

IPV6: an ICANN perspective

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Introductory

- ⦿ What is ICANN and its role in Internet numbering
- ⦿ IP numbering and the development of IPv6
- ⦿ What can you do?
- ⦿ Roadmap to IPv6 implementation

Unique Names and Numbers

Anything connected to the Internet – including computers, mobile phones and other devices – has a unique number called its IP address. IP stands for Internet Protocol.



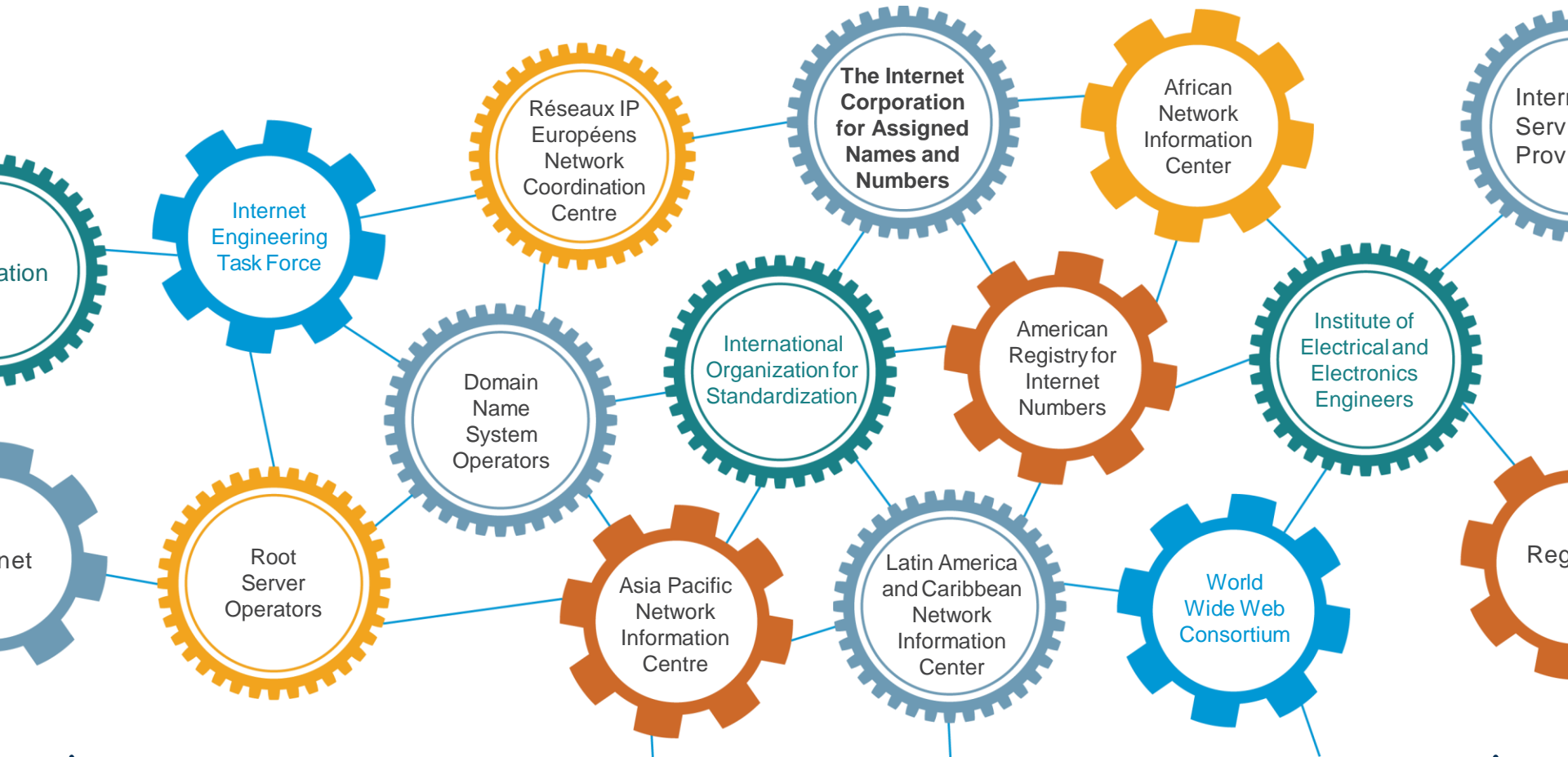
This address is like a postal address. It allows messages, videos and other packets of data to be sent from anywhere on the Internet to the device that has been uniquely identified by its IP address.

