Internet Governance
ICANN and IANA functions

Virgilio Almeida
Harvard University

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Critical Internet Resources (CIR)

• CIR are finite virtual, internet-specific, globally unique resources.
  – Internet addresses
  – Domain Names
  – Autonomous System Numbers (ASN)

• Demand some type of central oversight

• Multistakeholder institutions control CIRs: Internet Corporation for Assigned Names and Numbers (ICANN), Internet assigned numbers authority (IANA), regional internet registries (RIR), and Domain Name Registries
Internet Names and Addresses

• Addresses, e.g. 212.171.47.146
  – Computer usable labels for machines
  – Conform to structure of the network

• Names, e.g. www.harvard.edu
  – Human usable labels for machines
  – Conform to organizational structure

• How do you map from one to the other?
  – Domain Name System (DNS) maps human readable strings to machine addresses
  – insurance.com → 70.42.23.110
ICANN: Domain Name System
3. DNS Name Space Hierarchy
The name space is organised in a (hierarchic) tree. Responsibility for a subtree can be delegated to another organisation (e.g. from an ISP to a company).

TLD
Top Level Domains

2nd level domains

i-addr.arpa name space

Labels (1 ... 63 chars) per node

Zones

FQDN: „www.zhaw.ch.“

Generic domains

Country domains

- Generic top-level domains (gTLDs including «new gTLDs»)
- Country code top-level domains (ccTLDs)
Naming Hierarchy

- Top Level Domains (TLDs) are at the top
- Maximum tree depth: 128
- Each Domain Name is a subtree
  - .edu ➔ harvard.edu ➔ cs.harvard.edu ➔ www.cs.harvard.edu
  - Name collisions are avoided
    - harvard.com vs. harvard.edu
Domain Name Query and Response

End-user

Caching DNS Server

Root DNS Server

edu DNS Server

DNS Server

www.harvard.edu

212.171.47.146
Domain Name System (critical)

- Internet Protocol numbers are unique addresses that allow computers to find one another
- The Domain Name System matches IP numbers with a name
- DNS is the underpinning of unified Internet
- DNS keeps Internet secure, stable and interoperable

- DNS technical
  - Single master file known as root zone file
  - Internet’s root name servers
13 root servers, labeled A→M
6 are anycasted, i.e. they are globally replicated.
Tasks Necessary for the DNS to Operate

- Assigning domain names
- Resolving names into numbers for each domain
- Controlling and making changes to the root zone file
- Authorizing the creation of a new TLD
- Adjudicating domain name trademark disputes
- Operating and housing the root zone servers
- Authorizing the use of new language scripts in the DNS
- Securing the DNS

- Role of ICANN
What does ICANN do?

WHAT DOES ICANN DO?

To reach another person on the Internet you have to type an address into your device—a name or a number. That address must be unique, so computers will know where to find each other. ICANN maintains and administers these unique identifiers across the world. Without ICANN’s management of this system, known as the Domain Name System (DNS), we wouldn’t have a global, scalable Internet where we can find each other.
Multiple Stakeholders Create Policy

ICANN
Staff & Policy Making Process

ICANN Board Approval

Governments and IGOs, via GAC

Business, NGOs and Non Profit Organizations

Civil Society, e.g. At-Large

Security and Stability Advisors, e.g. Root Server Operators

Registries and Registrars, e.g. ccTLDs and gTLDs

Engineering and Technical Community, e.g. IETF

Numbering and Addressing Organizations

ICANN
ICANN’s functions

• Domain Name System (DNS)
  – Generic Top-Level Domain Names (gTLD) system management
  – Country-code Top-Level Domain Name (ccTLD) DNS
• Internet Protocol (IP) Address Allocation
• Protocol-Parameter Registry
• Root Server Systems
• Time Zone Database Management
Functions ICANN coordinate

- Domain Name System (DNS)
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- Time Zone Database Management
ICANN’s operations

- ICANN is structured to manage DNS, ensuring growth and stability of Internet
  - Internet Assigned Numbers Authority
- Supporting Organizations
  - Address, Country Code Names, Generic Names
- Board of Directors Advisory Committees
  - At-Large, Governmental, DNS Root Server System, Security & Stability
- Technical Advisory Bodies
  - Technical Liaison Group, Internet Engineering Task Force
IANA FUNCTIONS: THE BASICS

When you want to visit a website, you type or paste the site’s domain name into your browser, or click on an HTML link.

That domain name is sent to a server which translates the name into a series of numbers – the Internet Protocol or IP Address - which the server uses to direct your request to the website’s physical location. *This all happens in the blink of an eye.*

Those names and numbers are called “unique identifiers” and are aligned with a standard set of protocol parameters that ensure computers can talk to and understand each other.

These are part of the IANA functions, which are managed by ICANN, the Internet Corporation for Assigned Names and Numbers.

These functions aren’t just limited to browsing the Internet - they also enable you to send an email or backup photos to the cloud, amongst other tasks.
THE HISTORY

Internet Assigned Numbers Authority

The acronym was developed when Jon Postel was administering the ARPANET, a U.S.-government-funded Department of Defense network. It was originally called The IANA, as it was just one person performing the functions.

