The Internet Ecosystem and ICANN

Steve Sheng @ Stanford University, Center for Information and Society
29 April 2013
Ecosystem

+ A network of interactions among organisms, and between organisms and their environment.

+ The Internet is an ecosystem.

+ The Internet is successful and thriving because its ecosystem is open, transparent and collaborative.
Components of Internet Ecosystem

- Organizations, individuals and processes that shape the coordination and management of the global Internet
- Highly interdependent parts which require significant coordination
- ICANN is one of these organizations
- ICANN is pivotal to naming and addressing
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.
Domain Name System Primer

THE BASICS

Anatomy of a URL | Example: Third-level domain | Second-level domain | Top-level domain

maps.google.com

THE TWO TYPES OF TLDs

Generic top-level domain names (gTLDs)
Example: " .com"

Country code top-level domains (ccTLDs)
Example: " .ly" (The ccTLD for Libya. Many U.S. sites are registered under " .ly" for English domain names that end with the suffix " .ly").
The domain name system

- **DNS database maps:**
  - Name to IP address
    - www.cmu.edu = 128.2.10.162
  - And many other mappings (mail servers, IPv6, reverse…)

- **Data organized as tree structure:**
  - Each zone is authoritative for its own data
  - Minimal coordination between zone operators
The World’s Network – the Domain Name System

+ 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
+ ICANN was formed in 1998 to coordinate DNS
Functions that ICANN Coordinates

+ 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
ICANN Qualifications

+ ICANN created to coordinate DNS and other systems of unique identifiers

+ Affirmation of Commitments established ICANN’s independence, accountability and commitment to the public interest

+ IANA functions performed in line with the National Telecommunications and Information Administration, an agency within the U.S. Department of Commerce.
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
DNS Query and Response

End-user

www.cmu.edu A?

www.cmu.edu A 128.2.10.162

Caching DNS Server

Root DNS Server

edu DNS Server

cmu.edu DNS Server
domain name industry – by the numbers

252 million domain names registered globally
11.8% increase year-over-year from Q4 of 2011

LARGEST TLDs BY ZONE SIZE IN Q4 2012

- .com
- other ccTLDs (de, net, uk, org, info, tk, nl, ru, cn)
- .net
- .uk
- .org
- .info
- .tk
- .nl
- .ru
- .cn

121.1 MILLION .com & .net domain names in the adjusted zone in Q4 2012
8 MILLION new .com & .net domain names in Q4 2012
77 BILLION Average Daily DNS Query Load

Verisign’s average daily DNS query load in Q4 2012 increased 21.5% over last year and increased 16% from Q3 2012. Daily DNS queries peaked at 123 billion, up 20.4% from last quarter and up 5.3% from last year.

6.4% INCREASE from Q4 2011
Root Servers Around the World
Allocation of IP Addresses

+ IP addresses are distributed in hierarchical system
+ IANA allocates IP addresses to RIRs
+ Policy is created through community, open consultation process
+ Global policy is developed through consensus at an RIR, forwarded to ASO and submitted to ICANN Board
Pillars of ICANN Strategy

+ Multi-stakeholder Model
+ Community-Driven Policy
+ Competition & Choice
+ Security & Stability
+ Interoperability
+ Compliance
Multi-stakeholder Model

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.

Multi-stakeholder Model:

Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.
Community-Driven Policy

Multi-stakeholder Model:
Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.

Community-Driven Policy
To keep pace with dynamic technologies and rapid innovation, ICANN enables consensus-driven, Multi-stakeholder policy development, with broad representation from the global Internet community.

Who’s Involved:
A number of groups: supporting organizations, advisory committees, technical advisory bodies and board of directors.
Competition & Choice

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.

Multi-stakeholder Model:
Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.

Community-Driven Policy
To keep pace with dynamic technologies and rapid innovation, ICANN enables consensus-driven, Multi-stakeholder policy development, with broad representation from the global Internet community.

Who’s Involved:
A number of groups: supporting organizations, advisory committees, technical advisory bodies and board of directors.

Competition & Choice
From accrediting over 1000 registrars, to introducing new Top Level Domains (TLDs), ICANN works to expand consumer choice by fostering competition and innovation in the domain name marketplace.

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.

Multi-stakeholder Model:
Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.

Community-Driven Policy
To keep pace with dynamic technologies and rapid innovation, ICANN enables consensus-driven, Multi-stakeholder policy development, with broad representation from the global Internet community.

Who’s Involved:
A number of groups: supporting organizations, advisory committees, technical advisory bodies and board of directors.

Competition & Choice
From accrediting over 1000 registrars, to introducing new Top Level Domains (TLDs), ICANN works to expand consumer choice by fostering competition and innovation in the domain name marketplace.

Security & Stability
ICANN supports DNS security through technical training and engagement, coordinating and collaborating with the community in the implementation of standards such as DNSSEC.

