An Introduction to IANA

ICANN At Large Community Briefing
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Internet Assigned Numbers Authority

Internet Corporation for
Assigned Names & Numbers

What is IANA?

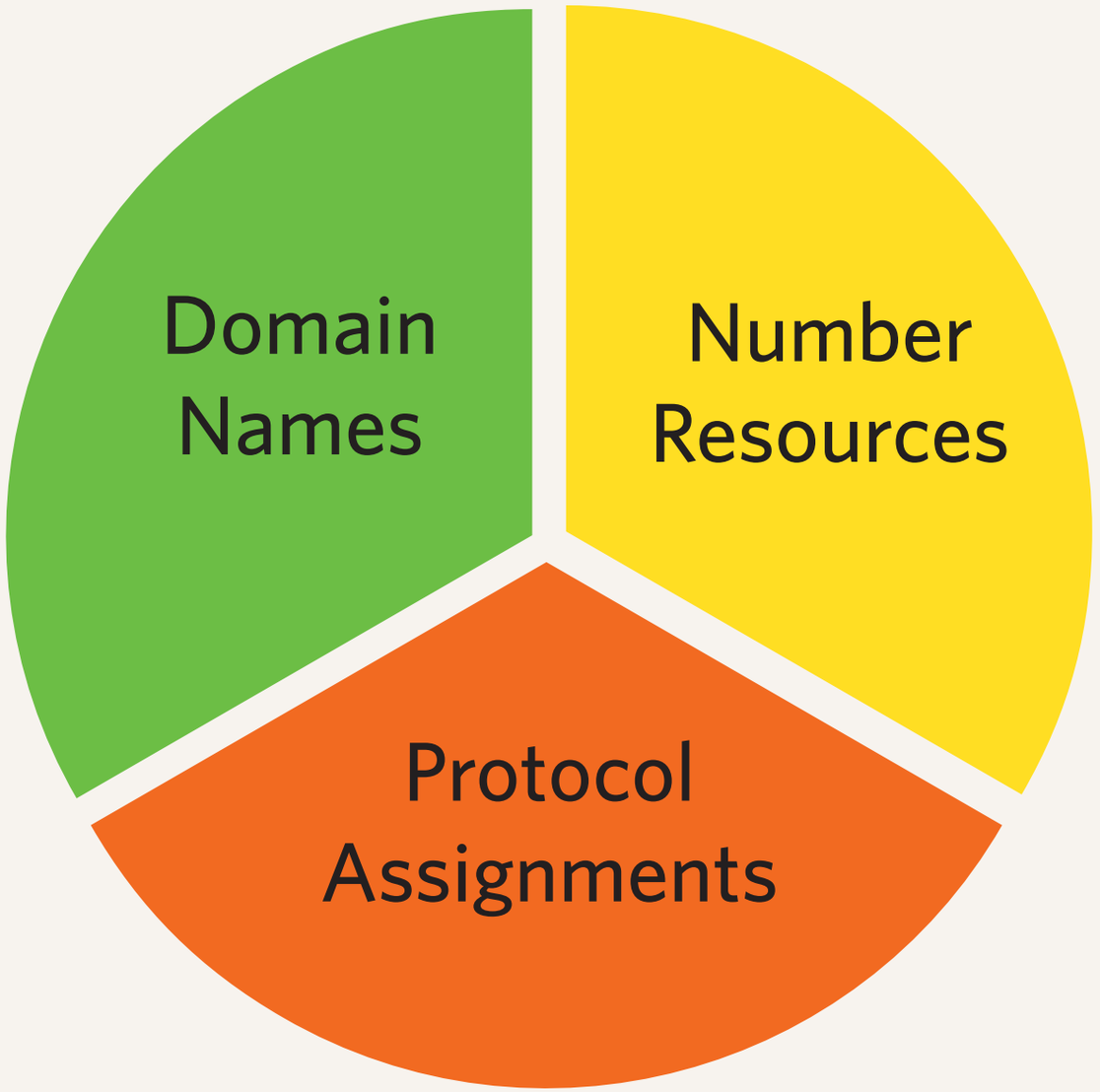
- “Internet Assigned Numbers Authority” is responsible for global Internet unique identifier systems.
- One of the oldest Internet institutions, its role dates back to 1970s.

