

An Introduction to IANA

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Internet Assigned Numbers Authority



Internet Corporation for
Assigned Names & Numbers

What is IANA?

- ▶ “Internet Assigned Numbers Authority” is responsible for global Internet unique identifier systems.
- ▶ One of the oldest Internet institutions, its role dates back to 1970s.

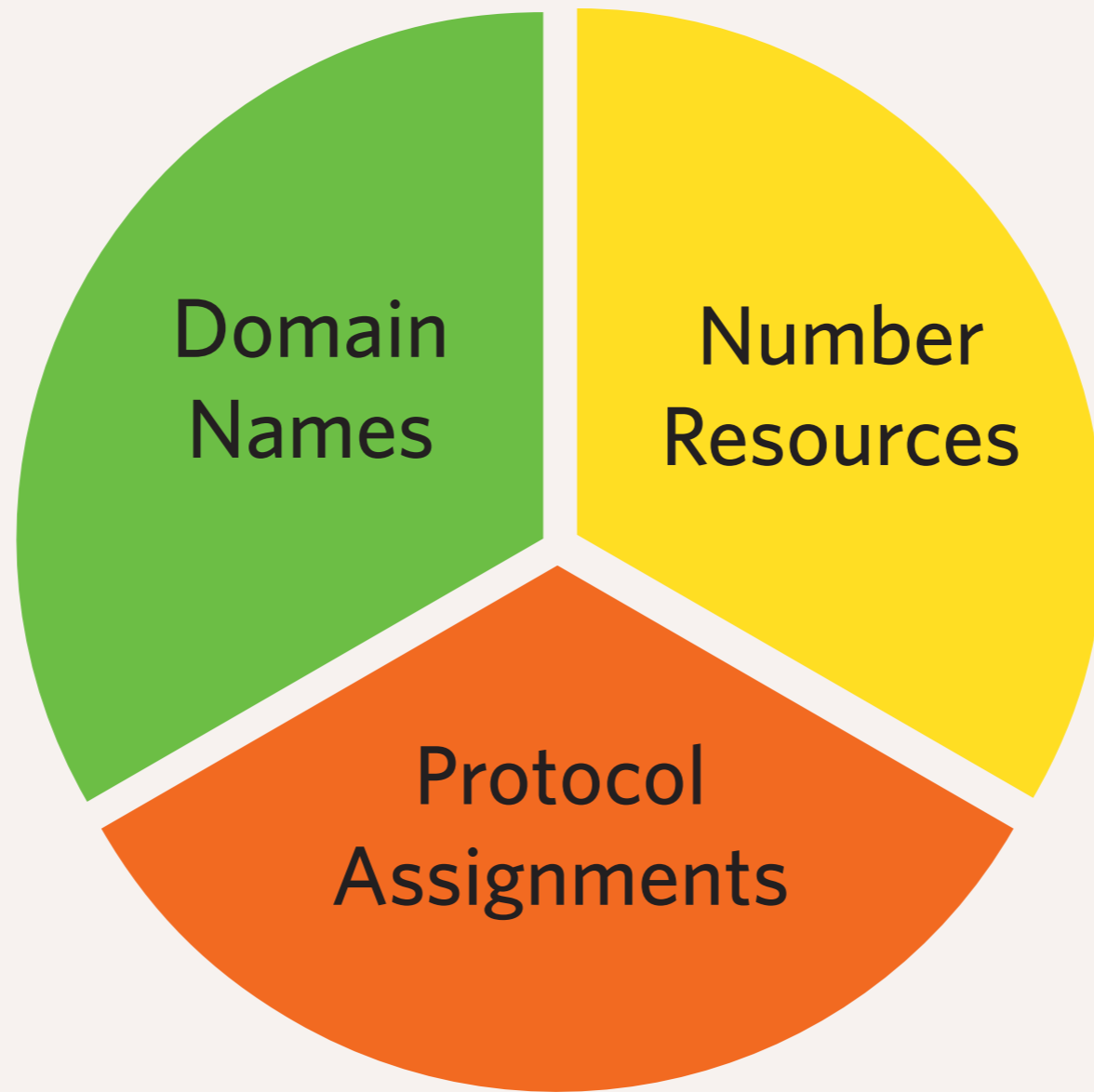


What is IANA?

- ▶ Since 1998, operated by ICANN - a non-profit internationally-organised entity setup by the global community as the steward for the IANA functions.
- ▶ Today, "IANA" may refer to either the functions, or the department within ICANN that runs the IANA functions.

Why does IANA exist?

- ▶ There is no central control of the Internet
- ▶ If computers did not use the same system of identifiers and numbers to talk to one another, the system would not interoperate
- ▶ IANA coordinates the numbering systems needed to ensure the Internet interoperates globally
- ▶ ICANN was devised to be the institutional home for the IANA

