RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE NCC Academic Day

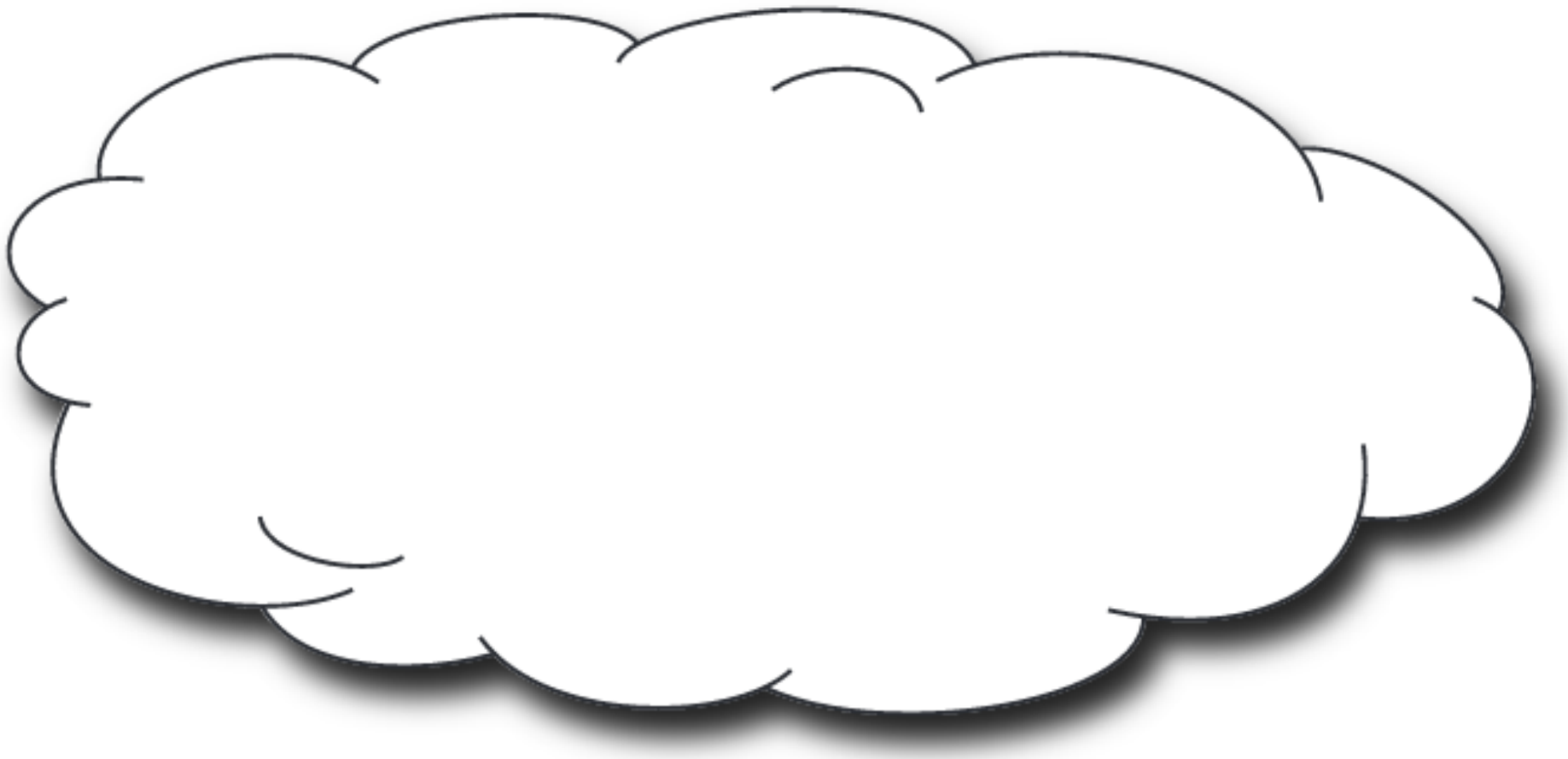
November 2016 | Saudi Arabia

Who Runs the Internet?

The Short Answer is

No ONE!!!

What is the Internet?



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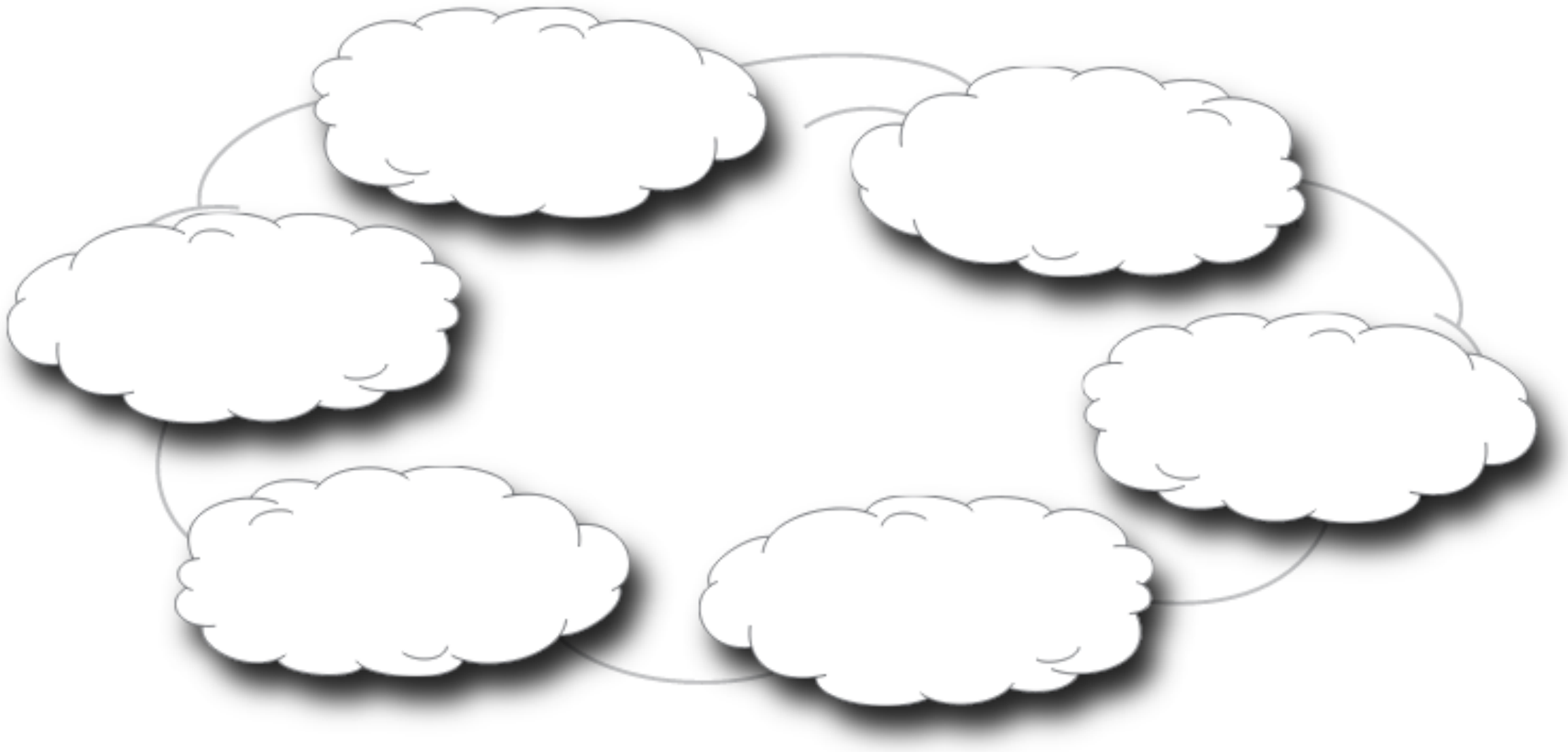

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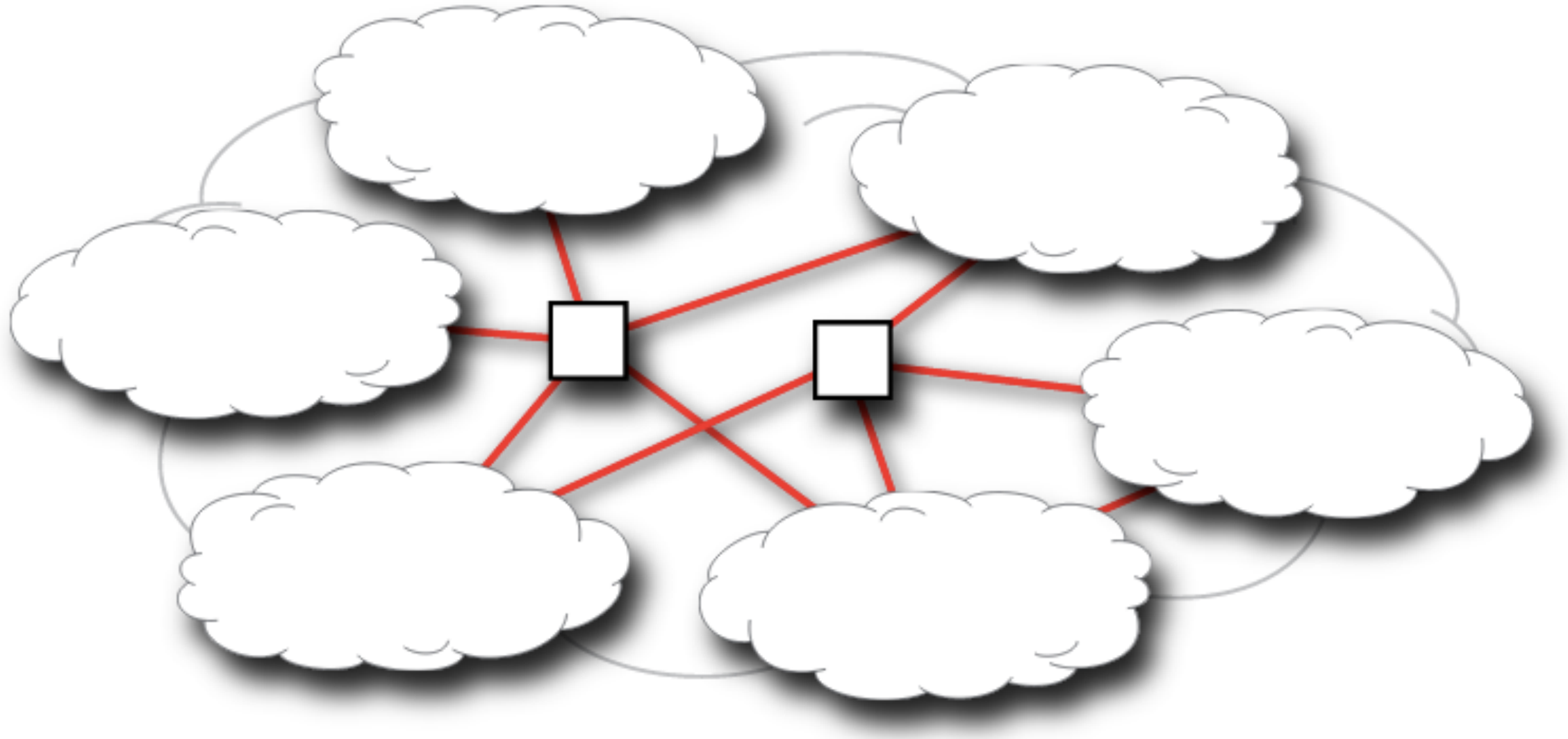


