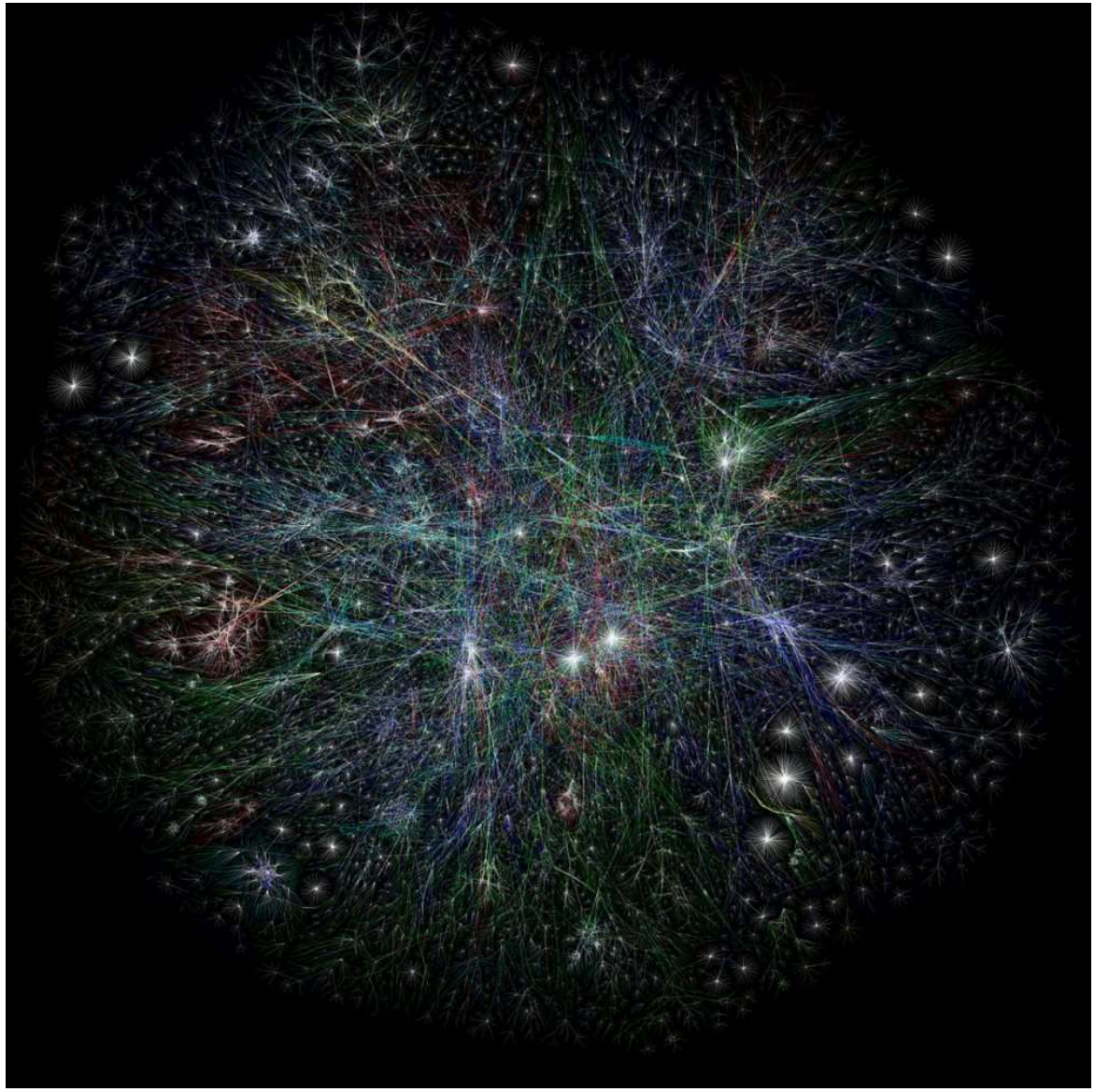
A Brief History of the Internet

Craig Gallen

Contents

- History
- How it works
- Socials
- Future



https://www.wired.com/2015/06/mapping-the-internet/

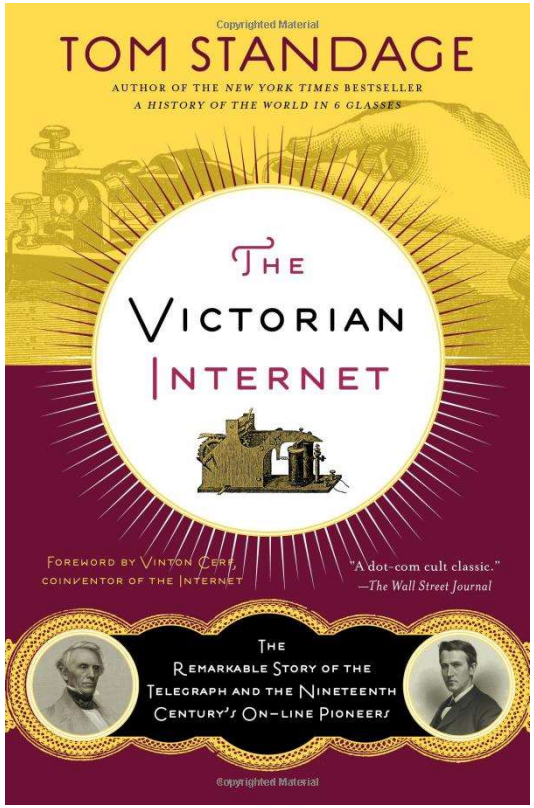
http://internet-map.net/

https://www.wired.com/2015/06/mapping-the-internet/

Victorian internet