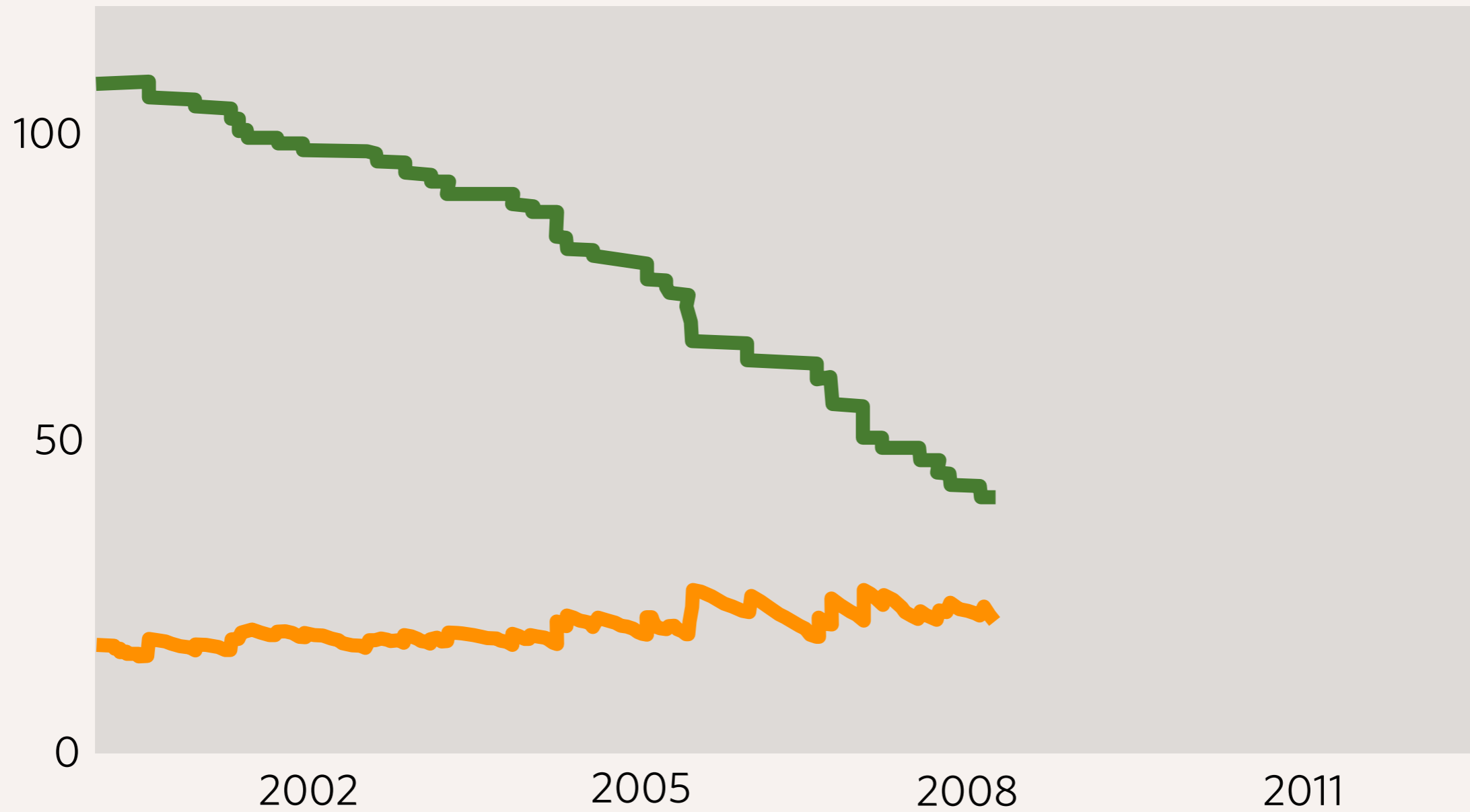


IANA services

Number Resources

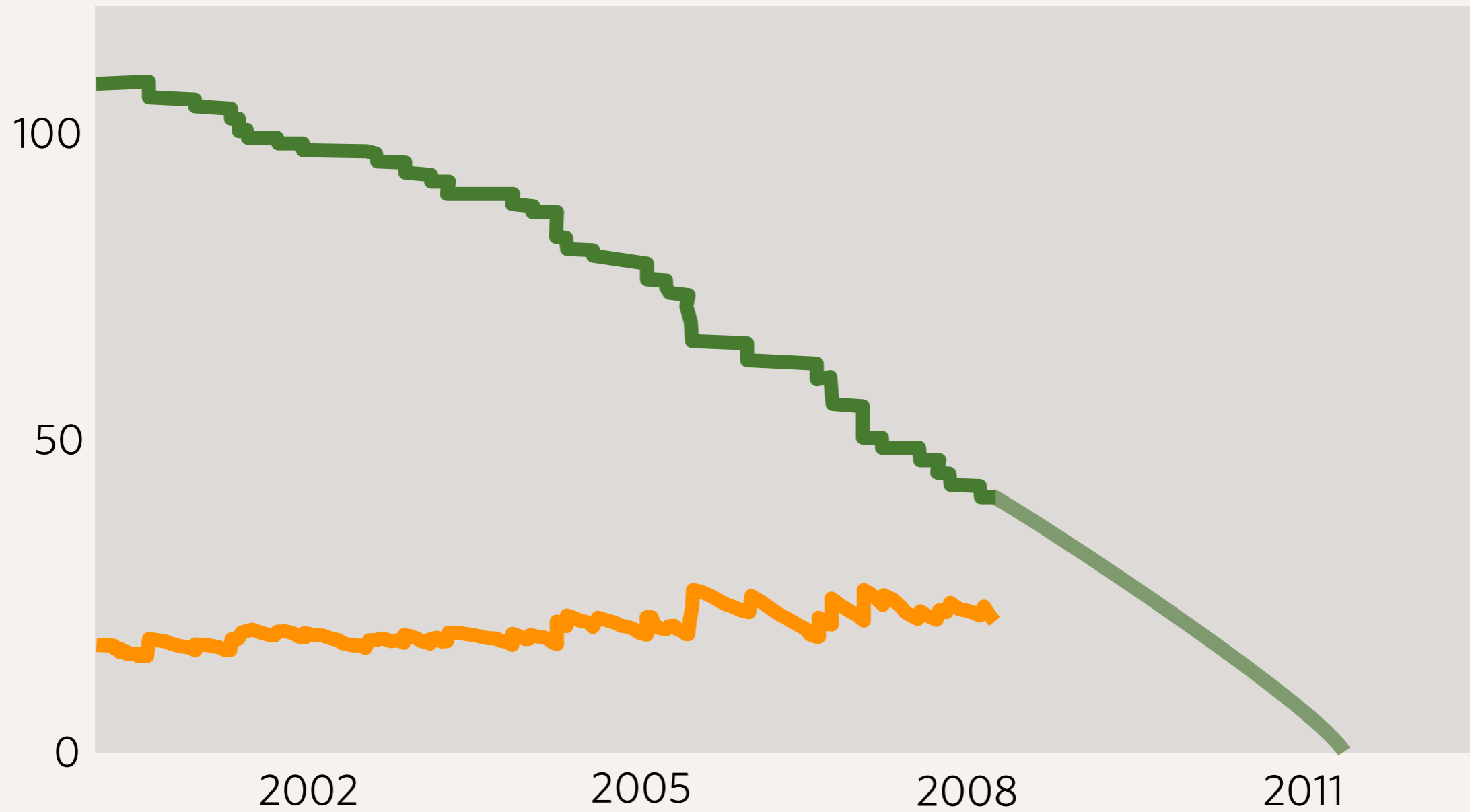
Number Resources

- ▶ Internet Protocol (IP) Addresses
 - ▶ Unique identifier for each computer connected to the public Internet
