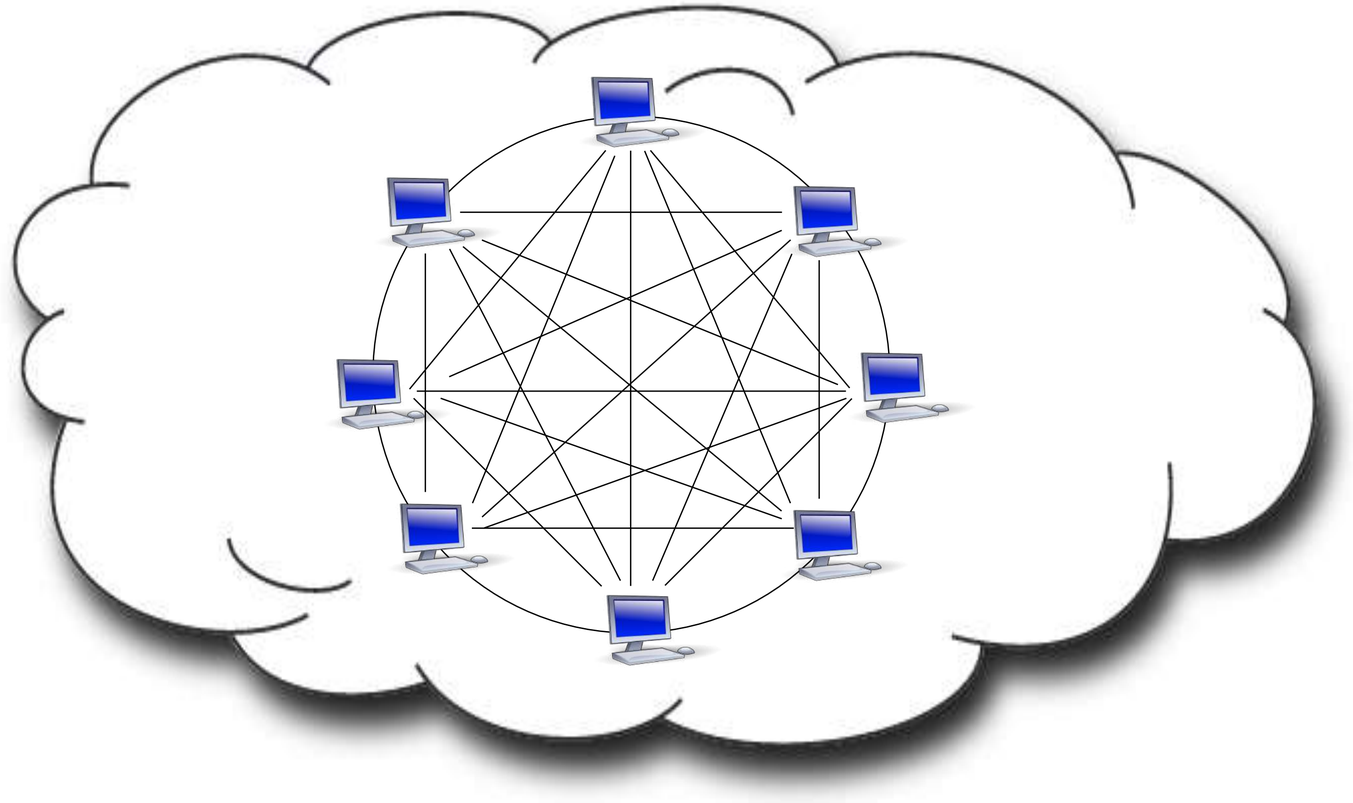
RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Internet 101
Numbers & Names

Gergana Petrova | 31 May 2021

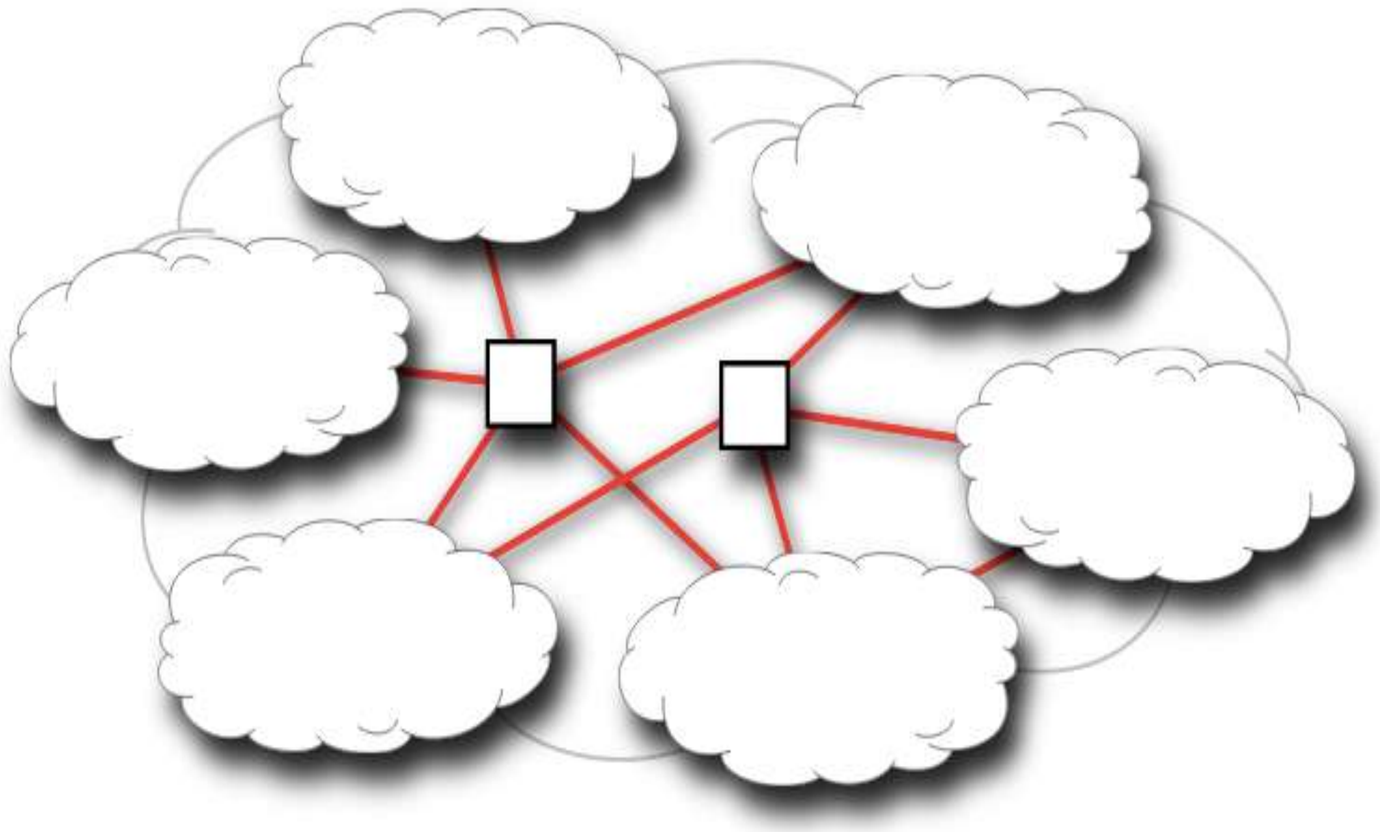
What is the Internet?