The Internet has roughly 55,000 autonomous networks that are interconnected.

Standards

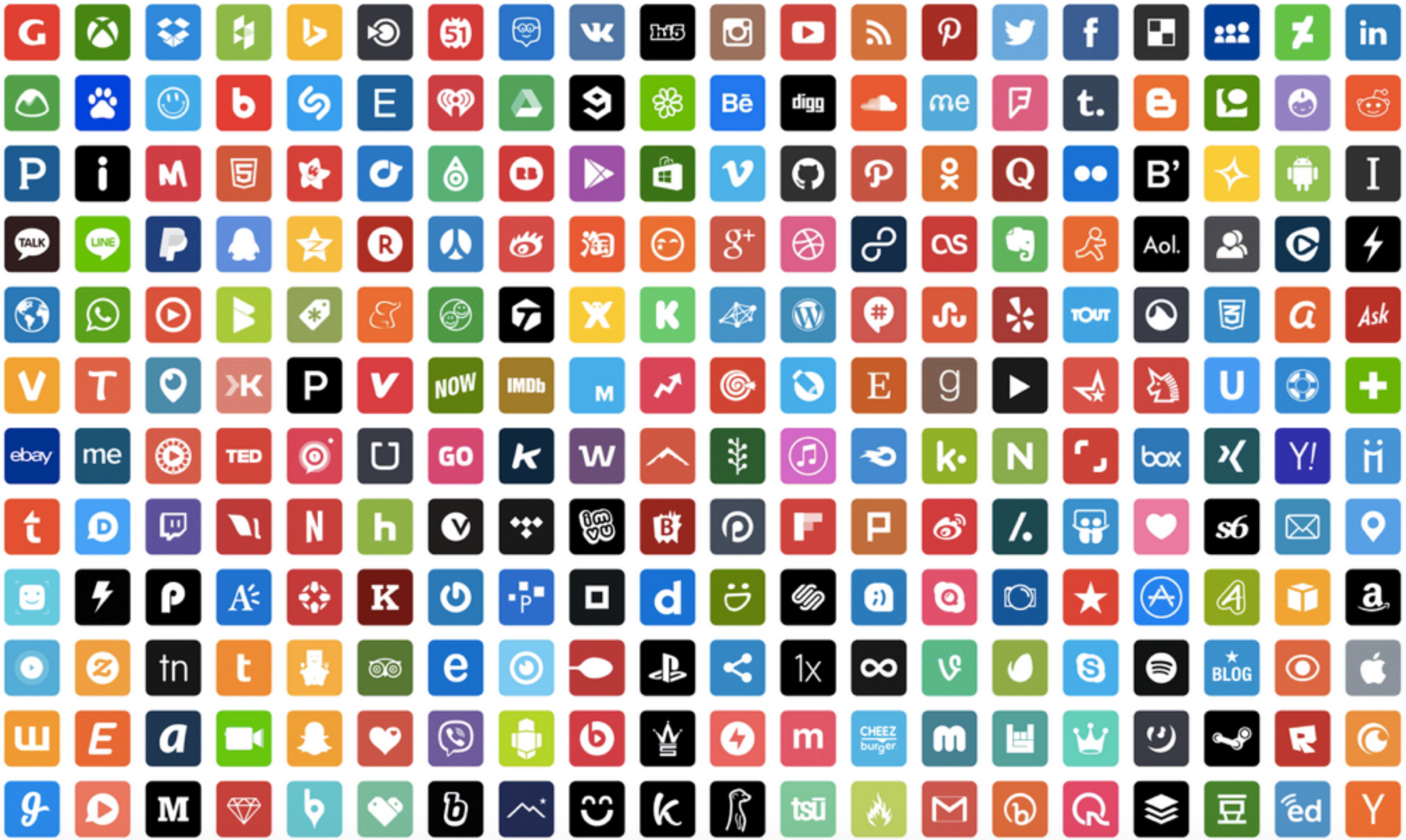
Rules of Engagement

Standardising Organisations

- The Internet Engineering Task Force
- They develop and promote voluntary Internet standards.
- It is an open standards organisation, with no formal membership.
- We believe in: rough consensus and running code.

- The World Wide Web Consortium
- They develop open standards to ensure the long-term growth of the Web.

Permissionless innovation



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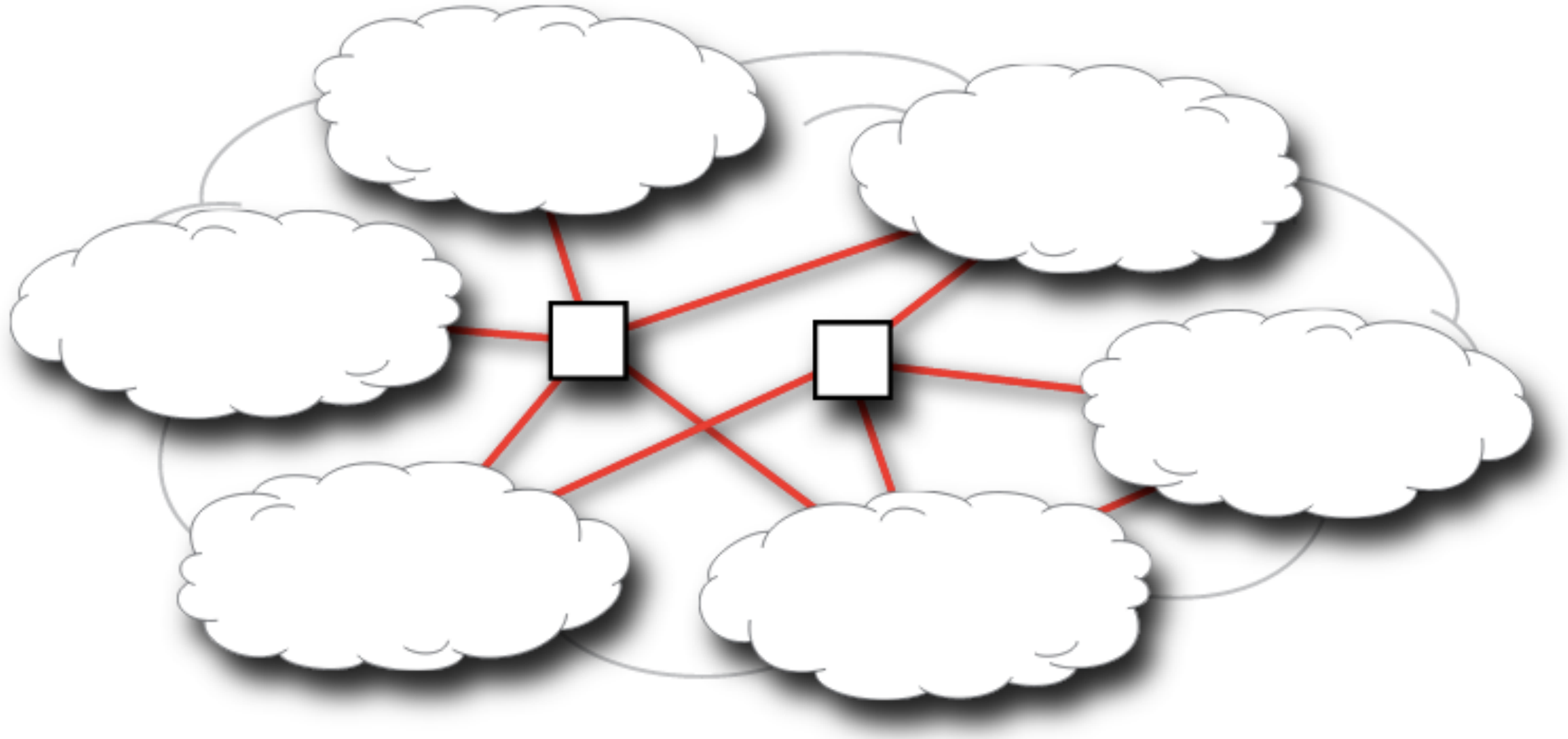


The Internet has more than 3 Billion Internet users interconnected.

