up from 39 states in the fourth quarter of 2015.

For the tenth consecutive quarter, West Virginia remained the state with the lowest 4 Mbps broadband adoption rate at 69% — up 4.7% quarter over quarter and 15% year over year. Iowa had the next-lowest adoption rate in the country at 75%, a 3% increase from the fourth quarter of 2015.

In addition to the numerous announcements of ultra-high-speed gigabit-plus services being rolled out in various cities across the United States, the first quarter also saw news of the continued push to bring broadband to more remote regions of the country. As part of President Obama's ConnectHome project, promising connectivity for 275,000 low-income homes, Google Fiber announced in February that it would provide free gigabit-speed services to low-income residents, starting with select public housing buildings in Kansas City, Mo., and eventually expanding to all of the Google Fiber cities.<sup>24</sup> In addition, at the end of March, the Federal Communications Commission approved a \$9.25/month broadband subsidy for low-income households in an effort to bridge the digital divide<sup>25</sup> (a notional gulf between those who have ready access to computers and the Internet, and those who do not).

### 3.4 UNITED STATES 10 MBPS BROADBAND ADOPTION (IPv4) /

Delaware and Rhode Island again held the top two spots for 10 Mbps broadband adoption with adoption rates of 80% and 79% respectively, as seen in Figure 15. All of the top 10 states enjoyed quarter-over-quarter growth, just as in the fourth quarter of 2015, though gains were lower in the first quarter of 2016, ranging from 1.8% in Maryland to 5.0% in New York. Half of the top 10 states had at least 70% of their unique IP addresses connecting to Akamai at average speeds above 10 Mbps, compared with 4 of 10 in the previous quarter.

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	Delaware	80%	2.8%	9.6%
2	Rhode Island	79%	1.9%	12%
3	New Jersey	75%	4.0%	23%
4	Massachusetts	73%	3.2%	13%
5	Maryland	70%	1.8%	35%
6	New York	69%	5.0%	25%
7	District Of Columbia	67%	4.4%	38%
8	Virginia	67%	3.4%	17%
9	Connecticut	64%	3.4%	9.9%
10	New Hampshire	63%	2.6%	4.7%

Figure 15: 10 Mbps Broadband Adoption (IPv4) by State

Across the nation in the first quarter, as in the preceding quarter, all 51 states saw gains in 10 Mbps broadband adoption rates. Mirroring the trend we saw with the top 10, increases across the country were more muted than in the fourth quarter of 2015. Increases ranged from 0.2% in Wisconsin (to 57% adoption) to 15% in Alaska (to 43% adoption), and only 2 states enjoyed double-digit quarterly growth, compared with 43 states in the previous quarter. Forty states had 10 Mbps broadband adoption rates of at least 50%, up from 33 states in the fourth quarter of 2015.

Year-over-year changes in 10 Mbps broadband adoption were positive across all 51 states as well, led again by Hawaii with a 115% jump (to 56% adoption). The next-largest increase was seen in Arkansas with a 57% gain (to 39% adoption), while the District of Columbia posted the biggest increase among the top 10 with a 38% yearly gain. New Hampshire once again had the lowest yearly increase in the country (and among the top 10) with adoption rates rising just 4.7% as compared with the first quarter of 2015.

Despite posting a 6.8% quarterly growth in its 10 Mbps broadband adoption rate, in the first quarter of 2016 Idaho remained in last place across the country with a 36% adoption rate. New Mexico, Iowa, and Arkansas had the next-lowest 10 Mbps broadband adoption rates in the country at 38%, 39%, and 39% respectively.

### 3.5 UNITED STATES 15 MBPS BROADBAND ADOPTION (IPv4) /

As seen in Figure 16, Delaware and Rhode Island continued to lead the country in 15 Mbps broadband adoption, just as they have in the 4 Mbps and 10 Mbps tiers. All of the top 10 states showed growth in the first quarter of 2016, but growth was more modest than in the preceding quarter. New York enjoyed the only double-digit increase with a gain of 10%, while Maryland had the smallest increase at 5.7%. Connecticut's 8.8% rise was enough to give it a top-10 spot, pushing out Washington, where adoption rose 5.9% over the previous quarter. Five states had 15 Mbps adoption levels surpassing 50%, compared with just two states in the preceding quarter.

	State	% Above 15 Mbps	QoQ Change	YoY Change
1	Delaware	57%	6.2%	33%
2	Rhode Island	55%	6.1%	57%
3	New Jersey	51%	9.6%	70%
4	Massachusetts	51%	8.3%	41%
5	District Of Columbia	51%	7.6%	62%
6	Maryland	48%	5.7%	79%
7	Virginia	46%	7.6%	51%
8	New York	45%	10%	73%
9	Pennsylvania	42%	8.5%	52%
10	Connecticut	42%	8.8%	43%

Figure 16: 15 Mbps Broadband Adoption (IPv4) by State

Across the country, first-quarter changes were mostly positive, with only Wisconsin and Idaho seeing adoption rates fall. These drops were small, at 1.0% and 0.6% (to adoption levels of 34% and 18% respectively). The remaining 49 states saw increases ranging from 2.7% in West Virginia (to 26% adoption) to 27% in Alaska (to 23% adoption). In all, 44 states had at least one-quarter of their unique IP addresses connecting to Akamai at average speeds of 15 Mbps or faster, up from 40 in the fourth quarter.

Like the fourth quarter of 2015, year-over-year changes in 15 Mbps access were robustly positive in the first quarter. Wisconsin posted the smallest gain at 20% (to 34% adoption), while Hawaii once again led the nation with an impressive 255% increase (to 25% adoption). Four additional states saw adoption rates at least double, and 28 more saw adoption increase by at least 50% compared with a year prior. Maryland again led the top 10 in yearly increases with a 79% jump, while Delaware again saw the smallest year-over-year increase in the top 10 at 33%.

Kentucky, the state with the lowest 15 Mbps adoption rate in the fourth quarter of 2015, posted a 22% increase in the first quarter of 2016 (to 20% adoption) to pull out of last place, replaced by Idaho, which saw adoption drop 0.6%. Kentucky, however, remained in second-to-last place together with Arkansas.

### 3.6 UNITED STATES 25 MBPS BROADBAND ADOPTION (IPv4) /

In the first quarter, all of the top 10 states saw quarterly growth in 25 Mbps broadband adoption, as seen in Figure 17, though adoption levels rose less than in the previous quarter, ranging from 9.7% in Washington to 20% in New Jersey. The District of Columbia held onto the top spot in the nation with adoption four percentage points higher than second-place Delaware, while New York, with an 18% quarterly increase, edged out Pennsylvania to regain its spot in the top 10. Delaware joined the District of Columbia as the only two states in the nation to have at least one in four of its unique IP addresses connecting to Akamai at average speeds of at least 25 Mbps.

	State	% Above 25 Mbps	QoQ Change	YoY Change
1	District Of Columbia	29%	15%	88%
2	Delaware	25%	12%	67%
3	Rhode Island	21%	14%	158%
4	Massachusetts	21%	17%	103%
5	New Jersey	19%	20%	180%
6	Maryland	19%	13%	139%
7	Utah	19%	14%	45%
8	Virginia	18%	13%	65%
9	Washington	17%	9.7%	52%
10	New York	17%	18%	127%

Figure 17: 25 Mbps Broadband Adoption (IPv4) by State

Across the nation, 48 of the 51 states enjoyed gains in the first quarter, though they were less impressive than in the preceding quarter. Increases ranged from 0.3% in Nebraska (to 9.8% adoption) to 40% in Alaska (to 5.2% adoption), with 38 states seeing double-digit gains as compared with all 51 states in the fourth quarter of 2015. Idaho, Wisconsin, and West Virginia were the three states to see 25 Mbps adoption fall, posting losses of 10%, 3.5%, and 0.4% to adoption levels of 5.6%, 11%, and 7.9% respectively.

Continuing the positive momentum from the previous two quarters, all of the top 10 states posted robust year-over-year improvements in 25 Mbps broadband for the first quarter of 2016. The top 10 saw gains ranging from 45% in Utah to 180% in New Jersey, and five of the top ten saw adoption rates more than double compared with the first quarter of 2015. Gains across the rest of the nation were strong as well, ranging from 25% in Wisconsin (to 11% adoption) to 257% in Hawaii (to 6.0% adoption). Nineteen states saw adoption rates more than double year over year in the first quarter, down from twenty-six in the preceding quarter.

Twenty-five Mbps broadband adoption rates remained fairly low nationwide but are steadily improving. In all, 23 states saw adoption levels below 10%, down from 25 in the fourth quarter, with several more close to crossing this threshold. Kentucky and Alaska again had the lowest adoption rates in the country at 4.0% and 5.2% respectively, but both saw quarterly increases of more than 30%. In the first quarter, Kentucky was the only state remaining with adoption levels below 5%, whereas just two quarters prior there were 10 such states.





# [SECTION]<sup>4</sup>

## GEOGRAPHY

### AMERICAS

The metrics presented here for the Americas region (North and South America) are based on a subset of data used for Section 2 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks within North and South America, based on classification by Akamai's EdgeScape geolocation tool.

**4.1 AMERICAS AVERAGE CONNECTION SPEEDS (IPv4)** / In the first quarter of 2016, the United States again had the fastest average connection speed among surveyed Americas countries, with Canada just 1.0 Mbps behind, as shown in Figure 18. The United States and Canada remained well ahead of the other countries in the region, with Canada posting an average connection speed 7 Mbps faster than third-place Chile. The gap in average connection speeds between the fastest and slowest countries in the region also widened slightly, from 12.6 Mbps to 13.4 Mbps. In the first quarter of 2016, changes were positive across the board and stronger overall than in the fourth quarter of 2015. Paraguay had the

Global Rank	Country/Region	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
16	United States	15.3	7.7%	29%
24	Canada	14.3	8.9%	24%
62	Chile	7.3	19%	29%
66	Uruguay	7.1	15%	6.5%
67	Mexico	7.1	20%	43%
84	Argentina	5.3	14%	15%
85	Ecuador	5.3	21%	30%
88	Peru	5.2	16%	16%
92	Colombia	4.6	4.3%	5.7%
95	Brazil	4.5	9.3%	35%
98	Panama	4.5	16%	41%
105	Costa Rica	3.8	13%	27%
129	Bolivia	2.4	23%	60%
135	Paraguay	2.2	36%	51%
142	Venezuela	1.9	16%	27%

Figure 18: Average Connection Speed (IPv4) by Americas Country

biggest gain at 36%, while Colombia posted the smallest increase at 4.3%. Eleven surveyed countries posted double-digit gains over the previous quarter.

All 15 surveyed countries saw positive growth on a yearly basis as well, ranging from 5.7% in Colombia to 60% in Bolivia. Like the preceding quarter, 13 of the 15 saw double-digit quarterly increases in average connection speeds. Eleven of the surveyed Americas countries had an average connection speed at or above the 4 Mbps threshold — up from 10 in the fourth quarter — and once again only the United States and Canada had speeds above the 10 Mbps broadband threshold.

In addition to the U.S. broadband developments noted in Section 3 of this report, the first quarter saw some positive news for other communities in the Americas. Cuba, a country where Internet access is still highly restricted and extremely limited, may see its situation change in the near future as Google has reportedly secured a deal to bring and build-out broadband access across the country.<sup>26</sup> Meanwhile, as part of an initiative supported by the Chilean government, telecommunications provider Entel has enabled broadband access for residents of Easter Island through a new satellite link. The remote island is home to fewer than 6,000 people and is nearly 3,700 km away from the Chilean mainland.<sup>27</sup>

#### 4.2 AMERICAS AVERAGE PEAK CONNECTION SPEEDS (IPv4) /

In the first quarter of 2016, Uruguay regained the top spot among the surveyed Americas countries for average peak connection speeds after losing that spot to the United States in the fourth quarter of 2015. As shown in Figure 19, Uruguay posted a 24% gain in its average peak connection speed in the first quarter after seeing a 5.0% drop in the fourth quarter. Changes among the remaining countries were mostly positive, with only Paraguay and Peru posting declines (of 6.8% and 0.8% respectively). Among the remaining countries, gains ranged from 0.9% in Colombia to 29% in Ecuador. The spread of average

Global Rank	Country/Region	Q1 2016 Peak Mbps	QoQ Change	YoY Change
17	Uruguay	70.8	24%	38%
22	United States	67.8	10%	27%
33	Canada	59.6	8.6%	20%
51	Chile	48.6	8.8%	34%
80	Brazil	33.2	9.7%	39%
82	Mexico	32.1	7.5%	16%
84	Ecuador	31.6	29%	37%
85	Peru	31.3	-0.8%	15%
89	Argentina	29.8	4.4%	22%
107	Colombia	23.8	0.9%	-16%
119	Panama	19.1	11%	-0.1%
121	Costa Rica	18.6	19%	27%
131	Bolivia	14.8	12%	23%
136	Paraguay	12.5	-6.8%	9.4%
137	Venezuela	12.1	7.1%	13%

Figure 19: Average Peak Connection Speed (IPv4) by Americas Country

peak connection speeds between the fastest and slowest countries increased slightly from 50.2 Mbps in the fourth quarter of 2015 to 58.7 Mbps in the first quarter of 2016.

Year-over-year changes were mostly positive as well, although Colombia and Panama both posted declines, losing 16% and 0.1% respectively. On the gaining side, Paraguay had the smallest yearly increase at 9.4%, while the remaining countries enjoyed double-digit growth, led by Brazil with a 39% yearly gain.