 - ▶ Version 4 — currently in use
 - ▶ Version 6 — under deployment
- ▶ Autonomous System (AS) Numbers
 - ▶ Unique identifier for each network that cross-connects with other networks



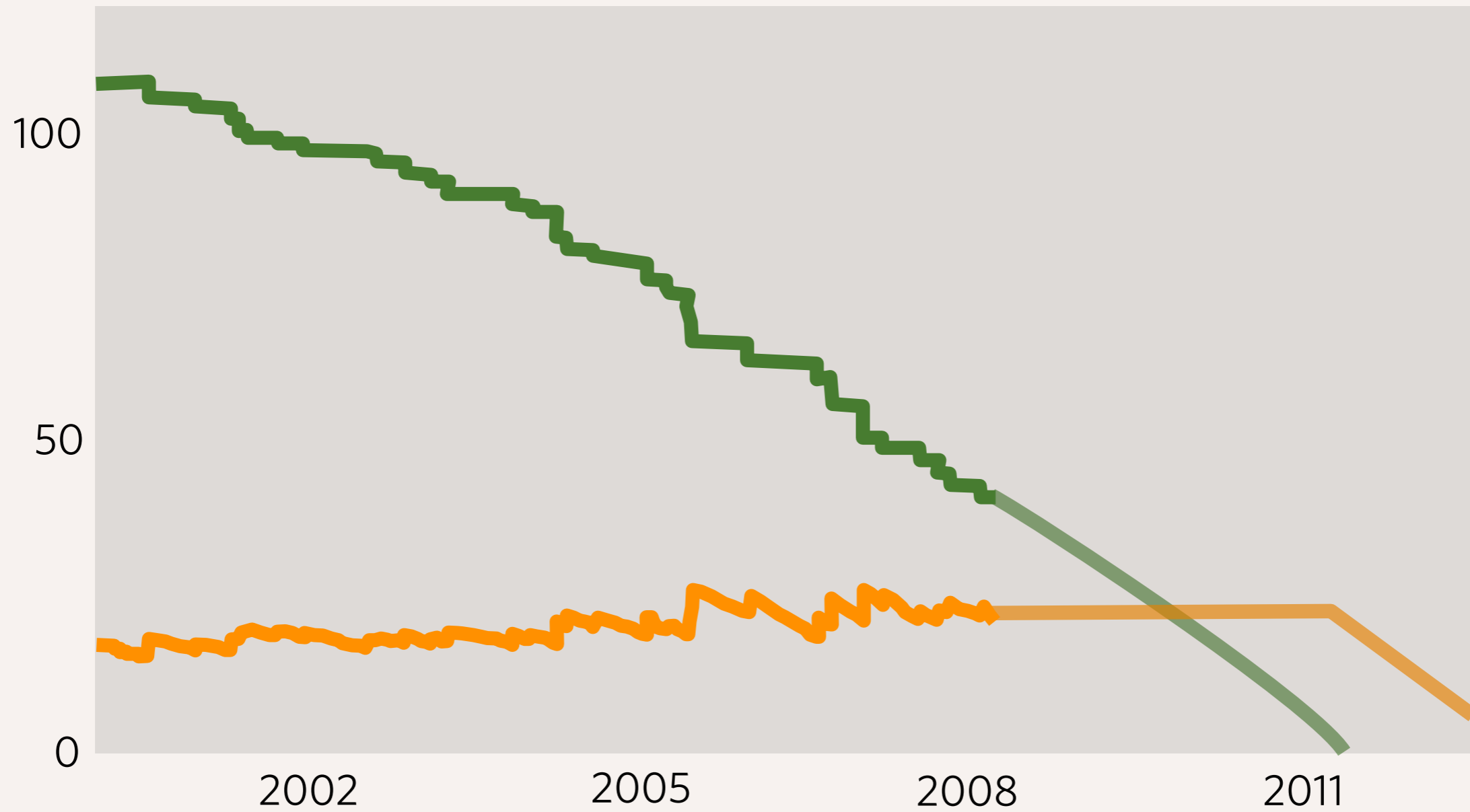
IPv4 Availability

▶ Dwindling stocks ...