Identification

Sender and Receiver Addresses

Internet Number Resources

11000000000000000000001000110101

192.0.2.53

11000000000000000000001000110100

192.0.2.52

IP version 4 (IPv4)

- Initially deployed: 1 January 1983.
- IPv4 addresses are 32-bit numbers. (4.2 Billion)
- Still the most commonly used version.

Internet Number Resources

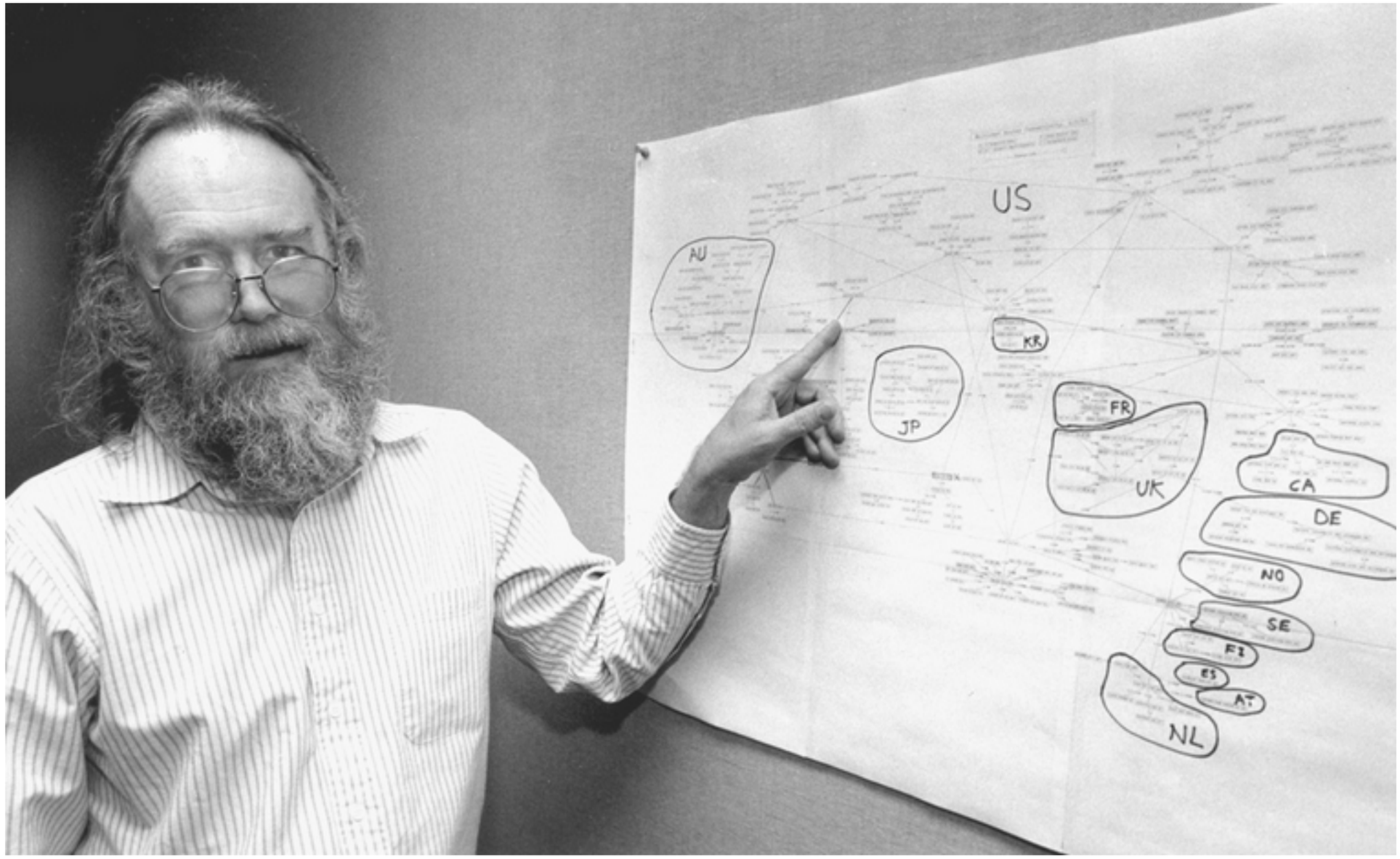
192.0.2.52

?