IP addresses can be difficult to remember, so instead of numbers, the Internet's domain name system uses letters, numbers and hyphens, to form a name that is easier to remember.



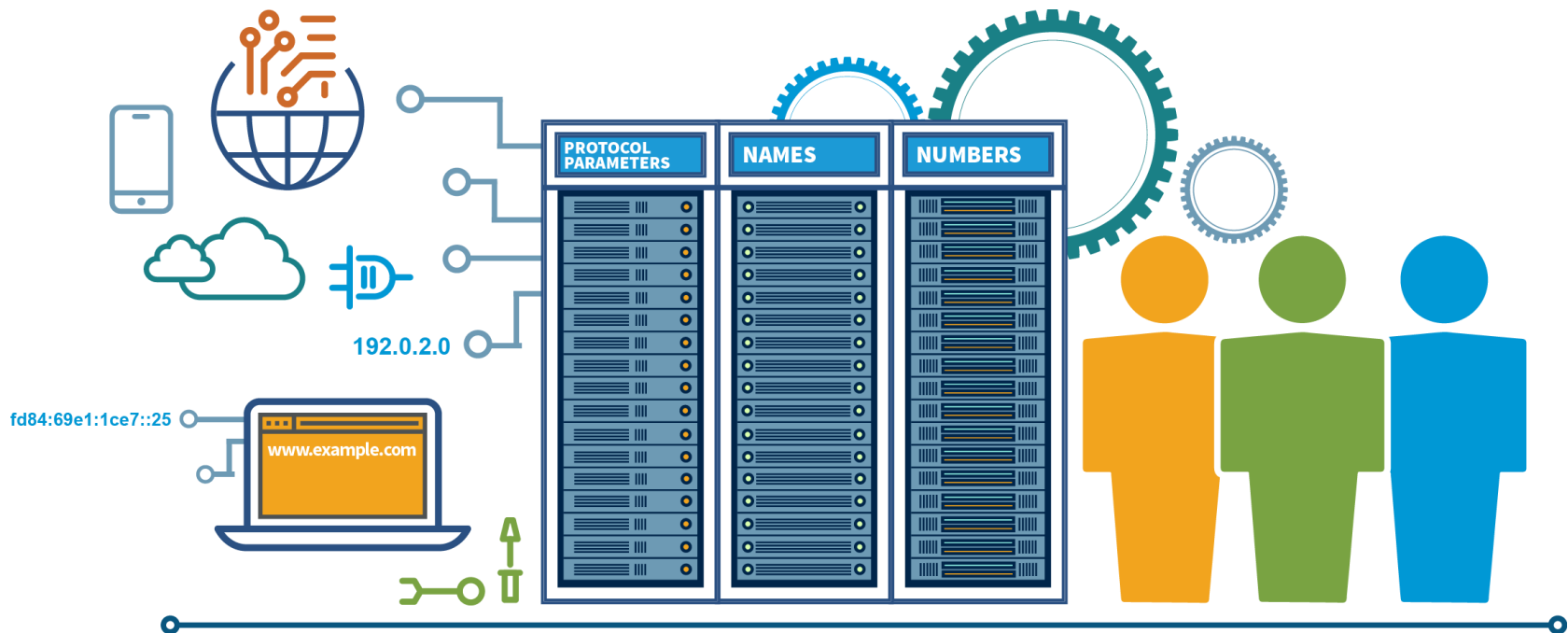
Our Technical Partners

Coordinating with our technical partners,
we help make the Internet work.



Overview


Coordinating with our partners,
we help make the Internet work.