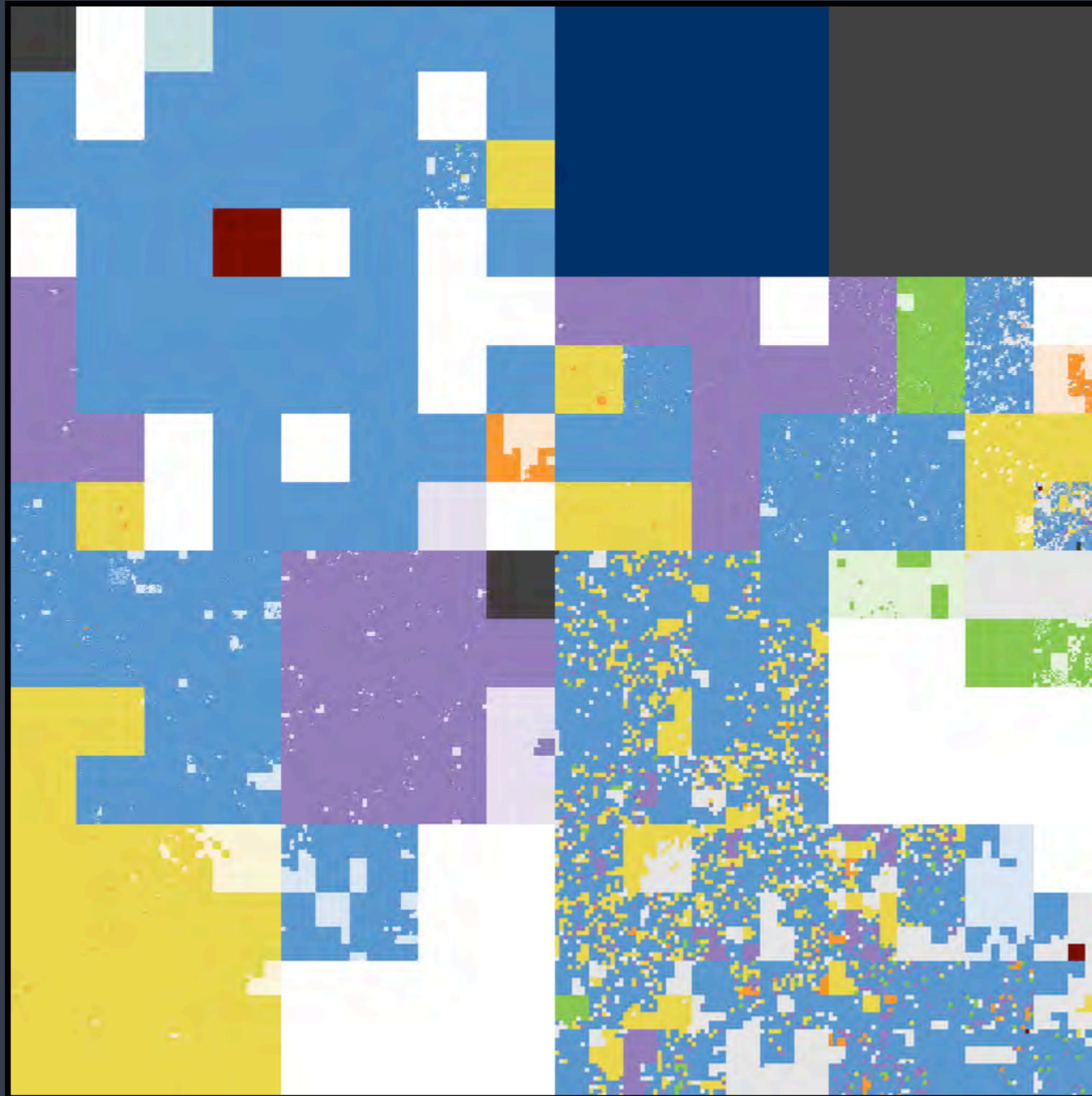
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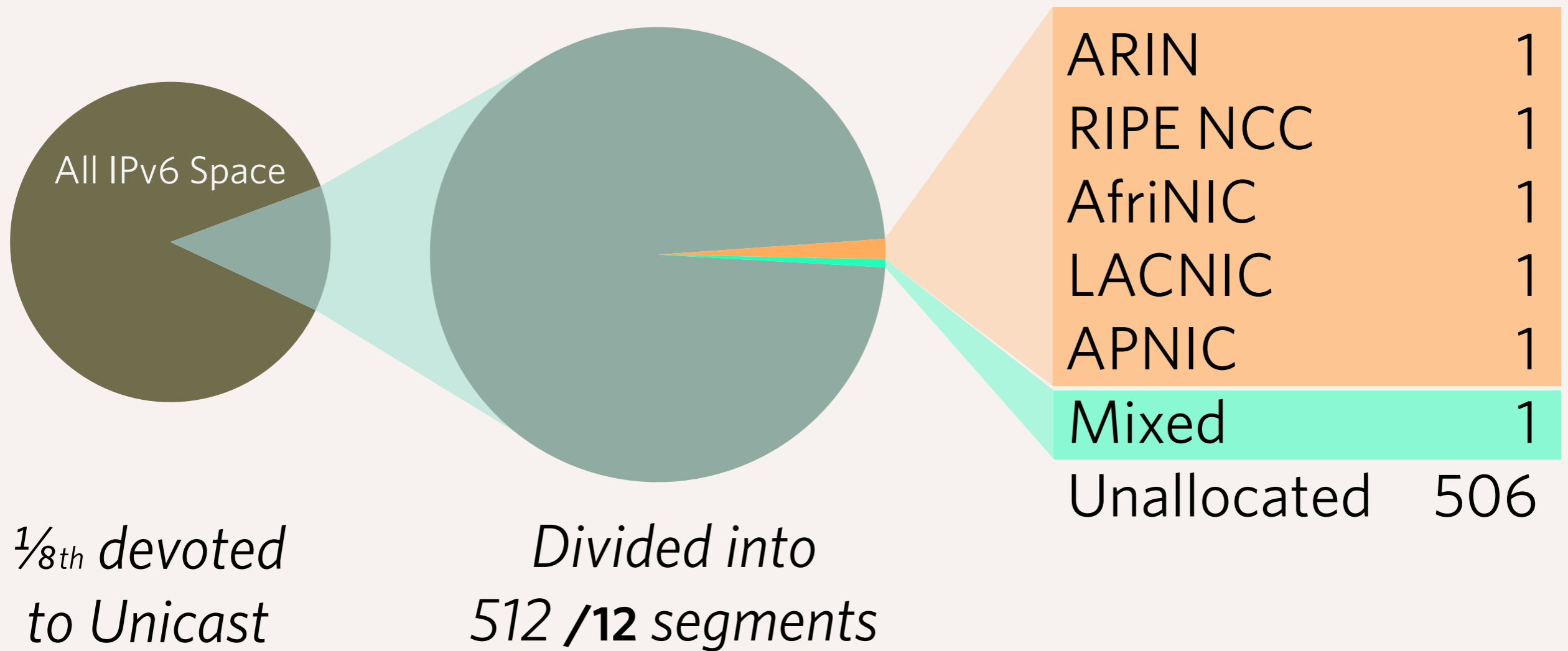