Interoperability
ICANN’s work enables new technologies to flourish while maintaining interoperability across the global Internet. For example, management of the unique protocol identifiers allows communication using secure connections between users.
Contractual Compliance

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 manages and administers these unique identifiers across the world. Without ICANN’s management of the system, known as the Domain Name System (DNS), we wouldn’t have a global, scalable Internet where we can find each other.

Multi-stakeholder Model:
Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.

Community-Driven Policy
To keep pace with dynamic technologies and rapid innovation, ICANN enables consensus-driven, multi-stakeholder policy development, with broad representation from the global Internet community.

Who’s Involved:
A number of groups: supporting organizations, advisory committees, technical advisory bodies and board of directors.

Competition & Choice
From accrediting over 1000 registrars, to introducing new Top Level Domains (TLDs), ICANN works to expand consumer choice by fostering competition and innovation in the domain name marketplace.

Security & Stability
ICANN supports DNS security through technical training and engagement, coordinating and collaborating with the community in the implementation of standards such as DNSSEC.

Interoperability
ICANN’s work enables new technologies to flourish while maintaining interoperability across the global Internet. For example, management of the unique protocol identifiers allows communication using secure connections between users.

Compliance
ICANN Oversees the contracts it maintains and enforces policies developed through the community-driven process. ICANN’s compliance function seeks to address and correct non-conforming practices.
ICANN and Internet Ecosystem: What’s Next

- New Top-Level Domain Names
- ccTLDs – country code TLDs
- IDN – Internationalized Domain Names
- IPv6 Deployment
Expanded gTLDs

+ Introduction of unlimited gTLD names or extensions
+ A platform for innovation, choice and competition in marketplace
+ Creating online cultural, geographic and linguistic communities
+ 1930 applications from 60 countries and territories
+ Adding safeguards to the process
ccTLDs

+ Broadening the character repertoire available for country code TLDs
+ Expansion of overall operation of the ccTLDs
Internationalized country code Top-level Domain Names
Internationalized Domain Names

+ Most newcomers to Internet do not speak English
+ IDNs allow users to access the Internet entirely in their own language characters, rather than in Latin characters
+ Applicants for expanded gTLDs include more than a hundred IDNs
+ Making the Internet ever more globally inclusive
Adoption of IPv6

- IPv6 deployment grew once the last IPv4 address was taken
- ICANN Board ratified plan for recovered IPv4 addresses
Individuals and the Internet Ecosystem

+ At-Large Advisory Committee is the ICANN home for individual Internet users
+ Ground-up, tiered structure
+ 150 At-Large Structures at grassroots level
+ Sends a voting member to ICANN’s Board
+ Increased quantity and quality of public policy statements
Participation in ICANN

+ Open to entire Internet ecosystem
+ Receive updates via MyICANN.ORG
+ Join public comment forum on ICANN’s web site
+ Attend ICANN’s public meetings in person or online
+ Join one of ICANN’s Supporting Organizations or Advisory Committees
One world. One internet.

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 the system, known as the Domain Name System (DNS), we wouldn’t have a global, scalable Internet where we can find each other.

Multi-stakeholder Model:
Civil Society & Internet Users, the Private Sector, National & International Organizations, Governments, Research, Academic and Technical Communities are all represented.

Community-Driven Policy
To keep pace with dynamic technologies and rapid innovation, ICANN enables consensus-driven, multi-stakeholder policy development, with broad representation from the global Internet community.

Who’s Involved:
A number of groups: supporting organizations, advisory committees, technical advisory bodies and board of directors.

Compliance
ICANN oversees the contracts it maintains and enforces policies developed through the community-driven process. ICANN’s compliance function seeks to address and correct non-conforming practices.

Get involved:
- Sign up for updates at myicann.org
- Join one of the many Public Comment Forums on ICANN’s website
- Attend ICANN’s Public Meetings in person or online to provide input at a Public Forum
- Join one of ICANN’s Supporting Organizations or Advisory Committees

Interoperability
ICANN’s work enables new technologies to flourish while maintaining interoperability across the global Internet. For example, management of the unique protocol identifiers allows communication using secure connections between users.

Competition & Choice
From accrediting over 1000 registrars, to introducing new Top Level Domains (TLDs), ICANN works to expand consumer choice by fostering competition and innovation in the domain name marketplace.

Security & Stability
ICANN supports DNS security through technical training and engagement, coordinating and collaborating with the community in the implementation of standards such as DNSSEC.
Thank You & Questions?
Graphic Credits


Slide 6: Domain Name Primer (http://columnfivemedia.com/work-items/demandforce-infographic-new-world-domain-nation-the-rush-for-top-level-domain-names/)


Slide 14: Root Servers Technical Association (http://www.root-servers.org)

Slide 24: New gTLD visualization (http://perryhewitt.com/let-the-bidding-begin-new-gtlds-visualized/)

Slide 26: IDN ccTLD visualization (Bytelevel research)