ICANN's Mission


The mission of the Internet Corporation for Assigned Names and Numbers (ICANN) is to **ensure the stable and secure operation of the Internet's unique identifier systems**


Specifically, ICANN:

- 

1 Coordinates the **allocation and assignment of names in the root zone** of the Domain Name System
- 

2 Coordinates the development and implementation of **policies concerning the registration of second-level domain names in generic top-level domains (gTLDs)**
- 

3 Facilitates the coordination of the **operation and evolution of the DNS root name server system**
- 

4 Coordinates the allocation and assignment at the **top-most level of Internet Protocol numbers & Autonomous System numbers**
- 

5 Collaborates with other bodies as appropriate to provide registries needed for the functioning of the Internet as specified by Internet protocol standards development organizations

The ICANN Multistakeholder Community

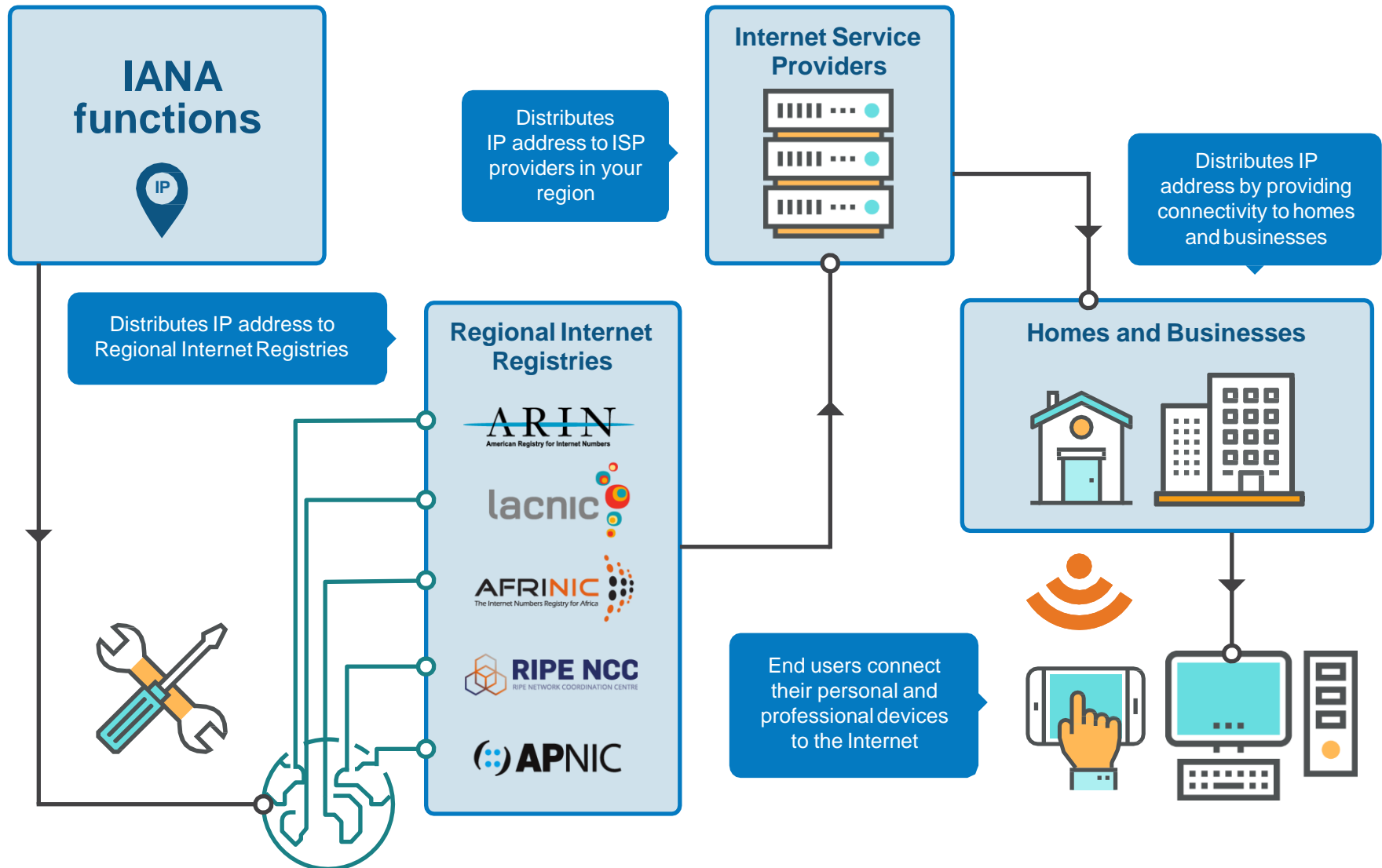
ICANN follows a bottom-up, multistakeholder model in which individuals, non-commercial stakeholder groups, industry, and governments play important roles in its community-based, consensus-driven, policymaking approach for the coordination of the Internet's unique identifiers.



