Internet Trends as Seen from IIJ Infrastructure —2025

Each year in the IIR, we present an analysis of data obtained through the operation of IIJ's network and server infrastructure, which ranks among the largest in Japan. This year, we again analyze changes in trends over the past year from the perspective of BGP routes, DNS query analysis, IPv6 and mobile, and the Internet backbone.

Topic 1

BGP and Routes

We start by looking at IPv4 full-route information advertised by our network to other organizations (Table 1) and the number of unique IPv4 addresses contained in the IPv4 full-route information (Table 3).

The annual increase in total routes recovered to over 40,000 (Figure 1), bringing the total to over 990,000 routes. Note that as of this writing (early October 2025), the total has already surpassed 1,000,000 routes, but as with other observation points, this milestone appears to have been passed without any real commotion. By prefix length, the increases in the number of routes stood out for /24 and /23 as well as for /16 and /20. While the number of /18 routes looks to have decreased according to Table 1, the figures for aggregated routes only (removing routes for which shorter-prefix route information exists; Table 1-a) instead show a three-digit increase, suggesting these are in high demand due to address transfers in recent years. The number of unique IPv4 addresses turned around after a two-year downtrend for a sharp rise of just under 74 million (/8 blocks x 4.4). This also exceeds the 2022 value and

Table 1: Number of Routes by Prefix Length for Full IPv4 Routes

Date	/8	/9	/10	/11	/12	/13	/14	/15	/16	/17	/18	/19	/20	/21	/22	/23	/24	total
Sep. 2016	16	13	36	101	267	515	1050	1767	13106	7782	12917	25229	38459	40066	67270	58965	335884	603443
Sep. 2017	15	13	36	104	284	552	1047	1861	13391	7619	13385	24672	38704	41630	78779	64549	367474	654115
Sep. 2018	14	11	36	99	292	567	1094	1891	13325	7906	13771	25307	39408	45578	88476	72030	400488	710293
Sep. 2019	10	11	37	98	288	573	1142	1914	13243	7999	13730	25531	40128	47248	95983	77581	438926	764442
Sep. 2020	9	11	39	100	286	576	1172	1932	13438	8251	14003	25800	40821	49108	101799	84773	473899	816017
Sep. 2021	16	13	41	101	303	589	1191	2007	13408	8231	13934	25276	41915	50664	106763	91436	497703	853591
Sep. 2022	16	13	39	101	298	592	1208	2064	13502	8292	13909	25051	43972	52203	109071	96909	536520	903760
Sep. 2023	16	14	39	102	298	577	1196	2064	13490	8245	13809	25059	43863	51012	109514	98178	550621	918097
Sep. 2024	16	16	37	93	295	573	1165	2059	13224	8220	13718	24624	43786	51827	111483	99239	579274	949649
Sep. 2025	16	14	41	92	298	576	1200	2125	13768	8257	13491	24718	44863	52244	112330	102820	616490	993343

Table 1-a: Number of Routes by Prefix Length for Full IPv4 Routes (Aggregated Routes Only)

Date	/8	/9	/10	/11	/12	/13	/14	/15	/16	/17	/18	/19	/20	/21	/22	/23	/24	total
Sep. 2024	16	9	34	88	264	487	1024	1667	10277	4417	6815	14827	19079	22624	59317	42062	283007	466017
Sep. 2025	16	9	41	85	263	485	1031	1655	11026	4460	6943	14831	20459	22686	59763	43628	304448	491829
Change	0	0	4	-3	-1	-2	7	-12	749	43	128	4	1380	62	446	1566	21441	25812

Table 2: Number of Routes by Prefix Length for Full IPv6 Routes

Date	/16-/28	/29	/30-/31	/32	/33-/39	/40	/41-/43	/44	/45-/47	/48	total
Sep. 2016	153	1294	216	8110	3092	1445	371	1492	1006	14291	31470
Sep. 2017	158	1757	256	9089	3588	2117	580	1999	1983	18347	39874
Sep. 2018	168	2279	328	10897	4828	2940	906	4015	2270	24616	53247
Sep. 2019	192	2671	606	12664	6914	3870	1566	4590	4165	34224	71462
Sep. 2020	205	3164	641	14520	9063	4815	2663	5501	4562	45160	90294
Sep. 2021	223	3628	705	20650	13050	10233	4170	11545	5204	61024	130432
Sep. 2022	298	4247	895	21926	15147	12509	4108	13840	6994	73244	153208
Sep. 2023	316	4357	923	23228	17427	14828	5518	16453	9579	86881	179510
Sep. 2024	322	5360	934	24739	20198	17657	4672	19418	12470	95628	201398
Sep. 2025	271	5089	1062	25643	22627	20719	5430	21021	14522	101103	217487

marks a new record high since the inception of this periodic observation report.

Next, we look at IPv6 full-route information (Table 2) and the number of unique IPv6 /64 blocks in the IPv6 full-route information (Table 3).

The annual increase in total routes was around 16,000. This marks the lowest value since 2019 and the first time in this periodic observation report that the year-on-year growth rate has dipped below 10% (+8%). Looking at aggregated routes only, however, the increase (+9,000) was on par with the previous year's and ranks fourth overall in this periodic observation report's history. The number of unique /64 blocks also surpassed 1 trillion (+23%), suggesting that IPv6 deployment and the expansion of IPv6 networks continue to progress steadily. By prefix length, the number of routes for /16–/28 prefix blocks and /29 blocks fell substantially, but the drop in the former is attributable to a reduction in routes for which shorter prefixes are announced elsewhere. Looking at aggregated routes only, we instead see an increase of 6 (Table 2-a).

