



Computer Network

Introduction to CN

Lecture : 1

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GATE Syllabus: Computer Network

- Concept of layering: OSI and TCP/IP Protocol Stacks;
- Basics of packet, circuit and virtual circuit-switching;
- Data link layer: framing, error detection, Medium Access Control, Ethernet bridging;
- Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT);
- Transport layer: flow control and congestion control, UDP, TCP, sockets;
- Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

Reference Books

- Computer Networks: Book by Andrew S. Tanenbaum
 - Computer Networking with Internet Protocols and Technology : William Stalling
 - Data Communication and Networking : Behrouz A. Forouzan
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Lecture Plan

Topic	Number of Sessions
Introduction to CN	
Physical Layer	
Data Link Layer	
Network Layer	
Transport Layer	
Application Layer	
Problem Practice	
Total	50

Introduction to Computer Network

Goal of networking: Communication, resource sharing, scalability, etc.

Device A <---router---> Internet <---router---> Device B

History of Computer Network

🏛️ Episode 1: The War Begins (1940s – WW2)

This led to the birth of **ENIAC** and **Colossus** — the earliest electronic computers.

Episode 2: The Cold War Sparks Innovation (1950s–60s)

This was the **foundation of packet switching**

Episode 3: The Birth of ARPANET (1969) In 1969, a group of brilliant minds from **UCLA**, **Stanford**, **UC Santa Barbara**, and the **University of Utah** created the first network of computers — called **ARPANET**, funded by the U.S. Department of Defense's **ARPA** (now DARPA).

First message was: LOGIN

History of Computer Network

Episode 4: The Protocol Wars (1970s–80s)

Every system used different protocols!

IBM, Microsoft, UNIX — all spoke **different network languages**.

To solve this, two models were proposed:

- **OSI Model** (Europe): 7-layered theoretical model.

- **TCP/IP Model** (USA): 4-layered practical protocol suite.

Eventually, **TCP/IP** became the king — and is the basis of today's Internet.



Episode 5: Enter the Internet (1983 – Present)

In **1983**, ARPANET officially adopted **TCP/IP**, marking the **birth of the Internet** as we know it.

DNS was introduced (so we didn't have to remember IP addresses).

HTTP & HTML were invented by **Tim Berners-Lee** in the early '90s.

And suddenly, we had the **World Wide Web**!

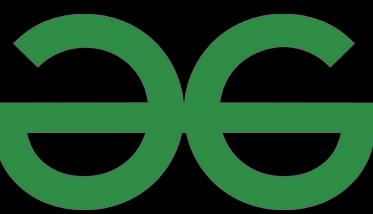


Episode 6: The Modern Age – WiFi, 4G, IoT

We have **billions of devices** connected.

Data flows over **5G, WiFi, satellites, fiber optics**, even **undersea cables**.

We live in a **hyperconnected world** of smartphones, smart homes, smart cars.



<https://www.nslookup.io/domains/www.google.co.in/dns-records/>

DNS for Developers — Learn DNS once and for all

NsLookup.io

www.google.co.in Find DNS records

Learning Browser extension

DNS records for **www.google.co.in**

Cloudflare Google DNS Authoritative Control D Local DNS 

The Cloudflare DNS server responded with these DNS records. Cloudflare will serve these records for as long as the time to live (TTL) has not expired. After this period, Cloudflare will update its cache by querying one of the authoritative name servers.