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

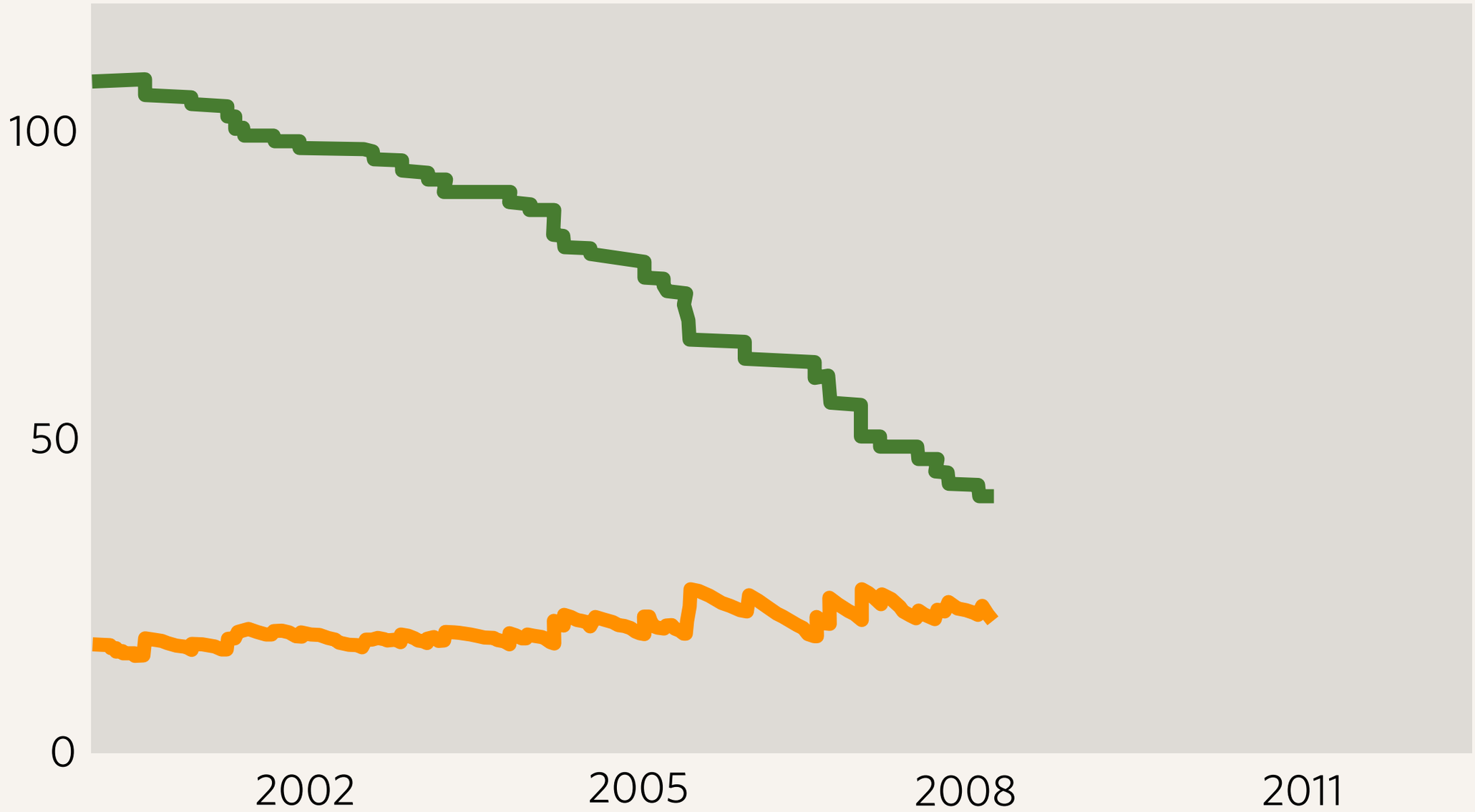


IANA services

Number Resources

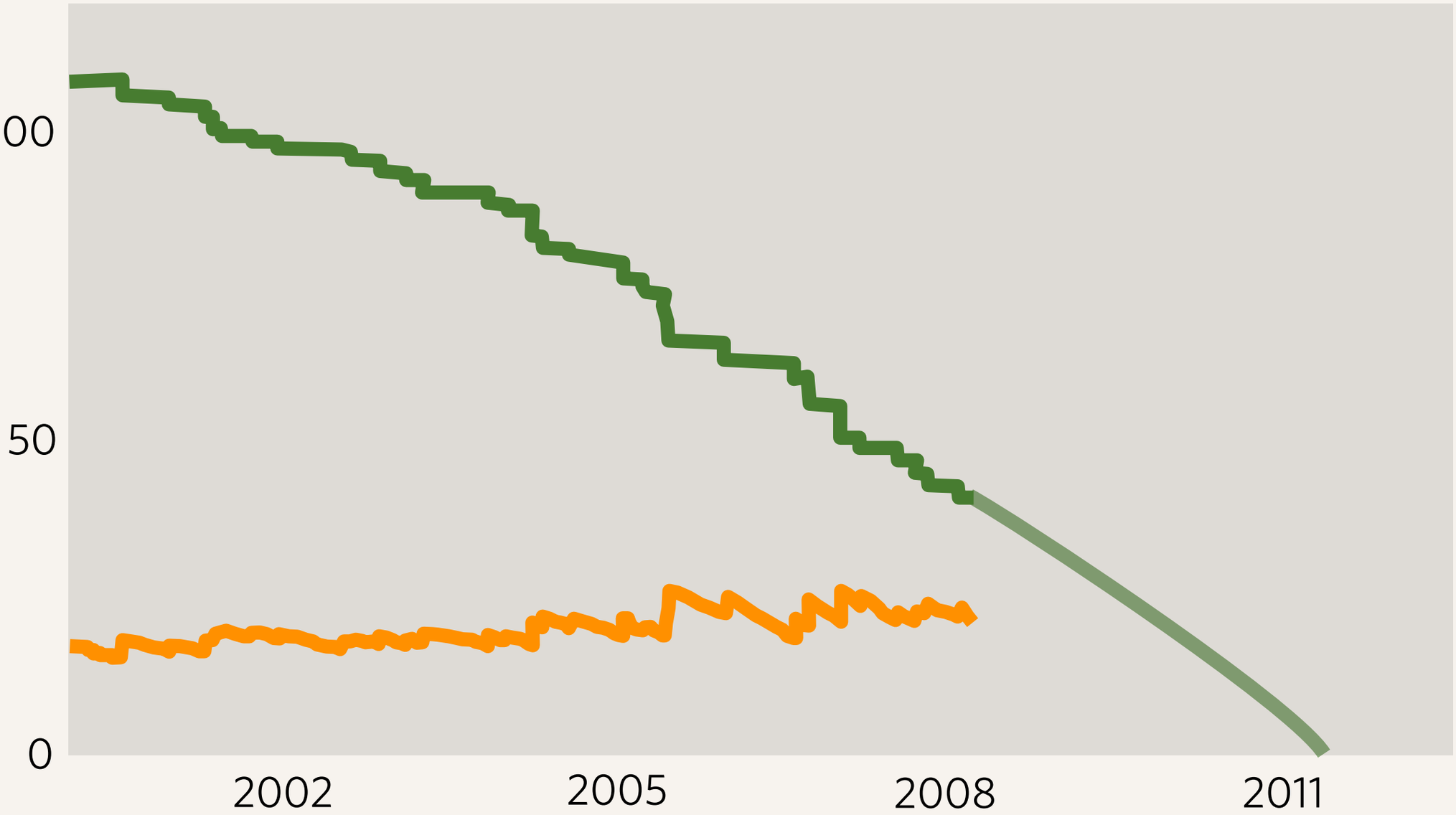
Number Resources