- Autonomous System (AS)
- The Internet has roughly 60,000 interconnected ASs

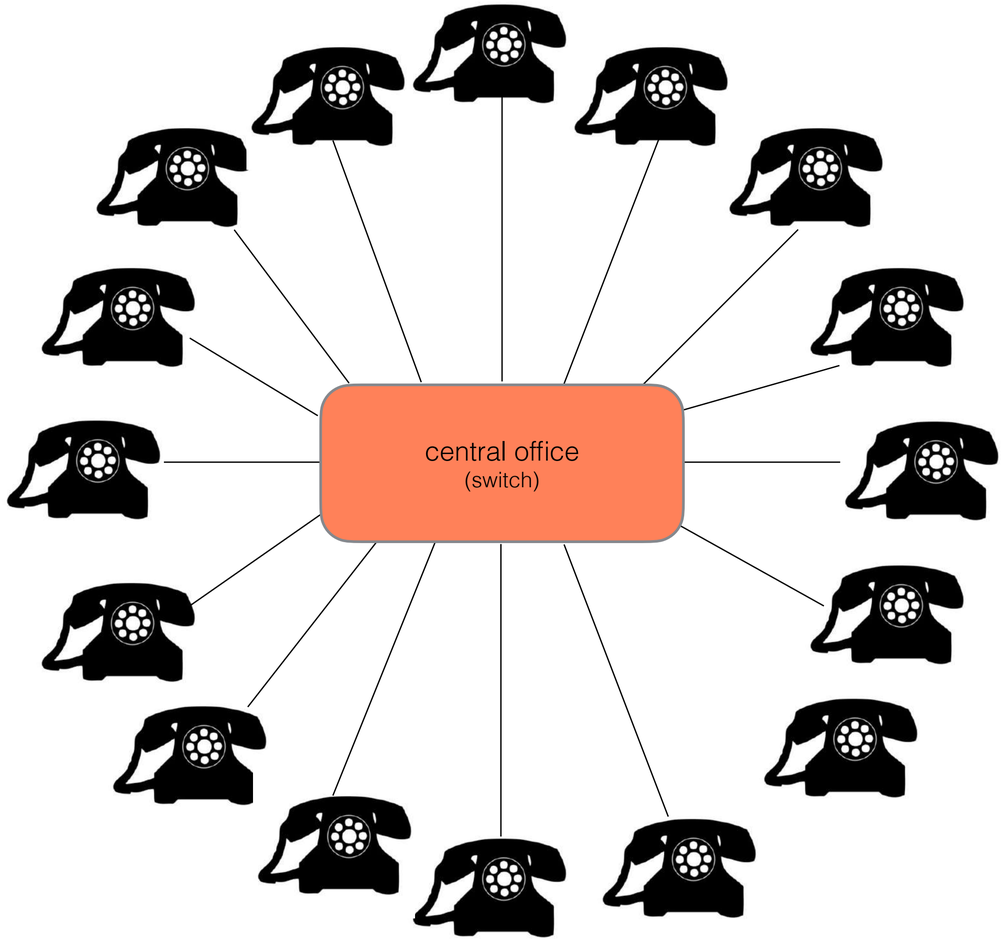


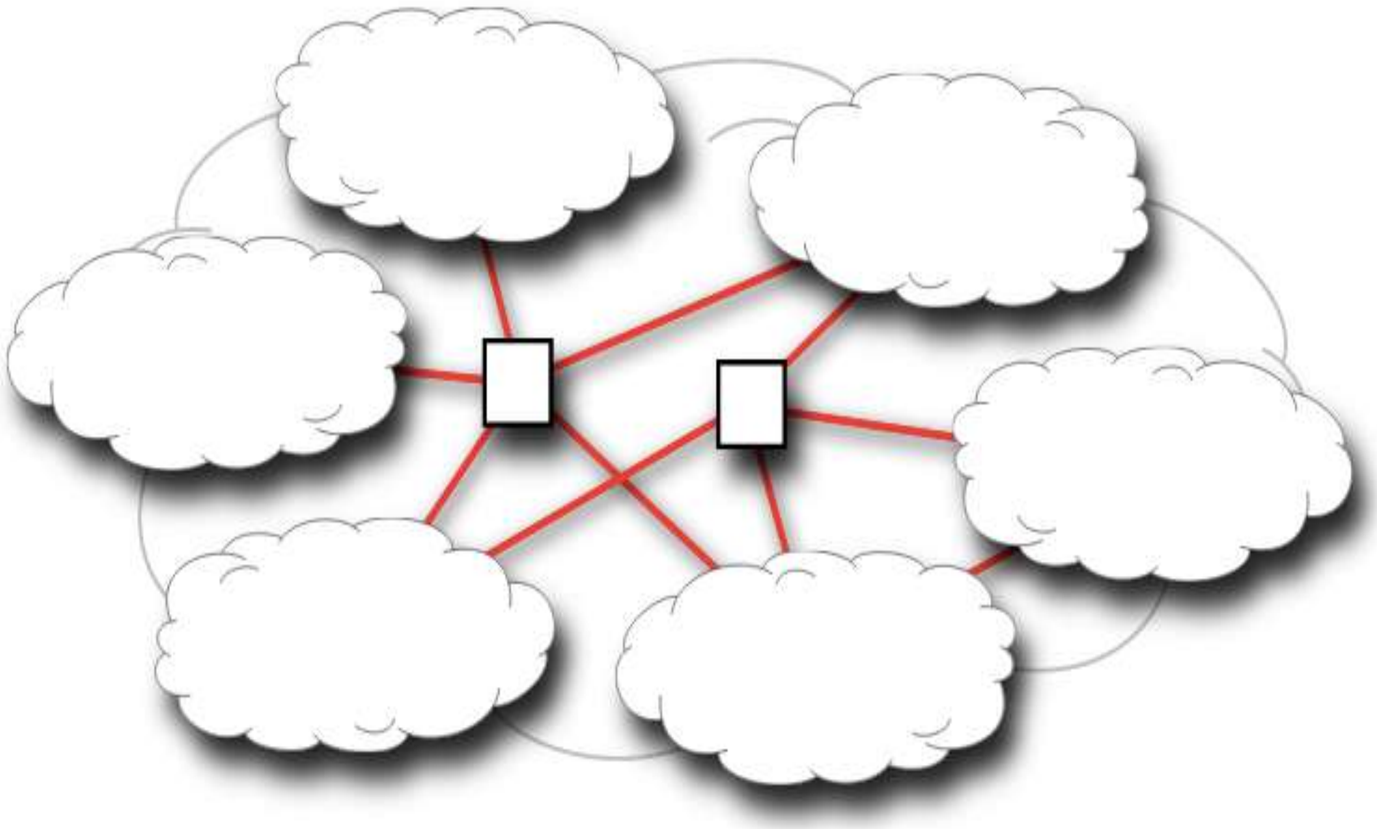
What is the Internet?