Since then, the Internet has grown tremendously. The IANA functions are no longer managed by just one person. Instead, they are managed by ICANN.

THE IANA FUNCTIONS ONLINE

Coordinating the unique identifiers that make the Internet run is an important IANA function.

When a computer or device comes online, it needs to know how to talk to the other devices that are online. It is able to do so because there are standards set in place, and each device has a unique identifier.

NAMES AND NUMBERS

The Internet is designed to be user-friendly and simple to navigate. In performing the IANA functions, ICANN coordinates Domain Names, like www.icann.org. Each Domain Name points to a specific IP address.

icann.org  }  DOMAIN NAME
192.0.32.7  }  IP ADDRESS

THE INTERNET ECOSYSTEM

The IANA functions are a major part of the Internet ecosystem, but they are just one part. Other actors play a vital role in the operation of the Internet.

ICANN, in performing the IANA functions, coordinates the unique identifiers.

ICANN performs these functions under a contract with the NTIA.

Verisign edits and publishes the authoritative root zone file.
Iana Transition

Facebook, Google and other tech giants sent letter to Congress urging lawmakers not to block IANA transition

September 13, 2016

The Honorable Paul Ryan
Speaker of the House
H-232, The Capitol
Washington, DC 20515

The Honorable Nancy Pelosi
House Minority Leader
H-204, The Capitol
Washington, DC 20515

The Honorable Mitch McConnell
Senate Majority Leader
S-200, The Capitol
Washington, DC 20510

The Honorable Harry Reid
Senate Minority Leader
S-221, The Capitol
Washington, DC 20510

Dear Speaker Ryan, Minority Leader Pelosi, Majority Leader McConnell, Minority Leader Reid:

On October 1st, 2016, the National Telecommunications and Information Administration (NTIA) plans to end its stewardship of the Internet's addressing system, known as the Internet Assigned Numbers Authority (IANA). This authority would then shift to the global Internet community, through the Internet Corporation for Assigned Names and Numbers (ICANN), a private-sector led, multi-stakeholder organization to coordinate Internet addresses.

In March 2014, the U.S. Department of Commerce asked ICANN to convene the global community of Internet stakeholders to produce a transition plan that meets strict criteria. The undersigned companies and trade associations, representing thousands of companies across the country, are proud and active members of the Internet community. We have worked with representatives from civil society, government, and the technical community to craft a proposal that enables the U.S. Government to seamlessly transfer stewardship of the Internet's addressing system to its global stakeholders.

The final proposal includes significant and concrete measures to enhance ICANN's accountability to its global community. We believe that this important proposal will assure the continuing security, stability and resiliency of this system. Furthermore, crucial safeguards are in place to protect human rights, including the freedom of speech. We are confident that the proposal goes above and beyond the criteria set out by the Commerce Department two years ago to protect Americans.

The Internet's addressing system helps keep the Internet global, scalable and interoperable. It is

Sincerely,

ACT | The App Association
American Registry for Internet Numbers (ARIN)
Computer & Communications Industry Association (CCIA)
The Domain Name Association (TheDNA)
Information Technology Industry Council (ITI)
Internet Association
Internet Infrastructure Coalition (I2Coalition)
NetChoice
Packet Clearing House
Affilias PLC
Amazon
Cloudflare
cPanel, Inc.
Donuts Inc.
Dropsuite
Dyn
Endurance
Facebook
Google
GoDaddy
Handy Networks
OnApp
Public Interest Registry
SingleHop
Tucows, Inc.
Twitter
Yahoo

CC:
Chairman Grassley
Ranking Member Leahy
Chairman Thune
Ranking Member Nelson
Domain Name Industry (2016/2015)

314 MILLION domain names registered globally

9% INCREASE year over year from Q4 2014

TOP 10 LARGEST TLDs BY ZONE SIZE

Source: Zooknic, Q4 2015; Verisign, Q4 2015; Centralized Zone Data Service, Q4 2015

<table>
<thead>
<tr>
<th>Rank</th>
<th>TLD</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>.com</td>
</tr>
<tr>
<td>2</td>
<td>.tk (Tokelau)</td>
</tr>
<tr>
<td>3</td>
<td>.cn (China)</td>
</tr>
<tr>
<td>4</td>
<td>.de (Germany)</td>
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<tr>
<td>5</td>
<td>.net</td>
</tr>
<tr>
<td>6</td>
<td>.org</td>
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<tr>
<td>7</td>
<td>.uk (United Kingdom)</td>
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<tr>
<td>8</td>
<td>.ru (Russian Federation)</td>
</tr>
<tr>
<td>9</td>
<td>.nl (Netherlands)</td>
</tr>
<tr>
<td>10</td>
<td>.info</td>
</tr>
</tbody>
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References for Next Class

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• Crawford, Susan, The Limits of Net Neutrality, Backchannel, Aug. 2nd, www.ece.cmu.edu/~peha/Peha_managed_specialized_services.pdf

THANKS!

Valmeida@cyber.law.harvard.edu