HOW Does IPv6 Compare with IPv4 Geolocation?

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IP geolocation databases can provide the physical location of a computer or device connected to the Internet. This data is useful for targeted advertising and implementing location-specific features or obtaining usage statistics. Despite becoming the Internet Standard in July 2017, IPv6 remains less commonly used and documented than IPv4 worldwide. Therefore, the available IP geolocation lookup data tend to be more accurate for IPv4 than for IPv6.

IPv4 versus IPv6

IP geolocation resources such as those offered by WhoisXML API support the use of IPv4 and IPv6 addresses. IPv4 uses 32 bits of recombined digits, resulting in around 4.3 billion possible IP addresses. IPv5 was phased out in 2012 when all of its address blocks were allocated by the Internet Corporation for Assigned Names and Numbers (ICANN).

IPv6 uses 128 bits, or eight groups of four hexadecimal digits, allowing for 3.4 x 10^38 possible addresses. This address space is sufficient to satisfy the foreseeable demand. While IPv6 is not backward-compatible with IPv4-exclusive systems, its implementation can coexist on some devices and services.

IPv4

The current definition of IPv4, the fourth version of the Internet Protocol (IP), was released in September 1981 to augment its predecessor publicized in January 1980. Its original design's most significant octet was the network identifier and the rest of the address referred to the host

identifier. Five network classes—A, B, C, D, and E—were introduced in 1981. IP networks began to be subdivided accordingly around 1985. In 1993, the Classless Inter-Domain Routing (CIDR) was introduced instead of classes to provide more flexibility.

Almost 40 years later, the majority of Internet traffic still gets routed via IPv4, likely due to slow development among enterprises and continued legacy application use according to a recent report . As expected, 2018 was the most active year in the history of the IPv4 market.

IPv6

IPv6 was introduced as an Internet Standard in December 1995 and became a Draft Standard in December 1998. Commercial deployment of this protocol, however, did not commence until 2006. Google and Facebook transitioned from IPv4 to IPv6 in June 2016.

A 2016 study found that IPv6 geolocation remained significantly less accurate than IPv4, but the author cited that the protocol has the potential to become just as precise. According to a June 2018 Internet Society report, more than 25% of Internet networks advertise IPv6 connectivity, 24 countries have IPv6 traffic exceeding 15% of the total traffic, and 49 countries deliver more than 5% of traffic over IPv6.

Who Created IPv6?

IPv6 was the brainchild of the Internet Engineering Task Force (IETF), an international group that develops Internet technical standards.

What Is IPv6 For?

Why shift from IPv4 to IPv6? Experts tout the following reasons:

- **The IPv6 address space is substantially bigger than IPv4:** Due to the larger number of bits that IPv6 uses compared to IPv4 (128 bits versus 32 bits respectively), there are consequently more IPv6 addresses than IPv4 ones. There are 340 billion billion billion billion (3.4 x 10 ^ 38) unique IPv6 addresses, while there being only about 4 billion unique IPv4 addresses.

- **IPv6 routing gives better end-to-end connectivity than IPv4:** Again, due to the size of the IPv6 address space, IPv6 does not require network address translation (NAT) to provide end-to-end connectivity. Hence, peer-to-peer (P2P) applications such as Voice over IP (VoIP) or media streaming works very well with IPv6. Users will not experience lags or bad connections on apps like Skype or Netflix. In a sense, IPv6 is faster than IPv4.
- **IPv6 allows device autoconfiguration:** IPv6 automates configuration by providing simple mechanisms. This plug-and-play auto-configuration feature is not available in IPv4.
- **IPv6 has simplified header structures that hasten routing:** IPv6 has a much simpler packet header structure that minimizes time and effort spent on header processing.
- **IPv6 is more secure for applications and networks:** IP Security (IPSec) is a primary IPv6 requirement, allowing it to provide better security than IPv4. IPSec has cryptographic protocols to secure data communication and key exchange.
- **IPv6 has a better quality of service (QoS):** IPv6's Flow Label field, which defines how routers should identify and handle packets, makes its QoS better than that of IPv4.