Lastly, let's also look at IPv4/IPv6 full-route Origin AS figures (Table 4). In the past year, APNIC was allocated an additional 2048 32-bit only ASNs.

Table 2-a: Number of Routes by Prefix Length for Full IPv6 Routes (Aggregated Routes Only)

Date	/16-/28	/29	/30-/31	/32	/33-/39	/40	/41-/43	/44	/45-/47	/48	total
Sep. 2024	223	5311	521	22942	6861	4776	1773	5348	3712	38335	89802
Sep. 2025	229	5037	546	23628	7820	6265	2282	6635	4235	42376	99053
Change	6	-274	25	686	959	1489	509	1287	523	4041	9251

Table 3: Total Number of Unique IPv4 Addresses in Full IPv4 Routes and Total Number of Unique IPv6 /64 Blocks in Full IPv6 Routes

Date	No. of IPv4 addresses	No. of IPv6 /64 blocks
Sep. 2016	2,824,538,880	26,432,856,889
Sep. 2017	2,852,547,328	64,637,990,711
Sep. 2018	2,855,087,616	258,467,083,995
Sep. 2019	2,834,175,488	343,997,218,383
Sep. 2020	2,850,284,544	439,850,692,844
Sep. 2021	3,036,707,072	461,117,856,035
Sep. 2022	3,068,374,784	532,578,391,219
Sep. 2023	3,055,604,992	700,359,397,494
Sep. 2024	3,033,333,504	896,502,953,452
Sep. 2025	3,107,136,512	1,102,106,091,904

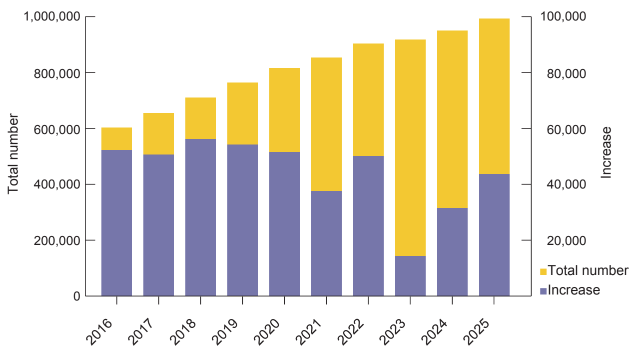

Figure 1: Total Number of Full IPv4 Routes and Annual Increases

Table 4: IPv4/IPv6 Full-Route Origin AS Numbers

ASN	16-bit(1〜64495)					32-bit only(131072〜4199999999)				
Advertised route (IPv6-enabled)	IPv4+IPv6	IPv4 only	IPv6 only	total	(IPv6 -enabled)	IPv4+IPv6	IPv4 only	IPv6 only	total	(IPv6 -enabled)
Sep. 2016	9116	33555	158	42829	(21.7%)	2406	9391	146	11943	(21.4%)
Sep. 2017	9603	32731	181	42515	(23.0%)	3214	12379	207	15800	(21.7%)
Sep. 2018	10199	31960	176	42335	(24.5%)	4379	14874	308	19561	(24.0%)
Sep. 2019	10642	31164	206	42012	(25.8%)	5790	17409	432	23631	(26.3%)
Sep. 2020	11107	30374	229	41710	(27.2%)	7653	19668	574	27895	(29.5%)
Sep. 2021	11465	29219	302	40986	(28.7%)	9514	21108	5242	35864	(41.1%)
Sep. 2022	11613	28398	369	40380	(29.7%)	10816	22211	5764	38791	(42.7%)
Sep. 2023	11770	27617	460	39847	(30.7%)	12640	22128	2067	36835	(39.9%)
Sep. 2024	12068	26720	476	39264	(31.9%)	13905	22737	2386	39028	(41.7%)
Sep. 2025	12239	25835	438	38512	(32.9%)	15319	23223	2568	41110	(43.5%)

The number of 16-bit Origin ASes has been falling for 10 years straight, and this year's decline was the largest since we began these periodic observations. Because the decrease in "IPv4 only" again exceeded the increase in 32-bit-only ASes, the total number of IPv4 only Origin ASes fell for a third consecutive year (Figure 2). The number of IPv6 only Origin ASes also saw its first double-digit drop. The number of 32-bit-only Origin ASes increased by roughly the same amount as in the previous edition and has finally come to account for a majority of all Origin ASes. The increases in "IPv4 only" and "IPv6 only," meanwhile, were much lower than last time, and the share of total accounted for by "IPv4＋IPv6" Origin ASes rose from 58% last time to 68%. These results suggest that the practice of treating IPv4 and IPv6 separately (separate ASes) continues to unwind, and whether this trend continues is something we will continue to monitor in future editions.

Topic 2

DNS Query Analysis

IIJ provides a full-service resolver to enable DNS name resolution for its users. Here, we discuss the state of name resolution, and analyze and reflect upon data from servers provided mainly for consumer services, based on a day's worth of full-service resolver observational data obtained on October 22, 2025.

The full-service resolver provides a name resolution function that replies to DNS queries from user devices. Specifically, to resolve a name, it starts by looking at the IP address of an authoritative server for the root zone (the highest level zone), which it queries, and then goes through other authoritative servers to find the records it needs. If the full-service resolver repeatedly queries other servers like this, it can result in increased load and delays, so the information obtained is cached, and when the same query is received again, the response is sent from the cache. Recently, DNS-related functions are implemented on devices that lie on route paths, such as consumer-level routers and firewalls, and these devices are sometimes also involved in relaying DNS queries and applying control policies. Some applications, such as Web browsers, also have their own implementations of name resolver functionality and in some cases resolve names based on a policy that differs from the OS settings.

