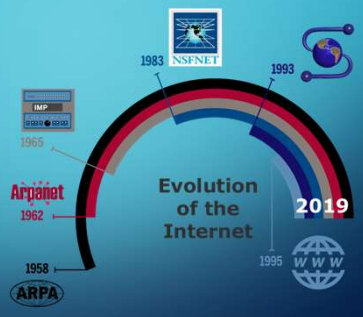
Summer Camp Lets Communicate



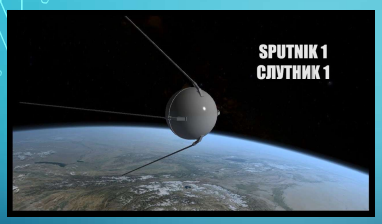
By Jorge Amodio
@jamodio
Summer 2019

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The Internet



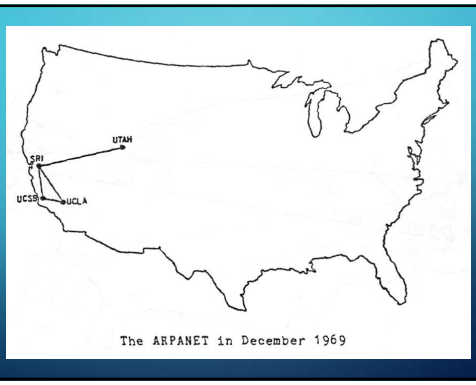
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In October 4, 1957 the Soviet Union launches into an elliptical low Earth orbit the first artificial satellite, getting ahead of the USA in the space race.

In response President Dwight Eisenhower creates the Advanced Research Projects Agency (ARPA) in February 1958. Among other projects ARPA funds the development of advanced computer networking technology. The ARPANet is born.

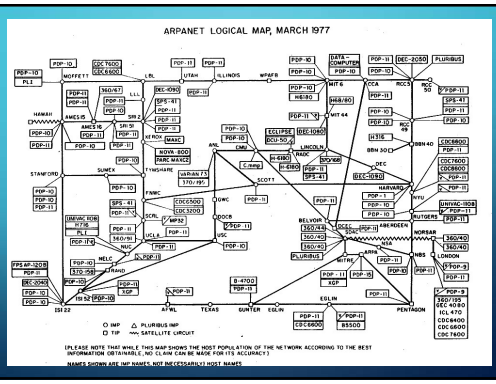
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The ARPANET in December 1969

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With the growth of ARPANet and the need to interconnect various different networks a new communication protocol was needed…



In May 1974, Vinton Cerf and Robert Kahn publish on IEEE Transactions on Communications: "A Protocol for Packet Network Intercommunication," describing the Transmission Control Protocol or TCP, that they invented in 1973

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Vint Cerf & Bob Kahn invent the TCP system in 1973

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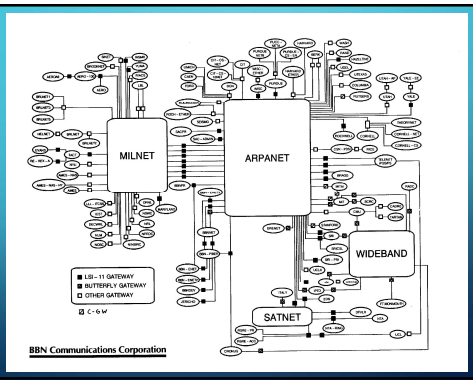
In 1978 TCP was split into TCP and IP For Internet Protocol. The full specification gets published as RFC791 in September 1981.