- The Internet is a network of interconnected networks
- TCP/IP is the standard of communication between all computers on this network
- IP = Internet Protocol



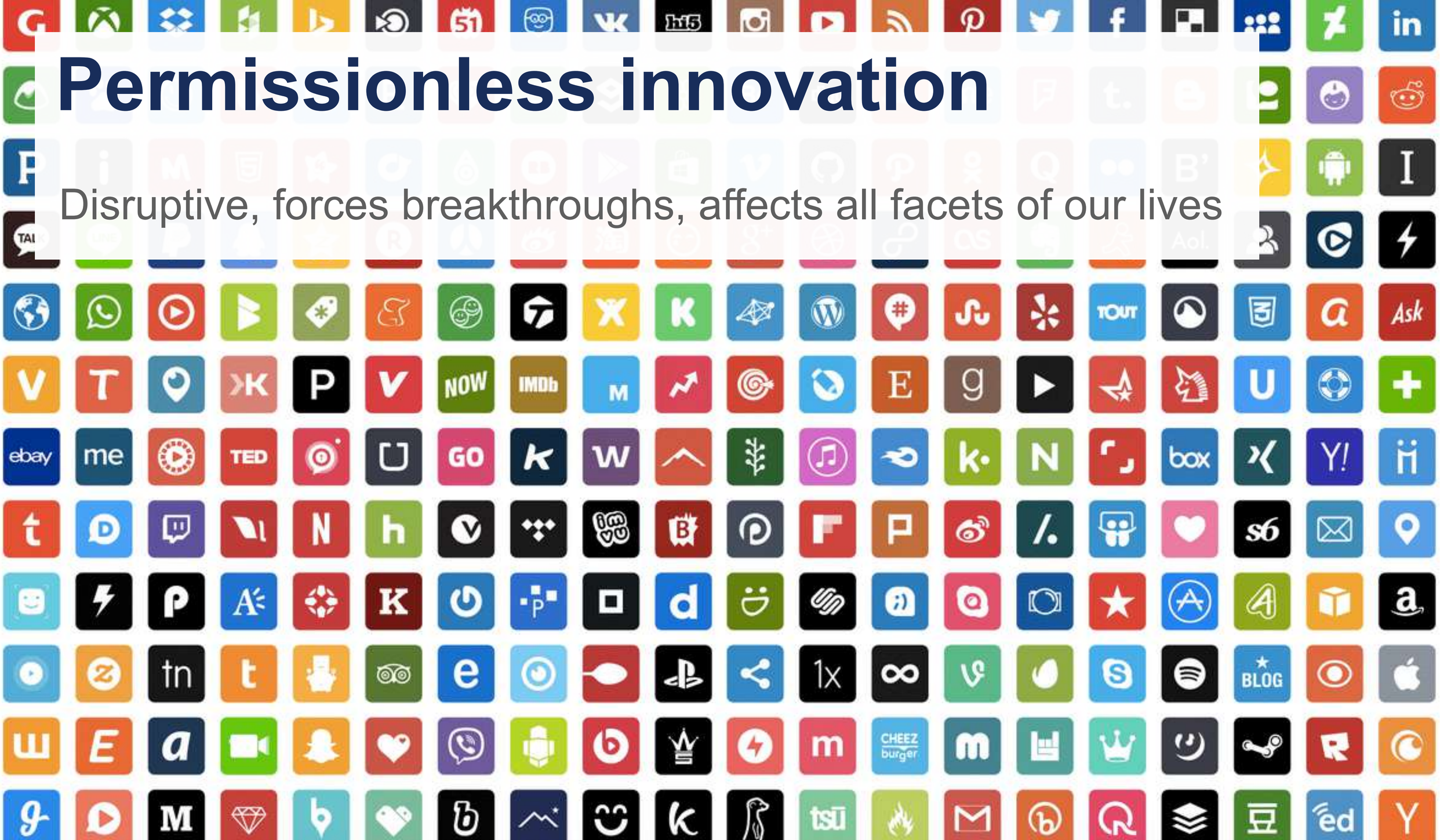
Unlike the phone system, the Internet is decentralised





Permissionless innovation

Disruptive, forces breakthroughs, affects all facets of our lives



Standardising organisations

The Internet Engineering Task Force

- Develop and promote voluntary Internet standards
- Open standards organisation, with no formal membership
- Rough consensus and running code

World Wide Web Consortium

- Develop open standards to ensure the long-term growth of the Web

Internet Corporation for Assigned Names and Numbers

- Global forum for developing policies for coordination of some of the Internet's core technical elements
- Coordinate the Internet Assigned Numbers Authority (IANA) functions:
  - management of the address and routing parameter area (ARPA) top-level domain
  - administration of certain responsibilities of generic (gTLD) and country code (ccTLD) Top-Level Domains
  - the allocation of Internet numbering resources