- 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



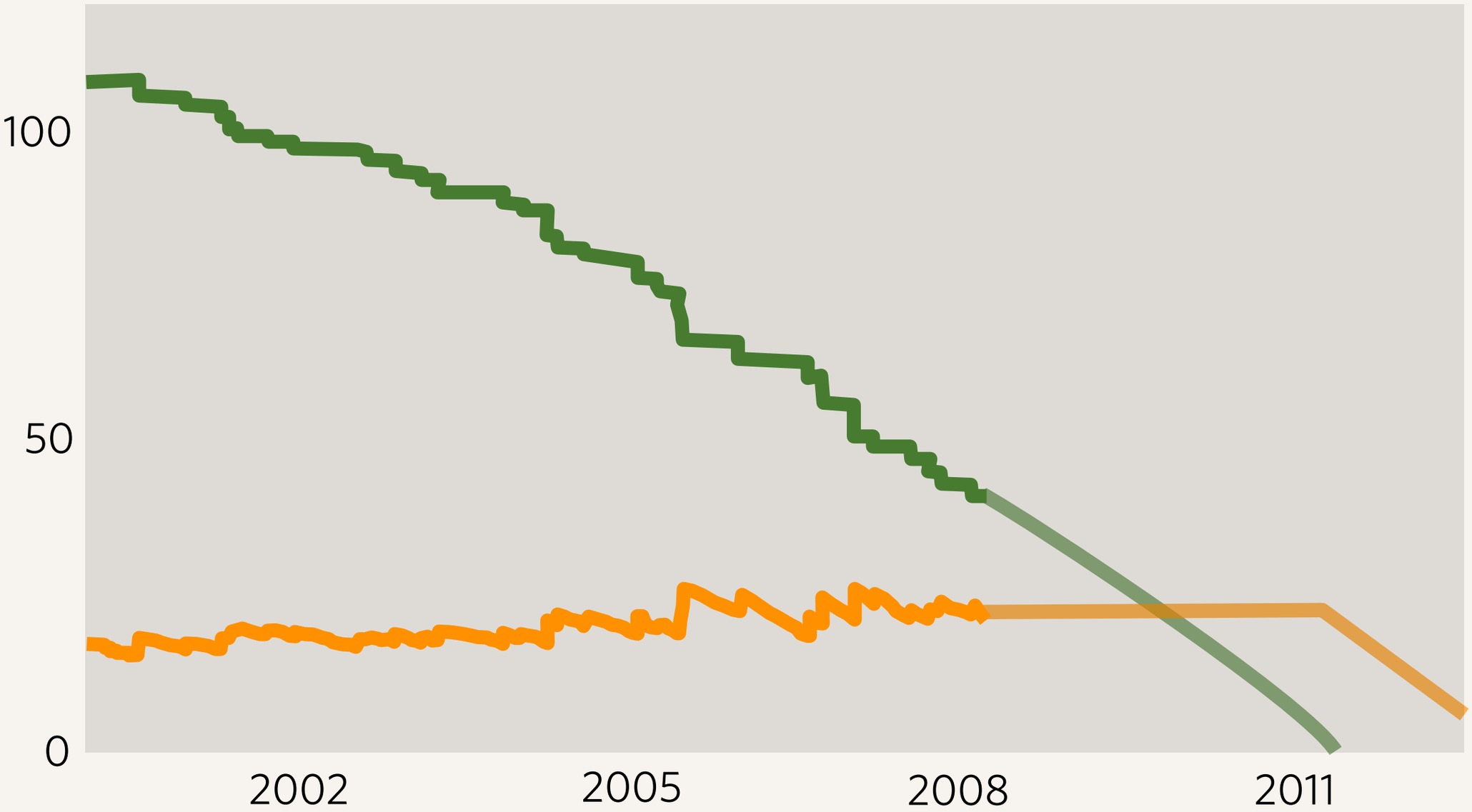
IPv4 Availability

- Dwindling stocks ...



IPv4 Availability

- Dwindling stocks ...