ISPs notify users of the IP address of full-service resolvers via various protocols, including PPP, DHCP, RA, and PCO, depending on the connection type, and they enable automatic configuration of which nameserver to use for name resolution on user devices. ISPs can notify users of multiple full-service resolvers, and users can specify which nameserver to use by altering settings in their OS, browser, or elsewhere. When more than one nameserver is configured on a user device, which one ends up being used depends on the device's implementation or the application, so any given full-service resolver is not aware of how many queries a user is sending in total. When running full-service resolvers, therefore, this means that you need to keep track of query trends and always try to keep some processing power in reserve because changes in behavior

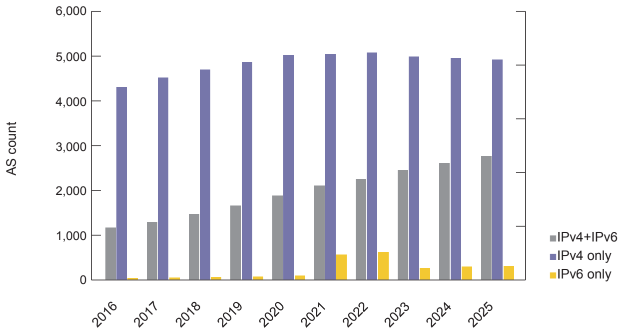

Figure 2: IPv4/IPv6 Full-Route Origin AS Counts (Combined Total)

or status on the user end can conceivably result queries suddenly being concentrated on a particular resolver.

Observational data on the full-service resolver provided by IIJ show fluctuations in user query volume throughout the day, with volume hitting a daily trough of about 0.13 queries/sec per source IP address at around 3:30 a.m., and a peak of about 0.27 queries/sec per source IP address at around 12:25 p.m. The minimum was down 0.02pt and the maximum down 0.05pt vs. the previous year. The breakdown shows that IPv4 accounted for around 43% of queries and IPv6 for around 57%, with IPv6's share having risen by around 16pt from the previous year, marking the first time since we began these periodic observations that IPv6 queries have outnumbered IPv4. Turning to protocols, UDP accounted for almost all (97.67%) of the queries. That said, TCP queries have been rising gradually in recent years, from 0.189% of total in 2021 to 0.812% in 2022, 1.419% in 2023, 1.561% in 2024, and 2.335% in 2025. This is possibly due to an increase in queries using DNS over TLS (DoT), and there may also be implementations out there that use TCP queries for some purpose such as connectivity or operation checks.

Recent years have seen a tendency for queries to rise briefly at certain round-number times, such as on the hour marks in the morning. We again saw similar increases in 2025. We also observed, as in the previous year, increases in query volume at 14 and 9 seconds before hour marks. This is a pattern we have seen in recent years, with query volume rising sharply at the hour mark and then tapering off gradually, but with the sudden spikes that occur ahead of the hour mark, query volume quickly returns to roughly where it had been. Hence, because a large number of devices are sending queries in almost perfect sync, we surmise that lightweight, quickly completed tasks of some sort are being executed. Last year, we observed query volume actually falling at the top of each hour from 8 a.m. to 10 p.m. and rising gradually thereafter, but this year we observed increases at all hour marks. We suspect this reflects some implementation changes on client devices that use name resolution.

Looking at the query record types, A records that query the IPv4 address corresponding to the host name, AAAA records that query IPv6 addresses, and HTTPS records used to resolve Web services account for 98% of the total. The trends in A and AAAA queries differ by IP protocol, with more AAAA record queries being seen for IPv6-based queries. Of IPv4- based queries, around 71% are A record queries and 11% AAAA record queries (Figure 3). With IPv6-based queries, meanwhile, A record queries account for around 42% and AAAA record queries around 34% of the total (Figure 4).

Compared with the previous year, we observe a 9-percentage-point increase in A record queries for IPv4 and a 2-percentage-point increase for IPv6. Meanwhile, HTTPS record queries, which we started to see in 2020, again declined as in 2024. They accounted for around 16% of IPv4 and 22% of IPv6 queries, decreases of 1 percentage point for IPv4 and 2 percentage points for IPv6 from the

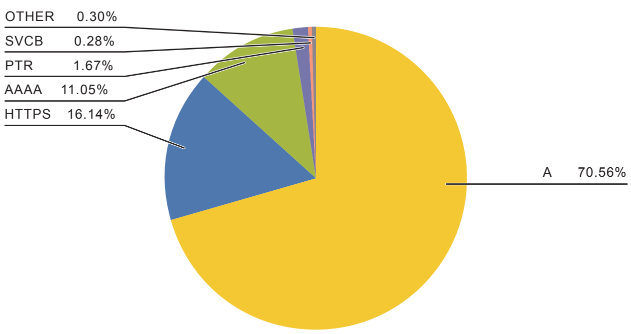

Figure 3: IPv4-based Queries from Clients

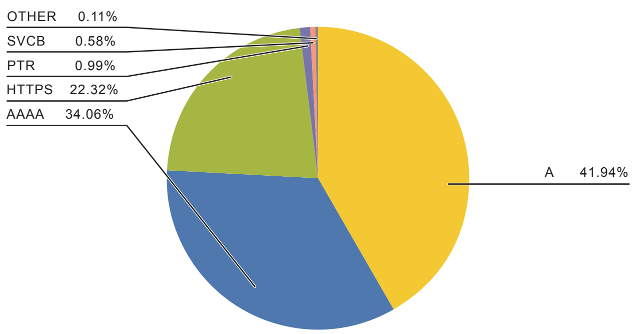

Figure 4: IPv6-based Queries from Clients

previous year. SVCB records, which we started to see in 2022, accounted for 0.28% of IPv4 and 0.58% of IPv6 queries, and while these queries are still only a small fraction of the total, they are progressing steadily. This may be attributable to the use of implementations of Discovery of Designated Resolvers (DDR), designed to allow clients to detect encryption-capable full-service resolvers.