192.0.2.53

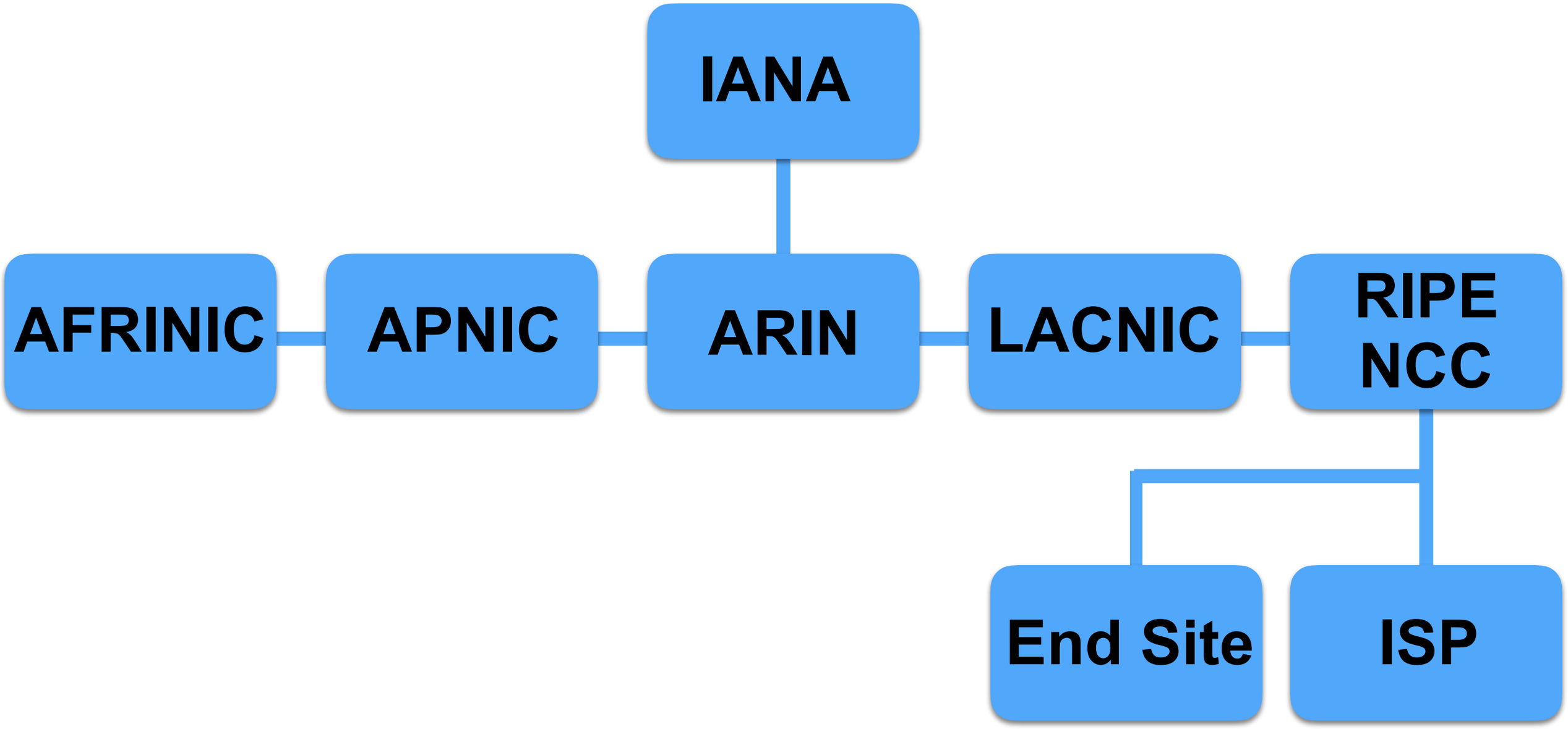
192.0.2.52

Internet Number Resource Management

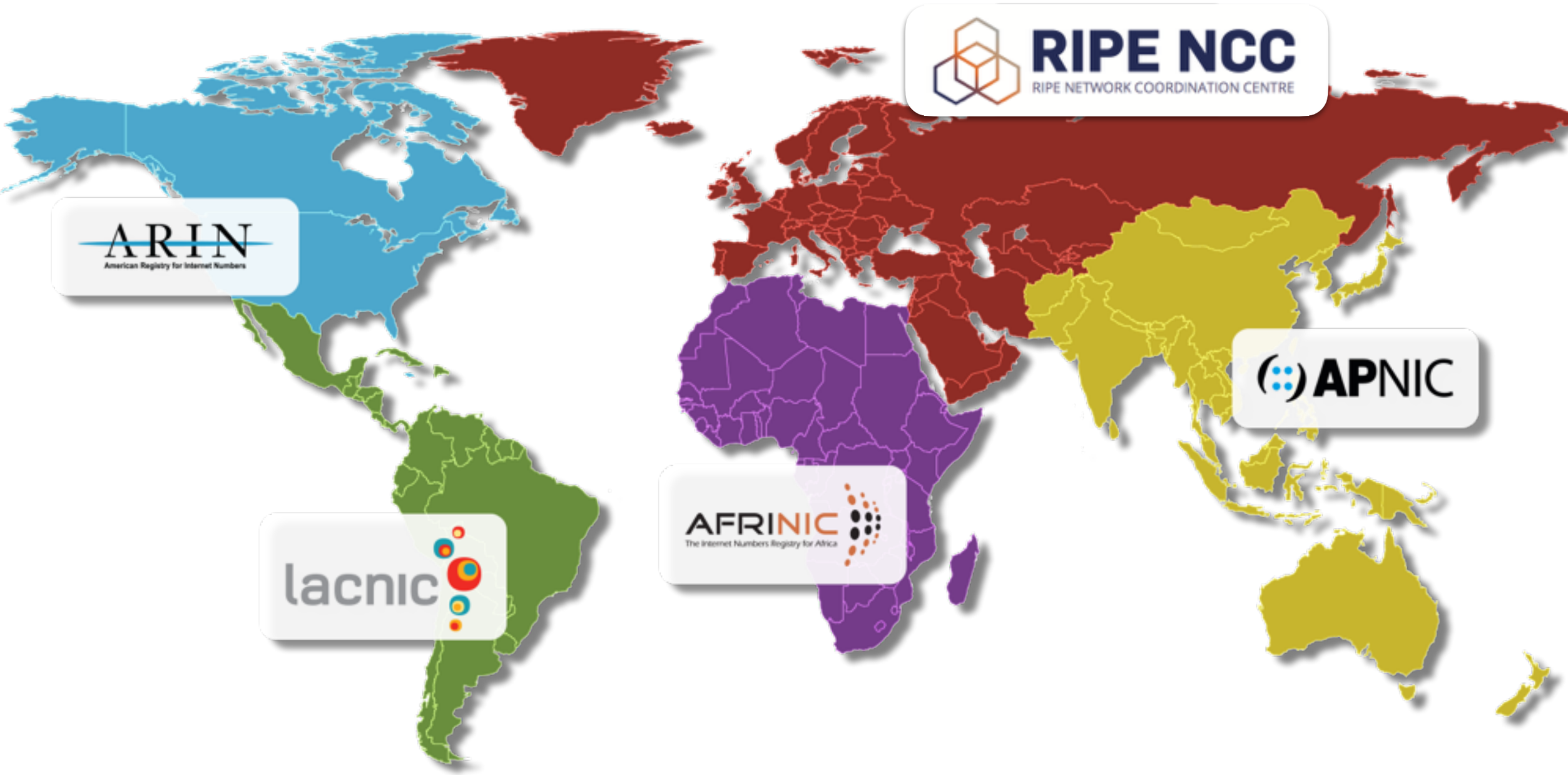


John Postal used to manually distribute IP addresses

Internet Number Resource Management

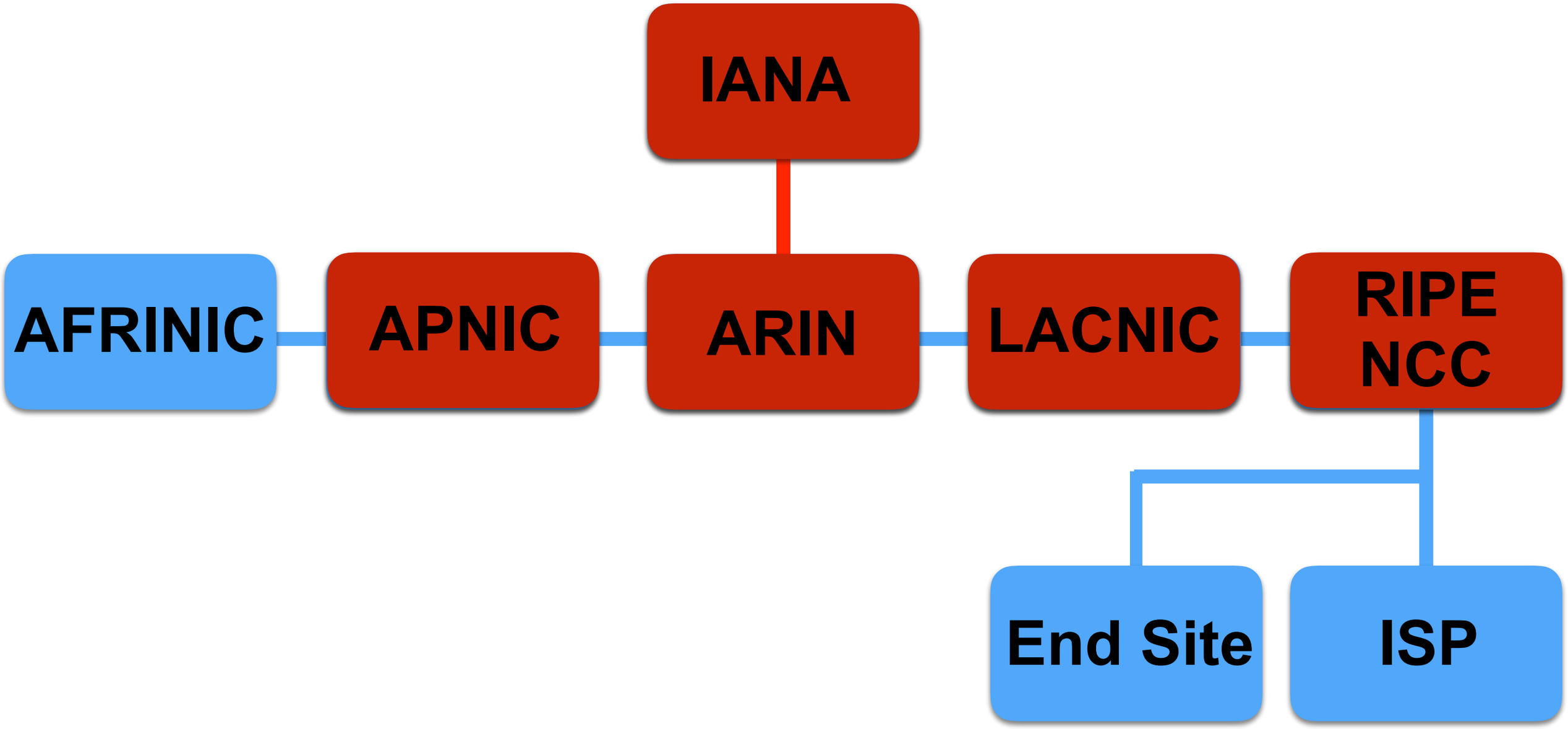


Regional Internet Registry (RIR)



The Regional Internet Registry (RIR) and bottom-up community driven number resource management model

IPv4 Depletion



Internet Protocol version 6 (IPv6)

2001:db8:0:0:0:0:0:2

0010 0000 0000 0001
0000 1101 1011 1000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0010

0010 0000 0000 0001
0000 1101 1011 1000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0001

2001:db8:0:0:0:0:0:1

Internet Number Resources

There are two types of IP addresses in active use:

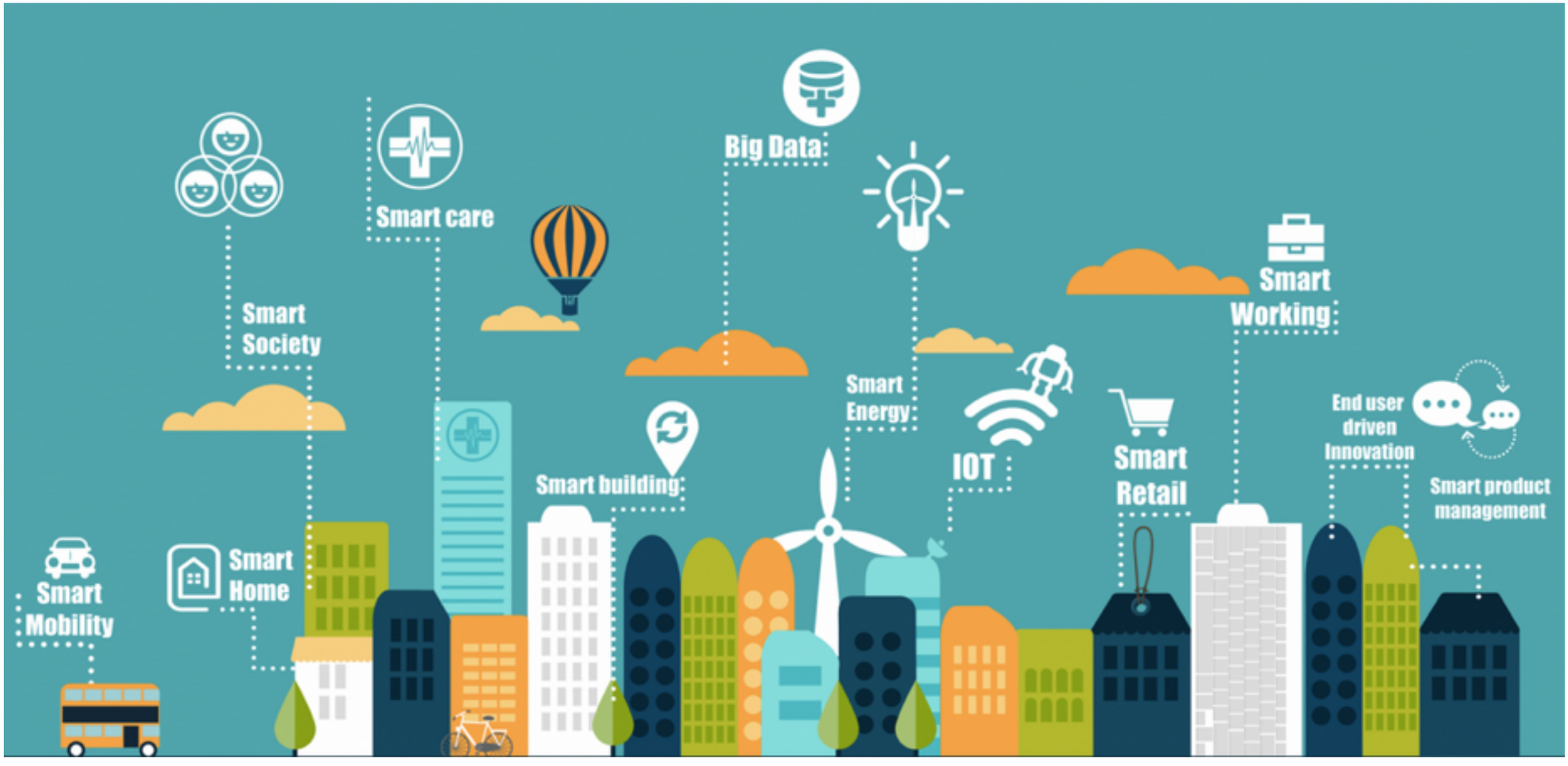
IP version 4 (IPv4)

- Initially deployed: 1 January 1983.
- IPv4 addresses are 32-bit numbers. (4.2 Billion)
- Example: 192.0.2.53
- Still the most commonly used version.