Numbers

Internet Protocol (IP) Address

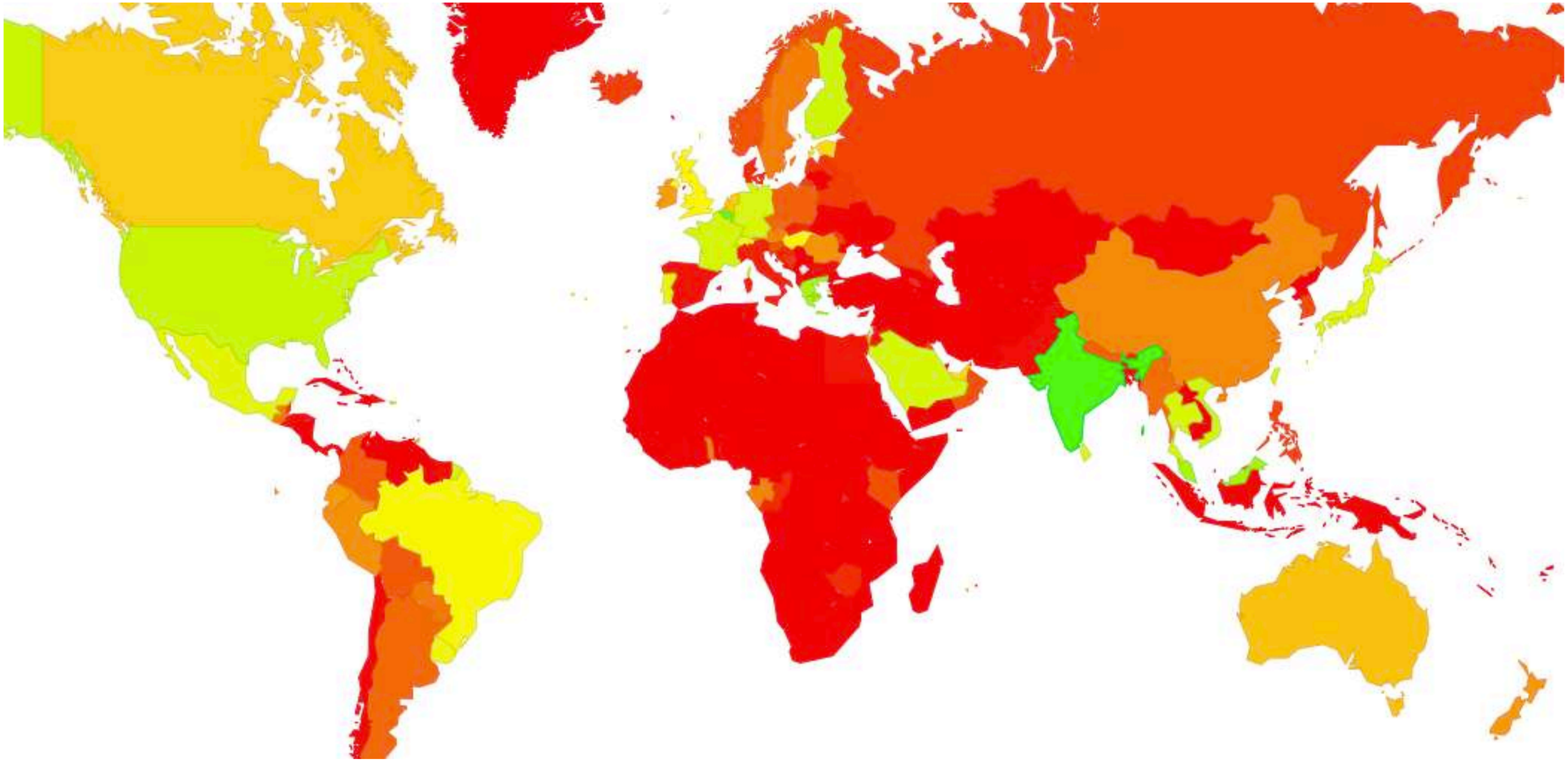
- It needs to be globally unique
- It is an address, not an identity
  - Represents a location in a network
  - If you move, your address is likely to change

- IPv4 e.g. 192.0.2.17 (32 bits)
- IPv6 e.g. 2001:db8:0:1234:0:567:8:1 (128 bits)

Internet Protocol (IP) Address

- The currently used IPv4 only has 4.2 billion addresses
- IPv6 functions the same as IPv4
  - “Same cardboard box, slightly bigger label on it”
- Address is 128 bits long (IPv4 uses 32 bits)
  - 2^128 addresses available
  - 340282366920938463463374607431768211456 options

IPv6 Deployment



What is the RIPE community?

- Réseaux IP Européens
- Established in 1989
- Open, inclusive, bottom-up, transparent
- Responsible for making policy, sharing information and best practices
- RIPE structures:
  - Working groups
  - Mailing lists
  - RIPE Meetings

What is RIPE NCC?

- RIPE Network Coordination Centre
- Established in 1992
- Independent, not-for-profit, membership organisation
- One of the five RIRs (Regional Internet Registry)
- Serving Europe, the Middle East, parts of Central Asia
- Around 140 staff based in Amsterdam, Dubai and Moscow

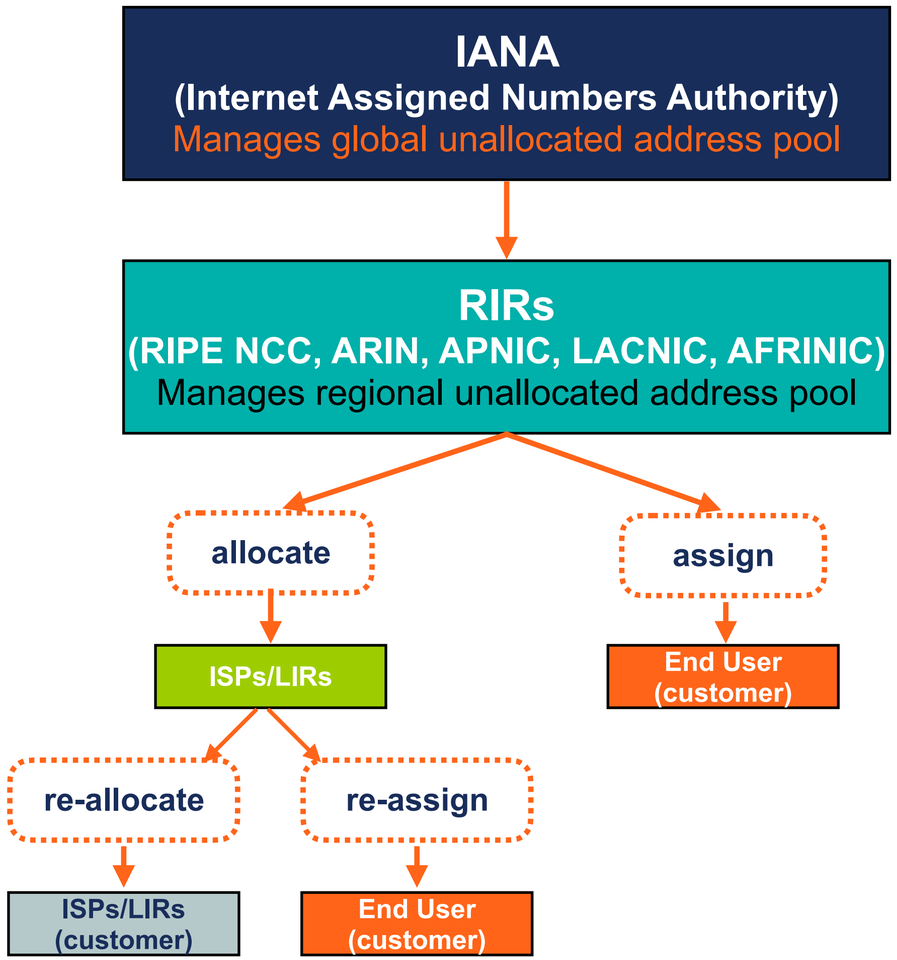
Where are the RIRs?

