The ‘net and it’s Ecosystem
What is DNS?
http://www.rule11.tech
Recursive

Authoritative

TLD

• Hardware
• Software
• Operations
• Maintenance
• Bandwidth
• Standards
• Development

Who pays for these?
Recursive servers are paid for by...

- Edge Providers
- Content Providers
- Corporations
- Transit Providers
- Public Institutions
Root servers are paid for by...

a.root-servers.net Verisign
b.root-servers.net USC-ISI
c.root-servers.net Cogent Communications
d.root-servers.net University of Maryland
e.root-servers.net NASA
f.root-servers.net Internet Systems Consortium
g.root-servers.net Defense Info Systems Agency
h.root-servers.net US Army Research Lab
i.root-servers.net Netnod
j.root-servers.net Verisign
k.root-servers.net RIPE NCC
l.root-servers.net ICANN
m.root-servers.net WIDE Project
TLD servers are paid for by...

- VERISIGN
- donuts
- AUTOMATTIC
- neustar
- Uniregistry
- Alexa
Authoritative servers are paid for by...

- GoDaddy
- web.com
- SiteGround
- network solutions
- AWS
- Google
Costs of operating TLD servers

- Fixed fee per domain name
- Contract operating fees from TLD holders
- Other operations

Domain Reseller

- Market value domain fees
- Hosting fees

VERISIGN™

Costs of operating a root

Costs of operating root

Costs of operating TLD servers

Costs of operating authoritative servers
Kinds of Peering

- Customer Edge (or provisioned, or “enterprise”)
- Paid (or transit)
- Settlement Free
- Open
Edge Provider

DSLAM

WiFi, LTE, DSL, etc.

Cable Access Channel, Metro Ethernet, etc.

ROADM

Metro Fiber Ring

ROADM

ROADM

ROADM

Transit Provider

A

B

C

D

E

F
Edge Provider Financial

Physical Cable
Right of Way/Access
Hardware & Software
Buildings/COs/POPs
DNS Servers

Infrastructure

User Access Fees
Service Subscriptions
Colocation Fees
Physical Plant Rental

Transit
People
Internet Exchange Point

Route Server

Member/peer

Member/peer

Member/peer

Member/peer

Member/peer

Internet Exchange Point
Physical Cable
Hardware & Software
Buildings/COs/POPs
DNS Servers

Infrastructure

User Access Fees
Service Subscriptions
Colocation Fees

Transit
People
Cogent Communications
Transit Provider Financial

Physical Cable
Right of Way/Access
Hardware & Software
Buildings/COs/POPs
DNS Servers

Infrastructure

Transit Fees
Service Subscriptions
Colocation Fees
Dark/Dim/Lit Fiber

Transit
People
Types of CDN

- Caching
  - Cache based on TTL
- Prepositioned Content
  - Common elements may appear on most pages
  - Preload these into the cache and serve locally
- Session Termination
  - Some sites can terminate sessions at the CDN
  - Draw only the information needed from
Content Reshaping the Internet

AS65000 content provider

AS65003 edge operator

AS65004 edge operator

AS65001 transit provider

AS65005 edge operator

paid
Content Reshaping the Internet
The Reshaping of the Internet

- What is the result of this change?
- Transit providers are struggling to survive
- Content providers are gaining more control over their content
- Raises the bar for entry into the content market
  - Although public cloud may offset this somewhat
- Difficult to determine
  - Is this good or bad? Hard to tell right now
The Internet Engineering Task Force (IETF®)

The goal of the IETF is to make the Internet work better.

The mission of the IETF is to make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use, and manage the Internet. Newcomers to the IETF should [start here].

**News**

- IETF 104 in Prague!
- IETF Blog
- IETF Daily Dose

**Next Meeting: IETF 101 London**

**IETF 101 - March 17-23, 2018**

- Register
- Important Dates
- Wiki
- Agenda
- Meeting Materials
- Remote Participation
- Hackathon (open to public)

**Email Archives**

A new mail archive tool realizing the requirements developed in RFC 6778 is now in use:

- [Search all IETF email archives](#)

If you choose to log in, use your datatracker credentials.

(Read full announcement in the archives here.)

**Recent Meeting: IETF 100 - Singapore**

- IETF 100 Information
- IETF 100 Proceedings

**Internet-Drafts and RFCs Quick Search**

**Related Web Pages**

ISA and IAOC | IAB | RFC Editor | IANA | IETF | IETF Trust | ISOC

ISOC Fellowship to the IETF Program

The Internet Engineering Task Force (IETF) is an organized activity of the Internet Society (ISOC).

ISOC is a non-profit organization founded in 1992 to provide leadership in Internet-related standards, education, and policy. It is dedicated to ensuring the open development, evolution and use of the Internet for the benefit of people throughout the world. See: [www.isoc.org](http://www.isoc.org)
IETF Notes

- The IETF is consensus driven
- Running code is required
  - Some states require two interoperable implementations
- Until the IETF last call is completed, any member of the community can comment on the document
- Management and security concerns must be addressed in protocol development
- This is a long, difficult process, designed to produce solid protocols with a lot of experience behind them
<table>
<thead>
<tr>
<th>IEEE</th>
<th>All layer 1 and layer 2 transport and control plane protocols, including Ethernet, spanning tree, wireless networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3C®</td>
<td>Markup languages (languages which describe how to display or render content), including HTML and XML</td>
</tr>
<tr>
<td>ITU</td>
<td>Any international standard, including numbering, encryption schemes, and routing protocols (such as IS-IS)</td>
</tr>
</tbody>
</table>
• Corporate membership and participation
  • Members mostly vendors
  • Standardization through formal voting

• Voluntary membership and participation
  • Members mostly vendors, providers, researchers
  • Standardization through rough consensus

• Governmental and corporate (NGO) membership and participation
  • Members mostly government and vendor representatives
  • Standardization through formal voting