Learn More ►

<https://www.icann.org/community>

How Internet Protocol (IP) Addresses are Distributed



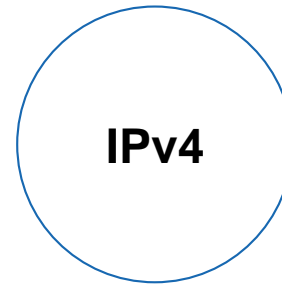
Evolution of the Internet Protocol (IP) : IPv4 & IPv6 (and why should we care?)

Evolution of the Internet Protocol

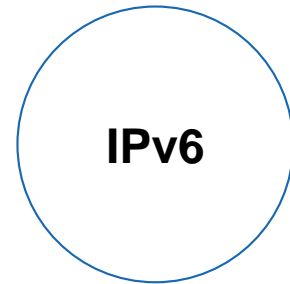
- ⦿ Today, the Internet works over the two protocols: IPv4 and IPv6.
- ⦿ IPv6 is an evolution of the Internet Protocol.
- ⦿ Future online presence will depend on IPv6.

Why IPv6?

- ⦿ Total of 4.3 billion IPv4 addresses
- ⦿ Total of 340 undecillion (3.4×10^{38}) IPv6 addresses
- ⦿ As of 2014, over 99% of IPv4 and less than 1% of IPv6 addresses have been allocated.



192.0.2.53



2001:db8:582::ae33

Why is it important to pay attention to IPv6

- RFC 2460 defines IPv6 as :

*the "... new version of the Internet Protocol, designed as the **successor** to IP version 4 (IPv4) [RFC-791]. ..."*

<https://tools.ietf.org/html/rfc2460>

- The IAB recent statement about IPv6 [Extract]:

" ... we are seeing an increase in both dual-stack (that is, both IPv4 and IPv6) and IPv6-only deployments, a trend that will only accelerate. Therefore, networking standards need to fully support IPv6. The IETF as well as other SDOs need to ensure that their standards do not assume IPv4. The IAB expects that the IETF will stop requiring IPv4 compatibility in new or extended protocols. Future IETF protocol work will then optimize for and depend on IPv6.

Preparation for this transition requires ensuring that many different environments are capable of operating completely on IPv6 without being dependent on IPv4 [see RFC 6540]. We recommend that all networking standards assume the use of IPv6, and be written so they do not require IPv4. We recommend that existing standards be reviewed to ensure they will work with IPv6, and use IPv6 examples. ..."

<https://www.iab.org/2016/11/07/iab-statement-on-ipv6/>

IPv4 Exhaustion

IPv4 exhaustion is the term used to describe when there will be no more unallocated IPv4 addresses available.



- ⦿ **IANA exhausted its IPv4 free pool in 2011.**
- ⦿ **ARIN has exhausted its unallocated pools.**
- ⦿ **Other RIRs have small pools available for new entrants (RIPE, APNIC, and LACNIC).**
- ⦿ **AFRINIC continues to allocate from its free pool.**

Enterprise and provider networks use these IPv4 addresses in their networks. There are a few addresses available at the RIRs. Eventually, these organizations may run out of IPv4 addresses.

How do we prepare for IPV6 ?

The protocol itself is mature and IPv6 addresses are being allocated by the Regional Internet Registries (RIRs) and used all over the world.