Topic 3

IPv6 & Mobile

In this section, we again report on IPv6 traffic on the IIJ backbone, source ASNs, and the main protocols used. Like last year, we also look at IPv6-enabled rates on mobile services by device OS.

■ Traffic

Figure 5 shows traffic measured using IIJ backbone routers at core POPs (points of presence—3 in Tokyo, 2 in Osaka, 2 in Nagoya). The data cover the eight months from February 1 to September 30, 2025.

Over the period, Internet traffic increased 5.6% year over year in total, with an increase of 25.2% for IPv6 and 0.6% for IPv4. Last year, growth in both IPv6 and IPv4 was largely flat, but IPv6 traffic grew markedly in 2025.

Figure 6 graphs traffic indexed to 100 as of February 1, 2025. IPv4 hovers around 100, whereas IPv6 ranges between 100 and 140, generally moving around the 120 mark.

Next, Figure 7 shows IPv6 as a proportion of total traffic. Over the period, it ranged from a minimum of 20.5% to a maximum of 26.9%, averaging 23.9%. This is an increase of around 4 points from the previous year. We did not expect to see much growth because it had been stagnant in the previous year, but we were pleasantly surprised.

Table 5 tracks the IPv6 ratio since 2017. IPv6 traffic accounted for only around 4% of total back when we began these periodic observations, but its use has now expanded to the point that it now accounts for some 24%.

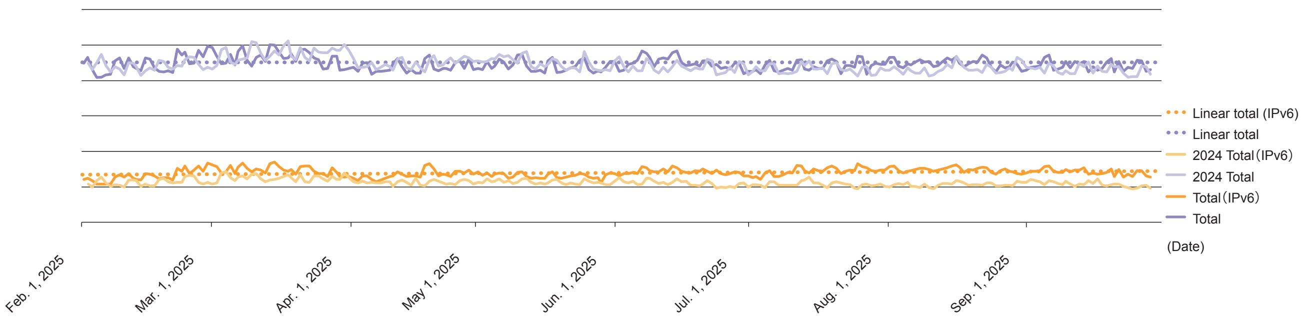

Figure 5: Traffic Measured on Backbone Routers at IIJ's Core POPs

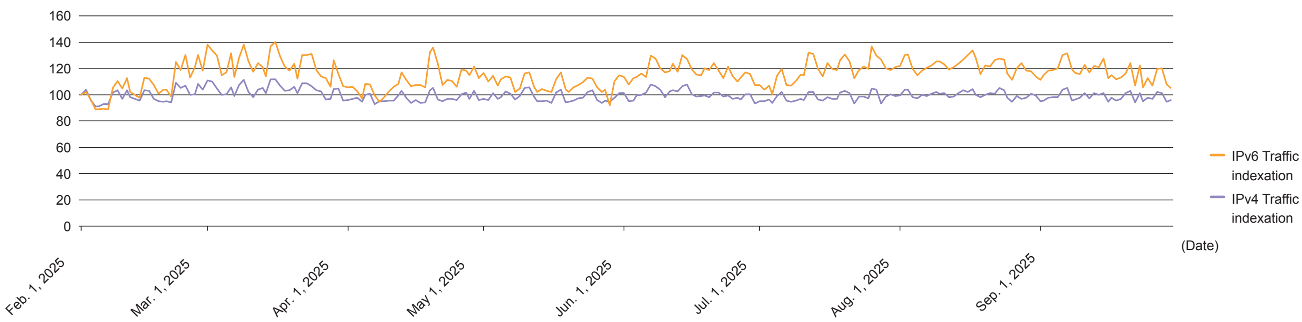

Figure 6: Traffic Indexed to 100 as of February 1, 2025

■ Traffic Source Organization (BGP Source AS)

Next, Figures 8 and 9 show the top IPv6 and IPv4 traffic source organizations (BGP Source AS Number) for February 1 – September 30, 2025.

For IPv6, traffic within IIJ traffic (AS2497<=>AS2497) accounts for 69%. This is an increase of 3 points from the previous year's reading of 66%.

Looking non-IIJ ASes, Company A, a major Japanese content provider, moves up from No. 2 last year to take the No. 1 spot (6% of traffic) from Company B, a major U.S. search provider. Company B slides back into No. 2 with 4%, and Company C, a major U.S. e-commerce and cloud services provider, comes in at No. 3 with 2%. The rest of the lineup has not changed much, but as was the case last year, no single entity stands out dramatically, and we would expect the rankings to change depending on the observation period chosen.