IPv4 Consumption as a map

IPv6 in a nutshell

- ▶ 128-bit address space
 - ▶ 340,282,366,920,938,463,463,374,607,431,768,211,456 addresses
- ▶ IANA still has lots in reserve



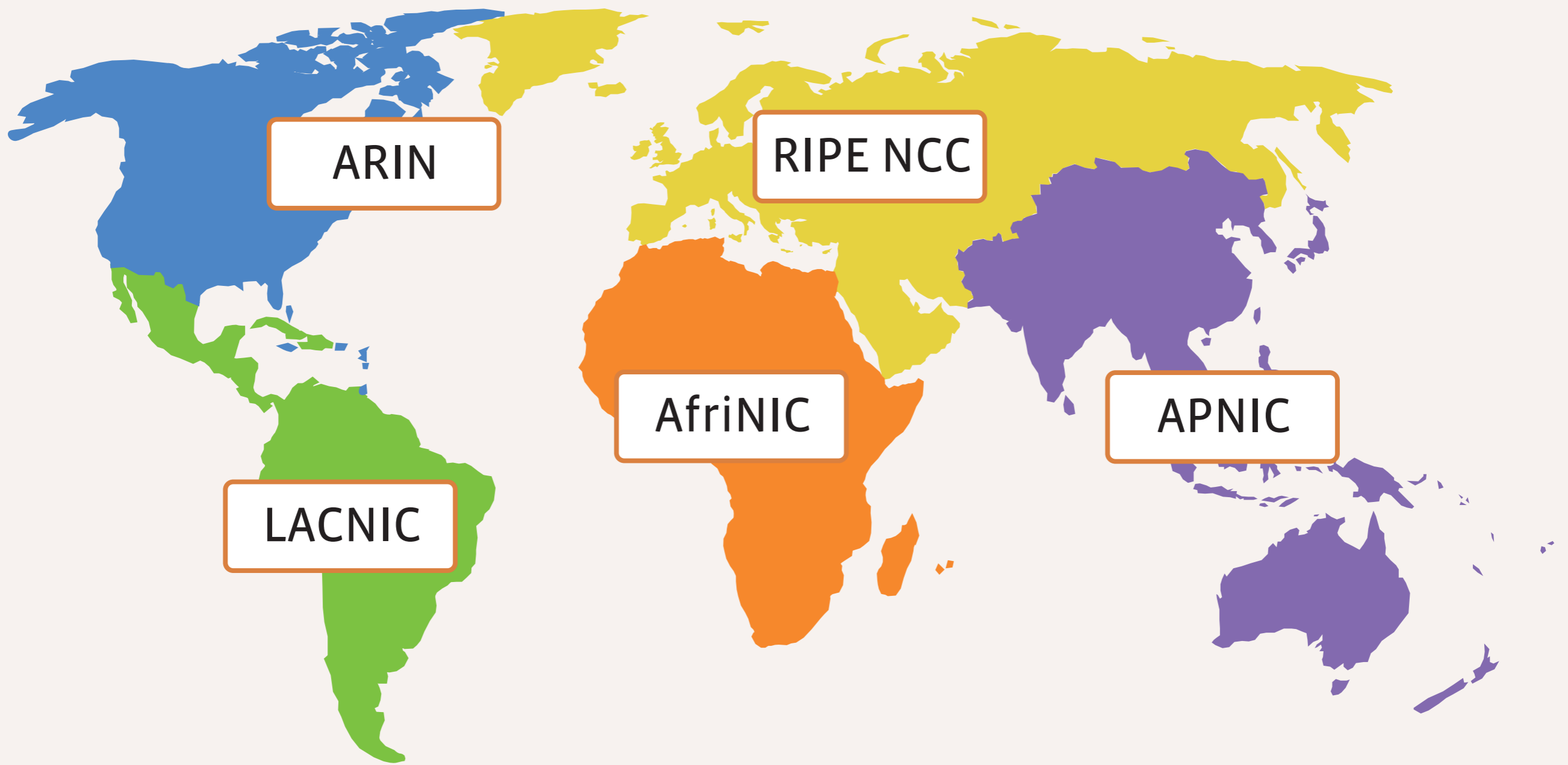


IPv6 Availability

- ▶ Approximately 1% of Unicast designated space is allocated to RIRs.