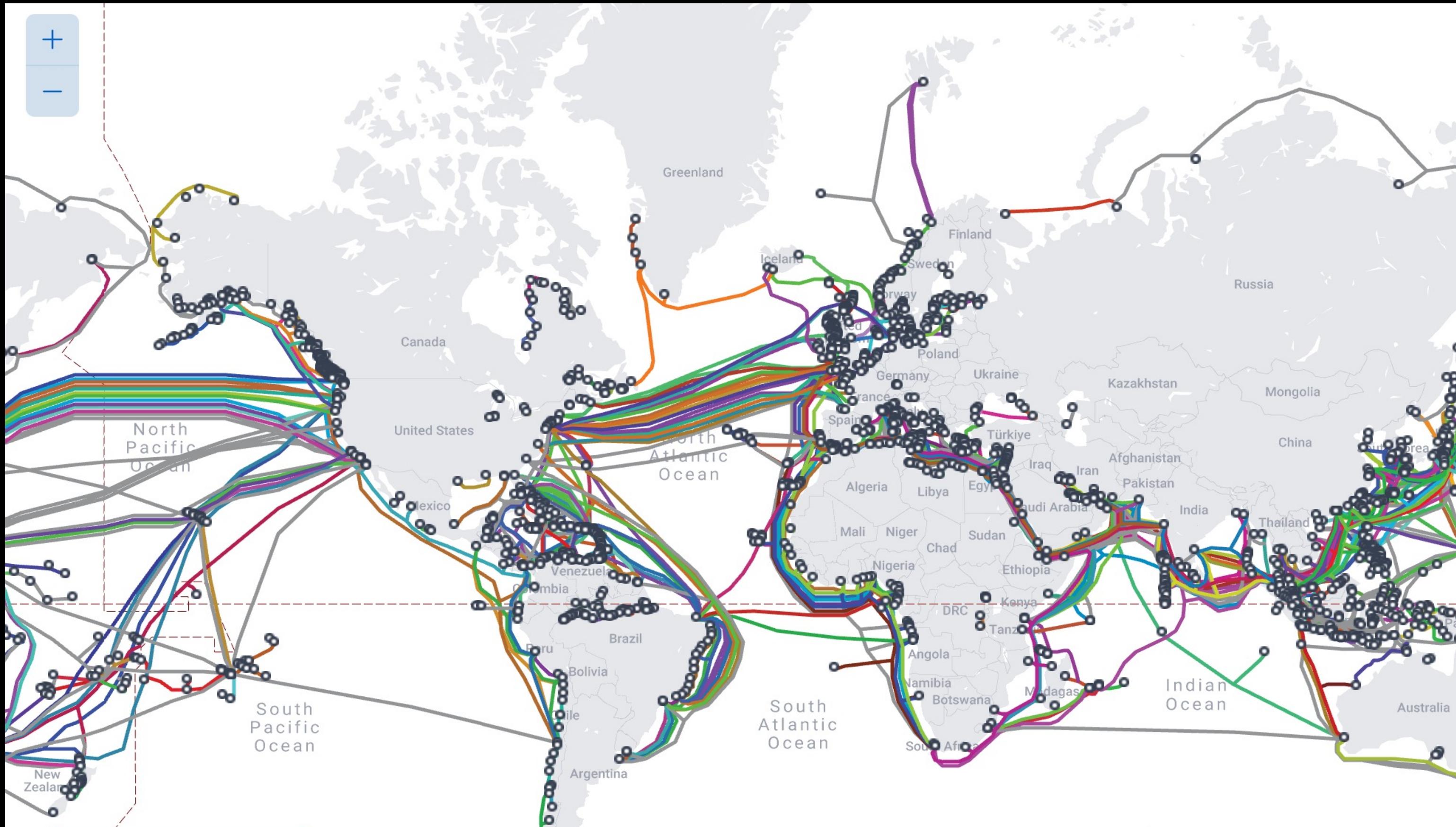
A records

IPv4 address	Revalidate in
>  74.125.200.94	4m 38s

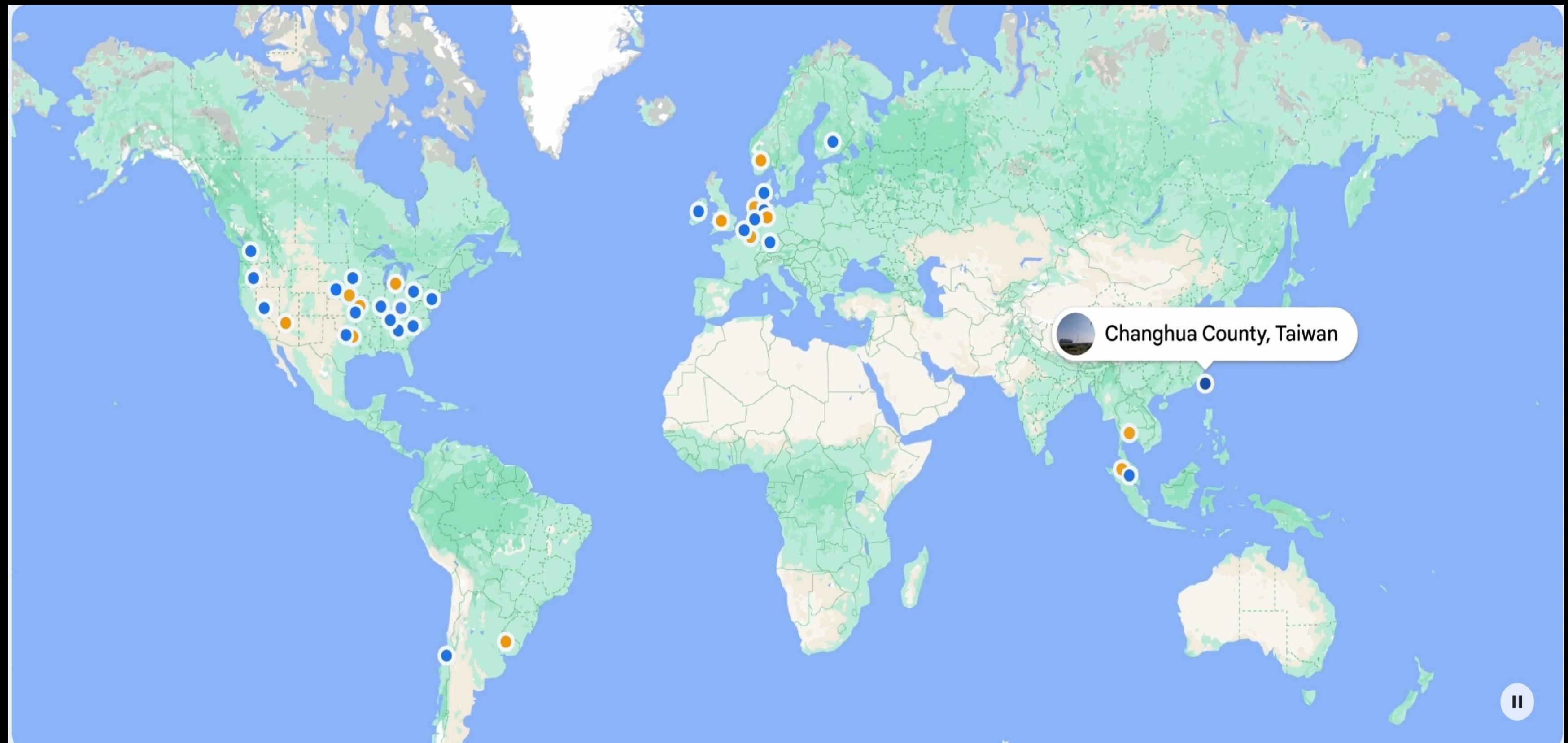
AAAA records

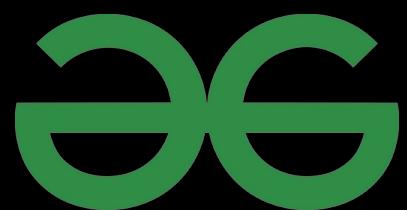
IPv6 address	Revalidate in
>  2404:6800:4003:c01::5e	3m 27s

<https://www.submarinecablemap.com/>



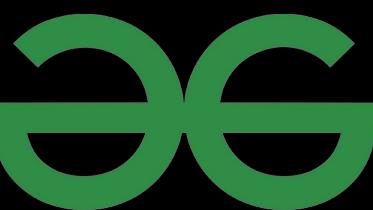
<https://datacenters.google/>





<https://dnsmap.io/#A/www.google.co.in>





<https://www.iana.org/domains/root/servers>

Root Servers

The authoritative name servers that serve the DNS root zone, commonly known as the “root servers”, are a network of hundreds of servers in many countries around the world. They are configured in the DNS root zone as 13 named authorities, as follows.