In 1983 the Defense Communication Agency (DCA) and ARPA establish TCP/IP as the protocol suite for the ARPANet, requiring all machines on the network to use TCP/IP replacing the previous protocol known as NCP (Network Control Protocol)



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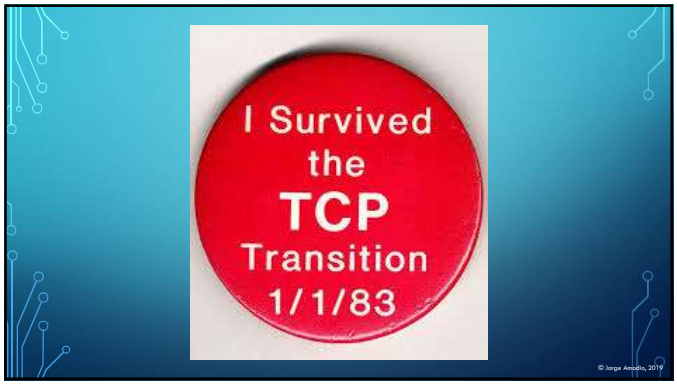
© Jorge Amodio, 2019

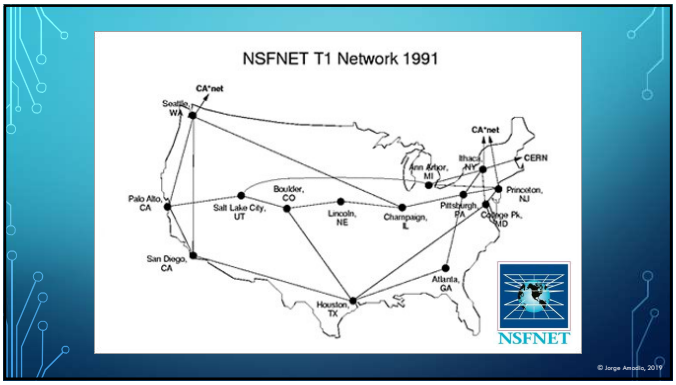


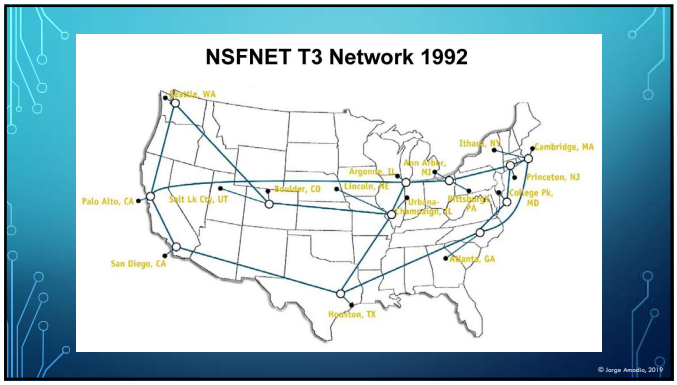
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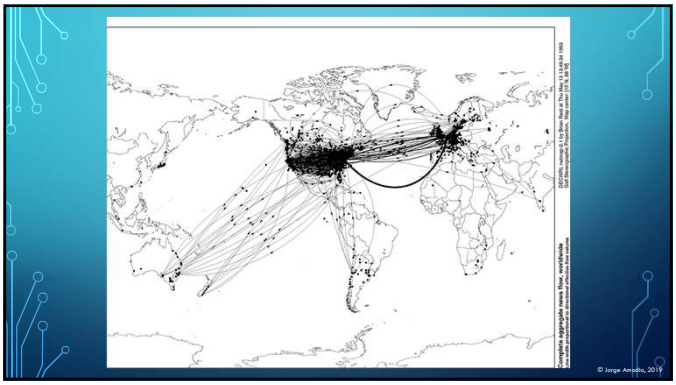
Vint Cerf on when TCP/IP enabled the birth of the internet

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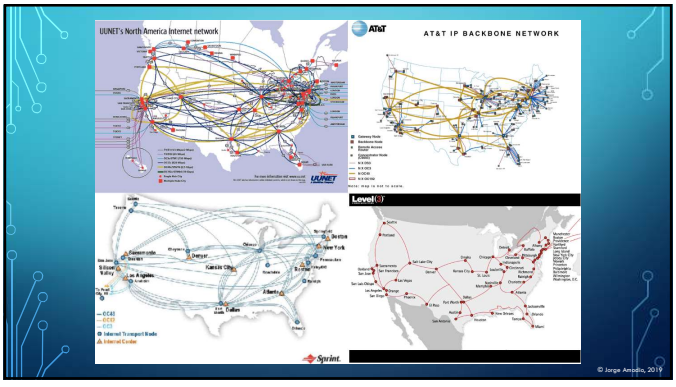