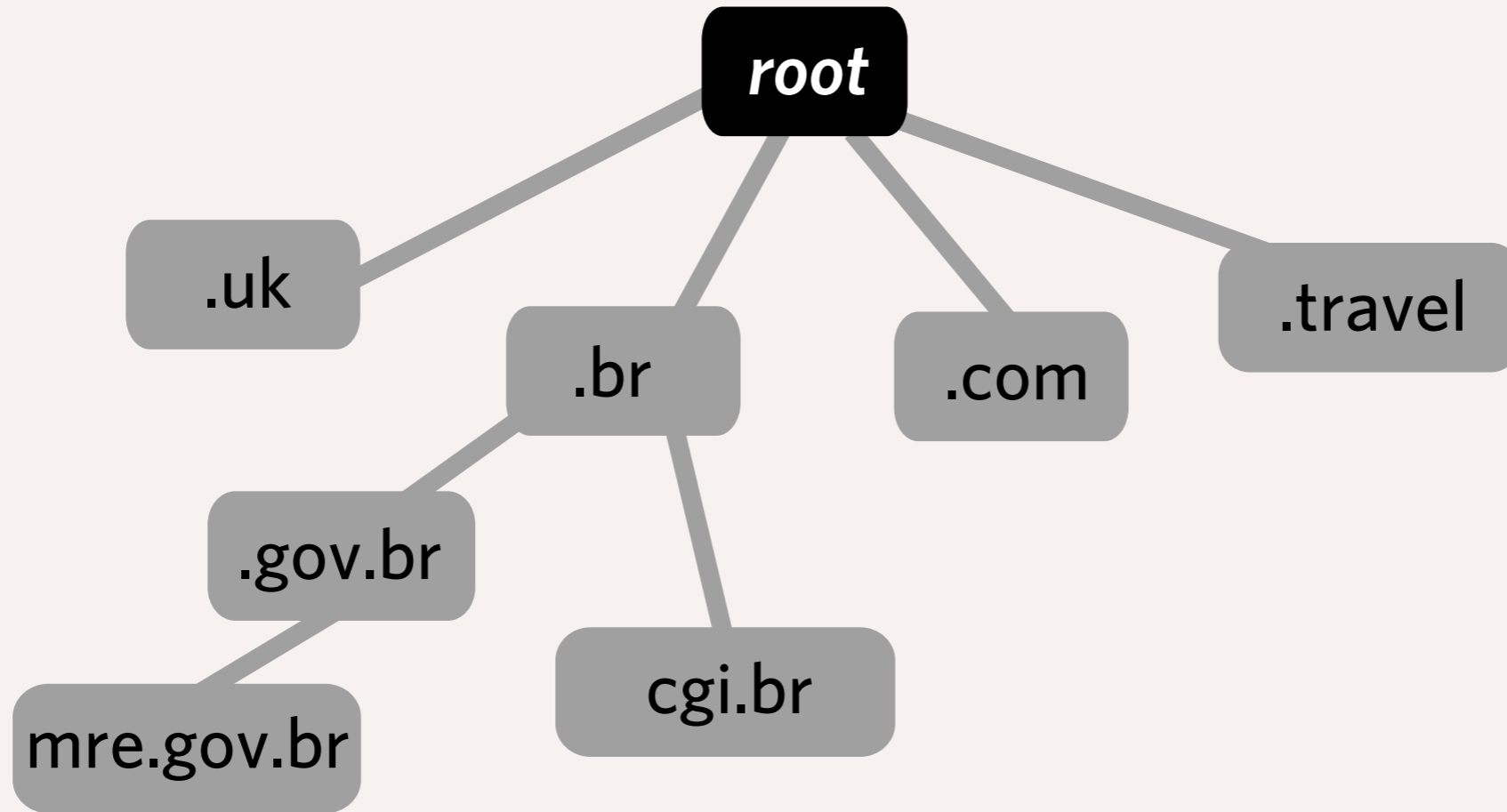
Number Allocation Systems

- ▶ Most numbers allocated in large blocks to Regional Internet Registries
- ▶ Some blocks held by IANA for special purposes (private use blocks, etc.)
- ▶ Some blocks allocated directly by IANA (multicast address space, protocol specific use)