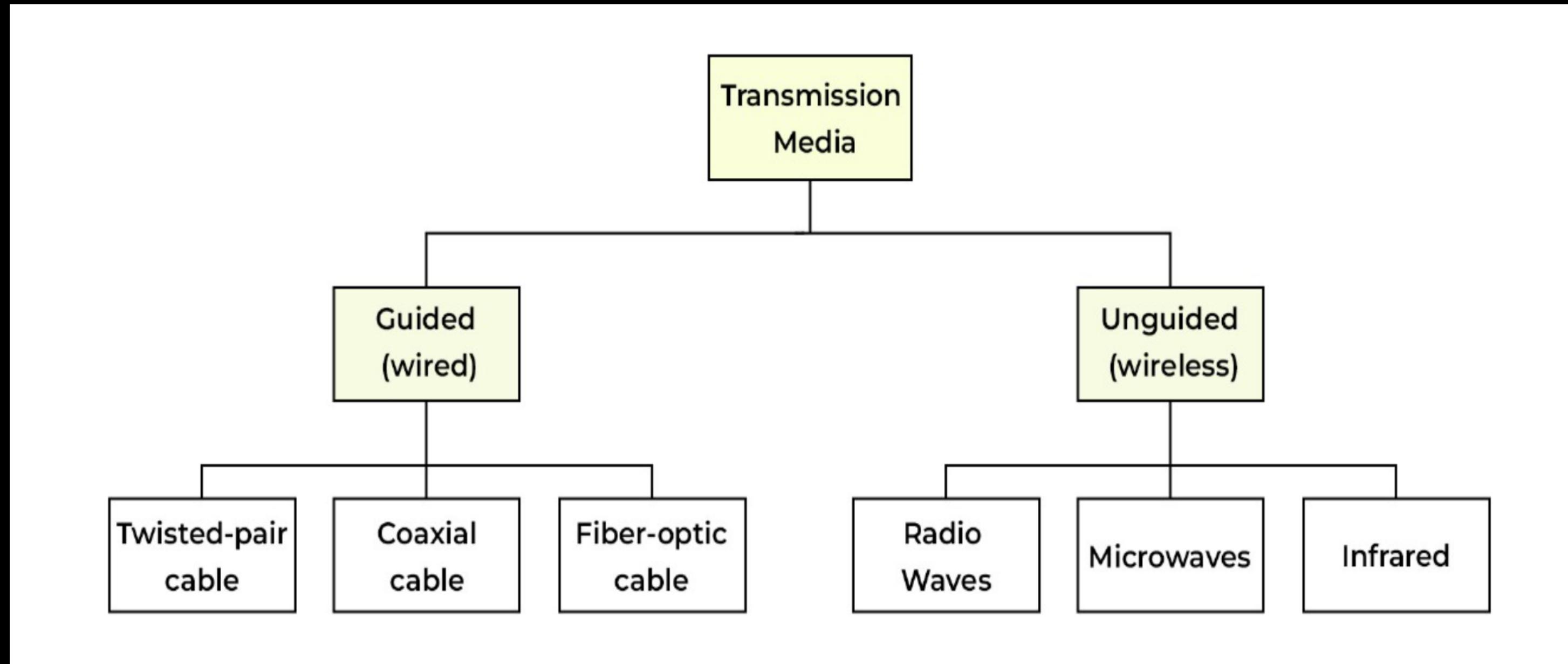
List of Root Servers

HOSTNAME	IP ADDRESSES	OPERATOR
a.root-servers.net	198.41.0.4, 2001:503:ba3e::2:30	Verisign, Inc.
b.root-servers.net	170.247.170.2, 2801:1b8:10::b	University of Southern California, Information Sciences Institute
c.root-servers.net	192.33.4.12, 2001:500:2::c	Cogent Communications
d.root-servers.net	199.7.91.13, 2001:500:2d::d	University of Maryland
e.root-servers.net	192.203.230.10, 2001:500:a8::e	NASA (Ames Research Center)
f.root-servers.net	192.5.5.241, 2001:500:2f::f	Internet Systems Consortium, Inc.
g.root-servers.net	192.112.36.4, 2001:500:12::d0d	US Department of Defense (NIC)
h.root-servers.net	198.97.190.53, 2001:500:1::53	US Army (Research Lab)
i.root-servers.net	192.36.148.17, 2001:7fe::53	Netnod
j.root-servers.net	192.58.128.30, 2001:503:c27::2:30	Verisign, Inc.
k.root-servers.net	193.0.14.129, 2001:7fd::1	RIPE NCC
l.root-servers.net	199.7.83.42, 2001:500:9f::42	ICANN
m.root-servers.net	202.12.27.33, 2001:dc3::35	WIDE Project