IP version 6 (IPv6)

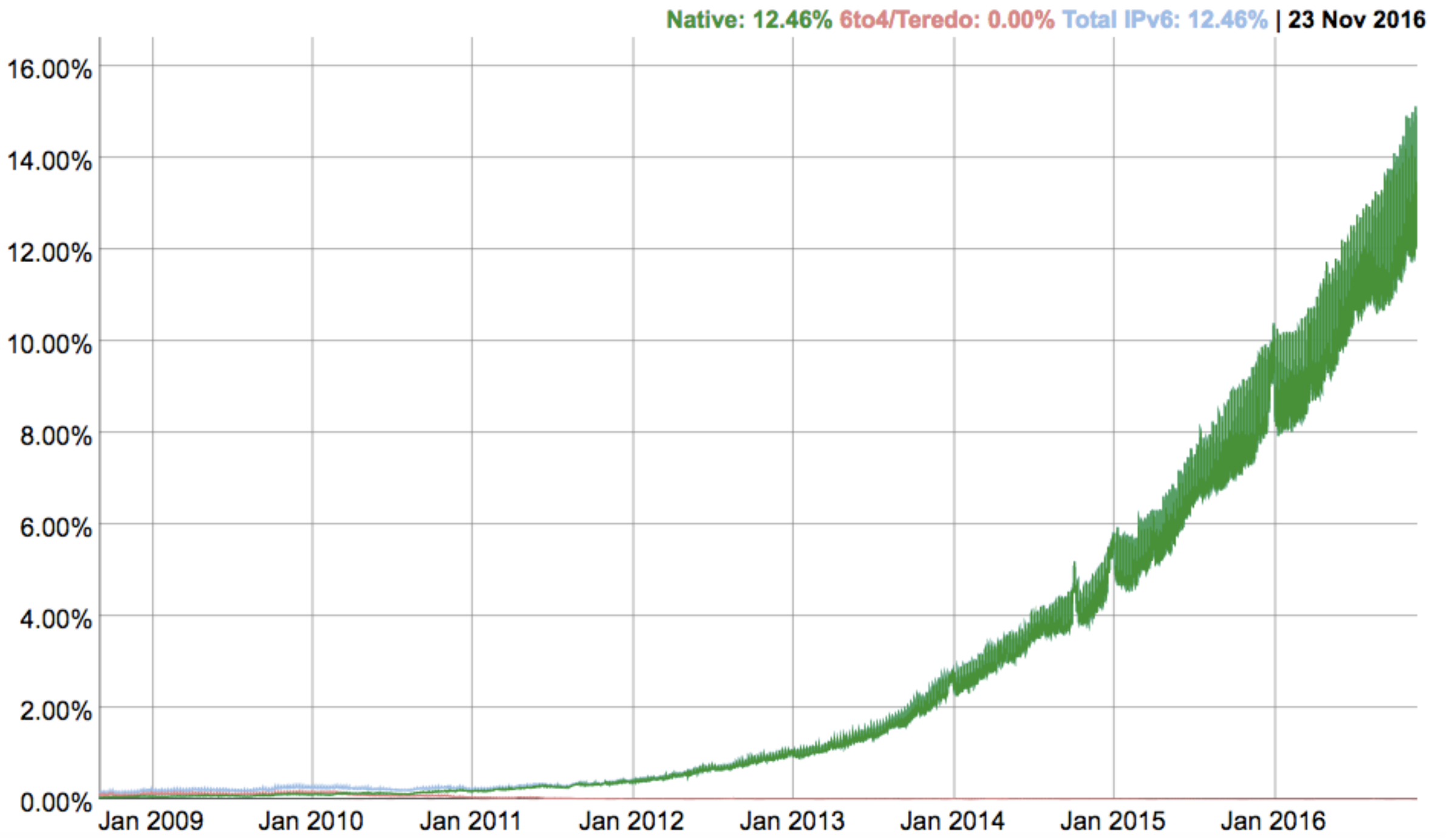
- Published by the IETF in 1998.
- IPv6 addresses are 128-bit numbers. (340 Trillion Trillion Trillion)

Internet of Things (IoT)



The only way to build a scalable and interoperable future with IoT is IPv6

IPv6 Statistics - Google



Percentage of IPv6 users that access Google over IPv6
Source: https://www.google.com/intl/en/ipv6/statistics.html#tab=ipv6-adoption&tab=ipv6-adoption

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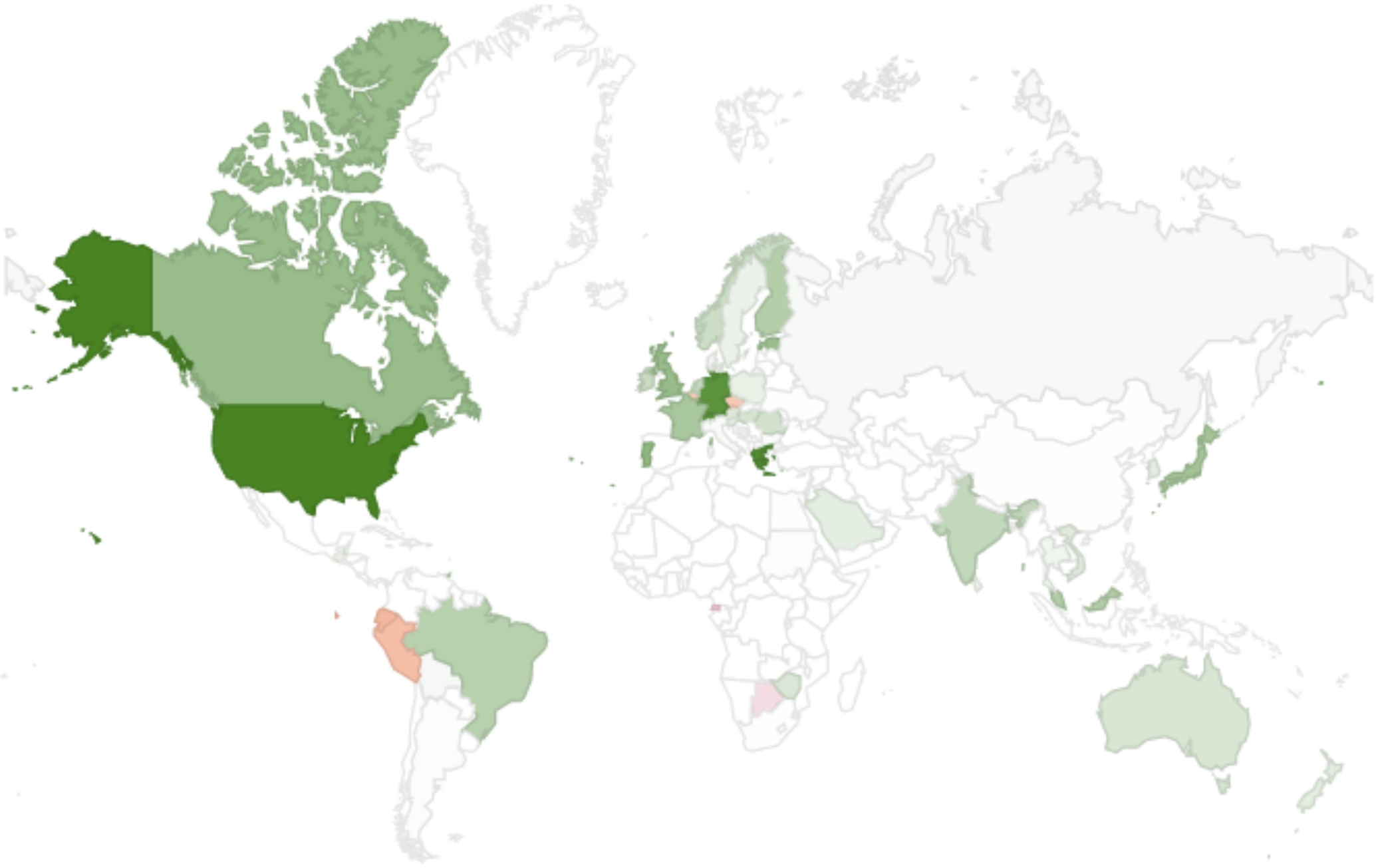