IPv4 Availability

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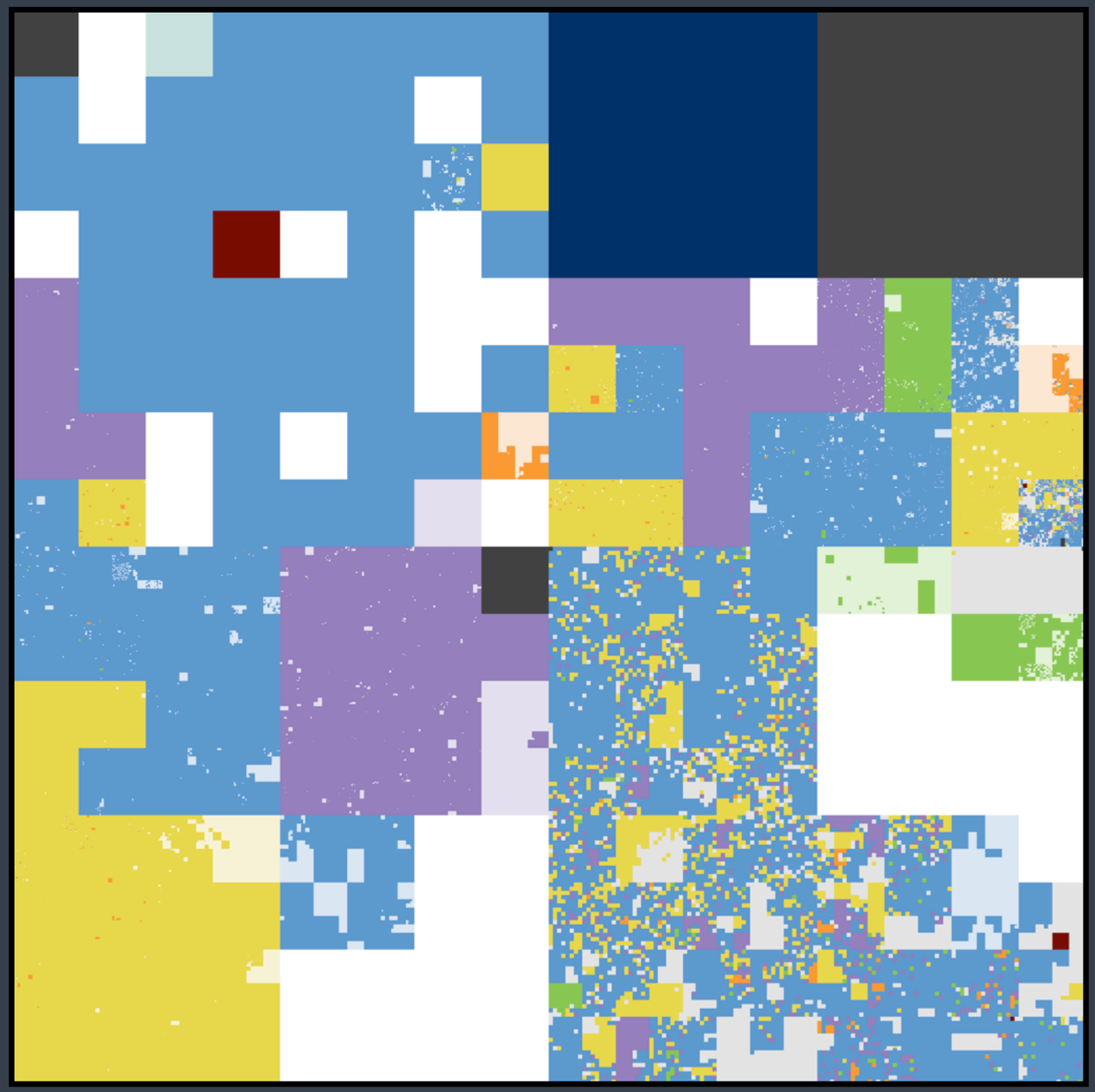
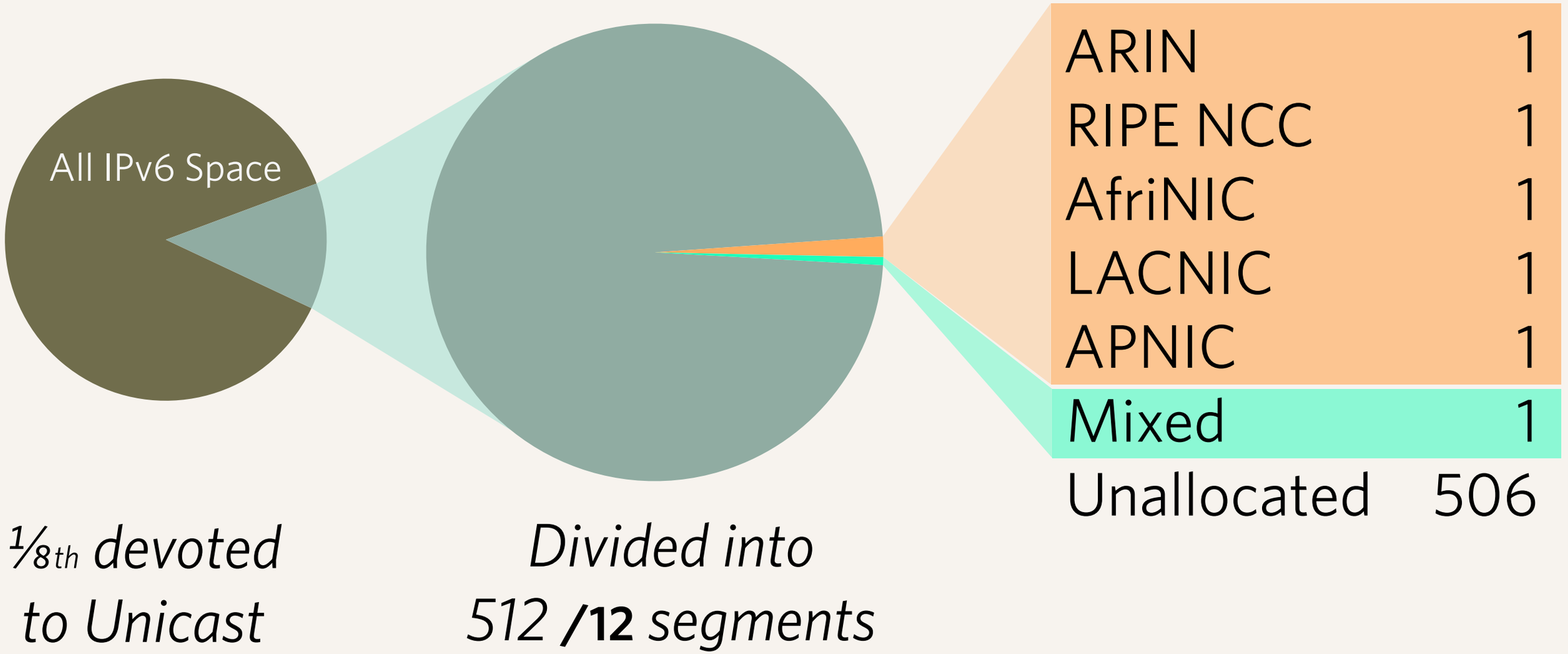