Note that Company A (No. 1 for IPv6) comes in at No. 5 for IPv4, so one can imagine that it is actively building and providing IPv6-enabled services.

Table 5: IPv6 as a Proportion of Total Traffic (Since 2017)

	2017 IIR Vol. 37	2018 IIR Vol. 41	2019 IIR Vol. 45	2020 IIR Vol. 49	2021 IIR Vol. 53	2022 IIR Vol. 57	2023 IIR Vol. 61	2024 IIR Vol. 65	2025 IIR Vol. 68
IPv6 ratio	4%	6%	10%	10%	11.2%	15.1%	20.1%	20.16%	23.9%

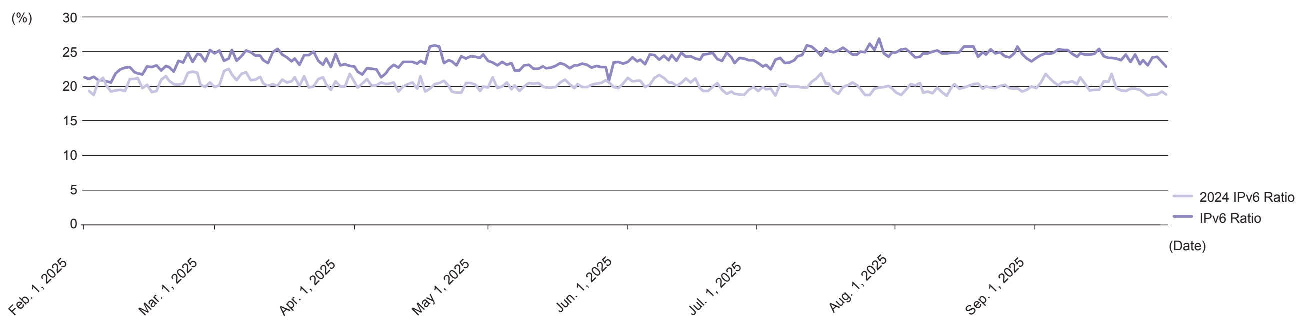

Figure 7: IPv6 as a Proportion of Total Traffic

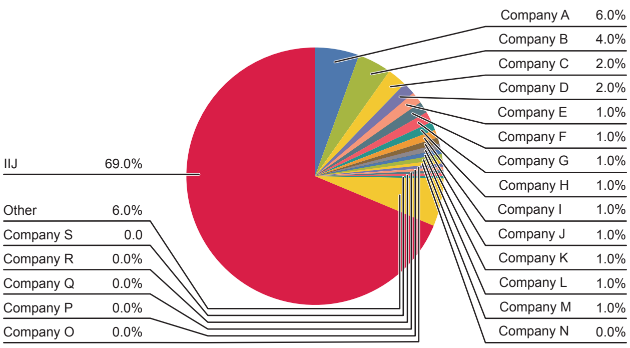

Figure 8: IPv6 Traffic by Source Organization (BGP AS Number)

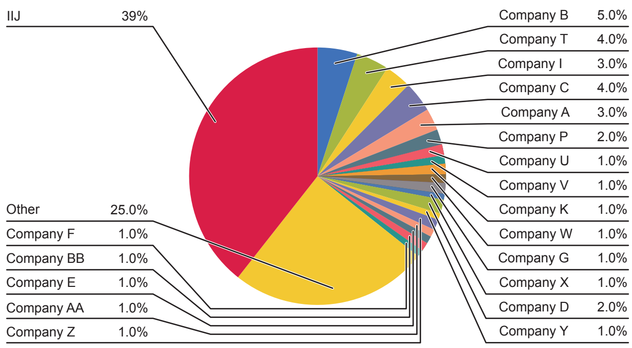

Figure 9: IPv4 Traffic by Source Organization (BGP AS Number)

Protocols Used

Figure 10 plots IPv6 traffic according to protocol number (Next Header) and source port number, and Figure 11 plots IPv4 traffic according to protocol number and source port number (for the week of Monday, September 29 – Sunday, October 5, 2025).

In the IPv6 space, as was the case last year, the top four protocols—HTTPS, QUIC, NAT Traversal, and ESP in that order—accounted for 92.4% of usage. HTTPS accounted for 76.3% (+2.3 points year over year), QUIC 8.7% (-0.3), and HTTP 0.8% (-0.2). So the proportion accounted for by HTTP-related protocols (around 85.9%, +1.9) is rising steadily, and encryption is also increasingly being implemented.

For HTTP-related protocols in the IPv4 space, HTTPS accounted for 55.8% (+0.6 points year over year), QUIC 6.7% (+1.0), and HTTP 4.2% (-1.1), bringing the total for HTTP-related protocols to 66.8% (+0.6). As with IPv6, it appears encryption is increasingly being implemented here as well. Compared with IPv6, HTTP-related protocols account for a lower proportion of total and a greater volume of traffic is classified as "other," suggesting that IPv4 features in a wider variety of use cases (protocols) and that there are many applications and servers that do not yet support IPv6.