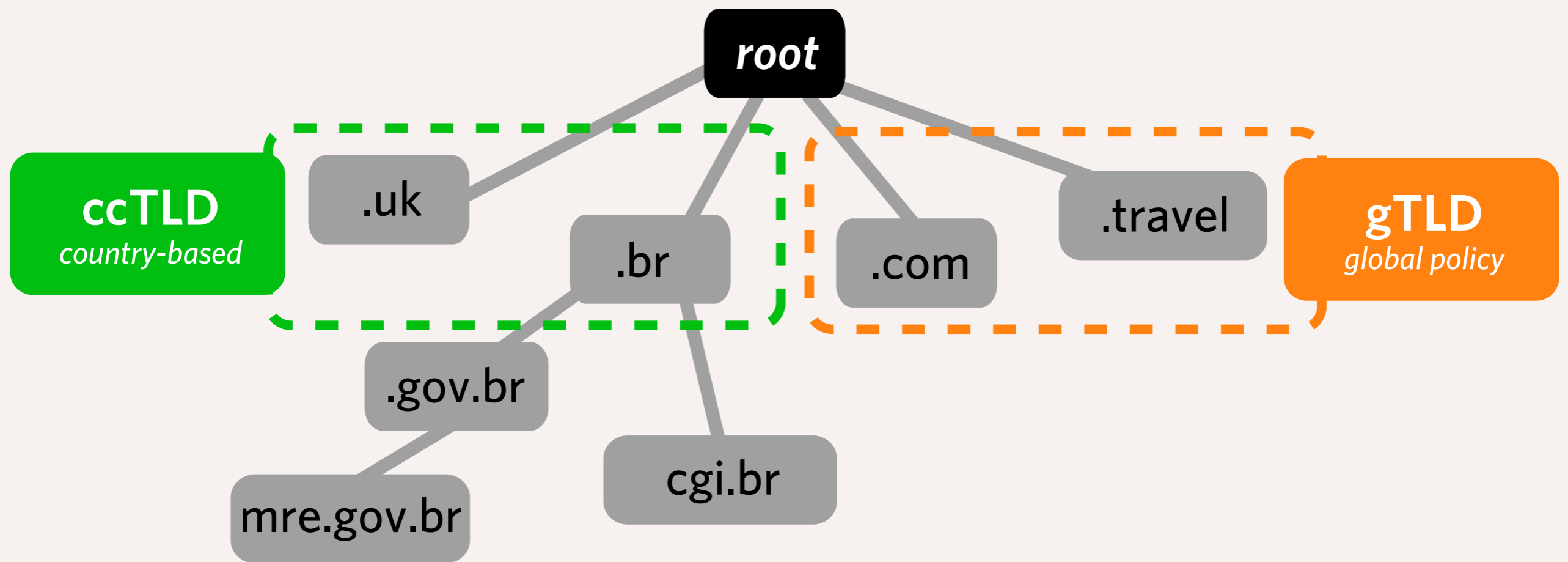


Regional Internet Registries

Domain Names

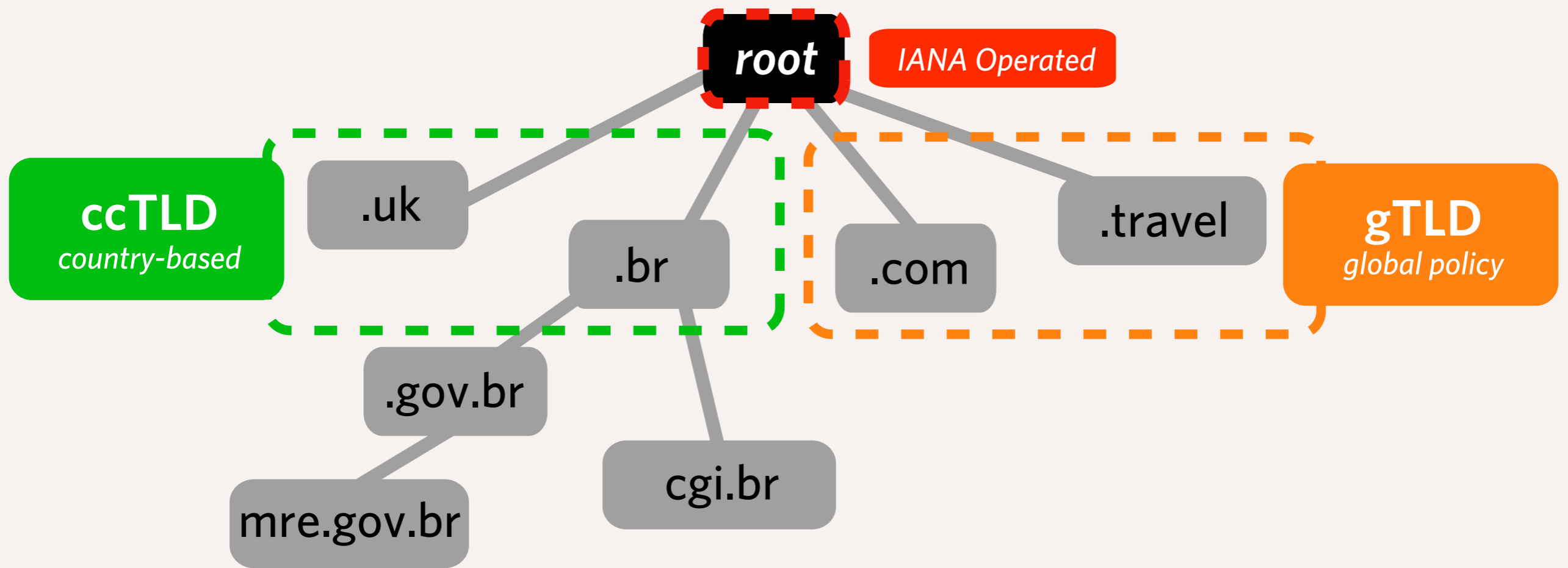


Domain structure



Domain structure

- ▶ Nominally split between ccTLDs and gTLDs



Domain structure

- ▶ IANA runs the DNS root

Domain Names — The Root Zone

- ▶ Delegates top-level domains
- ▶ Root Zone Database is like a regular domain registry, albeit with different policy
- ▶ Top-Level Domain Operators maintain their registration records with IANA
- ▶ gTLD Delegations governed by ICANN contracts
- ▶ ccTLD Delegations governed by Local Internet Community principles

How we manage the root zone

- ▶ Maintain data for the DNS root
 - ▶ Technical data (NS records, “glue”)
 - ▶ Social data (admin and tech contacts, sponsoring organisations, WHOIS, Registration URLs)
- ▶ Two types of changes
 - ▶ Routine (easy)
 - ▶ Confirm authenticity, check for technical problems, implement
 - ▶ Redelegations (hard)
 - ▶ Perform evaluation, submit to ICANN board, implement as appropriate.

What we don't do

- ▶ Don't set policy
 - ▶ We follow precedent where possible, encourage review of our operations by the community.
- ▶ Don't decide what the two letter codes should be
 - ▶ ISO 3166-1 standard provides these
- ▶ Don't decide who runs a ccTLD
 - ▶ The local Internet community decides this.
 - ▶ IANA performs due diligence to ensure requests accord with LIC view

Assignment of ccTLD Operators

- ▶ “selecting a designated manager for a domain that was able to do an equitable, just, honest and competent job”
- ▶ “These designated authorities are trustees for the delegated domain, and have a duty to serve the community. The designated manager is the trustee of the top-level domain for both the nation and the global Internet community”

Assignment of ccTLD Operators

- ▶ IANA performs due diligence on
 - ▶ Operator's technical and operational competency
 - ▶ Legal structure of organisation
 - ▶ Government views
 - ▶ Local Internet community views
 - ▶ Transfer plans and other stability issues
 - ▶ Compliance with various principles (GAC principles, RFC 1591)
- ▶ IANA's report is presented to the ICANN Board for final approval of a request
 - ▶ Condensed public reports published

Domain Names — Other functions

- ▶ .INT domains — Intergovernmental treaty organisations
- ▶ .ARPA domains — technical plumbing
- ▶ IDN tables — registries share IDN language practices

Protocol Assignments

Protocol Assignments

- ▶ Most unique identifiers are allocated directly by IANA to protocol developers and/or end users, with no politics or middle-men
- ▶ Number Resources and Domain Names are just specialised cases of protocol assignments
 - ▶ They are hierarchically allocated
 - ▶ Disproportionately policy-laden and/or political

How do protocols eventuate?