In February, Bell Canada, which currently provides gigabit-speed Internet access to 2.2 million homes in eastern Canada, reaffirmed its plans to increase that number to 3 million premises by the end of 2016. Looking toward the future, Bell Canada hopes its FTTH network can deliver speeds of 10 Gbps by 2017, which may be reflected in increasing peak speed metrics for Canada over the upcoming quarters.<sup>28</sup>

#### 4.3 AMERICAS 4 MBPS BROADBAND ADOPTION (IPv4) /

With a 90% adoption rate, Canada remained the leader in the Americas region for 4 Mbps broadband adoption in the first quarter of 2016, followed by the United States with an 86% adoption rate, as seen in Figure 20. The difference in adoption rates between the top and bottom qualifying Americas countries was a sizeable 86 percentage points, up from 85 percentage points in the fourth quarter of 2015. As noted before, this gap is likely to remain large for the foreseeable future. As in the fourth quarter, all of the surveyed Americas countries saw quarter-over-quarter growth in 4 Mbps broadband adoption in the first quarter of 2016. Once again, Venezuela, the bottom-ranking qualifying country in this metric, posted the largest quarterly gain at 59%, while Canada, the top-ranking country, posted the smallest at 2.2%.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
34	Canada	90%	2.2%	4.0%
44	United States	86%	3.4%	13%
47	Chile	84%	25%	38%
58	Mexico	78%	15%	48%
59	Uruguay	78%	8.4%	28%
73	Peru	64%	36%	28%
78	Ecuador	58%	40%	80%
79	Colombia	55%	8.8%	26%
82	Argentina	53%	15%	29%
84	Panama	48%	29%	129%
89	Brazil	44%	13%	46%
98	Costa Rica	32%	41%	88%
116	Venezuela	4.3%	59%	76%
-	Paraguay	8.2%	248%	346%
-	Bolivia	7.8%	133%	221%

Figure 20: 4 Mbps Broadband Adoption (IPv4) by Americas Country

Year-over-year changes were also positive across the board in the first quarter, though widely varying in magnitude. Canada again saw the smallest gain at 4.0%, followed by the United States with a 13% increase over the first quarter of 2015. Panama again saw the largest yearly increase among the qualifying countries with a 129% jump, and three other qualifying Americas countries saw 4 Mbps broadband adoption levels grow by more than 50%.

#### 4.4 AMERICAS 10 MBPS BROADBAND ADOPTION (IPv4) /

As shown in Figure 21, the United States and Canada once again remained the clear leaders in 10 Mbps broadband adoption among the qualifying surveyed Americas countries. The gap between Canada and the next-highest country narrowed slightly from 39 percentage points to 36 in the first quarter of 2016, while the gap between the top and bottom qualifying countries increased again, from 51 percentage points to 54. Like the fourth quarter of 2015, all of the qualifying surveyed countries enjoyed quarterly gains in adoption in the first quarter. Colombia had the smallest increase at 4.1%, while Argentina and Uruguay posted the largest jumps at 95% and 92% respectively.

From a yearly perspective, 2 of the 10 qualifying surveyed countries saw declines in 10 Mbps broadband adoption, just as in the fourth quarter. Colombia saw adoption rates fall 47% compared with the previous year, and Uruguay saw adoption fall 2.6%. The remaining countries posted gains ranging from 22% in Canada and Argentina to an impressive 212% in Mexico.

#### 4.5 AMERICAS 15 MBPS BROADBAND ADOPTION (IPv4) /

As Figure 22 shows, only 8 of the 15 surveyed countries in the Americas region qualified for inclusion in the 15 Mbps broadband adoption metric in the first quarter of 2016 — up from 7 in the fourth quarter of 2015 — with Uruguay seeing enough unique IP addresses connecting to Akamai above the speed threshold to qualify this quarter. The gap between the top- and bottom-ranking countries increased from 31

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
17	United States	57%	7.0%	29%
20	Canada	53%	9.4%	22%
56	Uruguay	17%	92%	-2.6%
58	Chile	16%	54%	74%
59	Mexico	15%	77%	212%
67	Argentina	8.6%	95%	22%
68	Ecuador	5.7%	71%	73%
71	Peru	4.4%	51%	76%
72	Brazil	3.8%	32%	73%
77	Colombia	2.3%	4.1%	-47%
-	Panama	3.2%	68%	203%
-	Costa Rica	1.5%	24%	63%
-	Bolivia	0.6%	106%	189%
-	Paraguay	0.5%	166%	461%
-	Venezuela	0.3%	42%	42%

Figure 21: 10 Mbps Broadband Adoption (IPv4) by Americas Country


percentage points in the fourth quarter to 34 in the first. However, all of the qualifying surveyed countries enjoyed robust gains in adoption in the first quarter, ranging from 11% in the United States to 102% and 136% in Uruguay and Argentina respectively.

Year-over-year numbers showed mixed changes in adoption levels across the qualifying surveyed Americas countries, with six countries posting yearly gains while Colombia and Uruguay saw declines of 41% and 6.8% respectively. Note, however, that Colombia's adoption rate is below 1%, so even small changes can be reflected as large percentage shifts. Among the gaining countries, increases ranged from 38% in Argentina to 245% in Mexico.

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
18	United States	35%	11%	63%
21	Canada	32%	18%	63%
55	Chile	4.4%	60%	150%
58	Uruguay	4.1%	102%	-6.8%
59	Mexico	4.0%	82%	245%
63	Argentina	1.7%	136%	38%
64	Brazil	1.1%	34%	110%
67	Colombia	0.6%	15%	-41%
-	Peru	1.4%	66%	214%
-	Ecuador	1.2%	54%	69%
-	Panama	0.8%	60%	187%
-	Costa Rica	0.6%	22%	40%
-	Bolivia	0.2%	89%	197%
-	Paraguay	0.2%	100%	720%
-	Venezuela	0.2%	43%	38%

Figure 22: 15 Mbps Broadband Adoption (IPv4) by Americas Country





# [SECTION]<sup>5</sup> GEOGRAPHY ASIA PACIFIC (APAC)

The metrics presented here for the Asia Pacific region are based on a subset of data used for Section 2 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in the Asia Pacific region, based on classification by Akamai's EdgeScape geolocation tool.

**5.1 ASIA PACIFIC AVERAGE CONNECTION SPEEDS (IPV4)** / As shown in Figure 23, in the first quarter of 2016, South Korea was again the top country/region in the world for average connection speed, and the gap between it and lowest-ranking India widened slightly from 24 Mbps to 26 Mbps. The first quarter saw gains across all of the surveyed Asia Pacific countries/regions, ranging from 3.3% in China to 31% in Vietnam. Eleven countries enjoyed double-digit quarterly gains, compared with 10 in the fourth quarter of 2015.

Global Rank	Country/Region	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
1	South Korea	29.0	8.6%	24%
4	Hong Kong	19.9	19%	19%
7	Japan	18.2	4.6%	20%
13	Singapore	16.5	19%	29%
21	Taiwan	14.8	15%	46%
39	Thailand	10.8	16%	49%
43	New Zealand	10.5	13%	25%
48	Australia	8.8	7.7%	15%
74	Malaysia	6.4	22%	49%
83	Sri Lanka	5.4	13%	12%
89	Vietnam	5.0	31%	59%
94	Indonesia	4.5	16%	110%
100	China	4.3	3.3%	15%
113	Philippines	3.5	10%	24%
114	India	3.5	24%	55%

Figure 23: Average Connection Speed (IPv4) by APAC Country/Region

Thirteen of the fifteen surveyed Asia Pacific countries/regions had average connection speeds above the 4 Mbps broadband threshold in the first quarter—up from eleven in the fourth quarter of 2015—and seven of these exceeded the 10 Mbps threshold—up from five last quarter. India and the Philippines once again had the lowest average connection speeds among surveyed countries in the region, both at 3.5 Mbps.

All 15 surveyed countries/regions in the Asia Pacific region showed year-over-year growth in observed average connection speeds in the first quarter. Indonesia, with a 110% gain, was again the only country to see its average connection speed more than double compared with the year prior. Increases in the remaining countries/regions ranged from 12% in Sri Lanka to 59% in Vietnam.

### 5.2 ASIA PACIFIC AVERAGE PEAK CONNECTION SPEEDS (IPv4) /

As seen in Figure 24, the Asia Pacific region continues to lead the world in average peak connection speeds, with the top eight global leaders all found in the region. (The countries ranked fifth and sixth—Macao and Qatar—are also in the region but are not among our surveyed countries.) In the first quarter of 2016, Indonesia and South Korea joined global leaders Singapore and Hong Kong as the four countries/regions in the world with average peak connection speeds above 100 Mbps, while an additional three surveyed countries/regions in Asia Pacific saw average peak speeds above 50 Mbps. All 15 surveyed Asia Pacific countries/regions posted quarterly gains in average peak speeds during the first quarter, ranging from 1.5% in Sri Lanka to 38% in Indonesia. However, the gap between average peak connection speeds in the top- and bottom-ranked countries/regions in the region increased from 114 Mbps in the fourth quarter of 2015 to 121 Mbps in the first quarter of 2016.

Global Rank	Country/Region	Q1 2016 Peak Mbps	QoQ Change	YoY Change
1	Singapore	146.9	8.3%	49%
2	Hong Kong	110.3	4.9%	19%
3	Indonesia	110.2	38%	535%
4	South Korea	103.6	8.7%	32%
7	Japan	84.6	2.0%	21%
8	Taiwan	83.1	5.4%	20%
20	Thailand	69.6	9.2%	30%
49	New Zealand	49.8	16%	28%
54	Malaysia	46.3	10%	46%
56	Australia	43.8	12%	6.8%
77	Sri Lanka	35.4	1.5%	14%
78	Vietnam	34.1	8.6%	60%
86	China	31.0	16%	60%
88	Philippines	29.9	11%	47%
104	India	25.5	20%	48%

Figure 24: Average Peak Connection Speed (IPv4) by APAC Country/Region

Year-over-year changes were consistently positive as well. Australia again had the smallest gain at 6.8%, while Indonesia again had the largest at 535%. The remaining countries/regions all posted double-digit gains, ranging from 14% in Sri Lanka to 60% in both China and Vietnam.

Singapore, which already leads the world in peak speeds, continues to push the speed frontier. After a successful pilot last year, in February Singtel launched a new 10 Gbps broadband service for local residences.<sup>29</sup> This could further strengthen Singapore's sizeable lead in average peak connection speeds in upcoming quarters.

### 5.3 ASIA PACIFIC 4 MBPS BROADBAND ADOPTION (IPv4) /

In the first quarter of 2016, South Korea once again led the world (and the Asia Pacific region) in 4 Mbps broadband adoption, with 97% of its IPv4 addresses connecting to Akamai at average connection speeds above this threshold. As shown in Figure 25, all of the 15 surveyed Asia Pacific countries/regions saw quarterly growth in adoption rates, ranging from 0.4% in South Korea to 38% in India. Seven of the surveyed Asia Pacific countries/regions enjoyed 4 Mbps broadband adoption rates of 90% or higher, and the difference in adoption levels between the top- and bottom-ranked countries/regions in Asia Pacific narrowed from 83 to 79 percentage points in the first quarter.

Looking at year-over-year changes, all 15 surveyed countries/regions saw improvements in the first quarter of 2016, although magnitudes varied widely. Top-ranking South Korea posted the smallest gain at 1.4%, and seven other countries also had modest single-digit increases. On the other end of the spectrum, Vietnam and India again both more than doubled adoption rates compared with the first quarter of 2015, and Indonesia again led the region in growth with a tremendous 674% year-over-year increase.

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
1	South Korea	97%	0.4%	1.4%
5	Thailand	96%	0.8%	15%
17	Hong Kong	94%	0.6%	2.2%
20	Taiwan	93%	2.6%	5.1%
22	Japan	92%	0.8%	2.7%
28	Singapore	91%	0.5%	8.8%
30	New Zealand	91%	3.5%	5.3%
60	Australia	78%	6.4%	8.2%
65	Sri Lanka	71%	35%	8.8%
69	Malaysia	68%	23%	58%
80	Vietnam	55%	37%	119%
88	Indonesia	46%	27%	674%
90	China	44%	6.6%	37%
107	India	23%	38%	139%
109	Philippines	18%	35%	81%

Figure 25: 4 Mbps Broadband Adoption (IPv4) by APAC Country/Region

In February, Google Loon—which uses balloons to provide affordable high-speed Internet access to remote and underserved locations—launched three test balloons in a trial in Sri Lanka. In a joint venture with the Sri Lankan government, Loon is expected to provide 15 balloons in total, delivering coverage across the entire island.<sup>30</sup> Google has also reportedly had discussions with several Indian telecommunications providers as well as the Indian government about launching a Loon pilot in India.<sup>31</sup> If successful, Loon could help greatly increase broadband adoption in these and other underserved areas around the world in the very near future.

#### 5.4 ASIA PACIFIC 10 MBPS BROADBAND ADOPTION (IPv4) /

As seen in Figure 26, South Korea led both the region and the world in 10 Mbps broadband adoption once again, with 84% of its IP addresses connecting to Akamai at average connection speeds above this threshold—a 4.0% increase over the fourth quarter. The gap between South Korea and the next-closest country/region in Asia Pacific stood steady at 18 percentage points in the first quarter, and the gap between it and the qualifying country/region with the lowest adoption levels in the region widened slightly from 80 percentage points to 82. The region enjoyed across-the-board quarterly growth in the first quarter, led by Vietnam and Malaysia with 412% and 109% quarter-over-quarter gains, respectively. Japan saw the most modest increase at 3.9%, while eight countries/regions enjoyed double-digit gains.

Year-over-year changes in 10 Mbps adoption were positive across the board as well in the first quarter. Seven qualifying Asia Pacific countries/regions saw double-digit increases in adoption rates and five in total saw triple-digit jumps, while Indonesia enjoyed the largest gain in the region with a tremendous 1,017% rise. Global leader South Korea posted the smallest yearly gain at 9.5%.