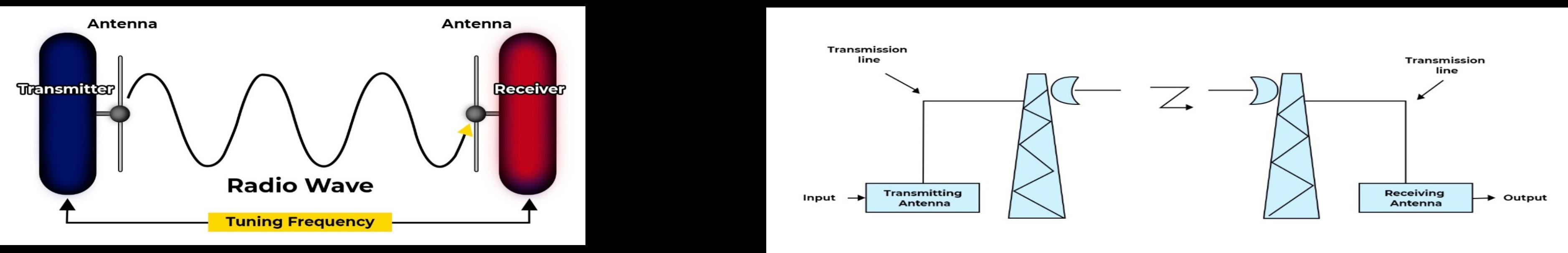
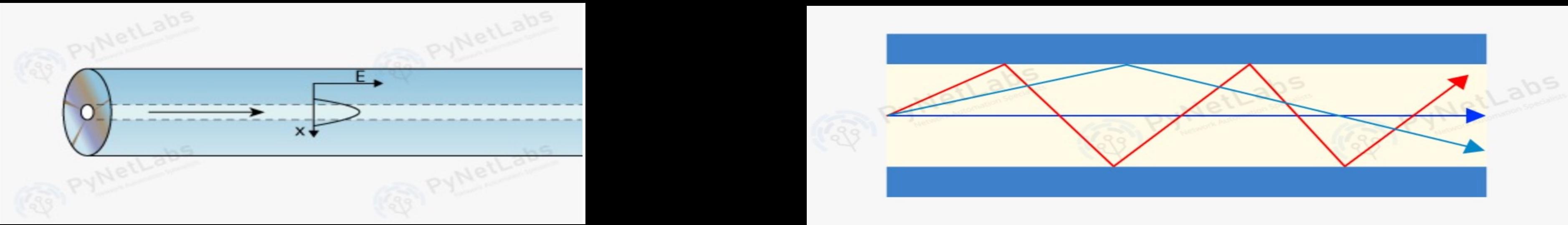
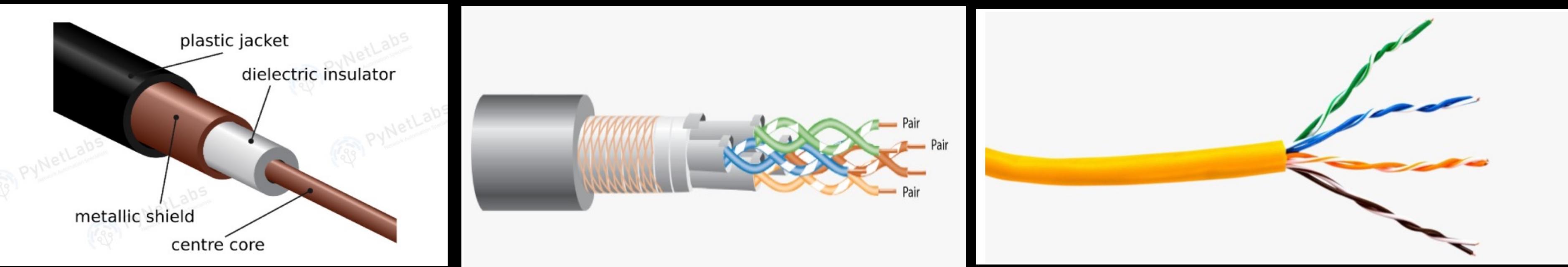