I Survived
the
TCP
Transition
1/1/83
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NSFNET T1 Network 1991
CA*net
Seattle, WA
CA*net
Ithaca, NY
CERN
Ann Arbor, MI
Boulder, CO
Palo Alto, CA
Salt Lake City, UT
Lincoln, NE
Champaign, IL
Pittsburgh, PA
Princeton, NJ
College Pk, MD
San Diego, CA
Atlanta, GA
Houston, TX
NSFNET
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NSFNET T3 Network 1992
Seattle, WA
Ithaca, NY
Cambridge, MA
Ann Arbor, MI
Argonne, IL
Princeton, NJ
Boulder, CO
Lincoln, NE
Palo Alto, CA
Salt Lk City, UT
Urbana-Champaign, IL
Pittsburgh, PA
College Pk, MD
San Diego, CA
Atlanta, GA
Houston, TX
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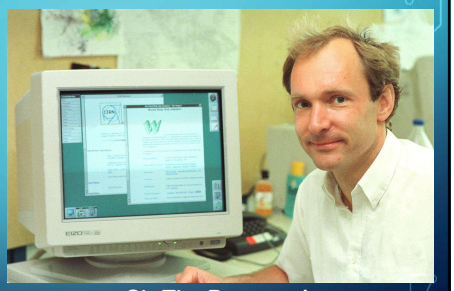

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UUNET's North America Internet network
AT&T
AT&T IP BACKBONE NETWORK
Level(3)
Sprint
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1990

The World Wide Web is born



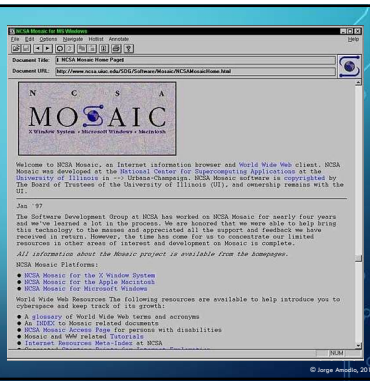
Sir Tim Berners-Lee

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NCSA MOSAIC

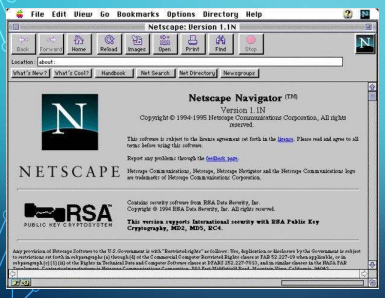
- Early Web Browser released by UIUC NCSA in November 1993
- 1993 Product of the Year by InfoWorld
- 1994 Technology of the Year by IndustryWeek





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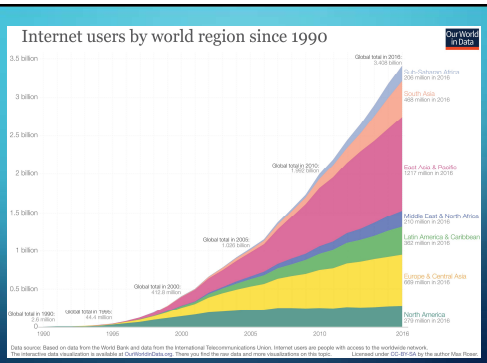
Netscape Navigator



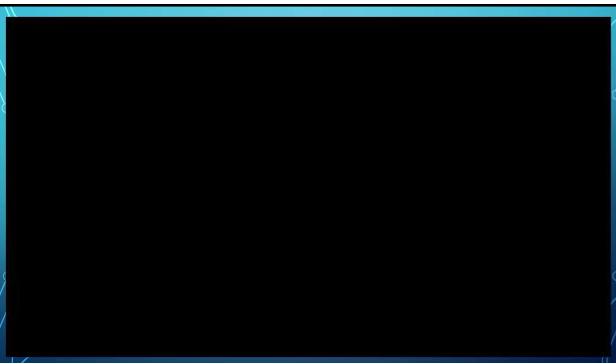


- Netscape co-founded by Marc Andresseen in April 1994
- Navigator was the dominant Web Browser.
- Company was later acquired by AOL for US$4.2 billion