Traffic patterns remain largely similar to last year. IPv6 usage is heavier at night, appearing to be nearly double that of daytime usage. But on weekends, daytime usage increases

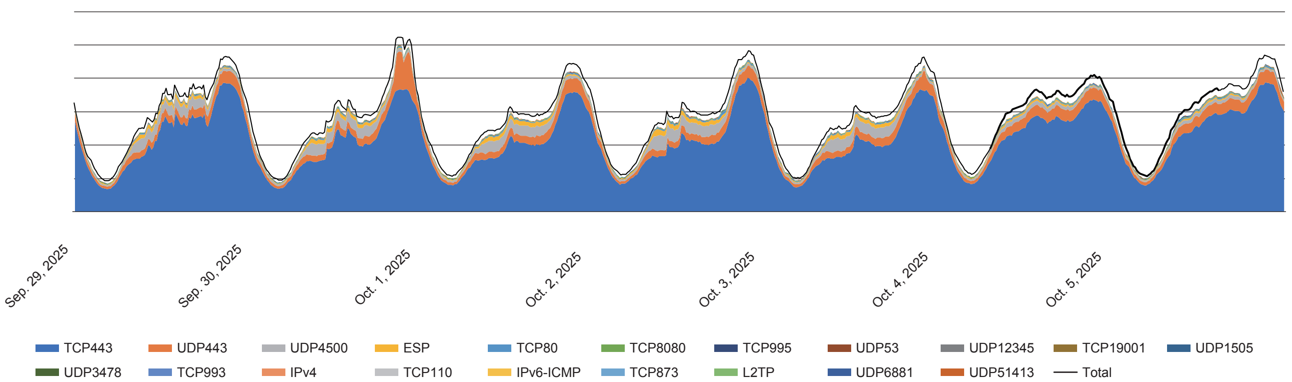

Figure 10: Breakdown of IPv6 Traffic by Source Port Number

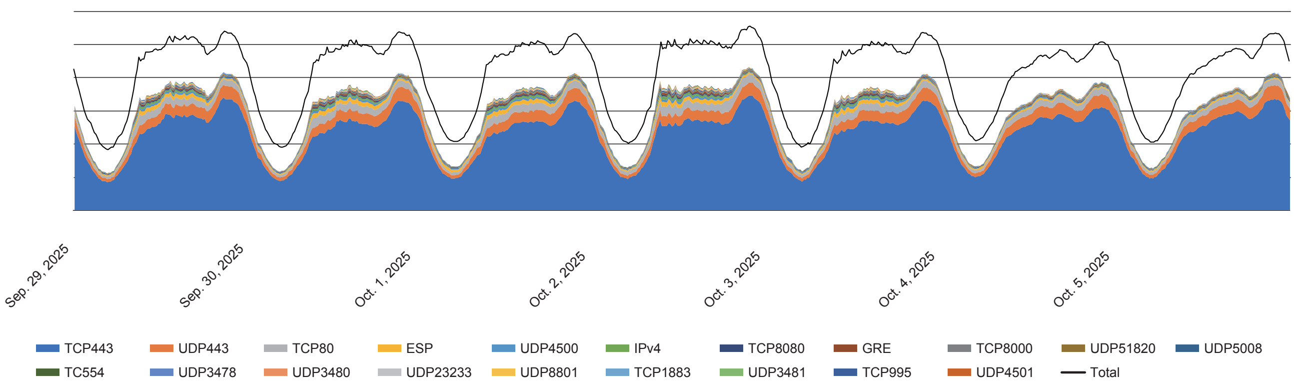

Figure 11: Breakdown of IPv4 Traffic by Source Port Number

while nighttime usage declines slightly. Compared with IPv4, the shape of the curve differs significantly: IPv4 is used fairly evenly throughout the hours when people are awake and active, whereas IPv6 appears to see heavier usage during private hours (outside of working hours).

IPv6 on Mobile Devices

In this edition, we again look at IPv6-enabled rates on personal mobile service (IIJmio Mobile Service) connections. We also look at differences by device OS and at whether there are differences depending on device manufacturer.

The IPv6-enabled rate for devices connected to the IIJmio Mobile Service was 62.9%. This represents an annual increase of around 2 percentage points, from 60.6% last year and 58.73% the year before that. By device OS, 86.9% of Apple iOS devices (including Apple OSes for other mobile devices such as iPadOS) had IPv6 enabled, while the figure was 35.5% for Android devices. The Android IPv6-enabled rate was up 5 percentage points for a second year running, which contributed to the overall rise in the IPv6-enabled rate.

Next, we look at IPv6-enabled connections on the IIJmio Mobile Service, ranked by manufacturer in order of connection count. The pie chart in Figure 12 shows Apple (iPhone, iPad, etc.) accounts for the vast majority of connections at 74%. Google Pixel follows at 10.2%, with Motorola putting in a strong showing in third place at 8.5%. Japanese manufacturers such as FCNT, Sharp,