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
1	South Korea	84%	4.0%	9.5%
6	Hong Kong	66%	7.8%	10%
9	Japan	65%	3.9%	17%
10	Singapore	65%	9.9%	40%
16	Taiwan	57%	27%	72%
36	Thailand	39%	50%	191%
40	New Zealand	33%	28%	59%
50	Australia	23%	17%	35%
66	Malaysia	11%	109%	204%
69	Vietnam	4.9%	412%	1017%
70	India	4.8%	75%	184%
75	Indonesia	3.0%	71%	738%
76	Philippines	2.7%	39%	351%
78	China	2.1%	30%	43%
–	Sri Lanka	4.5%	27%	192%

Figure 26: 10 Mbps Broadband Adoption (IPv4) by APAC Country/Region

#### 5.5 ASIA PACIFIC 15 MBPS BROADBAND ADOPTION (IPv4) /

Unsurprisingly, South Korea again led the region (and the world) in 15 Mbps broadband adoption with 69% of its IP addresses connecting to Akamai at average connection speeds above 15 Mbps, up 9.8% from the fourth quarter. As seen in Figure 27, China's adoption rate remained below half a percentage point, so the spread between the first- and last-place countries/regions in Asia Pacific widened from 63 percentage points in the fourth quarter of 2015 to 68 in the first quarter of 2016. All of the qualifying surveyed countries/regions in Asia Pacific posted quarterly gains, with Japan seeing the smallest at 8.1% and Vietnam enjoying the largest at

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
1	South Korea	69%	9.8%	20%
3	Hong Kong	48%	26%	21%
6	Japan	44%	8.1%	31%
8	Singapore	43%	33%	76%
20	Taiwan	33%	34%	136%
38	New Zealand	15%	40%	123%
39	Thailand	15%	84%	256%
46	Australia	10%	24%	50%
60	Malaysia	3.1%	158%	223%
62	India	2.0%	97%	210%
65	Vietnam	0.8%	307%	789%
68	China	0.4%	41%	44%
–	Sri Lanka	1.6%	23%	364%
–	Philippines	1.0%	34%	370%
–	Indonesia	0.8%	71%	534%

Figure 27: 15 Mbps Broadband Adoption (IPv4) by APAC Country/Region

307%. Malaysia also more than doubled its adoption rate, achieving a 158% increase over the previous quarter, and eight others in the region saw double-digit gains.


Yearly growth in Asia-Pacific was robust as well. South Korea had the smallest increase at 20%, followed by Hong Kong with a 21% gain. Six of the twelve qualifying surveyed countries more than doubled their adoption levels compared with the preceding year, with Vietnam seeing the biggest increase at 789%.

Thailand's impressive yearly increases in 10 and 15 Mbps broadband adoption may be due in part to its broad government initiative, announced in 2015, to create a national broadband network infrastructure by 2035 that would provide affordable universal access at minimum speeds of 30 Mbps. In March, the Thai government announced it would be speeding up the delivery of broadband access to 30,000 rural villages across the country (as part of the national initiative), completing the network installation by March 2017, six months ahead of schedule.<sup>32</sup> China, currently at the bottom of the list in 15 Mbps adoption among qualifying Asian countries/regions, will likely continue to see some growth in upcoming quarters as China Telecom, the state-owned broadband provider, revealed plans to add another 50 million homes to its FTTH deployment in 2016, to reach a total of 270 million homes. Its FTTH customer base grew by 67% in 2015.<sup>33</sup>









# [SECTION]<sup>6</sup> GEOGRAPHY EUROPE

Beginning with this quarter's *State of the Internet Report*, broadband metrics will be presented separately for the European region and the Middle East/Africa region (previously presented together as the EMEA region). In addition, the number of countries surveyed in both regions will increase, allowing for more comprehensive insight into these areas of the world. The list of surveyed countries within this section has been expanded to include all 28 member countries of the European Union plus three more non-members that have long been included within the EMEA section. The metrics presented here for the European region are based on a subset of data used for Section 2 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in the European region, based on classification by Akamai's EdgeScape geolocation tool.

**6.1 EUROPEAN AVERAGE CONNECTION SPEEDS (IPv4)** / With a 14% quarter-over-quarter increase, Norway posted a 21.3 Mbps average connection speed and overtook Sweden to command the top spot

Global Rank	Country/Region	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
2	Norway	21.3	14%	68%
3	Sweden	20.6	8.3%	32%
5	Switzerland	18.7	12%	25%
6	Latvia	18.3	9.8%	33%
8	Netherlands	17.9	5.5%	20%
9	Czech Republic	17.8	12%	31%
10	Finland	17.7	6.9%	30%
12	Denmark	17.2	6.8%	35%
14	Romania	16.1	22%	31%
15	Bulgaria	15.8	19%	29%
17	Belgium	15.3	7.9%	35%
18	Lithuania	15.1	5.7%	17%
19	United Kingdom	14.9	7.8%	29%
22	Slovenia	14.5	17%	60%
23	Ireland	14.4	13%	-14%
25	Germany	13.9	8.1%	37%
26	Slovakia	13.8	10%	47%
27	Hungary	13.8	8.9%	48%
29	Austria	13.4	8.7%	29%
30	Spain	13.3	10%	49%
31	Portugal	13.1	8.6%	44%
32	Poland	12.8	16%	30%
33	Malta	12.7	7.5%	40%
35	Russia	12.2	4.8%	29%
37	Estonia	11.7	6.6%	32%
41	Luxembourg	10.6	7.3%	20%
45	France	9.9	11%	29%
54	Italy	8.2	9.8%	33%
56	Greece	7.8	7.3%	23%
61	Croatia	7.4	16%	48%
65	Cyprus	7.2	7.8%	48%

Figure 28: Average Connection Speed (IPv4) by European Country

among the surveyed European countries in the first quarter of 2016. As seen in Figure 28, the difference in average connection speeds between the fastest and slowest countries in the region was 14 Mbps in the first quarter. Twenty-six of the thirty-one surveyed countries had average connection speeds at or above the 10 Mbps threshold, and all of the surveyed countries saw average connection speeds above 7 Mbps. First-quarter changes were positive across the board for the surveyed countries, with increases ranging from 4.8% in Russia to 22% in Romania. Twelve countries posted double-digit gains.

Year-over-year changes in average connection speeds were positive across the board as well with the exception of Ireland, which saw a 14% decline to 14.4 Mbps. The remaining countries all enjoyed double-digit yearly gains, with Norway again having the biggest increase at 68%, and 26 countries saw yearly gains of at least 25%.

**6.2 EUROPEAN AVERAGE PEAK CONNECTION SPEEDS (IPv4) /** Romania again led the European region in average peak connection speeds in the first quarter with a 12% quarterly increase to 82.4 Mbps—54 Mbps higher than Cyprus, the surveyed European country with the lowest average peak connection speed, as shown in Figure 29. Of the 31 surveyed countries, France was the only one to see a quarter-over-quarter decline, as its average peak connection speed dropped 5.1%. The remaining countries saw modest increases, ranging from 1.2% in Lithuania to 17% in the Czech Republic. Fourteen countries in total saw moderate double-digit growth, and 25 had average peak connection speeds of at least 50 Mbps.

Year-over-year changes were positive across the board for the surveyed European countries in the first quarter with the exception of Luxembourg, which posted a 1.3% loss, and Lithuania, which remained unchanged. Norway had the largest gain, with an increase of 47% over the previous year, while Ireland had the smallest, with a gain of 2.7%. In all, 26 of the 31 surveyed countries enjoyed double-digit gains over the first quarter of 2015.

A number of announcements in the first quarter reflect continued active developments in ultra-high-speed Internet deployments across Europe, particularly in FTTH rollouts. A report by BuddeCom noted the active deployment of high-speed fiber networks in Lithuania—many of which are gigabit-speed—with the government committing €1 billion toward a national broadband fiber network.<sup>34</sup> Meanwhile, Vodafone Greece launched its 100 Mbps broadband service in January,<sup>35</sup> and in March, Gigaclear announced the near-completion of its Oxfordshire, England rollout of 5 Gbps FTTH service, reaching 10,000 homes and businesses in more than 40 rural villages in the area. Gigaclear is aiming to deliver ultrafast broadband to more than 40,000 premises in remote communities across the United Kingdom as part of the Broadband Delivery U.K. initiative.<sup>36</sup>

**6.3 EUROPEAN 4 MBPS BROADBAND ADOPTION (IPv4) /** In the first quarter of 2016, Malta—a country that was added to the European survey this quarter—and Bulgaria led the European region in 4 Mbps broadband adoption with 97% of their IPv4 addresses connecting to Akamai at average speeds at or above the threshold, as seen in Figure 30. The Netherlands, which led the region in the preceding quarter, dropped to fifth in the region after a 0.2% quarterly decline. The remaining surveyed countries all saw modest increases in adoption, ranging from 0.9% in Belgium to 11% in Croatia.

A total of 20 countries enjoyed 4 Mbps broadband adoption rates of at least 90% with several more in close range. France's 81% adoption rate was the lowest in the region—16 percentage points lower than the European leaders.

Global Rank	Country/Region	Q1 2016 Peak Mbps	QoQ Change	YoY Change
9	Romania	82.4	12%	20%
11	Sweden	79.5	11%	27%
14	Switzerland	76.2	15%	27%
15	Latvia	75.1	14%	21%
18	Netherlands	70.5	7.9%	18%
19	Norway	69.6	16%	47%
21	Belgium	69.2	7.9%	33%
24	Spain	64.7	8.0%	44%
25	Czech Republic	63.8	17%	29%
26	Russia	63.8	6.2%	20%
27	Hungary	63.0	7.7%	26%
28	United Kingdom	61.0	7.4%	18%
29	Luxembourg	60.7	13%	-1.3%
30	Ireland	60.6	10%	2.7%
32	Finland	59.7	7.7%	13%
34	Bulgaria	59.0	12%	12%
35	Denmark	58.6	8.1%	23%
36	Slovakia	55.8	9.6%	27%
38	Germany	53.9	5.1%	16%
41	Poland	53.1	9.1%	20%
44	Portugal	51.4	5.1%	9.8%
45	Austria	51.1	7.4%	16%
46	Lithuania	50.2	1.2%	0%
47	Malta	50.0	11%	22%
48	Estonia	50.0	2.2%	17%
52	Slovenia	47.8	12%	22%
62	France	41.0	-5.1%	16%
75	Italy	36.5	14%	20%
76	Croatia	35.5	15%	37%
83	Greece	31.7	9.2%	5.1%
96	Cyprus	28.4	16%	26%

Figure 29: Average Peak Connection Speed (IPv4) by European Country

On a year-over-year basis, the surveyed European countries saw across-the-board first-quarter gains in 4 Mbps broadband adoption with the exception of Bulgaria, where adoption declined a slight 0.1%. Croatia and Cyprus led the pack with increases of 56% and 49% respectively, while Denmark saw the smallest yearly growth at 2.3%. A total of nine countries saw year-over-year growth of more than 10% in the first quarter.

#### 6.4 EUROPEAN 10 MBPS BROADBAND ADOPTION (IPv4) /

In the first quarter of 2016, Switzerland edged out the Netherlands to regain the top spot in 10 Mbps broadband adoption among surveyed European countries, with an adoption rate of 68%. As seen in Figure 31, 15 European countries had at least half of their unique IP addresses connecting to Akamai at average speeds of at least 10

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
2	Malta	97%	1.4%	4.5%
4	Bulgaria	97%	2.4%	-0.1%
6	Switzerland	96%	2.3%	2.8%
7	Denmark	96%	1.6%	2.3%
9	Netherlands	95%	-0.2%	3.0%
10	Romania	95%	4.2%	5.7%
11	Latvia	95%	2.6%	8.4%
12	Hungary	95%	2.3%	9.2%
13	Austria	94%	2.9%	3.9%
15	Sweden	94%	1.1%	3.4%
16	Belgium	94%	0.9%	6.4%
19	Finland	93%	1.8%	5.0%
23	Russia	92%	1.8%	8.1%
24	Germany	91%	2.6%	5.8%
25	Norway	91%	1.7%	7.5%
26	Poland	91%	5.8%	4.6%
27	United Kingdom	91%	2.5%	7.5%
29	Czech Republic	91%	2.6%	4.4%
32	Slovakia	90%	6.4%	20%
33	Spain	90%	2.2%	9.1%
35	Luxembourg	89%	1.8%	2.8%
36	Lithuania	89%	2.5%	8.4%
37	Portugal	89%	3.6%	12%
38	Slovenia	89%	2.9%	13%
39	Estonia	88%	3.0%	19%
40	Greece	88%	5.2%	15%
48	Croatia	84%	11%	56%
49	Ireland	83%	5.6%	14%
50	Italy	83%	5.7%	20%
52	Cyprus	82%	6.3%	49%
55	France	81%	4.0%	8.9%

Figure 30: 4 Mbps Broadband Adoption (IPv4) by European Country

Mbps, but there was a 56-point gap between the highest and lowest adoption rates in the region. Quarterly changes in adoption rates were positive across Europe in the first quarter as Croatia led the pack with a 54% gain. Other increases were more moderate, ranging from 4.2% in the Netherlands to 27% in Italy.

All 31 surveyed European countries posted yearly gains in the first quarter as well. Four countries — led by Cyprus and Croatia with increases of 297% and 274% respectively — saw adoption rates more than double compared with the first quarter of 2015. The remaining countries experienced increases ranging from 11% in Lithuania to 88% in Slovenia.