What is an RIR?

- A Regional Internet Registry (RIR) manages the allocation and registration of Internet number resources in a particular region of the world and maintains a unique registry of all IP numbers issued.
- Number resources include:
  - IP addresses (IPv4 and IPv6)
  - Autonomous System (AS) Numbers

Core RIPE NCC Functions

- Receive large IP address blocks from IANA
  - Distribute those in smaller blocks to its members
  - Publish and maintain a list of who has which block
  - Implement the rules (policies) set by the RIPE community
- Support the infrastructure of the Internet through technical coordination
- Provide services for the benefit of the Internet community at large

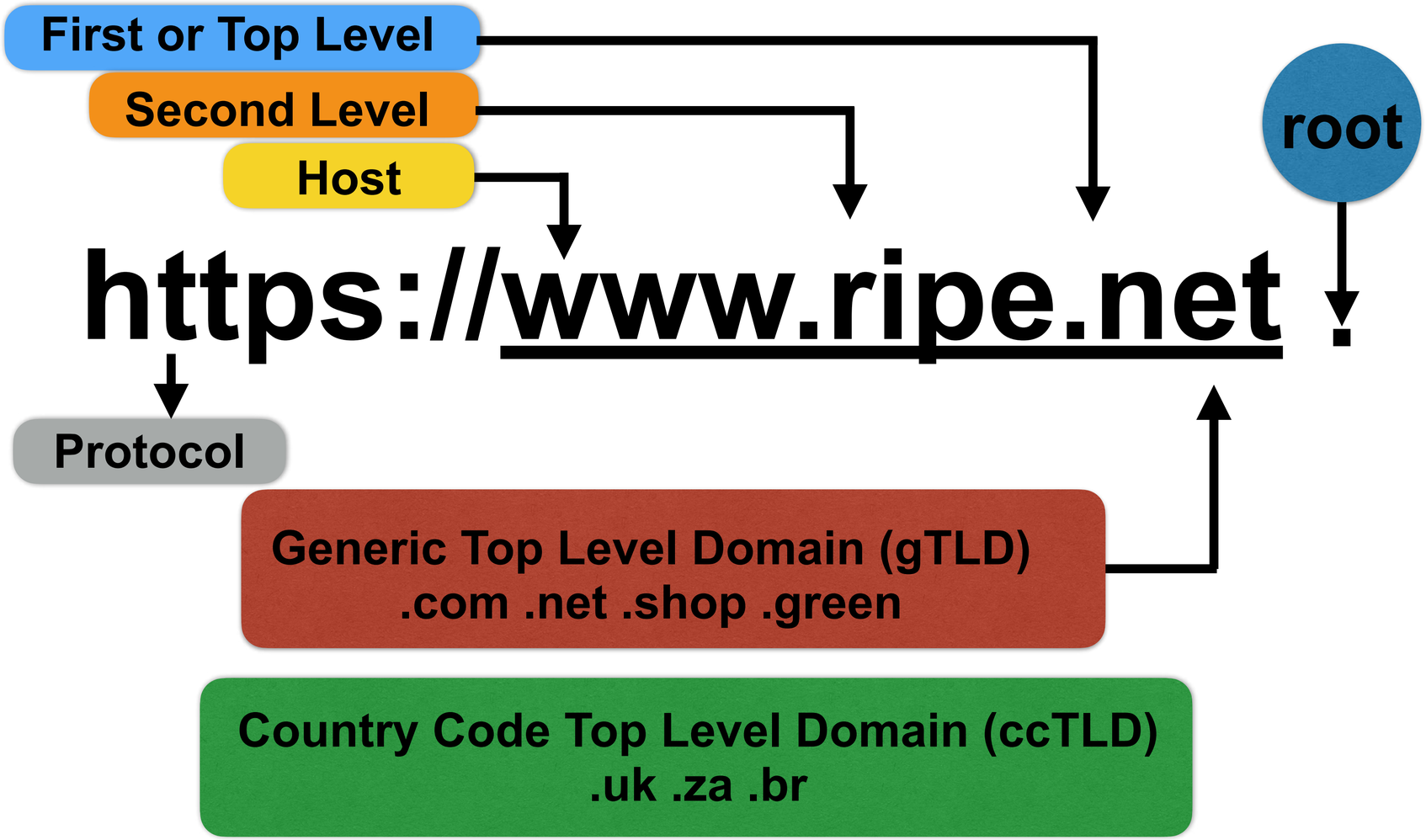


Names

Domain Name System (DNS)

- People can’t remember numbers, so we use names
  - Uniform Resource Locator (URL)
- DNS
  - A naming system for computers, services and other resources
  - Translates the easy-to-remember domain names to the numerical IP addresses
  - Hierarchical and decentralised