IPv4 Consumption as a map

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



1/8th devoted to Unicast

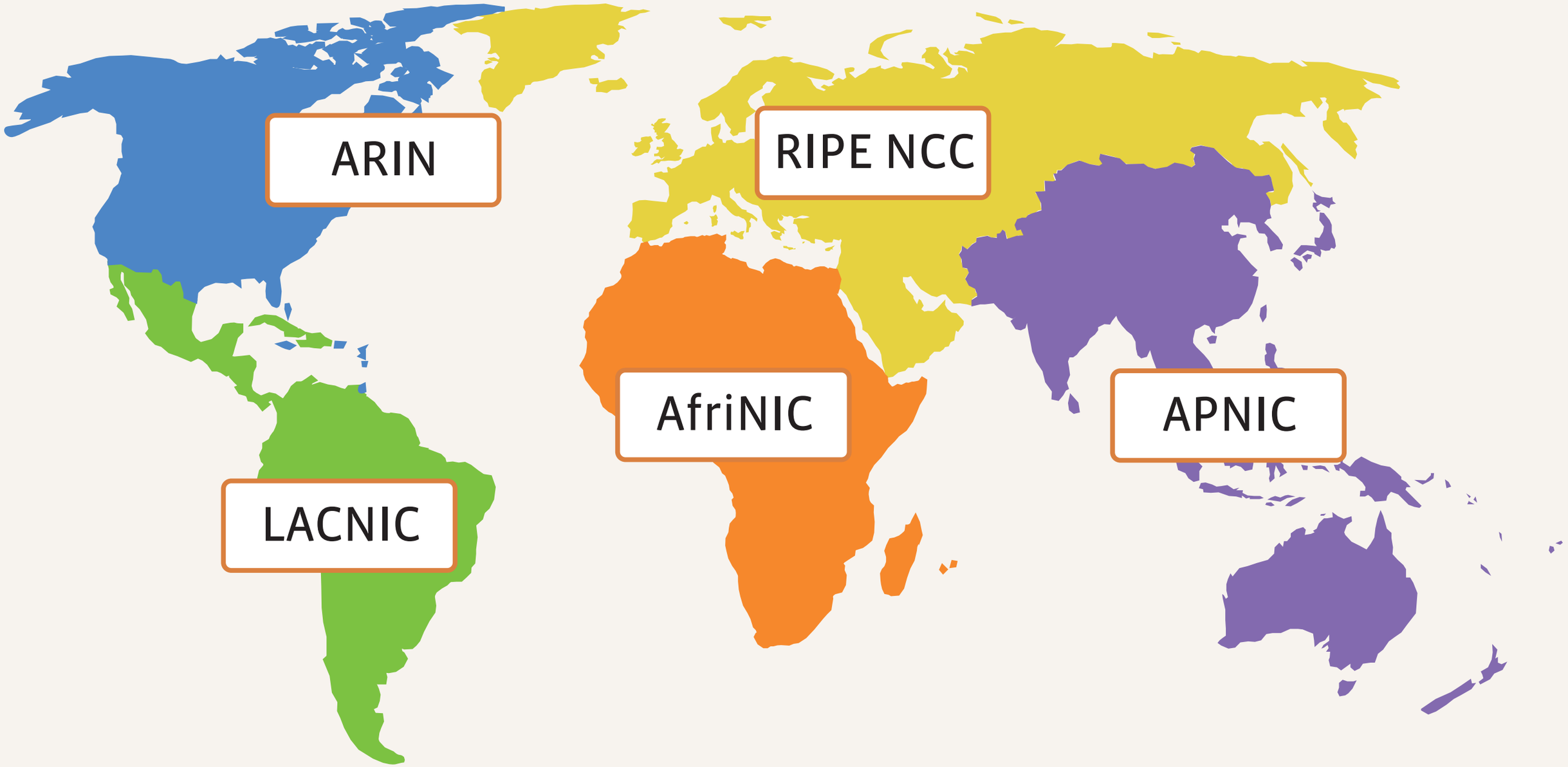
*Divided into 512 **/12** segments*