- ▶ IETF is the main venue for Internet standardisation
- ▶ Technical standards documents are part of a documentation series known as RFCs (Request for Comments)
 - ▶ Maintained by the RFC Editor (a former sister of IANA)
- ▶ RFCs nominate IANA registries, and IANA maintains these registries with guidance from the Internet Engineering Steering Group (IESG), and Internet Architecture Board (IAB)

Open Shortest Path First v3 (OSPFv3)

[OSPFv3 LSA Function Codes](#) [RFC 4970](#)
0 Reserved, 1-255: Standards Action, 256-8175: Reserved, 8176-8183: Experimentation, 8184-8191: Vendor Private Use

[OSPFv3 Options](#) [RFC 4940](#)
Standards Action

[OSPFv3 Prefix Options](#) [RFC 4940](#)
Standards Action

[OSPFv3 Router LSA Link Type](#) [RFC 4940](#)
0 Reserved, 1-127: Standards Action, 128-255: Reserved

[OSPFv3 Router Properties Registry](#) [Internet Draft draft-ietf-ospf-ospfv3-update-23](#)
Standards Action

Open Systems Interconnection (OSI) Network Service Access Point Addresses (NSAPA) Internet Code Point

[OSI NSAPA Internet Code Point](#) [Internet Draft draft-gray-1888bis-03](#)
2-9999 IETF Consensus

Operating System Names

[Operating System Names](#) [RFC 952 \(?\)](#)
(?)

[Specific Parameters](#) [RFC 3659](#)
First Come First Serve

OPES Callout Protocol Core

[OCP Features](#) [RFC 4037](#)
Designated expert review for standards-track registration

Optimized Link State Routing Protocol (OLSR)

[Optimized Link State Routing Protocol \(OLSR\)](#) [RFC 3626](#)
5-127: Standards Action (section 22) 128-255: Reserved for Private/Local use. (section 22)

Per Hop Behavior Identification Codes

Protocol Assignments

- ▶ All protocol assignments are free
- ▶ Eligibility criteria varies, usually either open-to-all, or requires standard action to implement
- ▶ Some popular registries have automated or specialised approaches to allocation
 - ▶ Private Enterprise Numbers
 - ▶ Port Numbers
 - ▶ etc.

The US Government and IANA

US Government and IANA

- ▶ ICANN performs the functions of IANA governed by a contract with the US Government
- ▶ IANA reports on its performance to the US Government
- ▶ US Government authorises all changes to the DNS root zone
 - ▶ IANA does all the processing, and when a change is ready, it is sent to the USG as the final step before implementation.

Our work in progress

Improved processing efficiency

- ▶ Working on automation solutions for the root zone management workflow
 - ▶ Allow lodgment and status tracking via new web interface
 - ▶ Improved interface between IANA, USDOC and VeriSign
- ▶ Working with USDOC on compliance testing for production deployment
- ▶ Aim to start parallel operations as soon as possible
 - ▶ Possibility of “pilot” operations if there are significant delays

Improved technical procedures

- ▶ Clarifying the technical requirements for top-level domain operators
- ▶ Providing tools to performing testing
- ▶ Introducing streamlined acceptance criteria for certain types of IPv6 changes
- ▶ Adding new requirements in light of recent DNS security issues

New internationalised ccTLDs

- ▶ Work on internationalised ccTLDs
 - ▶ “Fast track” process under development for areas of high demand (e.g. Cyrillic-script countries)
- ▶ Process will closely match existing IANA redelegation process
 - ▶ Additional IDN-specific requirements
 - ▶ No “ISO 3166-1” equivalent, so another label selection criteria will be implemented
- ▶ Public process has not yet begun. Once applications are permitted the process will be announced.

New security work

- ▶ DNSSEC test-bed
- ▶ Outreach on DNS vulnerability issue

Summary

Summary

- ▶ IANA maintains the registries of unique numbering systems, that keep the Internet interoperating
- ▶ Most IANA registries are straightforward, and are not generally visible to the end-user
- ▶ High-profile, hierarchically-delegated, registries are used for the Domain Name System and Number Resources. IANA maintains the global “root” for these.
- ▶ IANA operates its registry functions under the auspices of a contract between ICANN and the US Government

For reference



An introduction to IANA

Presentation Notes



Présentation de l'IANA

Notes de présentation



Una introducción a IANA

Notas de presentación



Fecha 29 de septiembre de 2008

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Si bien Internet es reconocida como una red internacional sin coordinación central, existe la necesidad técnica de que ciertas partes clave estén coordinadas globalmente, y es la *Autoridad para la asignación de números de Internet* (IANA) quien cumple esta función de coordinación.

De manera específica, IANA asigna y mantiene códigos y sistemas de numeración únicos utilizados en los estándares técnicos ("protocolos") que permiten que los ordenadores y otros dispositivos se comuniquen entre sí a través de Internet.

Los requisitos de mantenimiento de los diferentes protocolos varían por naturaleza, pero básicamente procuran asegurar que los números y los códigos utilizados para implementar los estándares de Internet sean únicos y se usen de manera uniforme en todo el mundo. Tal coherencia es clave para garantizar la interoperabilidad de Internet.

IANA funciona gracias a un pequeño grupo de expertos que procesan las solicitudes para las diferentes áreas de responsabilidad de este organismo. El equipo mantiene

Thanks!

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