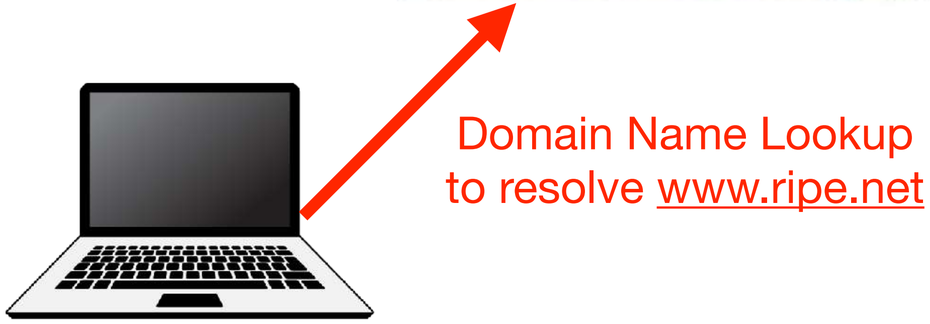
The Anatomy of a Domain



Internet Number Resources

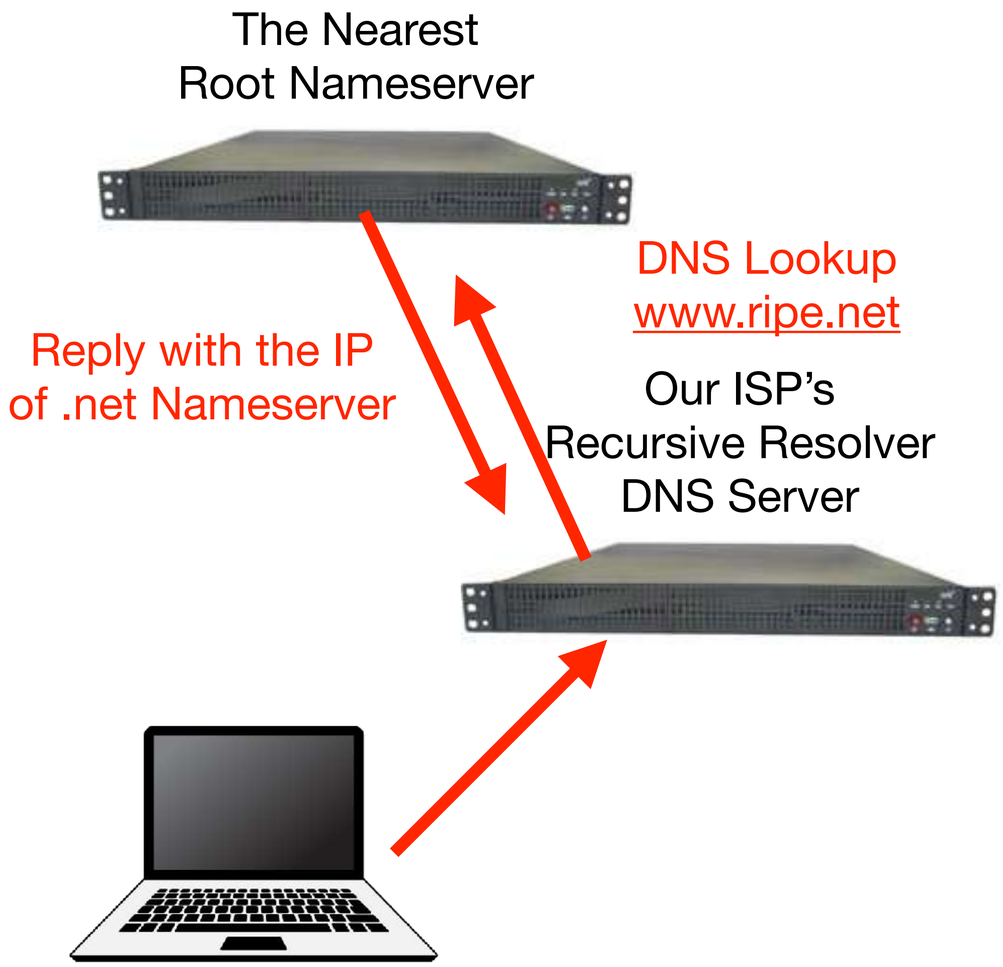
The Nearest
Root Nameserver

Our ISP's
Recursive Resolver
DNS Server