Which Is Faster, IPv4 or IPv6?

Because IPv6 does not use NAT, it is faster than IPv4. A NAT allows carriers to use a smaller set of IPv4 addresses for a bigger number of IP addresses. That lessens the speed of website loading and other functions.

A 2020 study of the world's top 25 sites revealed that 13 are now using IPv6 addresses. These websites include:

- google[.]com
- youtube[.]com
- facebook[.]com

- wikipedia[.]org
- qq[.]com
- yahoo[.]com
- instagram[.]com
- live[.]com
- weibo[.]com
- yandex[.]ru
- blogspot[.]com
- netflix[.]com
- linkedin[.]com

Where Are We Now in Terms of IPv6 Usage?

Internet users started the World IPv6 Launch back in June 2012. Companies like Google, Facebook, Microsoft Bing, and Yahoo were the protocol's earliest supporters. From 2012 to the present, IPv6 traffic increased significantly.

The other top-ranking websites that followed the leaders include but are not limited to the following:

- Wikipedia made its core MediaWiki software IPv6-ready shortly after the World IPv6 Launch.
- Facebook gave all of its data center servers IPv6 addresses in 2017.

As of 15 September 2020, around 30% of Alexa's Top 500 servers support IPv6.

Akamai ranked each country in terms of IPv6 adoption. As of this writing, India (with 61.1%)

topped the list. Here are the top 10 IPv6 country adopters:

Rank	Country	IPv6 User Share
1	India	61.1%
2	U.S.	48.5%
3	Switzerland	47.4%
4	Malaysia	47.3%
5	Belgium	44.8%
6	Germany	43.9%
7	Greece	43.5%
8	Vietnam	42.8%
9	Taiwan	41.7%
10	France	39.5%

Will IPv4 Addresses Still Work Once They Run Out?

All devices and networks that access the Internet using IPv4 addresses will continue to work as they do. We expect IPv4- and IPv6-based systems to coexist. But network operators and other entities that rely on Internet address assignments will find it more challenging and costly to obtain new IPv4 addresses to expand their networks.

How Much Does Shifting to IPv6 Cost?

The amount depends on the nature of the organization. All major operating systems (OSs), software applications, and hardware devices are IPv6-ready, and so that should not add to costs. What will constitute the bulk of spending is training for network and system operators and adding IPv6 to management databases and documentation. Those running in-house-developed software are also likely to spend more.

Does Everyone Need to Transition to IPv6?

As more and more people shift to IPv6, native IPv6 access is not only likely to become the norm, but it's possible that more sites will predominantly support IPv6. And while there are translation mechanisms that allow IPv4 systems to access IPv6-only sites, these devices will not perform as well as IPv6-enabled hardware. Issues may also be hard to troubleshoot.

IPv4 users should also consider which of their services and devices may need IPv6 support in the future. Existing IPv4 address allocations may not be sufficient to support sudden increases in the volume of connected devices such as IP-enabled wireless handheld products and the Internet of Things (IoT).

What Do Administrators Need to Do in Preparation for IPv6 Rollout?

Administrators need to plan for IPv6 the same way they would for any major service upgrade. They should audit their current IPv6 capabilities and readiness. They should also assess the level of IPv6 technical knowledge within their team and plan for staff development and training. Determining which services lose business opportunities because they are only IPv4-accessible is also helpful. It may also be necessary to identify legacy systems that cannot be upgraded, and choose a replacement for them.

Which Geolocation Database Should You Use?

Developers can still obtain the most accurate IP geolocation data for both IPv4 and IPv6 addresses. Query an IP address via WhoisXML API's IP geolocation services to get the country, time zone, region, state, province, city, postal code, and physical address. It is also possible to obtain domain WHOIS data drawn from regional Internet registries (RIRs), Border Gateway Protocol (BGP) feeds, and latency information. All of this information could prove ideal for content personalization, location-based access, and security. IP Geolocation API generates the code necessary to acquire this information in most major programming languages for implementation on web interfaces or applications.