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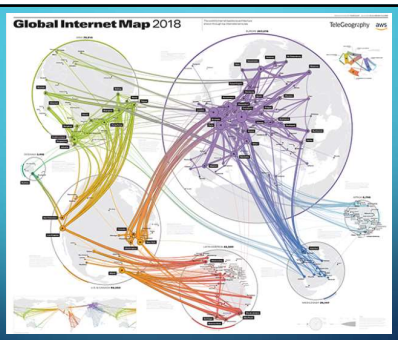


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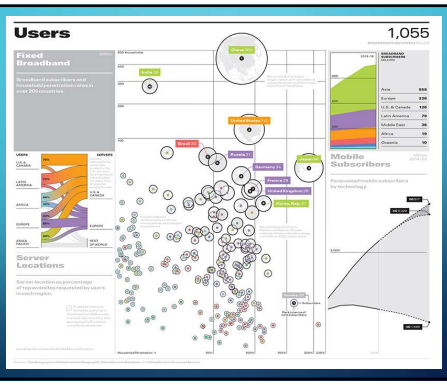
Sir Tim Berners-Lee & Dr. Vint Cerf

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https://global-internet-map-2018.telegeography.com/

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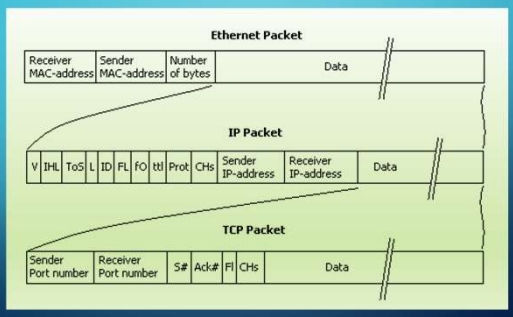


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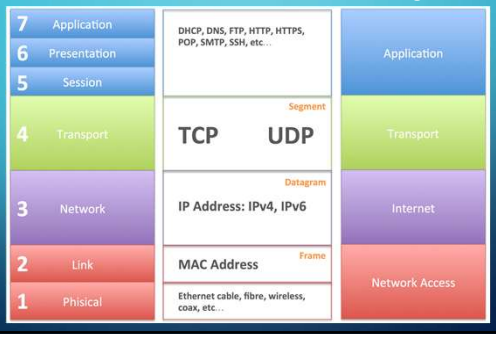
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The Packets !!



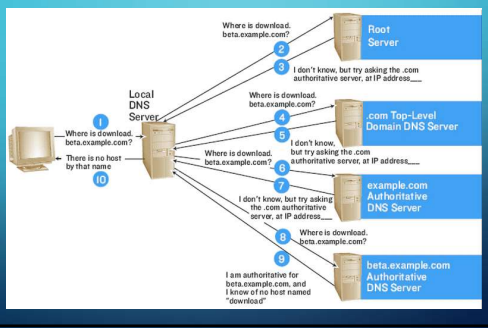
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The OSI and TCP/IP Model Layers



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The Domain Name System (DNS)