<https://theliquidgrid.com/underwater-data-centers/>

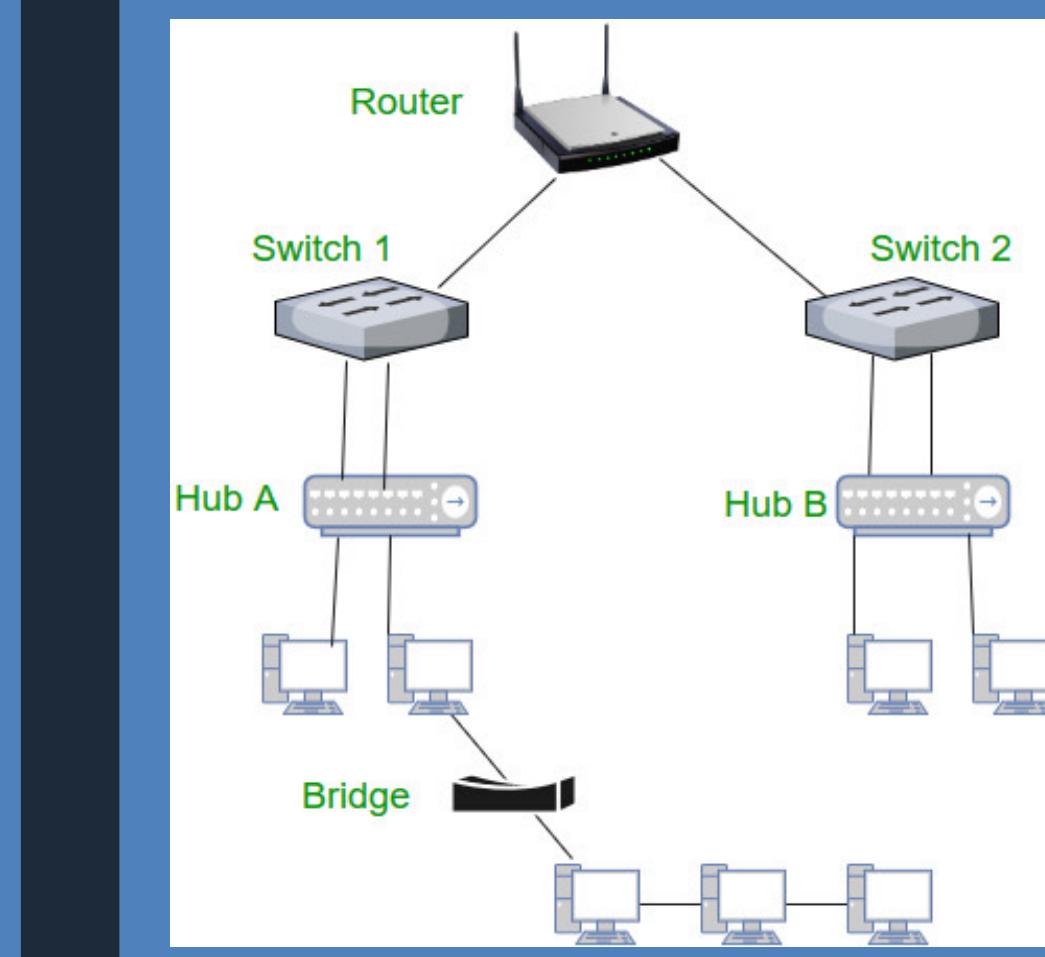