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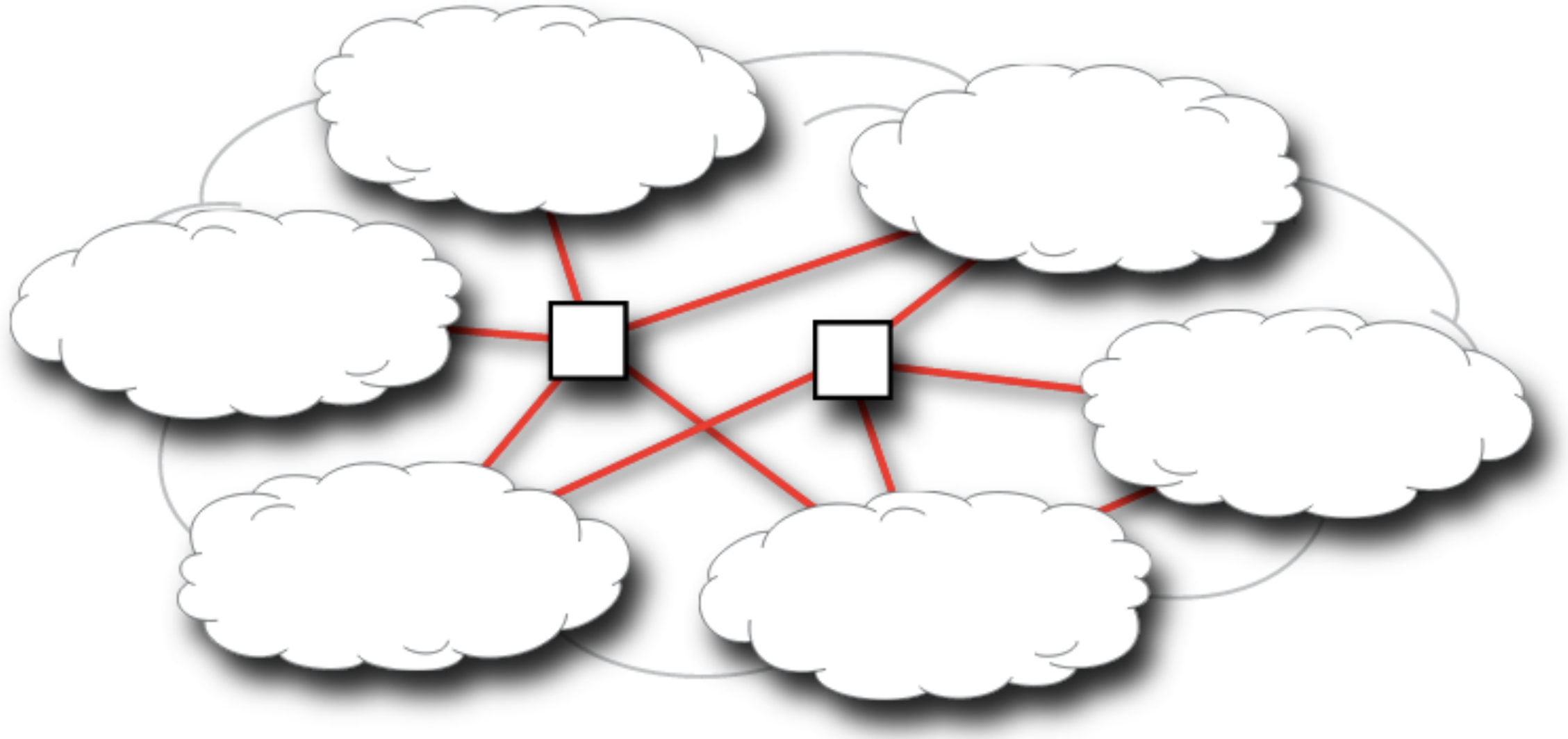
Autonomous System Numbers

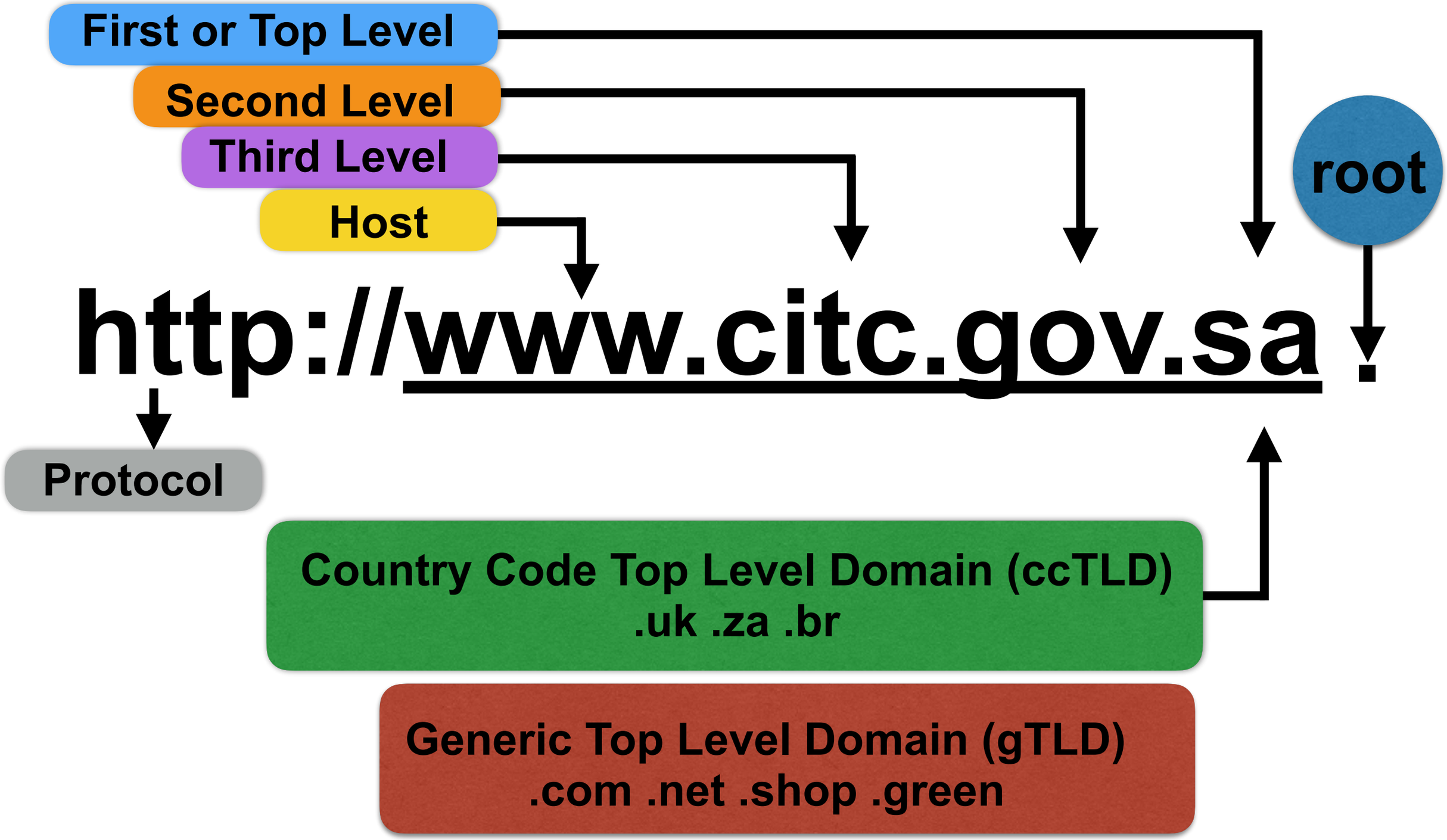


A public AS has a globally unique number, an AS Number, associated with it. This number is used as an identifier of the AS itself.

Names

What is in a name?

The Anatomy of a Domain



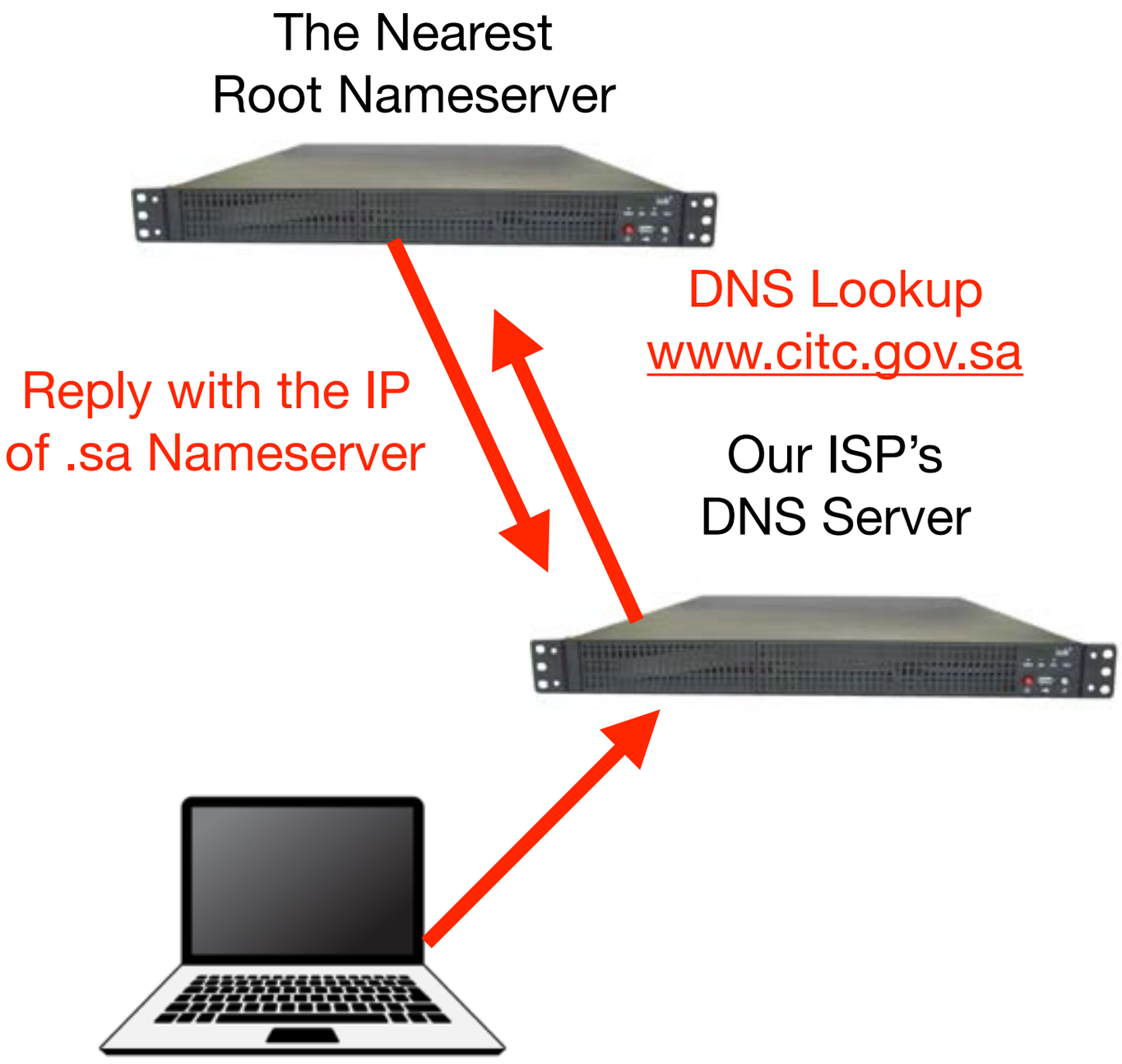
Domain Name System

The Nearest
Root Nameserver

Our ISP’s
DNS Server

Domain Name Lookup
to resolve www.citc.gov.sa

Domain Name System



Domain Name System

The Nearest
Root Nameserver

The .sa
Nameserver
(ccTLD)