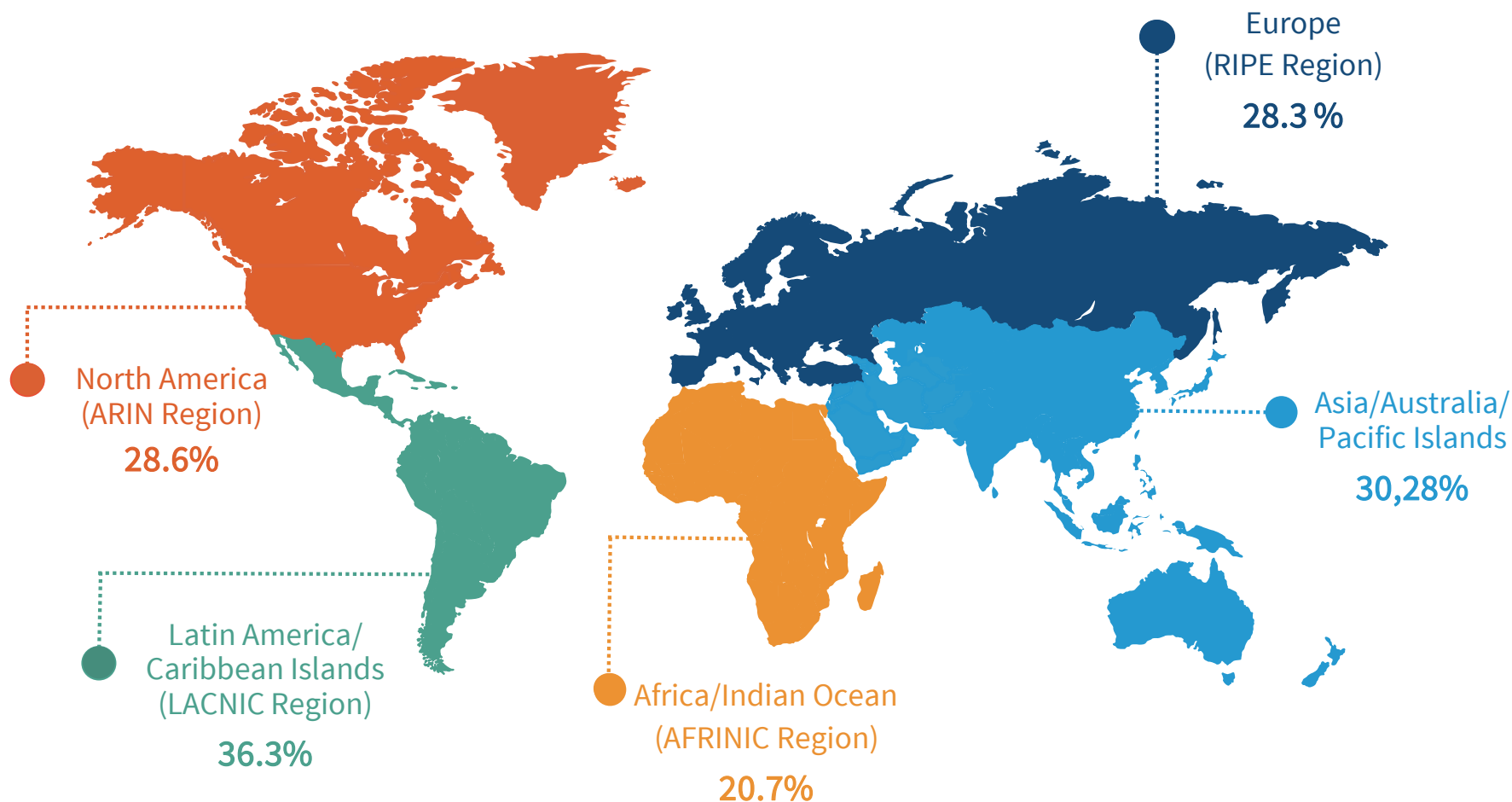
Recent measurements suggest that more than 29% of the world's Globally connected Networks are reachable over IPv6, including those serving the major ISPs, Operators and Content Providers such as T-Mobile, Verizon, Swisscom, Telefonica, Facebook, Google, App Store

**Globally connected networks
reachable over IPv6**

29,6%

Source : <http://v6asns.ripe.net/v/6?s= AL> (22.01.2017)

Regional view of the statistic



Source: http://v6asns.ripe.net/v/6?s= ALL;s= _RIR_RIPE_NCC;s= _RIR_LACNIC;s= _RIR_ARIN;s= _RIR_AfriNIC;s= _RIR_APNIC (22.01.2017)

What do we do? Direct link between ICANN and IPv6

PTI Function (IANA)

Allocate IPv6 address blocks to RIRs in line with the global policies adopted by the community.