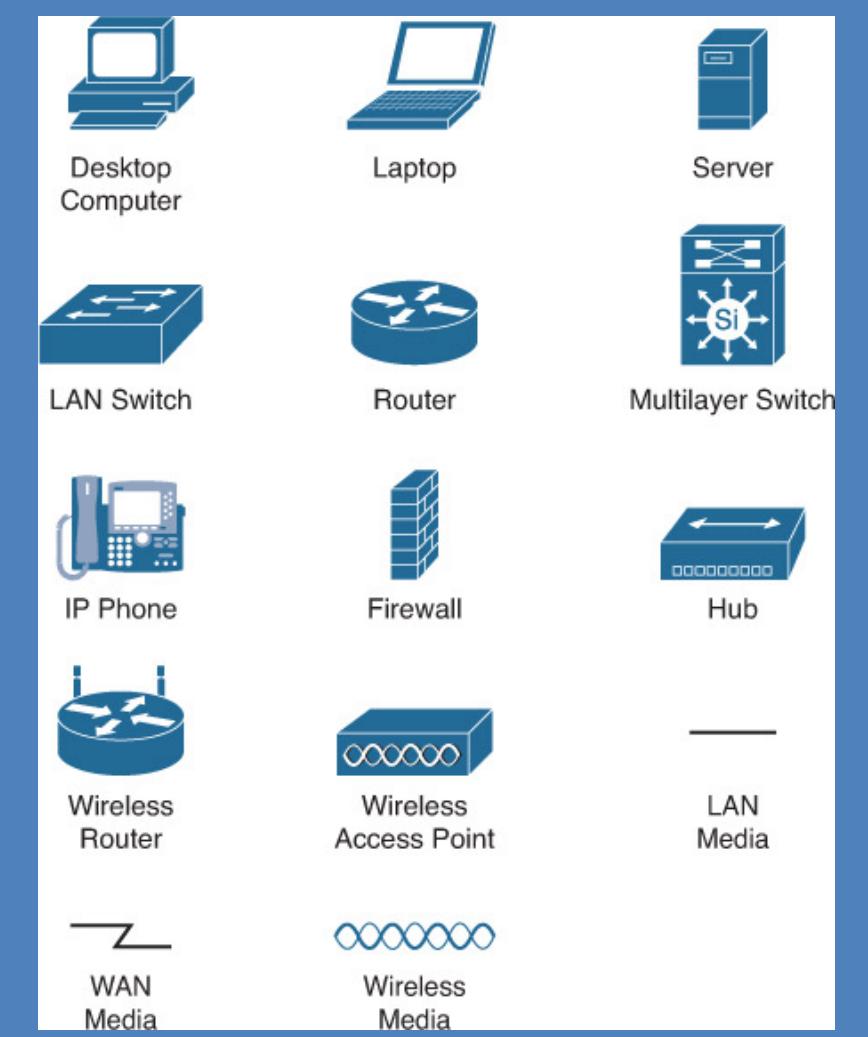
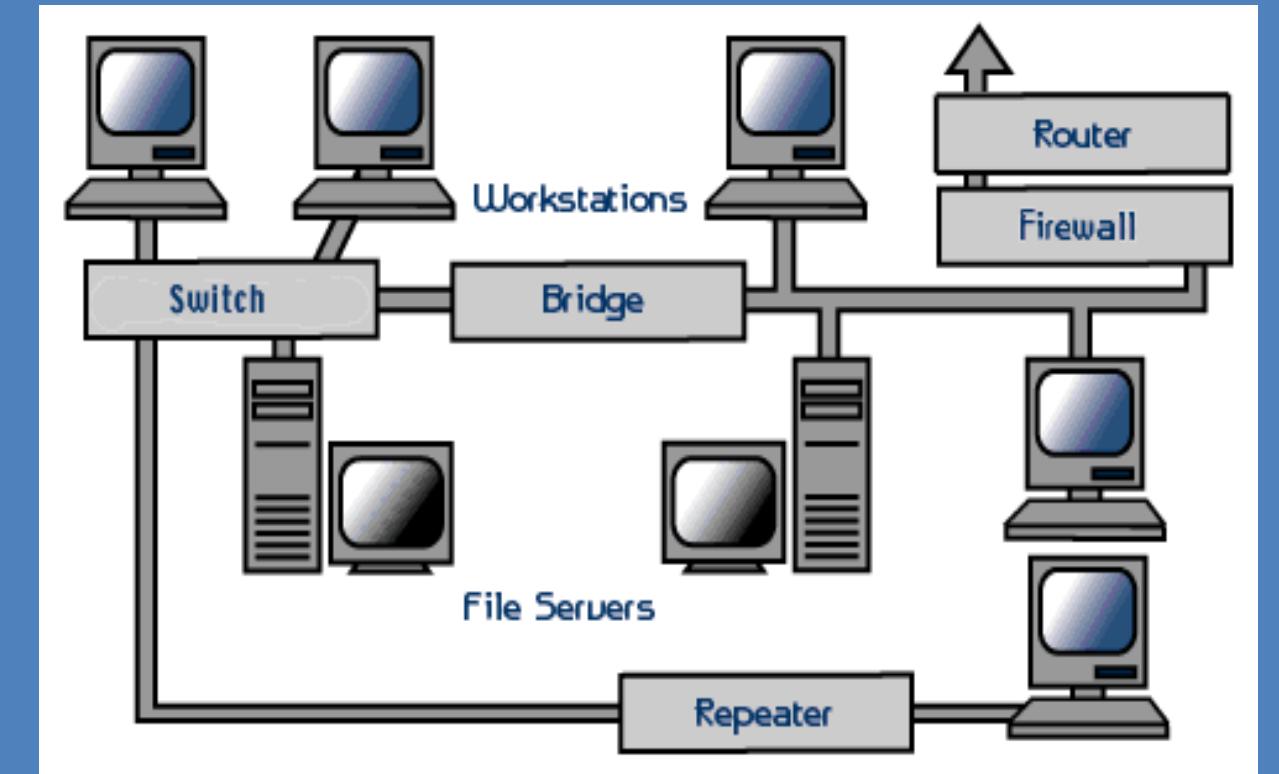