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
2	Switzerland	68%	9.8%	16%
3	Netherlands	67%	4.2%	14%
4	Belgium	66%	8.9%	40%
5	Bulgaria	66%	22%	20%
7	Norway	65%	5.8%	69%
11	Romania	64%	20%	14%
12	Denmark	63%	4.9%	29%
13	Sweden	63%	5.3%	21%
14	Latvia	61%	13%	24%
15	Finland	61%	5.6%	30%
18	Malta	57%	15%	85%
19	Czech Republic	56%	9.4%	18%
21	Hungary	53%	11%	72%
22	United Kingdom	53%	6.8%	30%
24	Russia	50%	8.0%	52%
25	Lithuania	48%	5.1%	11%
26	Portugal	48%	11%	56%
28	Ireland	48%	16%	24%
29	Germany	47%	11%	51%
30	Spain	47%	11%	73%
31	Poland	45%	25%	39%
32	Slovenia	42%	17%	88%
33	Austria	42%	12%	44%
35	Estonia	40%	12%	51%
37	Slovakia	37%	13%	56%
41	Luxembourg	30%	15%	42%
42	France	28%	18%	53%
55	Italy	18%	27%	135%
57	Greece	16%	20%	117%
61	Croatia	13%	54%	274%
65	Cyprus	12%	21%	297%

Figure 31: 10 Mbps Broadband Adoption (IPv4) by European Country

**6.5 EUROPEAN 15 MBPS BROADBAND ADOPTION (IPv4)** / Norway held onto the top position in 15 Mbps broadband adoption among surveyed European countries in the first quarter of 2016 with an adoption rate of 50%, up 12% from the fourth quarter of 2015. As seen in Figure 32, in the first quarter 25 of the 30 qualifying surveyed European countries had at least one in five IP addresses connecting to Akamai at average speeds above 15 Mbps, while three surveyed countries had adoption rates below 10%. Greece, the country with the lowest adoption level in the region despite a 24% quarterly increase, lagged 46 percentage points behind top-performing Norway. All of the surveyed European countries saw growth in 15 Mbps broadband adoption rates in the first quarter, led by Croatia with a 60% gain. Twenty-five countries enjoyed double-digit gains, while Lithuania posted the smallest quarterly increases at 7.1%.

Year-over-year changes were robust and positive across the board as well. Croatia saw a 233% gain over the first quarter of 2015, and nine additional countries in the region saw adoption rates more than double. Lithuania posted the smallest yearly gain among the qualifying surveyed European countries at 15%.


Though it is currently near the bottom of the list for 15 Mbps adoption among surveyed European countries, France has seen robust growth over the last year and signs point to this trend continuing. In its latest report, ARCEP, the French telecommunications regulatory agency, found that FTTH rollouts had increased in pace over the past year, with record deployment in the fourth quarter of 2015. At the end of 2015 in France, there were a total of 14.5 million households with access to “superfast” (at least 30 Mbps) broadband, up 9% from a year prior, with 4.3 million premises having active superfast subscriptions, up 53% from the previous year.<sup>37</sup>

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
2	Norway	50%	12%	104%
4	Sweden	46%	8.4%	35%
5	Switzerland	44%	18%	38%
7	Latvia	43%	16%	37%
9	Netherlands	42%	9.1%	34%
11	Romania	41%	46%	54%
12	Denmark	41%	8.2%	66%
13	Bulgaria	40%	41%	75%
14	Belgium	38%	18%	81%
15	Finland	37%	8.2%	46%
16	United Kingdom	36%	11%	49%
17	Czech Republic	35%	15%	41%
19	Lithuania	33%	7.1%	15%
22	Portugal	30%	17%	122%
23	Ireland	30%	22%	43%
24	Hungary	29%	17%	145%
25	Spain	28%	18%	148%
26	Germany	26%	17%	95%
28	Malta	26%	16%	199%
29	Poland	24%	30%	62%
30	Slovenia	24%	27%	122%
32	Russia	24%	10%	89%
34	Slovakia	22%	14%	75%
35	Austria	22%	15%	53%
36	Estonia	21%	14%	70%
41	Luxembourg	14%	17%	67%
43	France	14%	28%	101%
52	Italy	7.0%	33%	168%
54	Croatia	4.7%	60%	233%
56	Greece	4.3%	24%	118%
-	Cyprus	3.6%	31%	314%

Figure 32: 15 Mbps Broadband Adoption (IPv4) by European Country







# [SECTION]<sup>7</sup> GEOGRAPHY MIDDLE EAST + AFRICA (MEA)

Beginning with this quarter's *State of the Internet Report*, broadband metrics will be presented separately for the European region and the Middle East / Africa (MEA) region, and the number of countries surveyed in each of these regions will increase. This expanded coverage allows more comprehensive insight into both regions and reflects the growing importance of the Internet throughout MEA. The metrics presented here for the MEA region are based on a subset of data used for Section 2 and are subject to the same thresholds and filters discussed within that section. The subset used for this section includes connections identified as coming from networks in the Middle East and Africa region, based on classification by Akamai's EdgeScape geolocation tool.

**7.1 MEA AVERAGE CONNECTION SPEEDS (IPv4)** / With an average connection speed of 13.5 Mbps, Israel led the MEA countries in the first quarter of 2016 and is the only one of the thirteen surveyed countries in the region to have an average connection speed above 10 Mbps, as seen in Figure 33. Namibia, at the other end of the spectrum, posted an

Global Rank	Country/Region	Q1 2016 Avg. Mbps	QoQ Change	YoY Change
28	Israel	13.5	16%	14%
49	United Arab Emirates	8.8	26%	40%
53	Qatar	8.4	26%	21%
63	Kenya	7.3	45%	298%
64	Turkey	7.2	15%	12%
72	Kuwait	6.6	44%	27%
73	South Africa	6.5	59%	96%
91	Saudi Arabia	4.7	38%	23%
101	Morocco	4.3	16%	47%
111	Iran	3.5	75%	88%
116	Nigeria	3.3	23%	14%
130	Egypt	2.4	43%	44%
133	Namibia	2.3	11%	4.8%

Figure 33: Average Connection Speed (IPv4) by Middle East & Africa Country

average connection speed of 2.3 Mbps, 11 Mbps below the regional leader. While 12 of the 13 MEA countries had average connection speeds that put them in the bottom half of surveyed countries globally and 4 of the 13 saw average connection speeds below 4 Mbps, all of them enjoyed robust quarterly gains in the first quarter of 2016, with average speeds growing anywhere from 11% in Namibia to 75% in Iran. In many cases, these gains reflect new deployments and technology upgrades made by local telecommunications companies, such as Telecom Egypt's infrastructure upgrades mentioned previously in this report. In addition, Internet Solutions in South Africa, Qatar Telecom in Qatar, and various local providers in Kuwait are known to have built out capacity and upgraded last-mile infrastructure during the fourth quarter of 2015 and the first quarter of 2016. Finally, improved Akamai connectivity in several of the surveyed MEA countries during these two quarters have contributed in part to speed increases in the region as well.

Year-over-year changes in average connection speeds were also positive across the board. Namibia saw the smallest change with a 4.8% increase, while Kenya had the largest with a 298% increase. The remaining 11 countries all enjoyed double-digit yearly gains ranging from 12% in Turkey to 96% in South Africa. Seven countries had increases of at least 25%.

**7.2 MEA AVERAGE PEAK CONNECTION SPEEDS (IPv4)** / Qatar led the MEA region in average peak connection speeds with a 15% quarterly increase to 89.2 Mbps—23 Mbps higher than second-place Israel, as shown in Figure 34. In contrast, Namibia had the lowest average peak connection speed, posting a 3.1% gain to 13.3 Mbps—76 Mbps below Qatar. The MEA region saw mostly positive changes in this metric during the first quarter of 2016 with gains in all but two surveyed countries. South Africa and Iran posted the biggest increases at 40% and 39% respectively, while Egypt saw the smallest increase at 1.1%. Kenya and Morocco were the two

Global Rank	Country/Region	Q1 2016 Peak Mbps	QoQ Change	YoY Change
5	Qatar	89.2	15%	27%
23	Israel	65.8	6.6%	-3.4%
31	United Arab Emirates	60.6	16%	42%
53	Kuwait	47.8	28%	-46%
64	Turkey	40.7	6.5%	5.7%
79	Saudi Arabia	33.4	1.4%	31%
87	South Africa	30.1	40%	82%
106	Kenya	24.2	-25%	234%
110	Nigeria	23.3	3.2%	1.0%
111	Morocco	22.8	-1.6%	40%
123	Iran	17.8	39%	44%
129	Egypt	16.0	1.1%	36%
134	Namibia	13.3	3.1%	15%

Figure 34: Average Peak Connection Speed (IPv4) by Middle East & Africa Country

countries to see quarterly declines, as average peak connection speeds decreased 25% and 1.6% respectively. Three of the thirteen surveyed MEA countries had average peak connection speeds of at least 50 Mbps, while seven posted average peak connection speeds of at least 25 Mbps.

Year-over-year changes were mostly positive for the surveyed MEA countries as well in the first quarter, but Kuwait and Israel both posted declines, losing 46% and 3.4% respectively. Kenya had the largest gain with an increase of 234% over the previous year, followed by South Africa with an 82% gain. The remaining countries posted gains between Nigeria's 1% and Iran's 44%, with eight of the surveyed countries seeing double-digit gains.

**7.3 / MEA 4 MBPS BROADBAND ADOPTION (IPv4)** / With a 96% adoption rate for 4 Mbps broadband, Israel led the MEA countries during the first quarter of 2016, followed by the United Arab Emirates with a 90% adoption rate, as seen in Figure 35. In total, seven of the twelve qualifying surveyed countries in the region had more than half of their unique IPv4 addresses connecting to Akamai at average speeds of at least 4 Mbps. With a 9.7% adoption rate—86 percentage points below the regional leader, Egypt came in last place in the region. However, all 12 qualifying surveyed countries enjoyed quarterly gains during the first quarter, and last-place Egypt led the way with a tremendous 486% increase. The remaining countries posted quarterly growth ranging from 1.9% in Israel to 276% in Iran, with four countries in all more than doubling their adoption rate compared with the fourth quarter of 2015 and five countries enjoying double-digit growth.

On a year-over-year basis, all of the surveyed MEA countries saw gains in 4 Mbps broadband adoption across the board in the first quarter with the exception of Kuwait, which saw an 8.9% decline. Kenya led the gaining countries with an amazing 1,784% yearly

Global Rank	Country/Region	% Above 4 Mbps	QoQ Change	YoY Change
8	Israel	96%	1.9%	2.9%
31	United Arab Emirates	90%	4.8%	19%
41	Turkey	87%	14%	15%
57	Qatar	79%	16%	39%
74	Kenya	63%	3.8%	1784%
81	Kuwait	54%	20%	-8.9%
83	Saudi Arabia	51%	115%	39%
91	Morocco	43%	83%	261%
93	South Africa	42%	55%	118%
96	Iran	36%	276%	607%
101	Nigeria	29%	117%	42%
113	Egypt	9.7%	486%	473%
-	Namibia	10%	53%	19%

Figure 35: 4 Mbps Broadband Adoption (IPv4) by Middle East & Africa Country

increase, while four additional countries saw adoption more than double compared with the first quarter of 2015. The remaining six countries' gains ranged from 2.9% in Israel to 42% in Nigeria.

**7.4 / MEA 10 MBPS BROADBAND ADOPTION (IPv4)** / As seen in Figure 36, Israel was the clear leader in 10 Mbps adoption among the 10 qualifying surveyed MEA countries in the first quarter of 2016. With a 51% adoption rate, Israel's level of 10 Mbps adoption is 25 percentage points higher than second-place countries Qatar and the United Arab Emirates, and nearly 51 percentage points higher than last-place Iran, which had only a 0.3% adoption rate. Only 6 of the 10 qualifying surveyed countries had at least one in ten of their unique IPv4 addresses connecting to Akamai at average speeds of at least 10 Mbps in the first quarter, but quarterly changes were robustly positive across the board, as Egypt led the charge with a 1,883% increase. An additional six countries saw adoption levels more than double as compared with the fourth quarter of 2015, while the three countries with the smallest increases — Israel, Turkey, and Qatar — still enjoyed healthy gains of 33%, 52%, and 80% respectively.

Yearly changes were positive across the board as well, with Kenya seeing an impressive 5,507% yearly increase, followed by Egypt with a 1,479% gain. An additional five countries saw adoption levels more than double compared with the first quarter of 2015, while Israel had the smallest gain at 8.1%.

**7.5 / MEA 15 MBPS BROADBAND ADOPTION (IPv4)** / In the first quarter of 2016, there were only seven qualifying surveyed countries for this metric in the MEA region, as seen in Figure 37. Unsurprisingly, Israel took the top spot in 15 Mbps broadband adoption with a 24% adoption rate, 14 percentage points higher than second-place Qatar and 23 points higher than last-place Egypt. While Egypt was the only qualifying surveyed country in the region

Global Rank	Country/Region	% Above 10 Mbps	QoQ Change	YoY Change
23	Israel	51%	33%	8.1%
45	Qatar	26%	80%	21%
46	United Arab Emirates	26%	127%	189%
54	Kenya	18%	379%	5507%
63	South Africa	13%	243%	337%
64	Turkey	13%	52%	21%
74	Saudi Arabia	3.0%	405%	428%
79	Egypt	1.6%	1883%	1479%
80	Morocco	1.4%	174%	766%
82	Iran	0.3%	186%	218%
-	Kuwait	7.8%	96%	51%
-	Nigeria	1.4%	127%	43%
-	Namibia	0.6%	-7.5%	10%

Figure 36: 10 Mbps Broadband Adoption (IPv4) by Middle East & Africa Country

to see an adoption rate below 1.0%, all of the qualifying surveyed MEA countries — with the exception of Israel — had fewer than one in ten unique IPv4 addresses connecting to Akamai at average speeds of at least 15 Mbps.

