

Press Release

Bern, 3 February 2011

### The end of Internet growth?

***For over 10 years, warnings about the limited size of IPv4 address space have circulated. For over 10 years, IPv6, a new protocol, is ready to replace the 1982 defined IPv4. While this is no secret for most engineers, at present, IPv6 addresses are only used by a few operators. IPv4 addresses are now exhausted.***

Remember that date, 03.02.2011, today, is the day when the supreme authority for IP addresses, IANA (Internet Assigned Number Authority), has given out the last five large IPv4 addresses blocks. These blocks will be consumed within months, and then there will be no possibility for Internet service providers to get more IPv4 addresses.

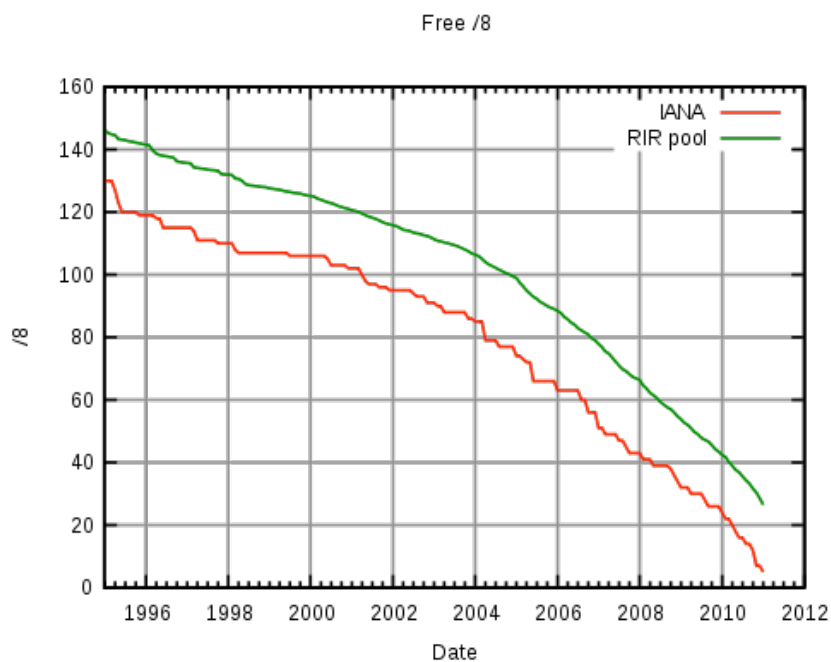


Figure1: IPv4 address exhaustion from 1995 to 2011. (Author: Mro License: CC-BY-SA)

### **What is an IP address?**

IP addresses are like phone numbers, but for computers on the Internet. Every computer on the Internet needs an IP address in order to communicate with other computers and services. The number of addresses available is finite and defined by the protocol version.

### **What is IPv4 / IPv6?**

IPv4 stands for Internet Protocol version 4. It has been defined in the RFC781 in 1981 and implemented in 1982. IPv4 provides space for 4'294'967'296 addresses. At that epoch, people thought that would be enough. But since the mid nineties, the development of the Internet has been consuming these IP addresses at an unexpected rate. This is why a new standard has been developed: IPv6. IPv6 is available as a standard, RFC2460, since 1998. It can handle about 340'282'366'920'938'463'463'374'607'431'768'211'456 ( $3.4 \cdot 10^{38}$ ) addresses. In order to better understand the amount of IPv6 addresses available, one can imagine that there are over 600'000'000'000'000'000 ( $600 \cdot 10^{15}$ ) IPv6 available per square millimetre on earth.

### **Great, we have IPv6! Is the problem solved?**

Yes, IPv6 solves the problem of the limitation of addresses – but everyone needs to migrate to this new protocol. This means that every vendor, every device, tiny or big, needs to support IPv6 and needs to be configured to be used. The Internet, while having an administratively well-organised and defined hierarchy, is completely decentralised in its infrastructure. There is no technical authority of the Internet. Governments and private companies build the network all together in a non-organised manner. So far this system worked very well for the development of the IPv4 Internet. But for IPv6 only few operators or governments took the needed steps. Access providers argued that the customers do not need it because there are no services available over IPv6, and on the other side, service providers argued that there are no customers having IPv6. For over 10 years, providers deny the need for IPv6 seeing no commercial benefit and high costs to implement it. Implementing IPv6 is no easy task; one must be very careful and have the required knowledge before doing it.

### **So everyone ignored the alarms?**

Not all of them. Some providers have taken the needed steps to offer IPv6 services to their customers. Nicolas Strina from Jaguar Network, an international carrier says, "The pool is almost over, that's why we are ready for IPv6, otherwise we'll be eaten [ed. by competitors]". Fredy Künzler from Init7, a Zurich based full service provider, says: "We have started to implemented IPv6 in 2008 and the last servers are currently being migrated. The main issue is to make your company IPv6 aware, help-desk, sales, product development but also engineers". On the hosting side René Luria from Infomaniak, a Geneva based hosting company says: "we are a hosting company, not an IPv4 hosting company. It shouldn't be the customer's problem, actually, he shouldn't even notice. That's why we adopted a dual stack setup [ed. IPv4 and IPv6] for quite a long time now."

### **Take the needed steps!**

Dreamlab Technologies, a well known and trusted security consulting company based in Bern, highly experienced in consulting, security auditing and education, offers to help access and service providers, but also companies or the government to audit their infrastructure in order to define in details the needed steps for IPv6 implementation. "It is fundamental for companies to understand that they will very soon hit the limits of IPv4 availability and that may strongly affect their daily business." says Pascal Gloor, a network security consultant at Dreamlab. A step further, Dreamlab offers IPv6 training for professionals to help them implement and master IPv6 related technologies.

**About**

- IANA** The Internet Assigned Numbers Authority, established in the 70s, is responsible for the global coordination of the DNS Root, IP addressing, and other Internet protocol resources.
- IPv4** Internet Protocol version 4, defined by RFC791 and published in September 1981.
- IPv6** Internet Protocol version 6, defined by RFC2460 and published in December 1998 but was originally defined by RFC1883 in December 1995.
- RFC** A Request for Comments is a memorandum published by the Internet Engineering Task Force (IETF) describing methods, behaviours, research, or innovations applicable to the working of the Internet and Internet-connected systems.

**Links**

Dreamlab Technologies: <http://www.dreamlab.net>

IPv4 exhaustion: [http://en.wikipedia.org/wiki/IPv4\\_address\\_exhaustion](http://en.wikipedia.org/wiki/IPv4_address_exhaustion)

Internet Protocol: [http://en.wikipedia.org/wiki/Internet\\_Protocol](http://en.wikipedia.org/wiki/Internet_Protocol)

IPv4 Address Report: <http://www.potaroo.net/tools/ipv4/>

IANA IPv4 Pool: <http://www.iana.org/assignments/ipv4-address-space/ipv4-address-space.xml>

RFC: <http://www.ietf.org/rfc.html>

Protocol Transition: [http://en.wikipedia.org/wiki/IPv6#Transition\\_mechanisms](http://en.wikipedia.org/wiki/IPv6#Transition_mechanisms)

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