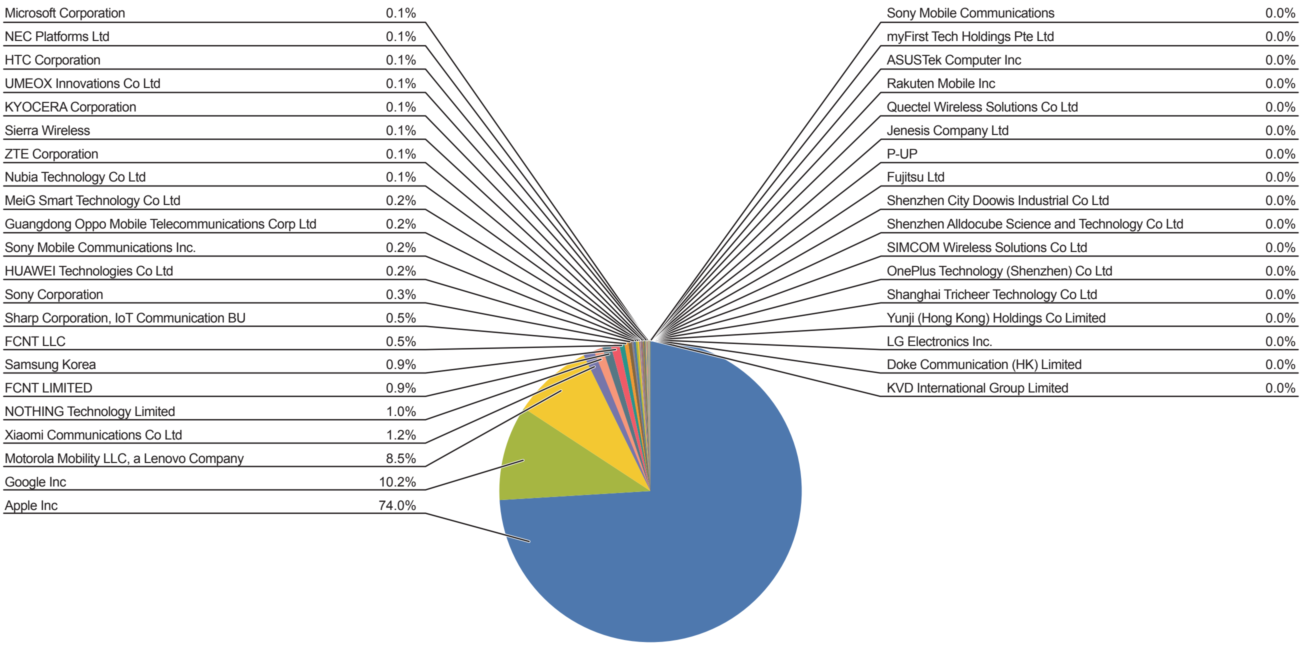

Figure 12: IPv6 Support by UE Manufacturer

Sony, Kyocera, and NEC Platforms are also part of the mix, but the connection counts are low and many of the devices do not have IPv6 enabled, so they all come in below 1%. In last year's report, we noted that the FCNT arrows We2 appears to have IPv6 enabled by default, and we hope to see IPv6 adopted as standard in even more devices going forward.

■ Summary

- IPv6 traffic on the IIJ backbone grew sharply in 2025, up 25.2% year over year, and total traffic volume increased 5.6% year over year. The pronounced growth in IPv6 in particular indicates steady progress in the shift toward IPv6 across the Internet infrastructure.
- IPv6 as a proportion of total traffic averaged 23.9%, a record high. Having expanded from around 4% in 2017 to about 24% over roughly eight years, IPv6 is becoming firmly established.
- By source ASN, excluding internal IIJ traffic, Company A at No. 1 accounted for 6% of traffic, Company B at No. 2 for 4%, Company C at No. 3 for 2%. Company A appears to be actively deploying IPv6-enabled services.
- By protocol, HTTPS is dominant, accounting for 76.3% of IPv6 traffic. Together with QUIC, NAT Traversal, and ESP, encrypted HTTP-related protocols and VPN protocols account for over 90% of traffic, indicating that secure communications have become the norm.
- The IPv6-enabled rate for mobile devices was 62.9%, with iOS devices (including iPadOS) at 86.9% and Android devices at 35.5%. Growth in the Android IPv6-enabled rate thus contributed to the overall increase. By manufacturer, Apple accounts for an overwhelming majority, while in the Android camp, Google Pixel and Motorola devices are going strong.

Topic 4

Internet Backbone Trends

In this section, we cover trends related to interfaces and RPKI as they relate to interconnectivity on IIJ's internet backbone infrastructure.

■ Interconnection Interface Trends and Requirements

To facilitate Internet interconnectivity, service operators need to agree on a standardized set of interfaces. As of October 2025, IIJ primarily uses 400G-FR4, 100G-LR4, and 10G-LR for interconnection interfaces. The recent trend of reevaluating operator interconnections based on 10G interfaces continued in 2025 as well. Factors in determining interconnection interfaces include traffic volumes and the number of available interfaces on each side, and the migration of interconnections to 100G as parties come to mutual agreements on the conditions is ongoing.

Figures 13 and 14 show the current breakdown of interconnection interface types on the IIJ backbone. The 2024 data were created using the same extraction criteria as for 2025. Note that the resulting percentages differ from those shown in IIR Vol.65 (https://www.iij.ad.jp/en/dev/iir/065.html).

Use of 400G interfaces for interconnections remains limited. In the charts, percentages for 400G are rounded down to 0% because the counts for 100G/10G have increased, but a small number of 400G interfaces do indeed exist. The decline in 10G interfaces is evident from the overall figures. We believe a major factor in this over the past year is the migration of interfaces at Internet Exchange Points (IXPs) from 10G to 100G.

10G interfaces that had been connected via Link Aggregation (LAG) are being migrated to 100G in step with equipment refresh cycles. And operators continue to migrate interconnections to 100G once, following equipment upgrades, both parties can provision 100G. For 10G handoffs after capacity upgrades, it has become increasingly common to provide them by bundling physical links via MPO-based

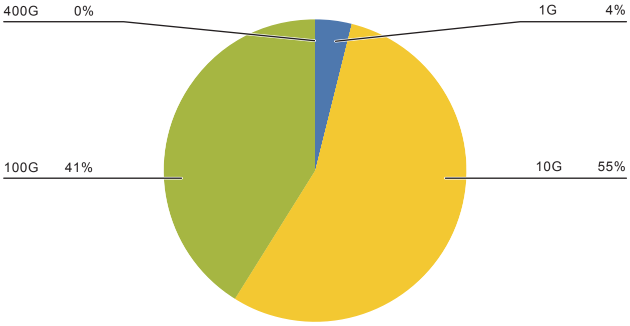

Figure 13:Breakdown of Interconnection Interfaces on IIJ's Internet Backbone (October 2024)