All of the qualifying countries saw robust growth in this metric in the first quarter, led by Egypt with a 1,851% increase over the fourth quarter of 2015. Note, however, that because Egypt had such a small adoption rate and a relatively small number of unique IP addresses connecting to Akamai, small changes in measurements can result in disproportionately large percentage changes. Kenya also enjoyed an impressive gain, with adoption rates growing by 958%.

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
31	Israel	24%	49%	24%
47	Qatar	9.6%	126%	24%
49	Kenya	8.9%	958%	15532%
51	South Africa	7.7%	305%	380%
53	United Arab Emirates	5.7%	113%	137%
57	Turkey	4.2%	42%	-5.7%
66	Egypt	0.7%	1851%	1452%
-	Kuwait	5.3%	190%	233%
-	Saudi Arabia	0.5%	389%	985%
-	Nigeria	0.5%	100%	54%
-	Morocco	0.2%	121%	557%
-	Namibia	0.1%	-16%	24%
-	Iran	0.1%	68%	100%

Figure 37: 15 Mbps Broadband Adoption (IPv4) by Middle East & Africa Country

Three other countries saw adoption levels more than double compared with the fourth quarter of 2015, while the two lowest gains, seen by Turkey and Israel, were still a healthy 42% and 49% respectively.

On a yearly basis, changes were positive across the region with the exception of Turkey, which saw a 5.7% decline compared with the first quarter of 2015. Israel and Qatar posted moderate gains of 24% each, while the remaining countries all saw gains of more than 100%. Kenya posted the largest increase, with an incredible jump of 15,532%. Note, however, that it was not a qualifying country in the previous quarter because it had too few IP addresses to make the cutoff; thus the large percentage change here can be misleading.

We hope to see continued strong growth in connectivity and speeds across this relatively underserved region of the world. South Africa set the right tone in the first quarter, as its Minister of Communications announced lofty goals for the administration's new broadband policy: by 2020, 90% of the country's population would have access to speeds of 5 Mbps while half would enjoy speeds of 100 Mbps.<sup>38</sup>







# [SECTION]<sup>8</sup> MOBILE CONNECTIVITY

The source data in this section encompasses usage from smartphones, tablets, computers, and other devices that connect to the Internet through mobile network providers. In addition, this section includes insight into mobile voice and data traffic trends contributed by Ericsson, a leading provider of telecommunications equipment and related services to mobile and fixed operators globally. Mobile connectivity metrics are aggregated at a country/region level. To qualify for inclusion in any given quarter, a country/region must have a minimum of 25,000 unique IP addresses seen by Akamai and identified as coming from a mobile network that quarter.

The mobile speed measurements shown here—particularly average peak connection speeds—can be influenced by a number of factors, including the use and location of proxies within mobile networks. If a country's major mobile carriers make heavy use of such proxies, peak connection speeds recorded for that country are likely to be influenced by the speeds achieved between Akamai and the proxies (residing in data centers) rather than speeds achieved between Akamai and the

mobile devices themselves. We note that some of the average peak connection speeds recorded below are higher than one might expect given the current state of LTE and LTE-A deployment,<sup>39,39</sup> so it is likely that these speeds are affected—to differing degrees—by proxies within those countries’ mobile provider networks and may not be fully representative of speeds being seen by end users.

### 8.1 CONNECTION SPEEDS ON MOBILE NETWORKS (IPv4) /

In the first quarter of 2016, 74 countries/regions around the world qualified for inclusion in the mobile section. Figure 38 shows that across these countries/regions, the United Kingdom once again had the fastest average mobile connection speed at 27.9 Mbps, with Belgium in second place at 19.4 Mbps, about 70% as fast as the United Kingdom. Algeria had the lowest average connection speed at 2.2 Mbps, followed by New Caledonia with an average connection speed of 2.3 Mbps. Iran, the country with the slowest mobile speed in the prior quarter (1.8 Mbps), saw its average mobile connection speed increase to 4.7 Mbps in the first quarter of 2016.

Overall, average mobile connection speeds increased as compared with the previous quarter. Eighteen countries in total had an average mobile connection speed at or exceeding the 10 Mbps broadband threshold, up from 11 countries in the previous quarter, while 53 countries achieved average speeds at or above the 4 Mbps broadband level, up from 46. Within the individual continental regions, the following countries had the highest average mobile connection speeds:

- **Africa:** Kenya, 5.9 Mbps
- **Asia Pacific:** South Korea, 13.0 Mbps
- **Europe:** United Kingdom, 27.9 Mbps
- **North America:** Canada and Puerto Rico, 8.8 Mbps
- **South America:** Paraguay, 6.1 Mbps

Average peak mobile connection speeds spanned an extremely broad range in the first quarter, from 171.6 Mbps in Germany to 11.7 Mbps in Ghana. As mentioned previously, the speeds on the upper end of this spectrum are higher than one might expect given the current state of LTE and LTE-A deployment and are likely to be influenced by mobile carriers’ use of proxies within their networks. Proxy usage differs across carriers and can affect the measurements to varying degrees in different countries.

A total of four countries—Germany, Australia, Thailand, and Israel—recorded average peak speeds above 100 Mbps. Twenty-eight countries posted average peak speeds above 50 Mbps, compared with 23 in the fourth quarter, and 55 countries had average peak speeds exceeding 25 Mbps. Ghana had the lowest average peak mobile connection speed at 11.7 Mbps, followed by Colombia at 19.0 Mbps. Within the individual continental regions, the following countries had the highest average peak mobile connection speeds:

- **Africa:** Angola, 86.8 Mbps
- **Asia Pacific:** Australia, 147.6 Mbps
- **Europe:** Germany, 171.6 Mbps
- **North America:** Canada, 68.9 Mbps
- **South America:** Peru, 70.5 Mbps

Mobile’s fast-paced adoption continues to drive demand for increasing mobile network speeds. The tenth annual Cisco Visual Networking Index, published in February, predicts that between 2015 and 2020, average worldwide mobile network speeds will increase 3.2x due to widespread adoption of 4G technologies.<sup>40</sup>

At the same time, the mobile speed frontier will likely continue to be pushed. This quarter, Orange Spain announced that it had achieved speeds of 500 Mbps over LTE-A,<sup>41</sup> while Singaporean telecom M1 and mobile phone manufacturer Huawei demonstrated download speeds of better than 1 Gbps over existing 4G LTE networks using a prototype mobile device.<sup>42</sup> Looking beyond 4G, Google is reportedly working on a secret project named Skybender that aims to develop solar-powered drones with millimeter-wave radio that can deliver Internet connectivity at speeds up to 40 times faster than current 4G technology allows.<sup>43</sup>

### 8.2 MOBILE BROWSER USAGE DATA /

In June 2012, Akamai launched the “Akamai IO” destination site (<https://www.akamai.com/io>), with an initial data set that highlighted browser usage across PCs and other devices connecting to Akamai via fixed and mobile networks. The data and graphs below are derived from Akamai IO.

Figure 39 illustrates mobile browser usage by users identified to be on cellular networks in the first quarter of 2016. As of Android version 4.4 (KitKat), Chrome has replaced Webkit as the default Android browser engine, so when comparing Android versus iOS platforms, we combine metrics from Android Webkit and Chrome for mobile to calculate an Android platform number. We saw this quarter, and expect to continue to see, that Webkit traffic is declining and Chrome traffic is increasing as older Android versions are retired.

As Figure 39 shows, in the first quarter of 2016, for the first time, Chrome Mobile was the leading browser consistently throughout the quarter. At the start of the quarter, Mobile Safari comprised approximately 35% of requests over cellular, trailing Chrome Mobile by less than one percentage point. Chrome also held a 14 percentage-point lead over Android Webkit. Over the quarter, both Safari and Webkit lost a little ground while Chrome steadily gained. At the end of the quarter, Chrome was beating Safari by nearly 11 percentage points and besting Webkit by nearly 26 points.

In comparing iOS versus Android platforms, Android had a clear and widening lead over iOS in the first quarter—just as it did in the previous one. Android started the quarter with a 22 percentage-point lead and ended 28 percentage points ahead. Overall, iOS comprised about 33% of requests in the first quarter, while Android was responsible for 58%.

Expanding the set of data to all networks (not just those defined as cellular), we see Mobile Safari commanded more share than Chrome, but with a narrowing lead, as shown in Figure 40. At the start of the quarter, Mobile Safari usage was roughly 14 percentage points higher than Chrome Mobile, but the gap narrowed to 5 percentage points by the end of the quarter. Chrome Mobile began the quarter with a 10 percentage-point lead over Android Webkit and ended with a



Country/Region	Q1 2016 Avg. Mbps	Q1 2016 Peak Mbps
<b>AFRICA</b>		
Algeria	2.2	29.5
Angola	4.7	86.8
Egypt	3.7	19.3
Ghana	2.6	11.7
Kenya	5.9	20.4
Morocco	3.9	27.3
Namibia	3.0	32.9
South Africa	4.8	28.8
Tunisia	4.0	33.7
<b>ASIA PACIFIC</b>		
Australia	10.5	147.6
China	6.5	29.3
Hong Kong	5.8	53.5
India	3.2	20.9
Indonesia	4.9	35.2
Iran	4.7	22.6
Israel	7.4	115.8
Japan	10.0	89.3
Kazakhstan	3.1	19.9
Kuwait	8.4	69.7
Malaysia	3.3	26.1
New Caledonia	2.3	26.4
New Zealand	9.7	96.0
Oman	6.4	42.2
Pakistan	3.4	19.2
Qatar	5.3	82.4
Saudi Arabia	4.2	20.0
Singapore	6.7	62.2
South Korea	13.0	73.8
Sri Lanka	5.0	45.8
Syrian Arab Republic	2.7	22.9
Taiwan	8.7	55.7
Thailand	5.1	118.3
United Arab Emirates	8.4	95.5
Vietnam	2.6	29.7
<b>EUROPE</b>		
Austria	11.4	44.5
Belgium	19.4	76.0

Country/Region	Q1 2016 Avg. Mbps	Q1 2016 Peak Mbps
Croatia	6.6	29.0
Czech Republic	7.4	28.9
Denmark	12.5	49.1
Estonia	9.6	43.2
Finland	15.5	89.2
France	11.5	52.6
Germany	15.7	171.6
Greece	6.2	37.6
Hungary	9.3	44.7
Iceland	6.6	23.2
Ireland	12.1	58.3
Italy	10.8	70.5
Lithuania	7.0	36.3
Moldova	6.9	39.7
Netherlands	10.3	42.7
Norway	18.1	59.3
Poland	8.8	42.9
Russia	10.0	66.3
Slovakia	13.3	57.6
Slovenia	8.4	26.8
Spain	16.0	81.9
Sweden	12.4	52.4
Turkey	6.5	76.9
Ukraine	9.5	38.1
United Kingdom	27.9	66.5
<b>NORTH AMERICA</b>		
Canada	8.8	68.9
El Salvador	3.8	21.1
Puerto Rico	8.8	36.3
United States	5.1	19.8
<b>SOUTH AMERICA</b>		
Argentina	2.7	22.7
Bolivia	3.3	19.1
Brazil	3.4	21.6
Chile	3.6	22.0
Colombia	3.4	19.0
Paraguay	6.1	43.3
Peru	3.9	70.5
Uruguay	3.3	24.8
Venezuela	2.3	22.3

Figure 38: Average and Average Peak Connection Speeds (IPv4) for Mobile Connections by Country/Region

nearly 19 point lead, continuing the previous quarter's trend. Chrome Mobile usage appeared to trend fairly strongly upward, while Safari and Webkit usage both fluctuated throughout the quarter with a slight downward trend.

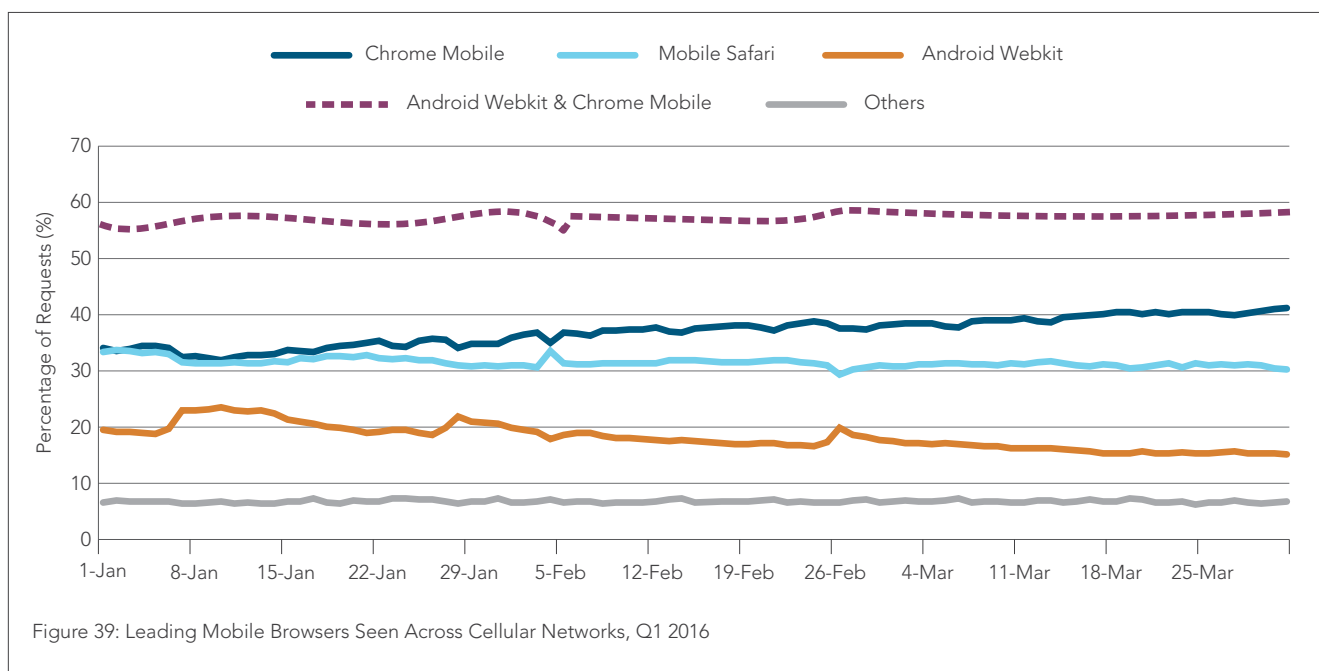
In comparing platforms, iOS started the first quarter with a six percentage-point deficit compared with Android. Due to Chrome Mobile's strong performance, iOS ended the quarter with a 12-point deficit. Averaged across the entire first quarter, iOS accounted for about 41% of requests, while Android accounted for roughly 51% of requests.