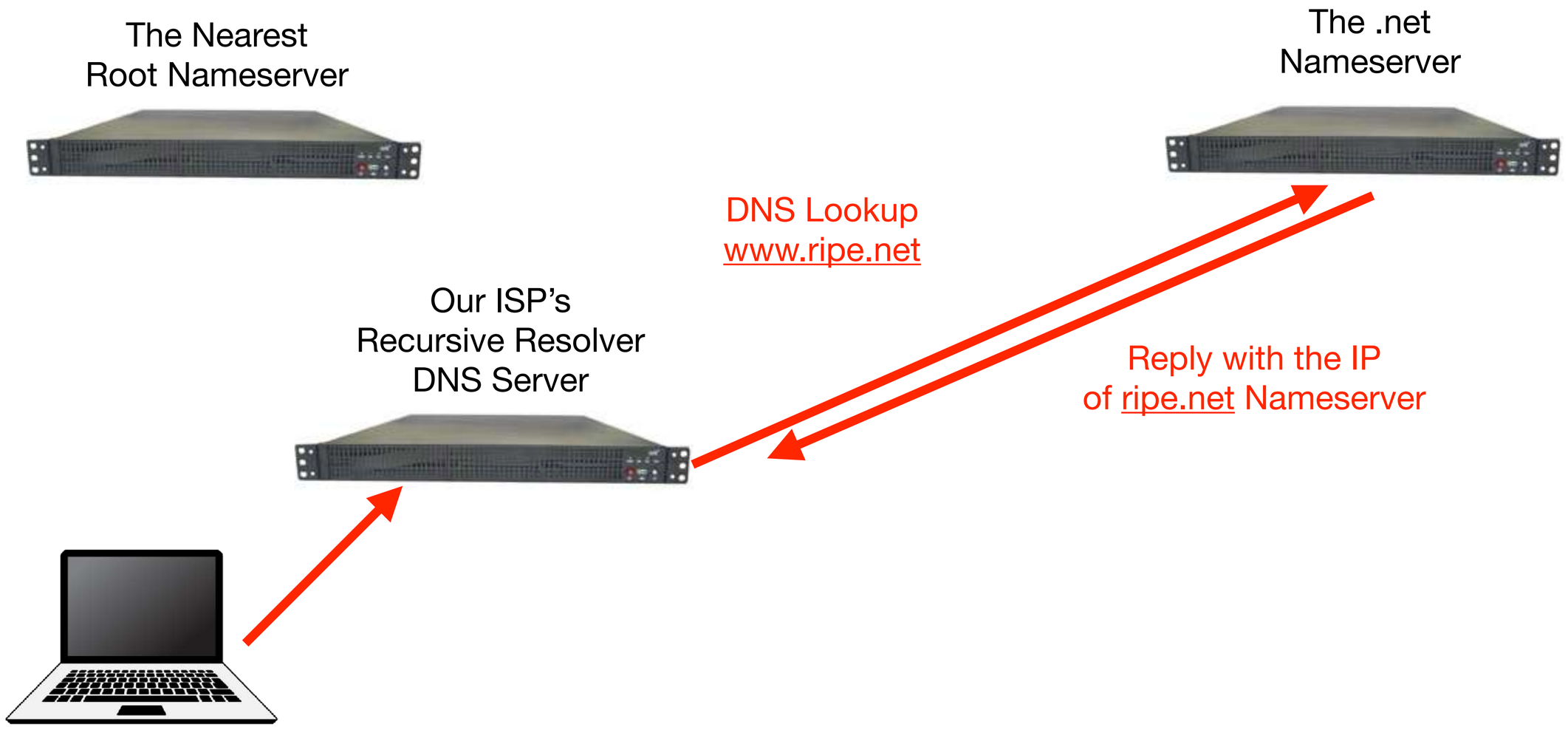


Domain Name Lookup
to resolve www.ripe.net

Internet Number Resources



Internet Number Resources



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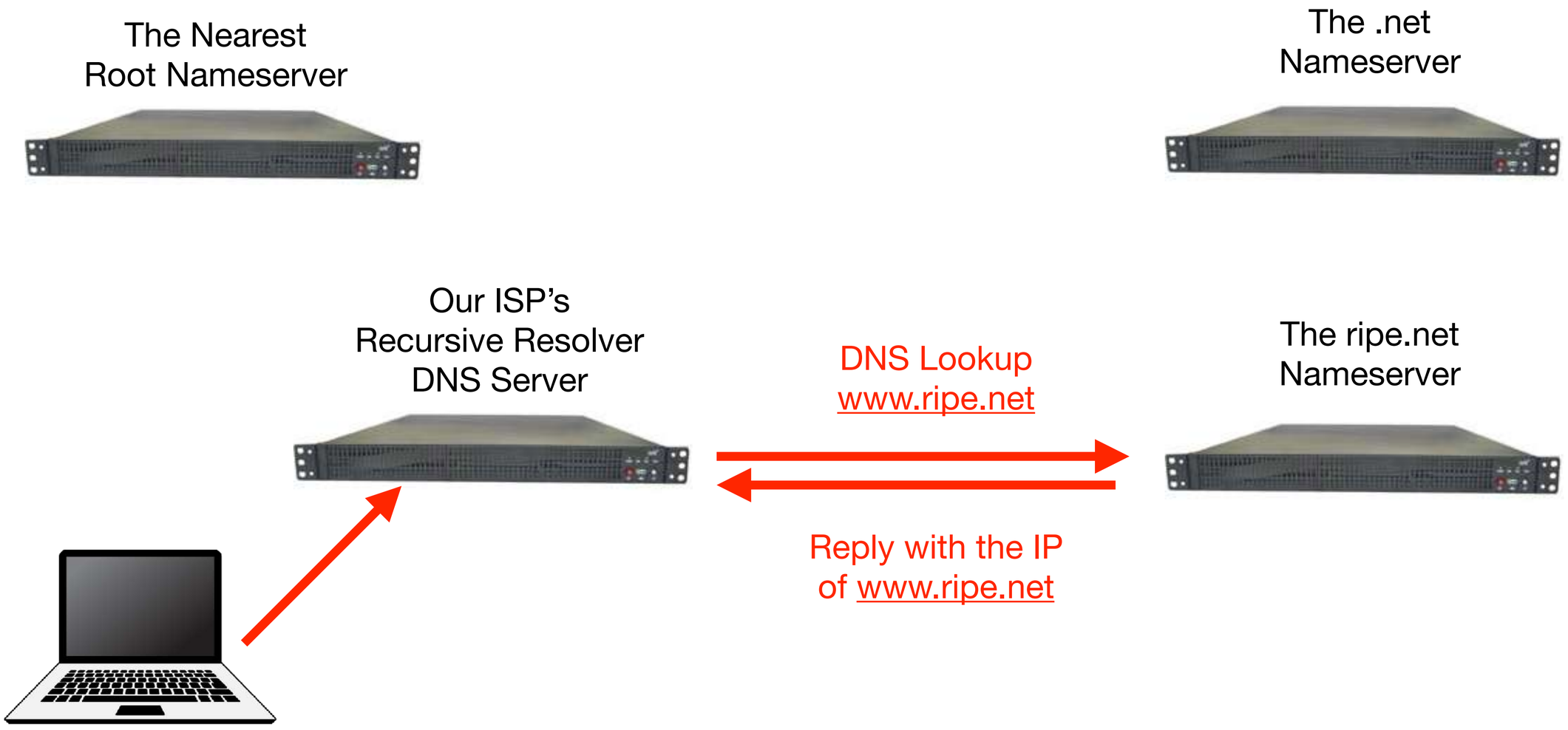