- **The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-Line Pioneers**

- **Morse code**
- **Messages relayed between stations**



Letters as numbers

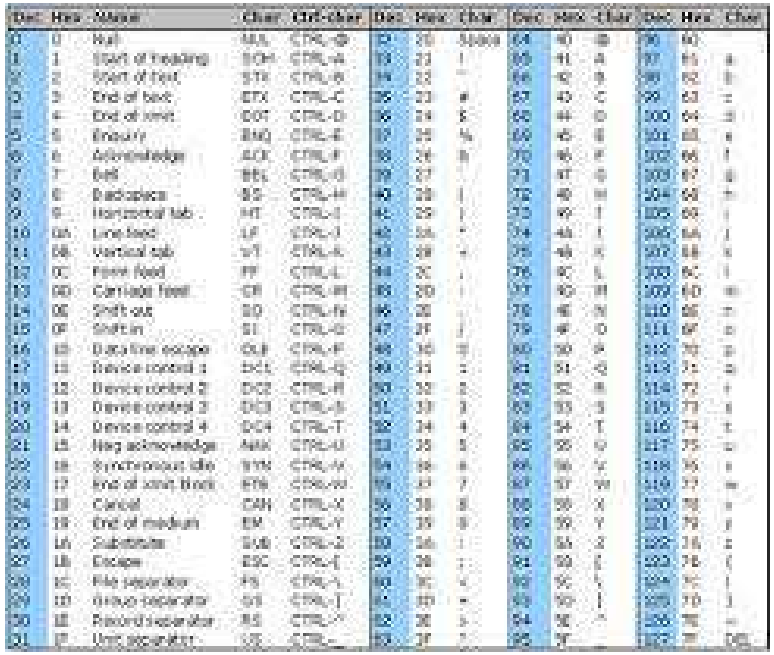
- Morse code

- Byte = 8 bits = 10101010
- 1 KB = 1024 bytes
- Characters are bytes (ASCII)
- Sound or pictures collections of bytes
- Audio 48 KB/s
- Video 2MB/s