**8.3 MOBILE TRAFFIC GROWTH OBSERVED BY ERICSSON /** In mobile networks, the access medium (spectrum) is 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 enable it to measure mobile voice and data volumes. The result is a representative base for calculating world total mobile traffic in 2G, 3G, and 4G networks (not including DVB-H, Wi-Fi, and Mobile WiMAX).

These measurements have been performed for several years. It is important to note that the measurements of data and voice traffic in these networks (2G, 3G, 4G/LTE) around the world show large differences in traffic levels between markets and regions, and also between operators, due to their different customer profiles.

Mobile data traffic has continued to grow, and Figure 41 shows total global monthly data and voice traffic from the first quarter of 2011 to the first quarter of 2016. It depicts a continued strong increase in data-traffic and voice-traffic growth in the mid-single digits per year. The growth in data traffic is being driven both by increased smartphone subscriptions and a continued increase in average data

volume per subscription, fueled primarily by increased viewing of video content. In the first quarter, data traffic grew 9.5% quarter over quarter and 60% year over year. Looking at the full five-year period shown in Figure 41, cumulative voice-traffic growth was only 46%, while cumulative data-traffic growth was just under 1,600%.



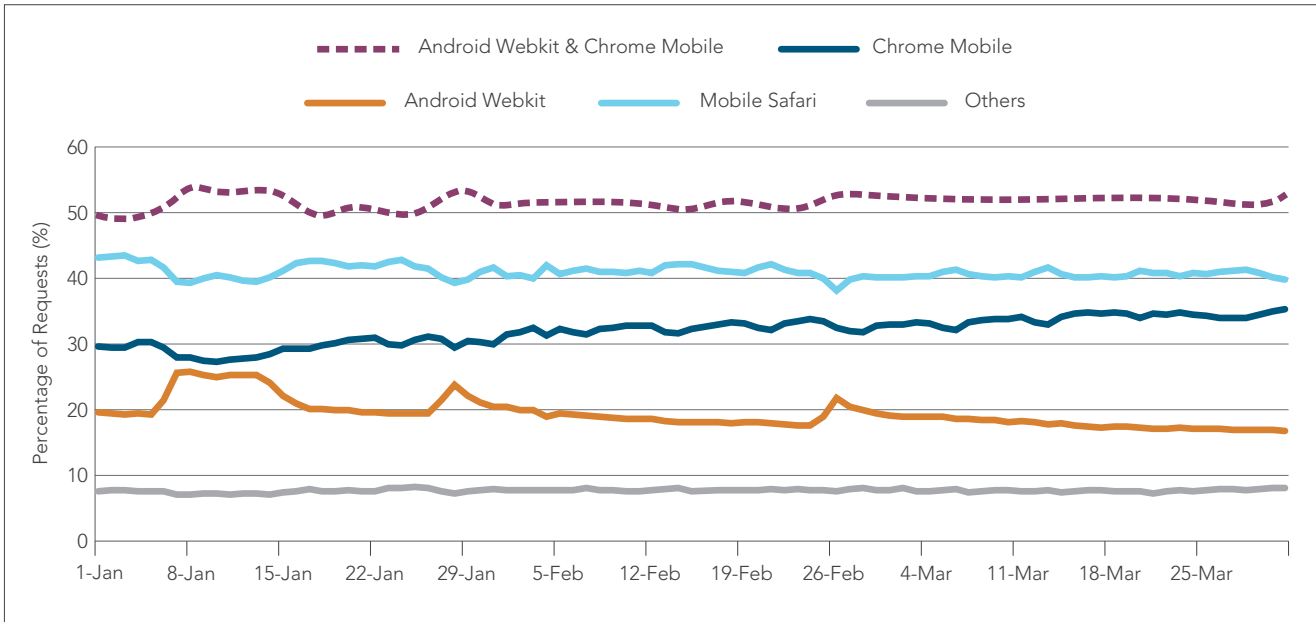


Figure 40: Leading Mobile Browsers Seen Across All Networks, Q1 2016

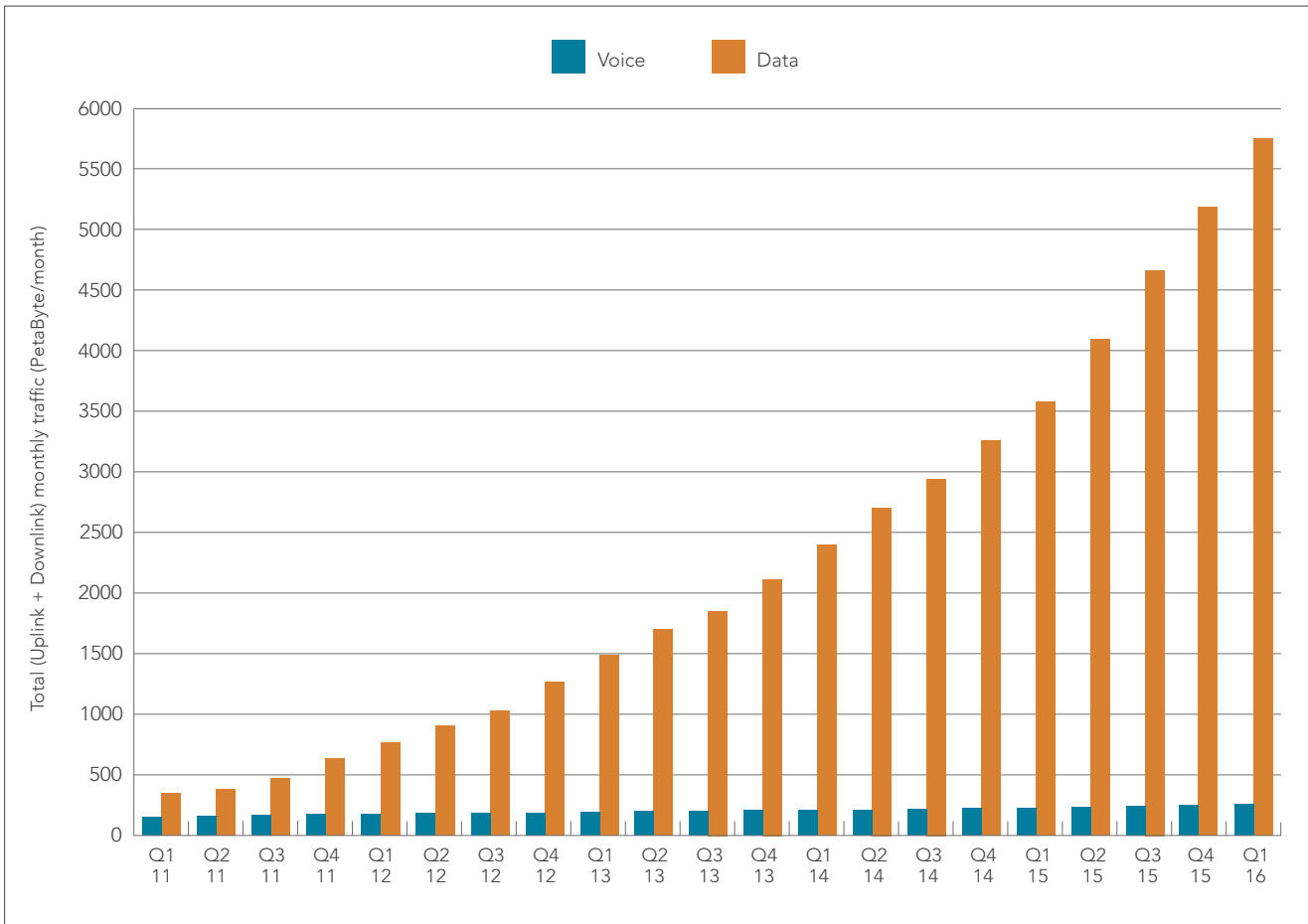


Figure 41: Total Monthly Mobile Voice and Data Traffic as Measured by Ericsson



# [SECTION]<sup>9</sup>

## SITUATIONAL PERFORMANCE

The metrics presented here are based on data collected through Akamai's Real User Monitoring (RUM) capabilities, which take passive performance measurements from actual users of a web experience in order to provide insight into performance across devices and networks. RUM is a complementary capability to synthetic testing, and the two can and should be used together to gain a comprehensive picture of user experiences. Note that no personally identifiable information ("PII") is used to generate this data.

Figure 42 shows average page load times for users on both broadband and mobile connections based on RUM data collected by Akamai during the first quarter of 2016. The underlying data was collected using navigation timing<sup>44</sup> (or "navtiming"), which allows JavaScript to collect page load time information directly from the user agent (browser) through an API. Navtiming is supported by most — but not all — of the browsers currently in use.<sup>45</sup> In particular, navtiming is not supported by Safari prior to version 8 on OS X and version 9.0 on iOS, Android before version 4.0, Internet Explorer before version 9, or any version of the Opera Mini browser, so data from these devices will not be included below.

The countries included within the table were selected based on several criteria, including the availability of measurements from users on networks identified as mobile and those identified as broadband as well as having more than 90,000 measurements from mobile networks during the first-quarter data collection period. In the first quarter of 2016, 112 countries/regions qualified for inclusion in this section, up from 104 in the fourth quarter of 2015. The inclusion criteria are subject to change in the future as we expand the scope of RUM measurements included within the *State of the Internet Report*.

In reviewing the average page load time measurements for broadband connections shown in Figure 42, we find the lowest values (i.e., fastest page load times) in Cambodia and Sweden, with 1.7-second average load times. The country with the slowest broadband page load time was the Democratic Republic of the Congo (a newly qualifying country), where pages took 9.5 seconds to load on average—more than 5.5 times as long as Cambodia and Sweden—a slightly smaller multiplier than that seen between the fastest and slowest broadband page load times in the fourth quarter. Afghanistan had the next-slowest broadband load time at 6.6 seconds. Note that these measurements do not just reflect broadband network speeds but are also influenced by factors such as average page weight, page composition, and the Akamai customer content consumed by users within these countries.

Looking at mobile networks, Laos again had the fastest average page load time at 1.25 seconds, followed by Israel, with an average load time of 1.3 seconds. At the other end of the spectrum, Ethiopia and Uganda had the highest average load times for mobile connections, at 8.5 seconds and 7.8 seconds respectively. Note again that all of these page load time measurements are affected by average page weight and page composition as well as mobile network speeds and may include content that is mobile-optimized.

In comparing the average broadband page load times to those observed on mobile connections, we again find significant variance in what we have dubbed the “mobile penalty”—that is, the ratio of average page load times on mobile connections versus average load times on broadband connections. As stated previously, this ratio should not be taken as a pure comparison of mobile versus broadband network speeds, as these speeds are just one factor in the overall user experience. Average page weight—which is dependent both on the type of content requested as well as potential mobile-specific content optimizations—is another significant factor.

In the first quarter, the mobile penalty across surveyed countries ranged from 0.4x in Laos to 2.3x in New Zealand, a larger variance than was seen in the previous quarter. Of the 112 countries/regions surveyed, 24 had a mobile penalty lower than 1.0x, meaning that average page load times were faster on mobile connections than on broadband connections. Note that many of these are countries which may have underdeveloped fixed-broadband infrastructure and depend heavily on mobile; as such, the content they are consuming may also be heavily optimized for the mobile experience, with aggressively slimmed-down content being delivered to mobile devices. On the other end of the spectrum, New Zealand, with the highest mobile penalty, was the only surveyed country with pages loading—

Country/Region	Avg. Page Load Time Broadband (ms)	Avg. Page Load Time Mobile (ms)	Mobile Penalty
<b>AFRICA</b>			
Algeria	2631	4273	1.6x
Angola	4567	4488	1.0x
Cameroon	6595	6733	1.0x
Cote d'Ivoire	6052	5455	0.9x
Democratic Republic Of The Congo	9496	6476	0.7x
Egypt	2543	2501	1.0x
Ethiopia	5600	8480	1.5x
Ghana	5834	6979	1.2x
Kenya	5721	7107	1.2x
Morocco	3615	3921	1.1x
Mozambique	4411	4174	0.9x
Nigeria	5167	7175	1.4x
Senegal	6580	5697	0.9x
South Africa	3975	4470	1.1x
Sudan	4793	6530	1.4x
Tanzania	5828	5933	1.0x
Uganda	6138	7796	1.3x
Zambia	6415	7336	1.1x
<b>ASIA PACIFIC</b>			
Afghanistan	6641	7443	1.1x
Australia	4128	5111	1.2x
Azerbaijan	2623	1968	0.8x
Bahrain	4751	4989	1.1x
Bangladesh	5190	4915	0.9x
Brunei Darussalam	3729	4921	1.3x
Cambodia	1702	2526	1.5x
China	2868	2572	0.9x
Hong Kong	2198	3726	1.7x
India	3666	5472	1.5x
Indonesia	3061	2945	1.0x
Iran	2515	2803	1.1x
Israel	1797	1300	0.7x
Japan	2146	3531	1.6x
Jordan	2493	1530	0.6x
Kazakhstan	2925	3357	1.1x
Kuwait	4775	3526	0.7x
Laos	3432	1253	0.4x
Lebanon	3594	3539	1.0x
Macau	2191	3284	1.5x