DNS Lookup
www.citc.gov.sa

Reply with the IP
of .gov Nameserver

Our ISP's
DNS Server

Domain Name System

The .sa
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(ccTLD)

The Nearest
Root Nameserver

The .gov
Nameserver

DNS Lookup
www.citc.gov.sa

Reply with the IP
of .citc Nameserver

Our ISP's
DNS Server

Domain Name System

The Nearest
Root Nameserver

The .sa
Nameserver
(ccTLD)

The .gov
Nameserver

Our ISP's
DNS Server

DNS Lookup
www.citc.gov.sa

The CITC
Nameserver

Reply with the IP
of www.citc.gov.sa

Domain Name System

The Nearest
Root Nameserver

The .sa
Nameserver
(ccTLD)

The .gov
Nameserver

Our ISP's
DNS Server

Reply with the IP
of www.citc.gov.sa

The CITC
Nameserver

WWW
Host

Domain Name System

The Nearest
Root Nameserver

The .sa
Nameserver
(ccTLD)

The .gov
Nameserver

Our ISP's
DNS Server

The CITC
Nameserver

WWW
Host

HTTP request to web server by IP address

HTTP reply to content of web page

Root Server Instances

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

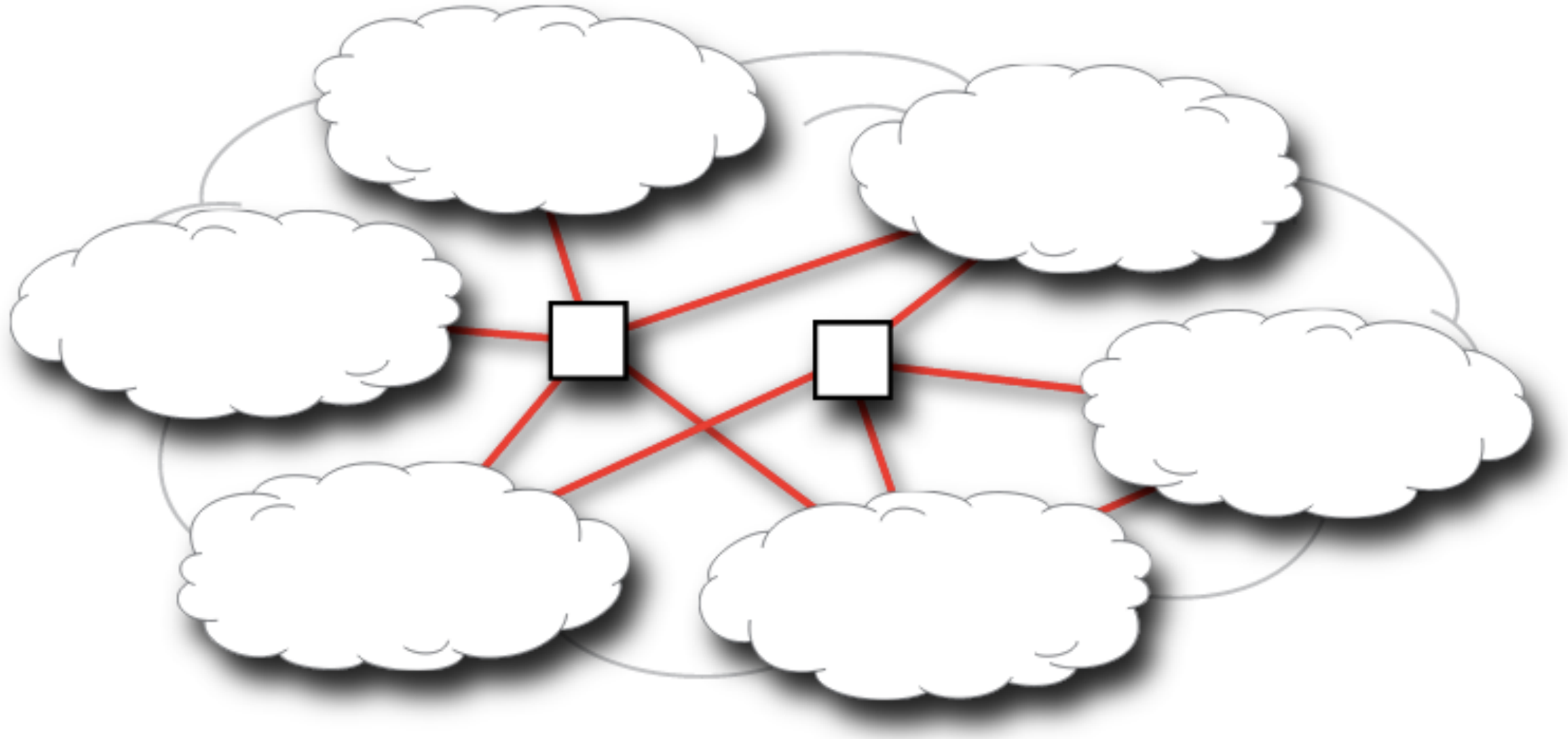
The Internet Corporation for Assigned Names and Numbers

- ICANN is a not-for-profit public-benefit corporation with participants from all over the world dedicated to keeping the Internet secure, stable and interoperable.

- It promotes competition and develops policy on the Internet's unique identifiers.

- Through its coordination role of the Internet's naming system, it does have an important impact on the expansion and evolution of the Internet.

What is the Internet?



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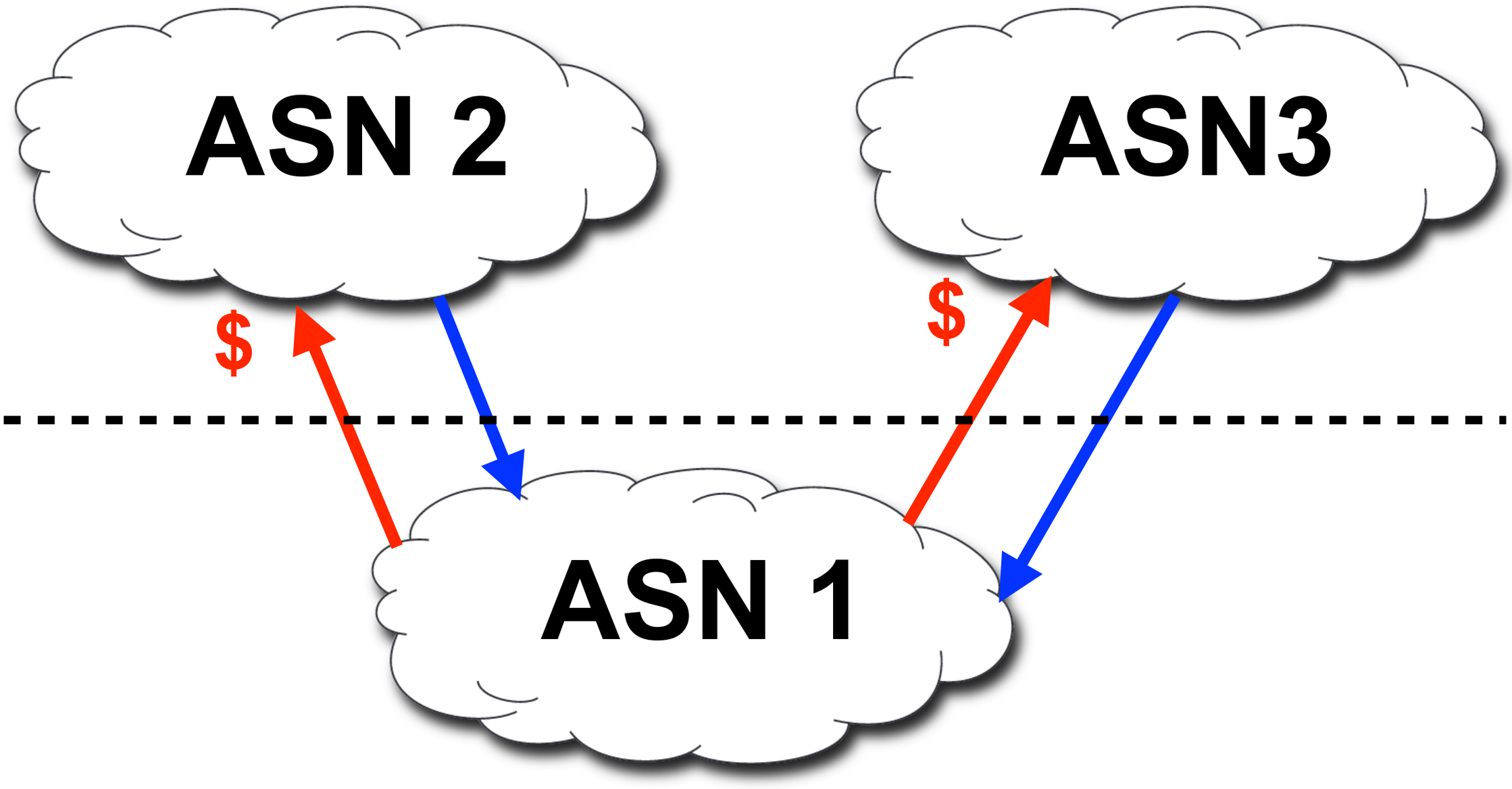
Operators