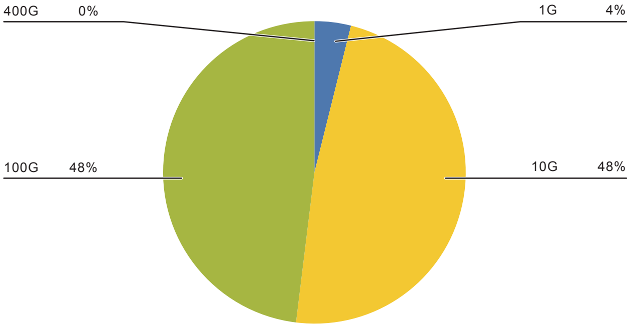

Figure 14:Breakdown of Interconnection Interfaces on IIJ's Internet Backbone (October 2025)

breakout from a 100G port. Some equipment does not provide standalone 10G interfaces, and instead supports splitting higher-speed interfaces into lower-speed interfaces for use. At IIJ as well, following equipment renewals, we have had more opportunities to adopt this feature when continuing to use 10G interfaces.

The share of 100G continues to increase and it is the primary interface for interconnections at present. In terms of 100G interface types, we continue to use 100G-LR4. We have not yet introduced single-lambda 100G-LR.

Current State of RPKI

Here, we provide an update on the state of RPKI. We look at current data on ROAs, signed objects that attest to the legitimacy of IP address resources held by an organization. To build a picture of ROA registrations, we analyzed validation results for Internet routes based on data obtained from an RPKI ROV validator operated by IIJ Lab (Figure 15, Figure 16). Across all IPv4 routes on the Internet, 57.18% are Valid (ROA registered, routing verified), 42.68% are Not-Found (ROA not yet registered), and 0.14% are Invalid (discrepancies in ROA registration, treated as unauthorized routes). In the IPv6 space, 63.32% of routes are Valid, 36.25% are Not-Found, and 0.44% are Invalid.

For both IPv4 and IPv6, the share of Valid routes has increased since October 2024. And because the percentages for Not-Found and Invalid have declined, we can infer that the issuance of ROAs for IP addresses has progressed. We note quite an improvement for Invalid in particular, a positive sign that organizations have been reviewing and correcting their ROA registrations for Internet routes.

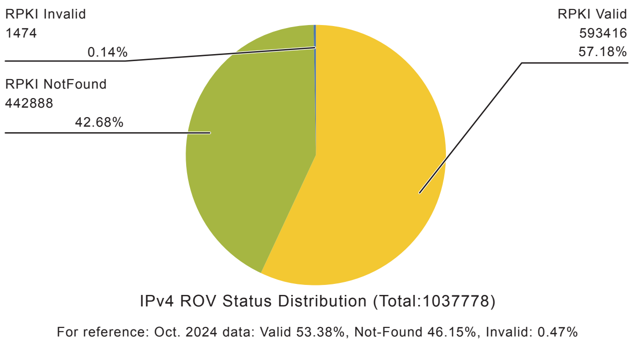

Table 15: ROA Registration Data from the RPKI Monitor (IPv4) as of October 2025

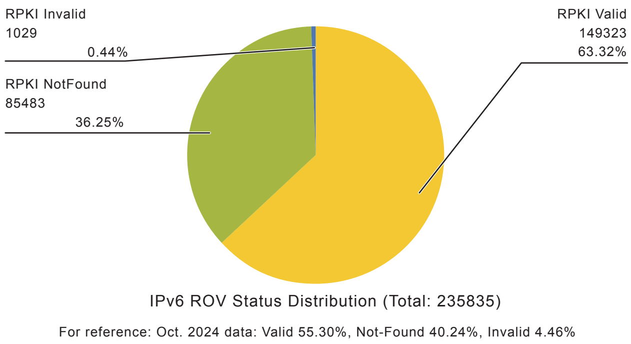

Table 16: ROA Registration Data from the RPKI Monitor (IPv6) as of October 2025

Now let's look at the ROA registration status of Internet routes that IIJ generates and advertises (Table 6). IIJ participates in the Internet using Global AS number AS2497, and thus the Origin AS for routes IIJ advertises is AS2497. As of October 2025, 43.65% of routes originating from AS2497 are Valid. This means ROAs are registered, confirming legitimacy, for just under half of all routes. Yet, ROV returns Not-Found for over 50% of the routes, indicating no ROA has been registered. One significant obstacle to ROA registration is the need for organizations that own IP addresses to register and issue their own ROAs. While IIJ has registered ROAs for nearly all IP addresses it owns (excluding special cases), there is evidently a lack of progress among users who bring their own IP addresses to IIJ. Since IIJ cannot currently register ROAs on behalf of users, they must complete the registration themselves. IIJ offers support in this regard, so we encourage you to take advantage of this to help us increase the ROA registration rate for AS2497.

When including routes for which IIJ provides transit service to customers, 56.72% of all routes are Valid according to ROV. This figure is higher than that from last year's data, again indicating decent progress in terms of ROA issuance within Japan as well.

Table 6: ROA Registration Status of Internet Routes Generated and Advertised by IIJ

	No. of routes originated by AS2497	No. of routes IIJ transits and advertises to the Internet
Valid	79	4405
Unknown	102	3757
Invalid	0	4
Valid rate	43.65%	56.72%

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