Figure 42: Average Page Load Times Based On Real User Monitoring

Country/Region	Avg. Page Load Time Broadband (ms)	Avg. Page Load Time Mobile (ms)	Mobile Penalty
Malaysia	3814	3784	1.0x
Maldives	5005	6876	1.4x
Myanmar	3900	2815	0.7x
New Zealand	2466	5576	2.3x
Oman	5098	4214	0.8x
Pakistan	5060	5824	1.2x
Philippines	4737	6679	1.4x
Qatar	4215	5182	1.2x
Saudi Arabia	3508	5215	1.5x
Singapore	2182	2928	1.3x
South Korea	2140	2803	1.3x
Sri Lanka	4034	4548	1.1x
Taiwan	2270	3885	1.7x
Thailand	2764	2694	1.0x
United Arab Emirates	4172	4910	1.2x
Uzbekistan	3842	3367	0.9x
Vietnam	2843	3532	1.2x
<b>EUROPE</b>			
Austria	2216	2826	1.3x
Belarus	3698	5186	1.4x
Belgium	1996	2023	1.0x
Bulgaria	2012	2156	1.1x
Croatia	2550	3161	1.2x
Czech Republic	2272	2923	1.3x
Denmark	1788	2452	1.4x
Estonia	2452	3017	1.2x
Finland	2080	2929	1.4x
France	2956	3126	1.1x
Georgia	2817	3197	1.1x
Germany	2189	1785	0.8x
Greece	3350	4031	1.2x
Hungary	2093	2319	1.1x
France	2956	3126	1.1x
Georgia	2817	3197	1.1x
Germany	2189	1785	0.8x
Greece	3350	4031	1.2x
Hungary	2093	2319	1.1x
Ireland	2531	3199	1.3x
Italy	2925	3887	1.3x
Lithuania	2380	3072	1.3x
Luxembourg	2149	2298	1.1x

Country/Region	Avg. Page Load Time Broadband (ms)	Avg. Page Load Time Mobile (ms)	Mobile Penalty
Moldova	3196	3410	1.1x
Netherlands	1994	2440	1.2x
Norway	1993	2681	1.3x
Poland	2483	2944	1.2x
Portugal	2522	3107	1.2x
Romania	2090	2635	1.3x
Russia	3059	4639	1.5x
Serbia	2227	2730	1.2x
Slovakia	2292	2489	1.1x
Slovenia	2118	2344	1.1x
Spain	2718	3549	1.3x
Sweden	1707	2389	1.4x
Switzerland	2014	2113	1.0x
Turkey	2530	3562	1.4x
Ukraine	2842	3114	1.1x
United Kingdom	2694	3893	1.4x
<b>NORTH AMERICA</b>			
Canada	2825	3859	1.4x
Costa Rica	3436	3910	1.1x
Dominican Republic	3045	3671	1.2x
El Salvador	3494	2663	0.8x
Guatemala	3085	2246	0.7x
Haiti	4489	4566	1.0x
Honduras	2743	2527	0.9x
Jamaica	3892	6265	1.6x
Mexico	2225	2493	1.1x
Nicaragua	3534	2814	0.8x
Panama	2970	4133	1.4x
Puerto Rico	2803	2573	0.9x
United States	2583	3482	1.3x
<b>SOUTH AMERICA</b>			
Argentina	3710	3623	1.0x
Bolivia	4423	3629	0.8x
Brazil	4420	4988	1.1x
Chile	4858	4544	0.9x
Colombia	3080	3937	1.3x
Ecuador	3504	4001	1.1x
Paraguay	5223	4300	0.8x
Peru	3247	4369	1.3x
Uruguay	3146	2930	0.9x
Venezuela	5600	6038	1.1x

on average — more than twice as quickly over broadband as compared to mobile. Taiwan and Hong Kong had the next-highest penalties of 1.7x. The average mobile penalty across all 112 qualifying countries was 1.2x, up from 1.1x in the fourth quarter.

As more customers integrate Akamai’s RUM capabilities and as more platforms support the navigation timing API, we expect we will be able to expand the scope of the Situational Performance measurements presented within future issues of the *State of the Internet Report*.





# [SECTION]<sup>10</sup>

## INTERNET DISRUPTIONS +EVENTS

Internet disruptions are unfortunately still all too common—occurring in some countries/regions on a frequent basis. These disruptions may be accidental (backhoes or ship anchors severing buried fiber), natural (hurricanes or earthquakes), or political (governments shutting off Internet access in response to unrest). Because Akamai customer content is consumed by users around the world, the effect of these disruptions—whether brief or spanning multiple days—is evident in the levels of Akamai traffic delivered to the affected country/region.

The content presented in this section provides insight into how Akamai traffic was impacted by major Internet disruptions and events during the first quarter of 2016.

**10.1 BELGIUM** / On the morning of March 22, suicide bombers detonated three nail bombs in Brussels, killing 32 and injuring hundreds more in the deadliest terrorist attack in Belgium's history. As events unfolded, Belgians turned to the web as a key channel for information about the attacks and to reach loved ones. Figure 43 depicts Akamai traffic to Belgium on March 21, the day before the bombings, and March 22, the day of the bombings. Traffic levels on March 21 were fairly typical for a weekday, with a bump in traffic during the evening after-work hours. On March 22, traffic levels were elevated all day. At approximately 7:30 a.m. UTC (about an hour and a half after the initial explosion), traffic

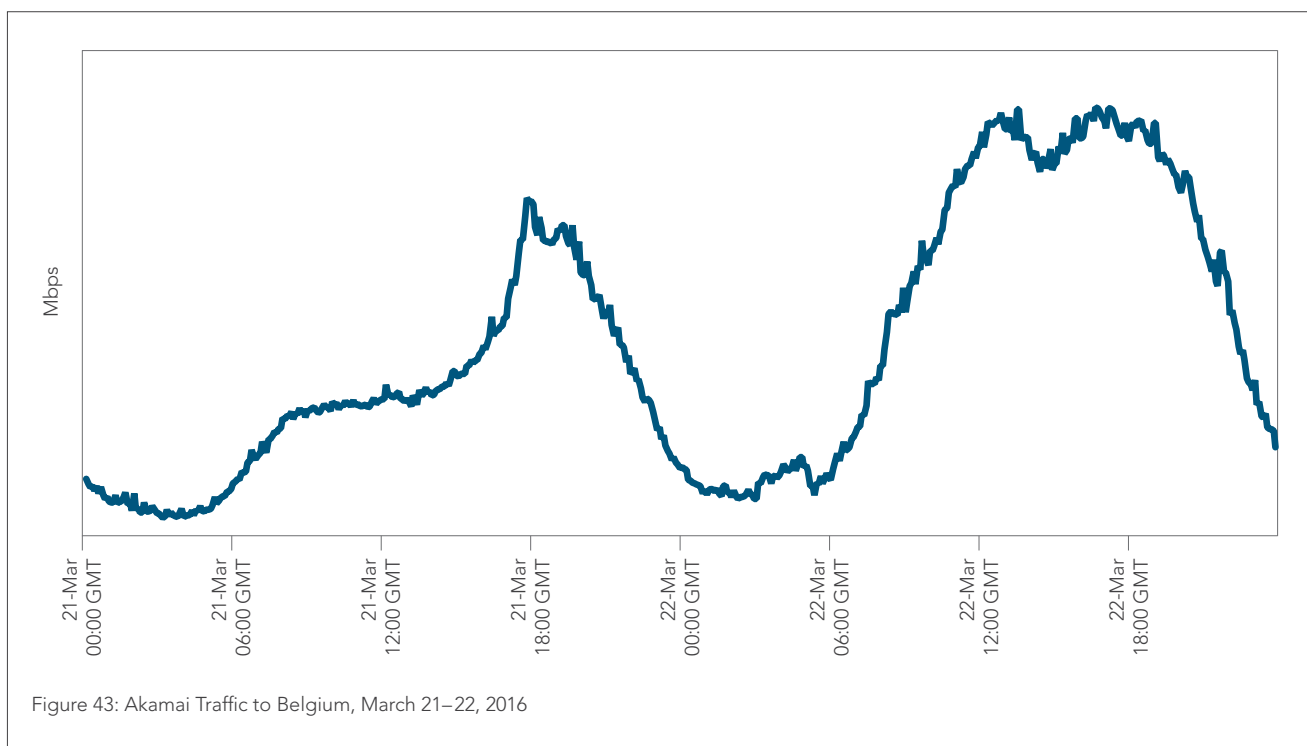


Figure 43: Akamai Traffic to Belgium, March 21–22, 2016

levels were about 50% higher than the same time the previous day, and they continued to climb from there. From about 9:15 a.m. to 4:45 p.m. UTC, Akamai traffic to Belgium was two to three times the levels seen the previous day at comparable times. Via Twitter, Belgian officials posted “IMPORTANT: Brussels mobile networks are getting saturated. Please contact through data messages: Facebook, WhatsApp, Twitter. Avoid calls” in an effort to avoid overburdening Belgian mobile networks in the hours after the attacks, while also posting on Facebook to ask that Belgians limit streaming media usage in order to avoid overloading Internet connections.<sup>46</sup>

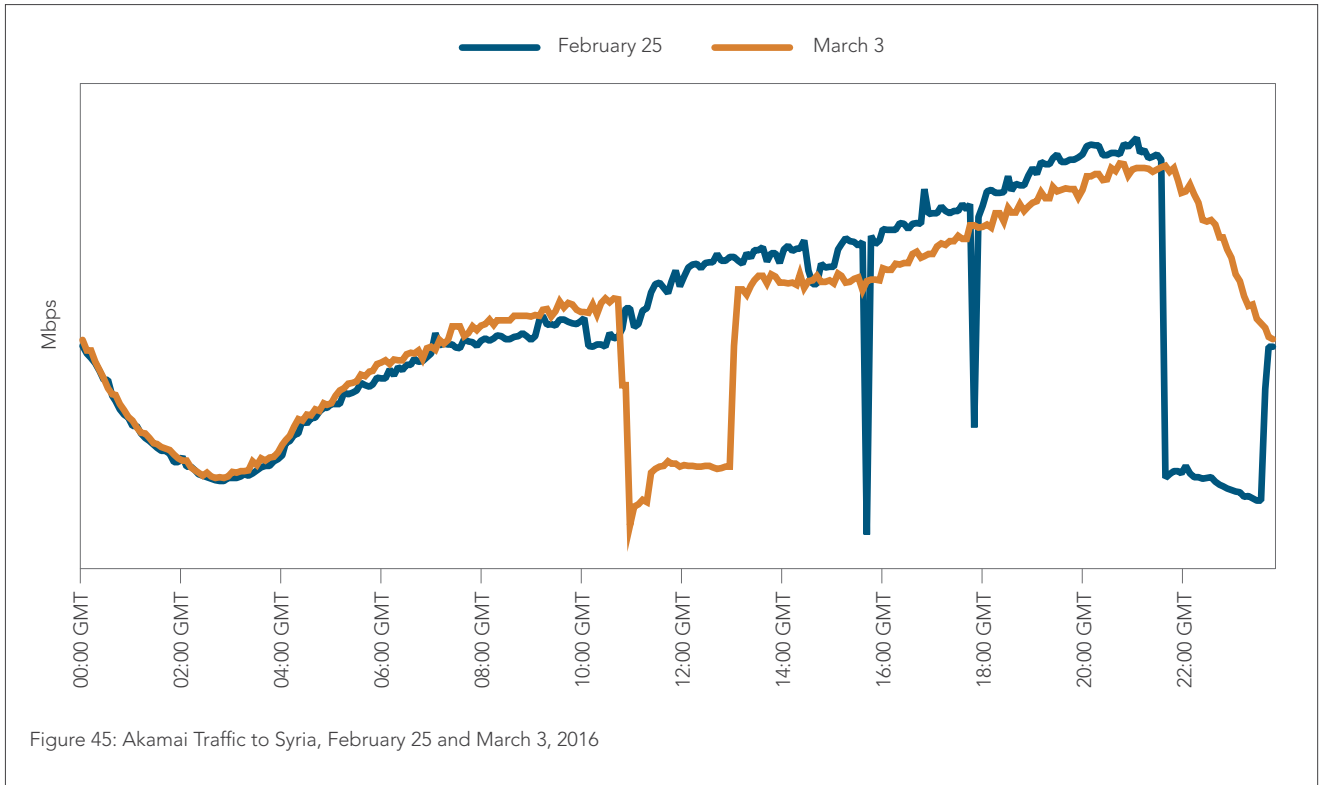
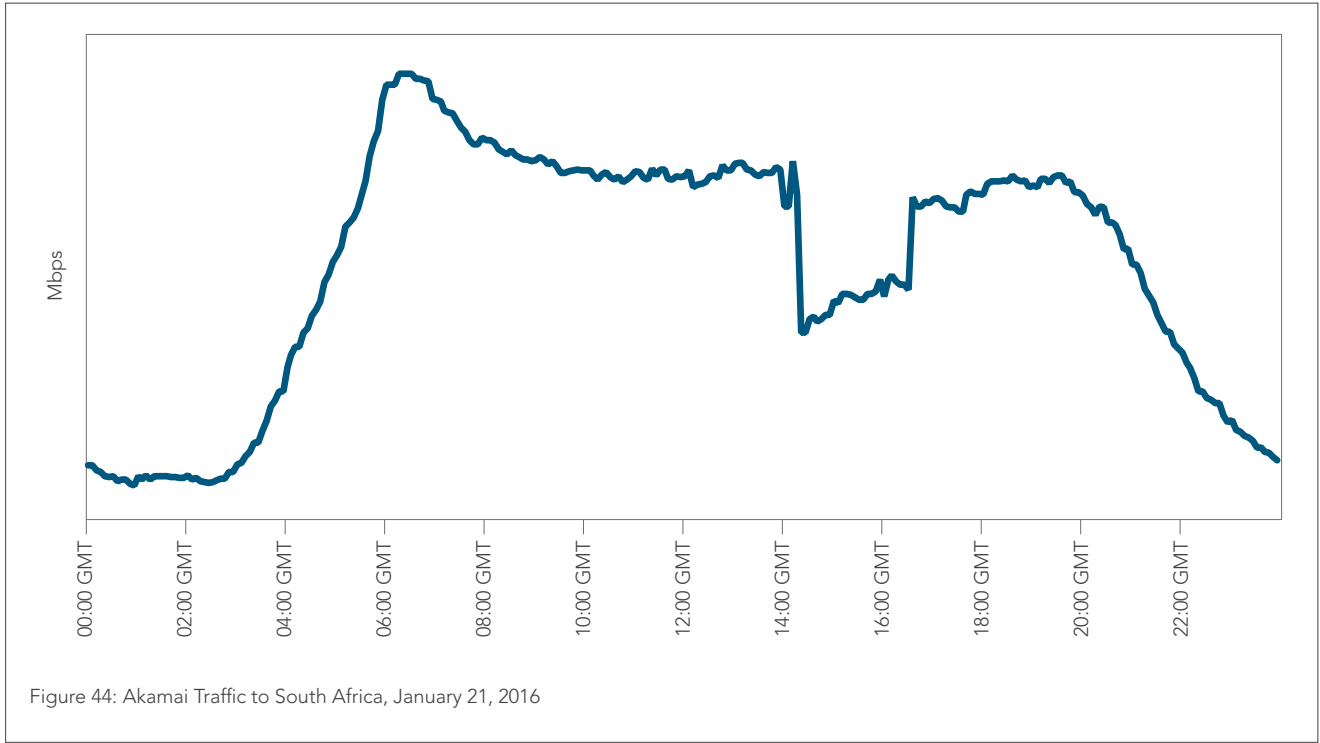
**10.2 SOUTH AFRICA** / As seen in Figure 44, at approximately 2:20 p.m. UTC on January 21, Akamai saw its traffic levels to South Africa suddenly dip by about 40%. Traffic remained at reduced levels for about two hours, until roughly 4:30 p.m. UTC. Dyn Research, the Internet monitoring arm of Internet performance company Dyn, corroborated the outage, noting that roughly 20% of network prefixes were down in South Africa as part of a larger set of outages throughout the African continent.<sup>47</sup> According to African cable operator Seacom, these outages were due to construction activity in Egypt leading to multiple damaged cables, which caused connectivity problems for the entire continent as Seacom’s cables in and around Egypt provide connectivity for much of Africa to Europe, Asia, and the Middle East.<sup>48</sup>