ICANN service Infrastructure

We must ensure that community members are able to use in a transparent way our platform and services, and can participate in our processes online, whichever version of the protocol is

Interaction with the community

We share with our peers the responsibility to promote protocols and norms which contribute to a stable, secure and resilient Internet.

IPv6 implementation by domain registries and registrars

ICANN Accreditation contracts with registries and registrars contain explicit obligations to ensure IPv6 readiness

IPv6 is not compatible with previous versions ; we must therefore be proactive and educate our respective communities, so as to avoid the potential fragmentation of the Internet.



What can the technical community do?



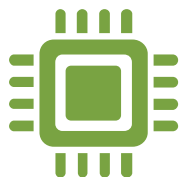
Service and Access providers

Provide them with access mechanisms that support both versions of the protocol. Check with your peers, vendors and upstream providers their plan for IPv6.



Content Providers

Ensure your contents is accessible over IPv6 in addition to IPv4. There are several proven mechanisms that allow you to serve your content over both IPv4 and IPv6.



Equipment vendors

Ensure that equipment is compatible with IPv6 in addition to IPv4.



Enterprise and corporations

Make sure that your key Internet services (including online applications) work properly over both IPv4 and IPv6.

What can governments do?

Coordinate with the industry to find appropriate measures to promote local IPv6 adoption.

Example of areas to explore are:

- Regulatory and economic Incentives for early adopters (but avoid inflexible mandating of IPv6, which has met no success)
- Support for capacity building and awareness campaign
- Government and its agencies to be a role model:
 - *By ensuring that government online services are provided over both IPv4 and IPv6*
 - *By making IPv6 support / compatibility part of basic government procurement requirements.*



What can civil society do?

End users and civil society constitute a powerful driver for technology adoption.

- As **individual Internet users**, we all must ask our data service providers (Mobile or Broadband) their plan to guarantee the future of our global connectivity by supporting IPv6.
- **Education/Academic** Sector will play an active role here as well by making sure that all IT trained students are comfortable using and deploying dual stack networks and services.

Necessary but challenging evolution

Why is the adoption still low after almost two decades of existence?

- IPv6 is not backward compatible with IPv4. Two different protocols.
- IPv6 is not a disruptive technology. It is just a protocol (totally transparent to users as we are). Difficult to market and monetize it (as we do not monetize IPv4 today) - **Just a new way of running the Internet for longer term scalability and sustainability.**
- NAT has evolved to Carrier-Grade NAT (CGN), a more robust way of doing NAT (*even though not the overall sustainable way of running an IP network*).
- **Emerging IPv4 Market:** Trading of IPv4 addresses outside the RIRs need based/justification policy system.
- Costs (human, financial) associated (perceived) with IPv6 deployment.

Elements for an effective Roadmap For IPv6 deployment

Always a complex situation

IMPORTANT

- Studying IPv6 impact on your strategy
- Doing your Ipv6 compliance assessment
- Build Your IPv6 Address Plan
- Request IPv6 Address from AFRINIC

VS

URGENT

- Ensure continuous Internet Service
- Deal with Network Incidents
- Increase Internet reach across country
- Optimize you traffic path
- Layout Fiber/Cable ...
- Etc

Roadmap focus areas

Elements of an effective roadmap



Get Involved and Informed

Visit ICANN's [dedicated pages on IPv6](#), and the rest...



Attend an ICANN Public Meeting. Three times a year, ICANN holds free and open public meetings in different regions around the world. Visit meetings.icann.org to learn more.



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Thank you and questions



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