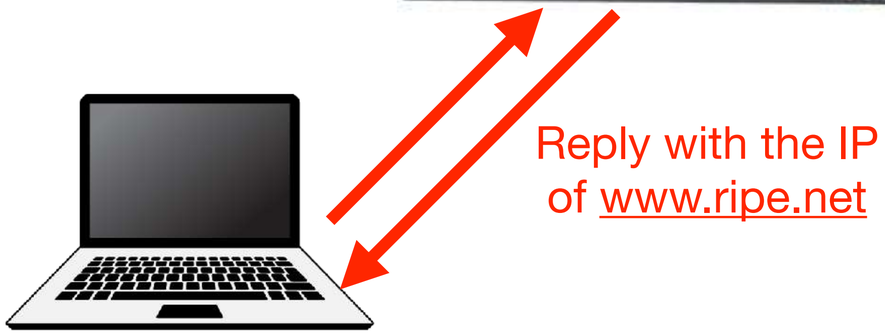
Internet Number Resources

The Nearest
Root Nameserver

The .net
Nameserver

Our ISP's
Recursive Resolver
DNS Server

The ripe.net
Nameserver



Reply with the IP
of www.ripe.net

Internet Number Resources

The Nearest
Root Nameserver

The .net
Nameserver

Our ISP's
Recursive Resolver
DNS Server

The ripe.net
Nameserver

HTTPS request to web server by IP address

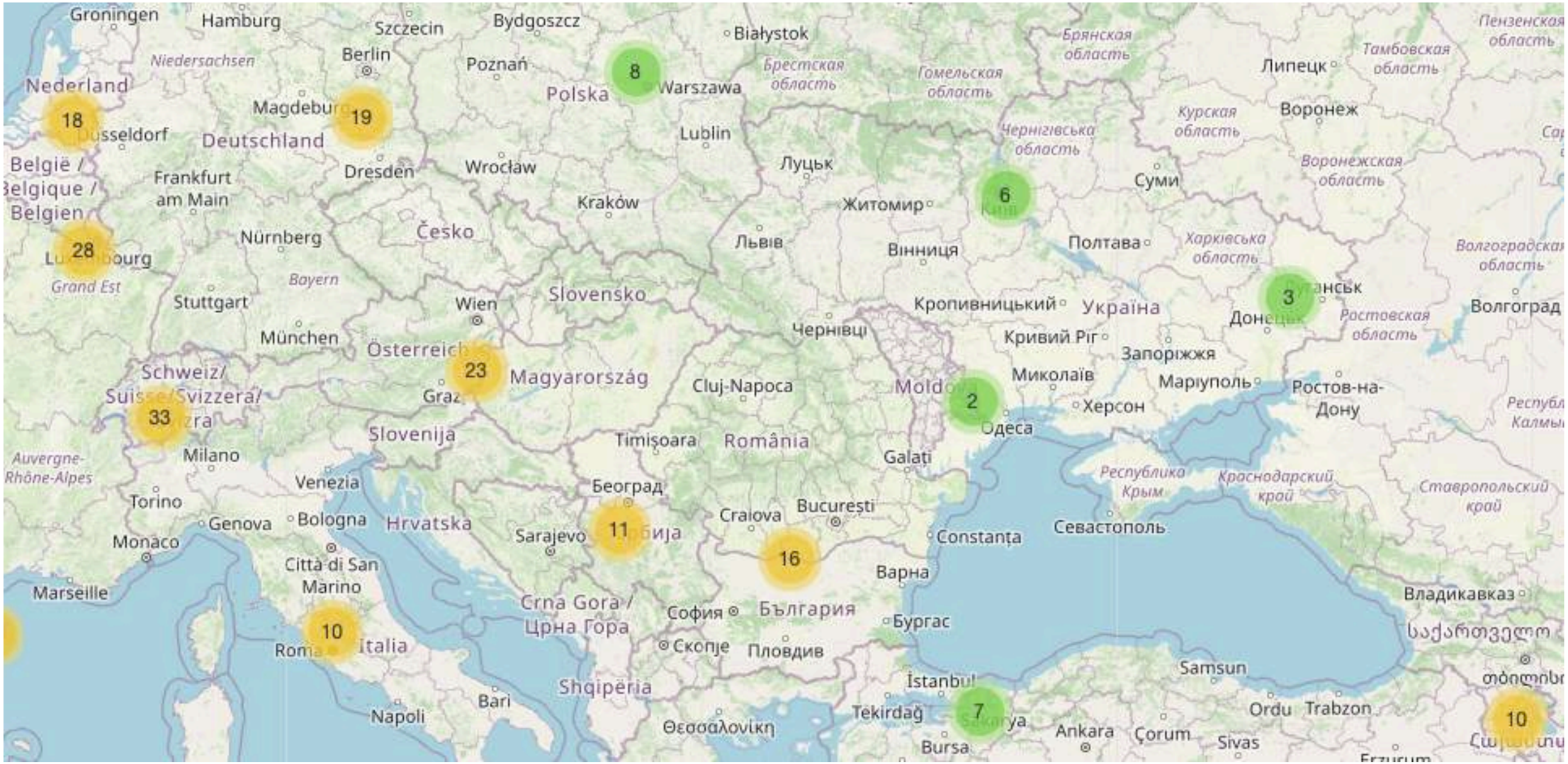
HTTPS reply to content of web page

WWW
Host

Root Server Instances

The 13 root name servers are operated by 12 independent organisations.

Root Server Instances



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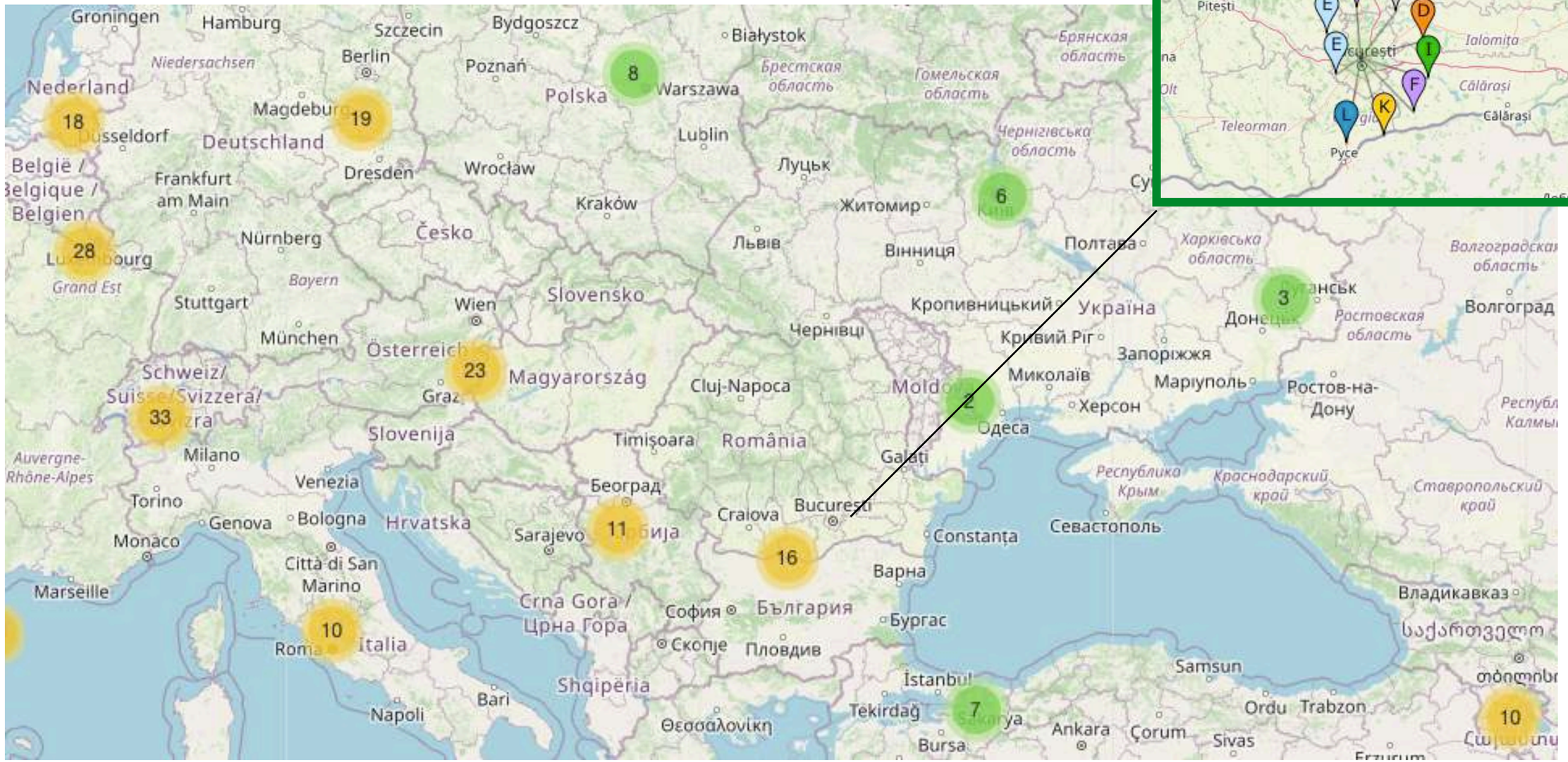

More resources

ccTLDs and online content explained:

- https://www.centr.org/education/cctld-registry.html (scroll down)
- By CENTR (Council of European National Top-Level Domain Registries)

Questions

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