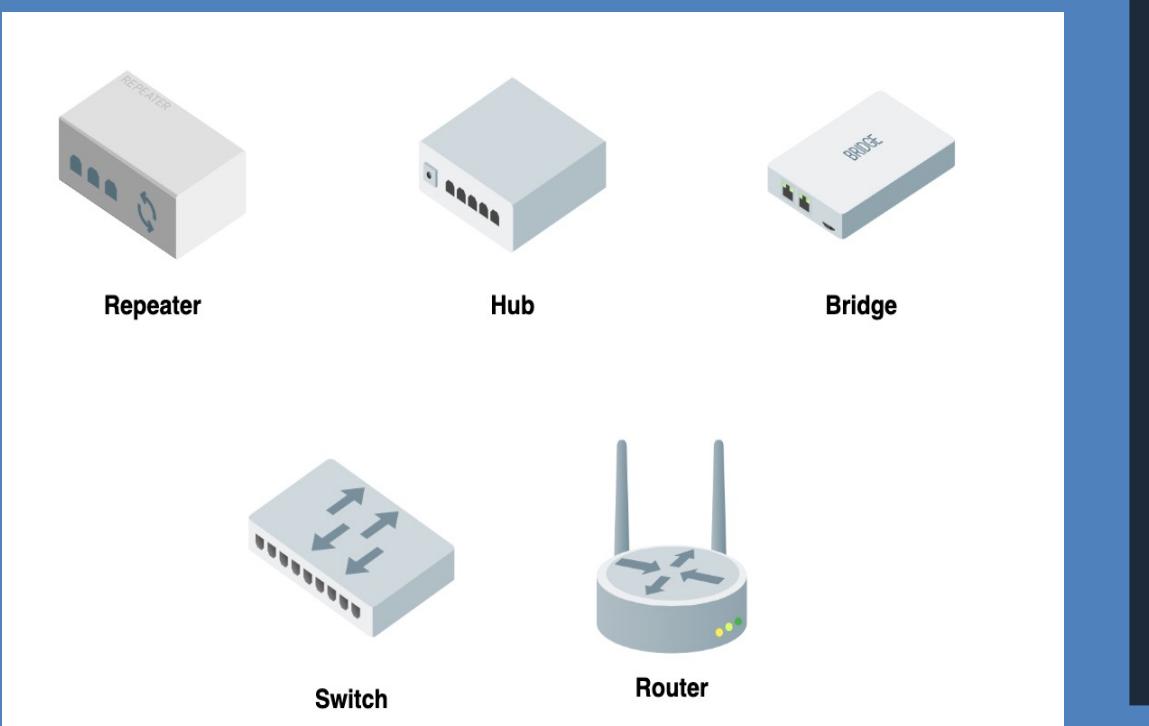
Transmission Media



Transmission Media



Network Devices





Thank You