IPv6 Availability

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

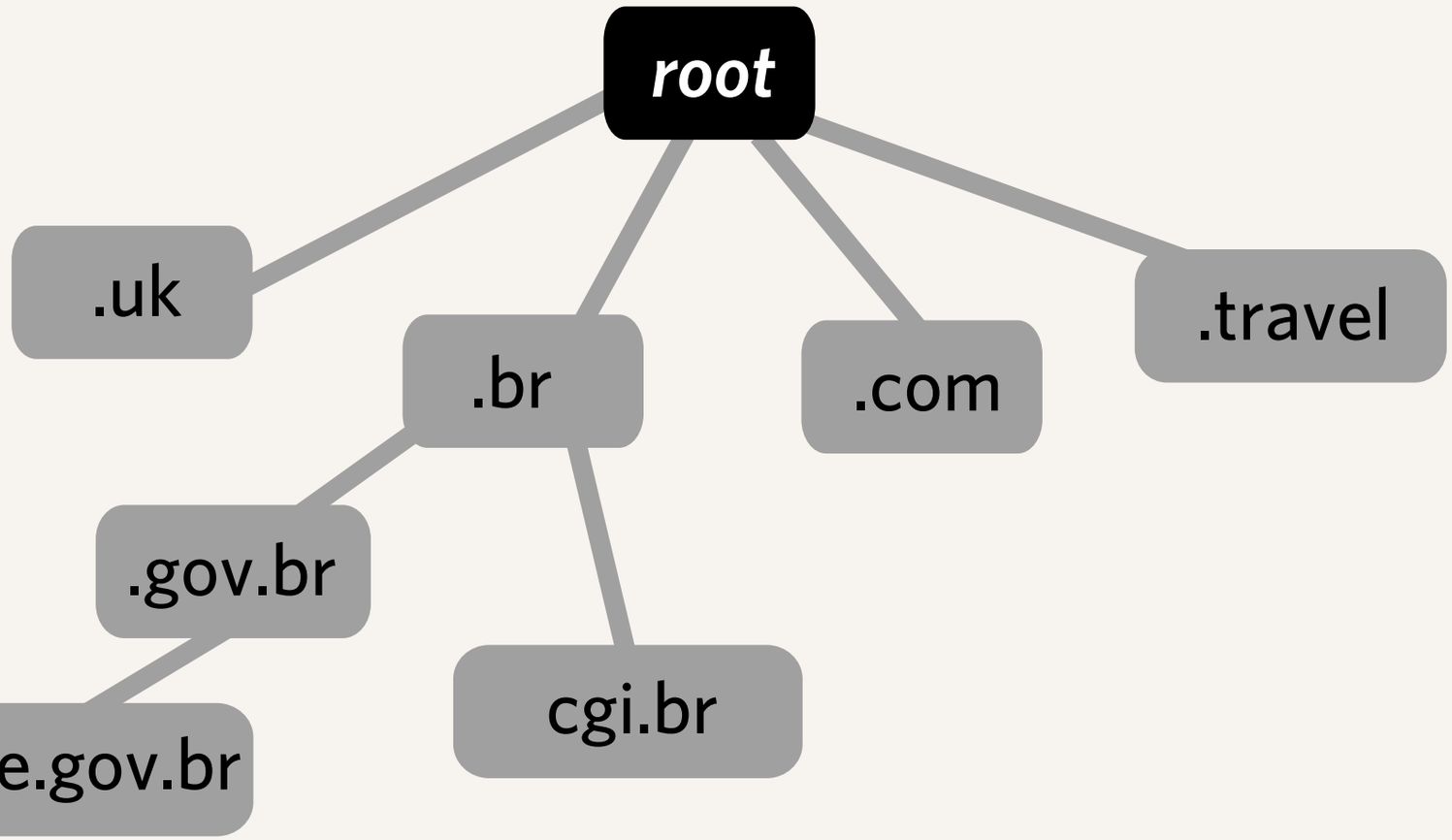
Number Allocation Systems

- 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)