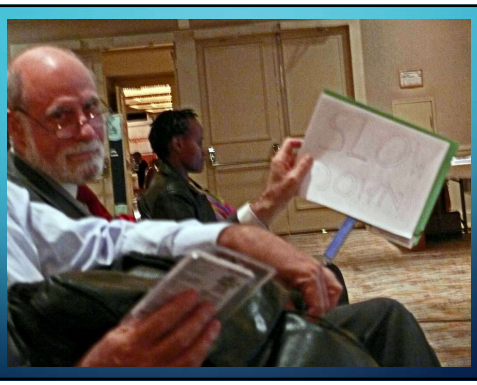


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The Internet Applications

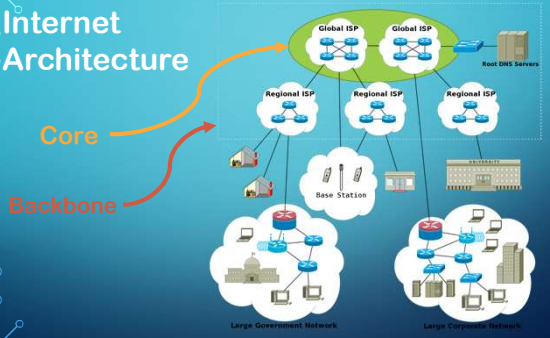


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Internet Architecture



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Internet Routing

(mtr www.google.com)

```
File  Edit  View  Terminal  Tabs  Help
                    My traceroute  [v0.92]
eniac (10.0.2.25)                                2019-05-20T04:12:03+0000
Keys:  Help   Display mode   Restart statistics   Order of fields   quit
                                 Packets               Pings
 Host                          Loss%   Snt   Last   Avg  Best  Wrst StDev
 1. gw0-eth2                    0.0%    49    0.5   0.4   0.3   0.8   0.1
 2. cpe-173-174-192-1.satx.res.rr.com  0.0%  48  17.5  17.4   8.9  71.8  11.2
 3. tge0-0-0.snaxtxfp02h.texas.rr.com  0.0%  48  19.4  67.5  17.6 511.7 107.0
 4. agg24.snaptx1902r.texas.rr.com  2.1%  48  12.5  16.5   8.5  73.9   9.4
 5. agg22.snantxvy01r.texas.rr.com  0.0%  48  18.4  17.1  10.3  81.0  10.2
 6. agg23.dllatxl301r.texas.rr.com  0.0%  48  20.7  24.7  17.2  36.0   3.6
 7. 66.109.1.216                0.0%  48  34.0  26.3  20.6  49.7   5.2
 8. 66.109.5.121                0.0%  48  32.9  23.7  16.8  40.2   5.1
 9. ix-ae-52-0.tcore2.dt8-dallas.as6453.net  2.1%  48  25.1  22.8  16.3  57.7   6.3
10. 74.125.50.214               0.0%  48  20.1  24.9  17.6  79.0  10.8
11. ???
12. 209.85.242.54               2.1%  48  23.0  22.6  17.1  31.6   2.9
13. 108.170.240.210             0.0%  48  19.5  24.3  16.9  81.2   9.2
14. 108.170.228.101             4.2%  48  20.9  23.6  18.1  31.2   3.2
15. 108.170.228.90              0.0%  48  20.8  24.5  16.7  81.1  10.3
16. 108.170.252.161             0.0%  48  30.3  23.0  18.2  30.3   2.7
17. 108.170.231.69              0.0%  48  21.6  22.7  17.3  39.8   3.8
18. dfw28s02-in-f4.1e100.net    2.1%  48  21.5  22.7  16.8  32.3   3.1
```

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Internet Troubleshooting

(ping www.amazon.com)

```
File  Edit  View  Terminal  Tabs  Help
pete@eniac:~$ ping www.amazon.com
PING d3ag4hukkh62yn.cloudfront.net (13.249.48.76) 56(84) bytes of data.
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=1 ttl=242 time=17.5 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=2 ttl=242 time=25.4 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=3 ttl=242 time=21.8 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=4 ttl=242 time=34.1 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=5 ttl=242 time=21.0 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=6 ttl=242 time=21.1 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=7 ttl=242 time=30.2 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=8 ttl=242 time=24.4 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=9 ttl=242 time=24.8 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=10 ttl=242 time=22.8 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=11 ttl=242 time=17.4 ms
64 bytes from server-13-249-48-76.iah50.r.cloudfront.net (13.249.48.76): icmp_seq=12 ttl=242 time=23.5 ms
^C
--- d3ag4hukkh62yn.cloudfront.net ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 11018ms
rtt min/avg/max/mdev = 17.440/23.699/34.145/4.592 ms
pete@eniac:~$
```

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QUESTIONS
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