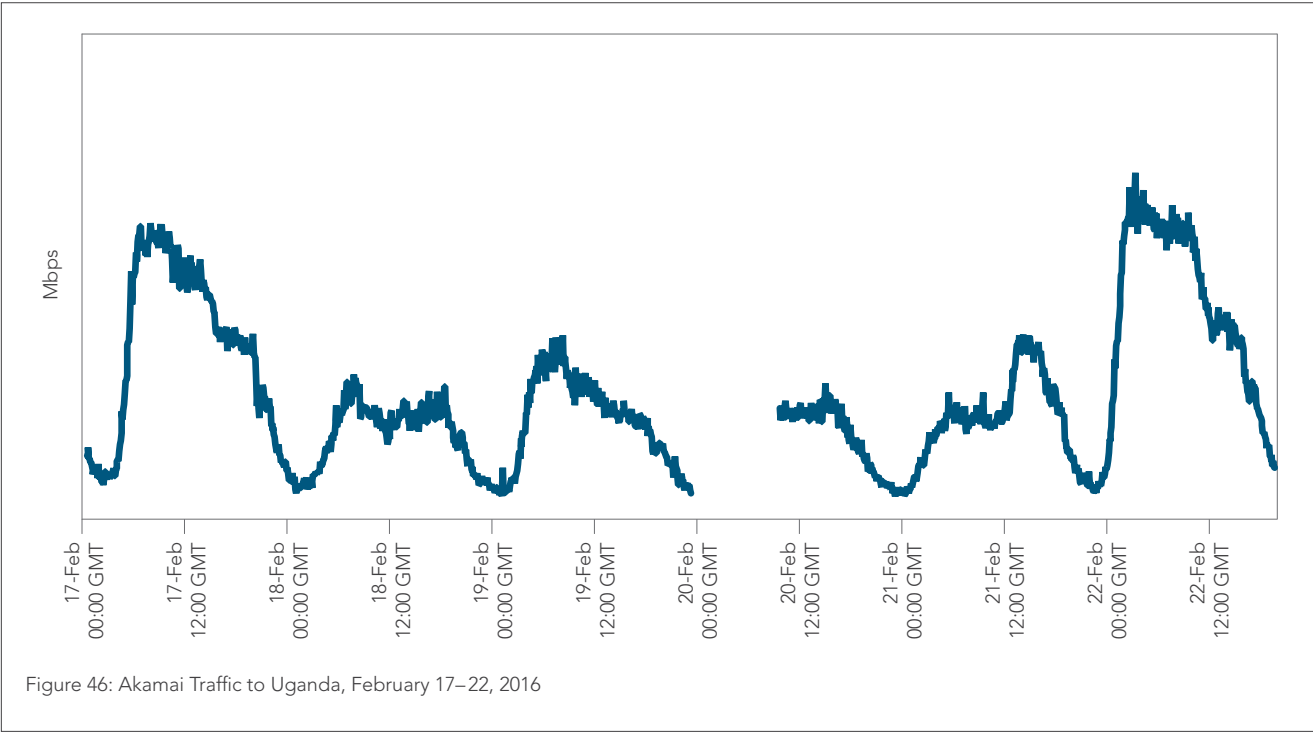
**10.3 SYRIA** / War-torn Syria suffered from a number of widespread electrical and Internet outages in the first quarter. As seen in Figure 45, on February 25, Akamai saw traffic to Syria drop sharply momentarily at approximately 3:45 p.m. and 5:55 p.m. UTC before a more prolonged outage starting at 9:45 p.m. UTC, when traffic suddenly dropped to less than one-fifth of previous levels. This outage lasted for two hours and was also noted by Dyn Research.<sup>49</sup> On March 3, Akamai saw a

similar precipitous drop in traffic to Syria starting around 10:50 a.m. UTC. Traffic initially dropped to about one-tenth of previous levels, then became partially restored but remained at under one-third of normal levels until about 1:00 p.m. Network monitoring firm BGPmon corroborated the outage, followed soon after by a small partial recovery.<sup>50</sup> The Syrian government reported a nationwide power outage during this time, but did not give a reason for the blackout. It also said that Internet services were partially halted due to network damage.<sup>51</sup>

**10.4 UGANDA** / From February 18 to 21, Akamai saw depressed levels of traffic to Uganda at roughly 30% to 40% of normal levels, as shown in Figure 46. During this time, the Ugandan government blocked access to social media and mobile money services as the country’s presidential and parliamentary elections were taking place. Note that traffic data from 1:15 a.m. UTC to 12:00 p.m. UTC on February 20 was affected by an Akamai data processing issue and is therefore not shown in the graph.

According to Ugandan President Museveni, the social media and mobile money platforms were shut down for security purposes, later explaining “some people misuse those pathways for telling lies.”<sup>52</sup> Some Ugandans found a way around the four-day social-media blackout, however, as nearly 1.5 million of them turned to VPN software to circumvent it.<sup>53</sup> The government later warned against doing so, saying that accessing social media platforms during the blackout would be considered “treason.”<sup>54</sup>





Region	Unique IPv4 Addresses	Average Connection Speed (Mbps)	Average Peak Connection Speed (Mbps)	% Above 4 Mbps	% Above 10 Mbps	% Above 15 Mbps
<b>AMERICAS</b>						
Argentina	8,204,008	5.3	29.8	53%	8.6%	1.7%
Bolivia	280,442	2.4	14.8	7.8%	0.6%	0.2%
Brazil	48,342,314	4.5	33.2	44%	3.8%	1.1%
Canada	15,146,853	14.3	59.6	90%	53%	32%
Chile	4,662,709	7.3	48.6	84%	16%	4.4%
Colombia	9,955,427	4.6	23.8	55%	2.3%	0.6%
Costa Rica	517,939	3.8	18.6	32%	1.5%	0.6%
Ecuador	734,445	5.3	31.6	58%	5.7%	1.2%
Mexico	14,714,443	7.1	32.1	78%	15%	4.0%
Panama	540,048	4.5	19.1	48%	3.2%	0.8%
Paraguay	216,137	2.2	12.5	8.2%	0.5%	0.2%
Peru	1,009,080	5.2	31.3	64%	4.4%	1.4%
United States	140,060,201	15.3	67.8	86%	57%	35%
Uruguay	1,055,628	7.1	70.8	78%	17%	4.1%
Venezuela	2,773,058	1.9	12.1	4.3%	0.3%	0.2%
<b>ASIA PACIFIC</b>						
Australia	10,043,175	8.8	43.8	78%	23%	10%
China	126,496,759	4.3	31.0	44%	2.1%	0.4%
Hong Kong	3,148,573	19.9	110.3	94%	66%	48%
India	17,016,708	3.5	25.5	23%	4.8%	2.0%
Indonesia	3,498,473	4.5	110.2	46%	3.0%	0.8%
Japan	45,782,047	18.2	84.6	92%	65%	44%
Malaysia	2,020,893	6.4	46.3	68%	11%	3.1%
New Zealand	2,111,251	10.5	49.8	91%	33%	15%
Philippines	1,501,611	3.5	29.9	18%	2.7%	1.0%
Singapore	1,865,253	16.5	146.9	91%	65%	43%
South Korea	24,506,931	29.0	103.6	97%	84%	69%
Sri Lanka	185,236	5.4	35.4	71%	4.5%	1.6%
Taiwan	10,478,777	14.8	83.1	93%	57%	33%
Thailand	3,589,101	10.8	69.6	96%	39%	15%
Vietnam	6,733,865	5.0	34.1	55%	4.9%	0.8%
<b>EUROPE</b>						
Austria	3,117,696	13.4	51.1	94%	42%	22%
Belgium	4,892,229	15.3	69.2	94%	66%	38%
Bulgaria	1,712,590	15.8	59.0	97%	66%	40%
Croatia	1,626,895	7.4	35.5	84%	13%	4.7%
Cyprus	369,659	7.2	28.4	82%	12%	3.6%
Czech Republic	1,888,596	17.8	63.8	91%	56%	35%

Region	Unique IPv4 Addresses	Average Connection Speed (Mbps)	Average Peak Connection Speed (Mbps)	% Above 4 Mbps	% Above 10 Mbps	% Above 15 Mbps
Denmark	3,081,807	17.2	58.6	96%	63%	41%
Estonia	572,595	11.7	50.0	88%	40%	21%
Finland	2,729,566	17.7	59.7	93%	61%	37%
France	30,393,326	9.9	41.0	81%	28%	14%
Germany	36,339,015	13.9	53.9	91%	47%	26%
Greece	3,411,536	7.8	31.7	88%	16%	4.3%
Hungary	2,865,607	13.8	63.0	95%	53%	29%
Ireland	2,139,757	14.4	60.6	83%	48%	30%
Italy	16,692,967	8.2	36.5	83%	18%	7.0%
Latvia	760,201	18.3	75.1	95%	61%	43%
Lithuania	1,285,777	15.1	50.2	89%	48%	33%
Luxembourg	187,738	10.6	60.7	89%	30%	14%
Malta	177,107	12.7	50.0	97%	57%	26%
Netherlands	9,402,341	17.9	70.5	95%	67%	42%
Norway	3,380,456	21.3	69.6	91%	65%	50%
Poland	7,840,918	12.8	53.1	91%	45%	24%
Portugal	3,623,086	13.1	51.4	89%	48%	30%
Romania	3,512,287	16.1	82.4	95%	64%	41%
Russia	19,473,367	12.2	63.8	92%	50%	24%
Slovakia	1,035,187	13.8	55.8	90%	37%	22%
Slovenia	1,146,701	14.5	47.8	89%	42%	24%
Spain	15,805,029	13.3	64.7	90%	47%	28%
Sweden	6,007,814	20.6	79.5	94%	63%	46%
Switzerland	3,700,442	18.7	76.2	96%	68%	44%
United Kingdom	31,095,823	14.9	61.0	91%	53%	36%
<b>MIDDLE EAST &amp; AFRICA</b>						
Egypt	8,675,972	2.4	16.0	9.7%	1.6%	0.7%
Iran	8,907,921	3.5	17.8	36%	0.3%	0.1%
Israel	2,572,159	13.5	65.8	96%	51%	24%
Kenya	2,465,180	7.3	24.2	63%	18%	8.9%
Kuwait	627,435	6.6	47.8	54%	7.8%	5.3%
Morocco	4,390,880	4.3	22.8	43%	1.4%	0.2%
Namibia	228,791	2.3	13.3	10%	0.6%	0.1%
Nigeria	251,858	3.3	23.3	29%	1.4%	0.5%
Qatar	337,551	8.4	89.2	79%	26%	9.6%
Saudi Arabia	4,309,995	4.7	33.4	51%	3.0%	0.5%
South Africa	5,833,046	6.5	30.1	42%	13%	7.7%
Turkey	8,662,910	7.2	40.7	87%	13%	4.2%
United Arab Emirates	1,493,054	8.8	60.6	90%	26%	5.7%

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