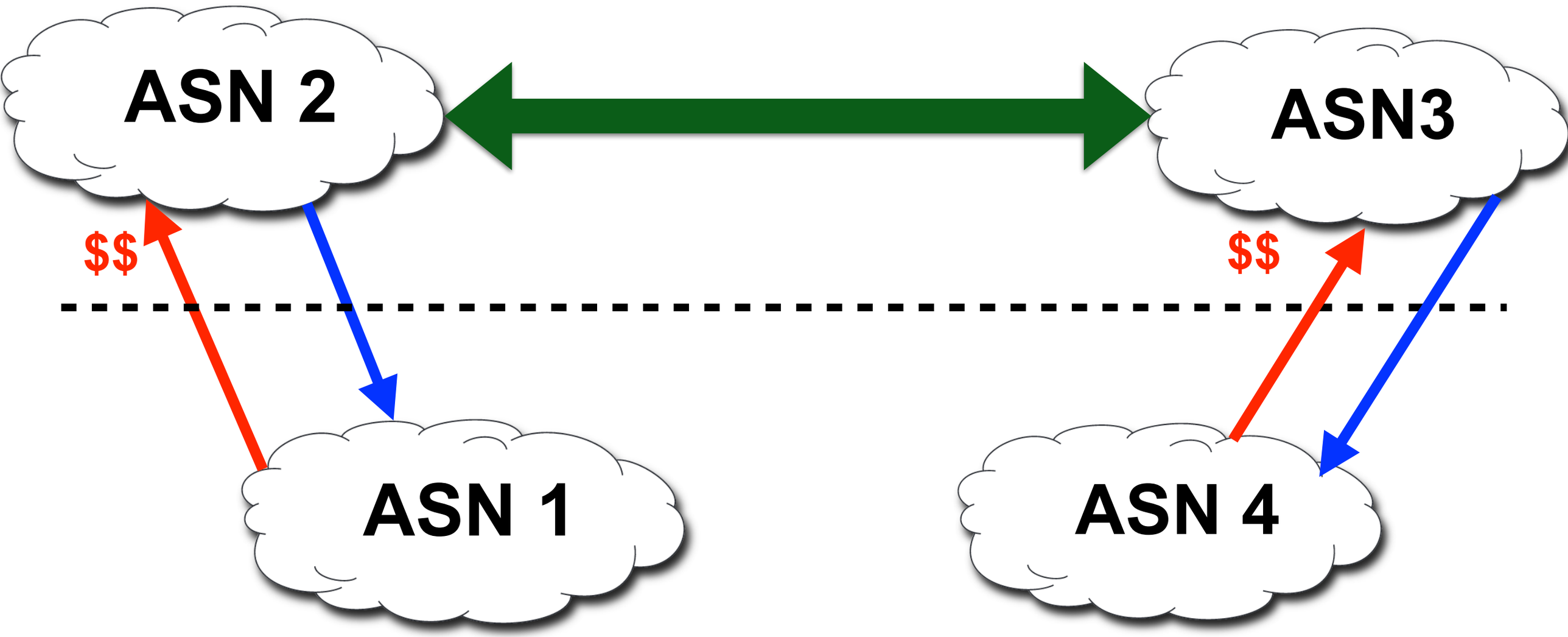
ISPs, IXPs & Enterprise

Connecting to the Internet

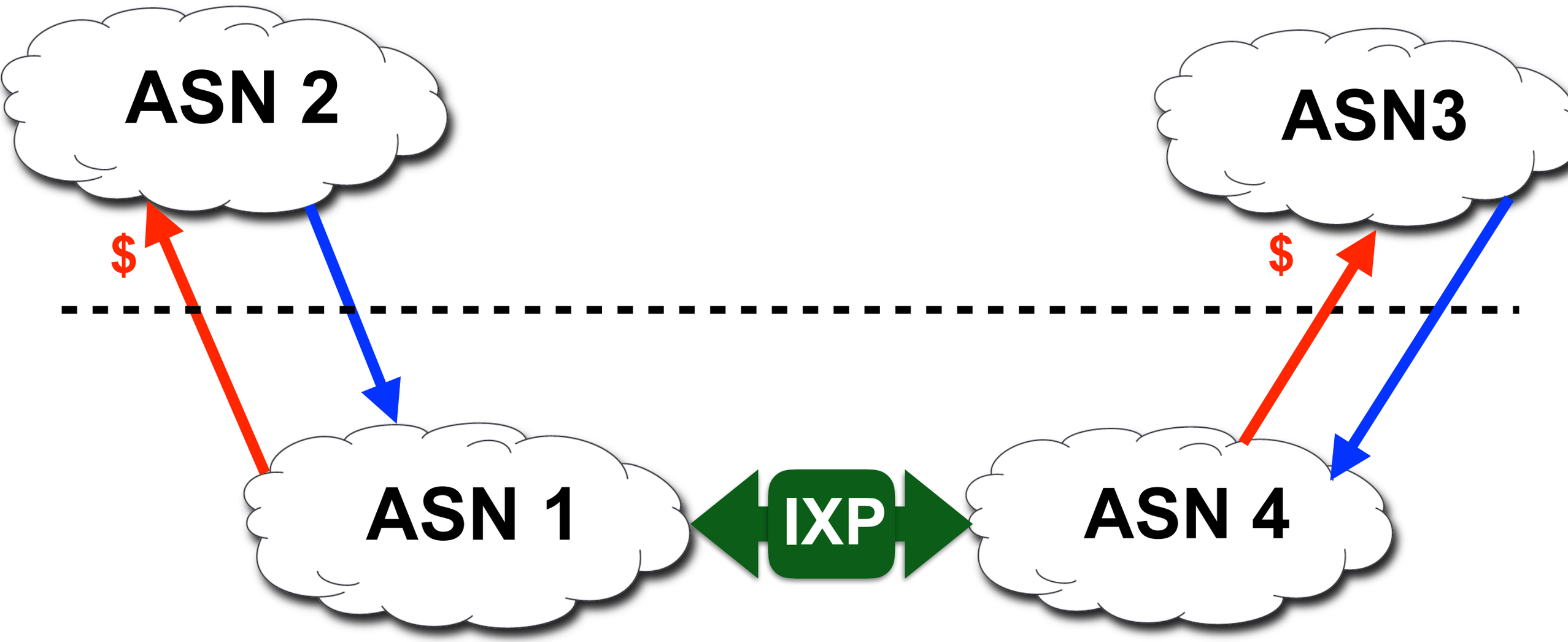


Country

Domestic Traffic Tromboning



Internet Exchange Points (IXPs)



Country

Saudi Internet Exchange (SIX)

To implement and operate Saudi Internet Exchange

MCIT signs Memorandum of Understanding with TAQNIA

13 October 2016

In its efforts the Ministry of Communications and Information Technology (MCIT) is proceeding from Saudi Arabia's Vision 2030 and National Transformation Program 2020, including the objectives and initiatives geared to enhance the digital infrastructure of the ICT sector and provide high speed broadband for all provinces of the Kingdom, by stimulating investment in infrastructure, and increasing the proportion of Internet users from 63% currently to 85% by end of 2020. In this context, MCIT has signed a memorandum of understanding with the Saudi Technology Development and Investment (TAQNIA) on Thursday, 13/10/2016. Pursuant to this memorandum, TAQNIA shall implement and operate the Saudi Internet Exchange (SIX), which represents one of the initiatives entered into force under the National Transformation Program.

http://www.mcit.gov.sa/En/MediaCenter/Pages/News/News-13102016_264.aspx

Critical Infrastructure Checklist

- Domestic IXP. One per major city eventually.
- Your own ccTLD nameservers at domestic IXPs and major IXPs on the other side of your international circuits.
- Root nameserver domestically. Multiple when possible.
- DNSSEC sign your national ccTLD.
- Use DANE to bootstrap a national Certificate Authority.
- Neighboring ccTLDs and other TLD nameservers of interest domestically, at your IXP, connected to your ISPs.
- Datacenters adjacent to your IXP.
- DDoS sinks on both sides of your international circuits.
- Redundant fiber paths both domestically and to major IXPs bordering the region

Upcoming events

MENOG 17 takes place in Muscat Oman,
Workshops 16 - 18 April
Plenary 19 & 20 April
http://www.menog.org/meetings/menog-17/

Questions

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RACI

RIPE Academic Cooperation Initiative

Chafic Chaya | Academic Initiative KSA | 28-29 November 2016

The RACI story

- Started in 2013 as a way to connect the RIPE and the research communities
- Offers academics the chance to present to industry, make connections and get feedback
- Successful applicants receive complimentary tickets, travel and accommodation to meetings
- All applicants can publish their work through RIPE Labs (labs.ripe.net)

Examples of relevant topics

- Network measurements and analyses
- IPv6 deployment
- BGP routing
- Network security
- Internet governance
- Peering and interconnectivity
- Internet of Things

Where are the meetings?

- RIPE Meetings - 5 days; all over Europe
  - RIPE 74, 8-12 May 2017 in Budapest
- MENOG - 2 days; all over the Middle East
  - MENOG 17, 19-20 April 2017 in Muscat
- ENOG - 2 days; all over Eurasia
  - ENOG 13, 23-24 May 2017 in St Petersburg
- SEE - 2 days; all over South East Europe
  - SEE 6, 12-13 June 2017 in Budva

Upcoming Deadlines

- Apply by **19 February** for MENOG 17
- Apply by **5 March** for RIPE 74
- Apply by **19 March** for ENOG 13
- Apply by **9 April** for SEE 6

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Get Involved

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Questions

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