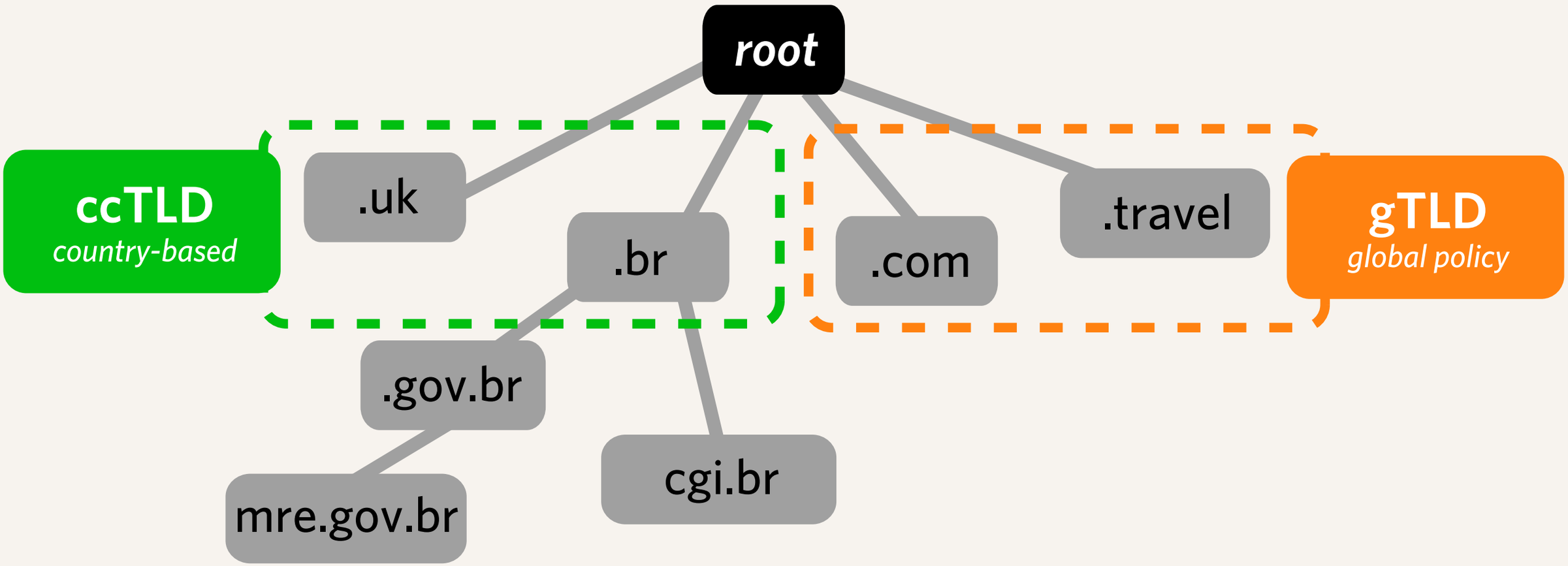


Regional Internet Registries

Domain Names

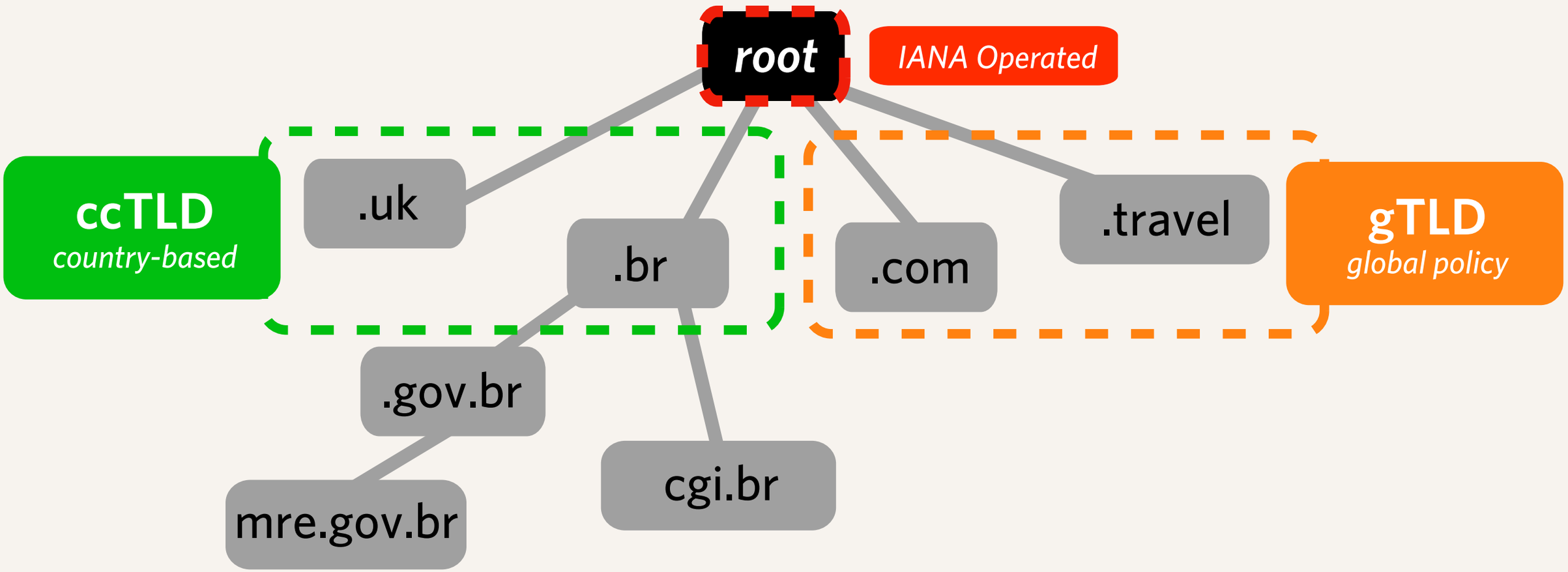


Domain structure



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

EN

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Presentation Notes

FR

Présentation de l'IANA

Notes de présentation

ES

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

Num

Thanks!

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