A ●–
B –●●●
C –●–●
D –●●
E ●
F ●●–●
G ––●
H ●●●●
I ●●

J ●–––
K –●–
L ●–●●
M ––
N –●
O –––
P ●––●
Q ––●–
R ●–●

S ●●●
T –
U ●●–
V ●●●–
W ●––
X –●●–
Y –●––
Z ––●●



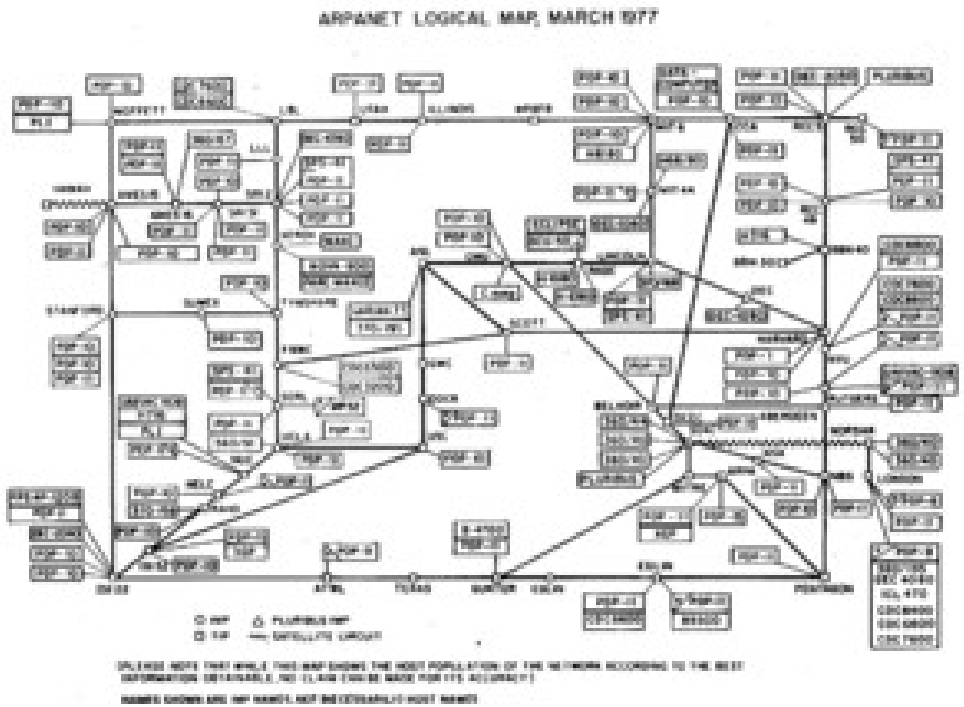
DARPAnet

- 1960 -1970's
- Cold war – potential nuclear annihilation
- US Government needed a communications system which would survive massive disruption
- DARPA Defence Advanced Research Projects Agency
- Self Organising
- Self healing
- Massively scalable

Vint Cerf

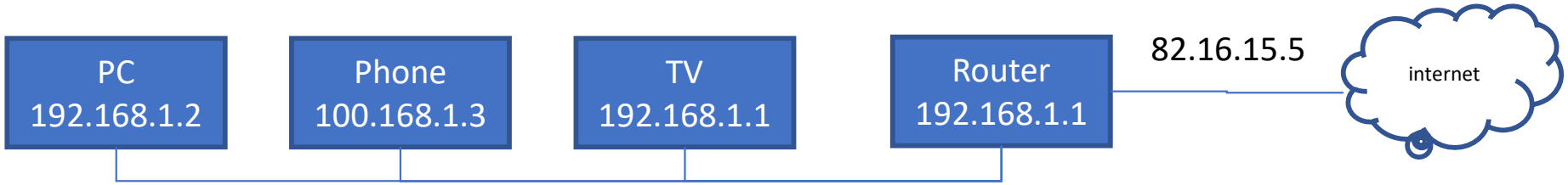
- Vinton Cerf, Robert Kahn, *A Protocol for Packet Network Intercommunication* (IEEE Transactions on Communications, May 1974)
- The Advanced Research Projects Agency Network (ARPANET) was the first wide-area packet-switched network with distributed control and one of the first networks to implement the TCP/IP

- ARPANET logical map, March 1977



IP Address

- IP address – every device has at least one IP address
- Example of IPv4: 66.94.29.13 (32 bits)
  - 2^{32} (4,294,967,296) all used 31 January 2011
- Example of IPv6: (128 bits)
  2001:0000:3238:DFE1:0063:0000:0000:FEFB

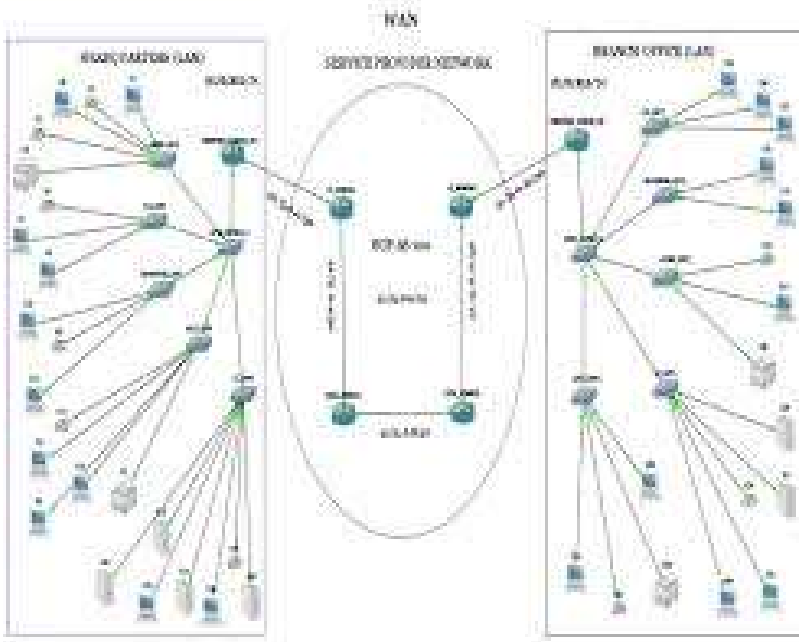


IP Packet

Destination Address	Source Address	Length	content.....
92.100.1.5	100.23.4.5		

Automatic Maps - Routing Protocols

- Routers are dumb
  - Receive a packet on one port – send it out a different route
- Routing protocols
  - How routers find each other automatically
  - Interior Routing Protocols
    - exchanging routing table information between routers within an autonomous system (corporate local area networks).
    - OSPF Open Shortest Path First
  - Exterior Gateway protocols
    - exchange routing information between autonomous systems
    - BGP Border Gateway Protocol

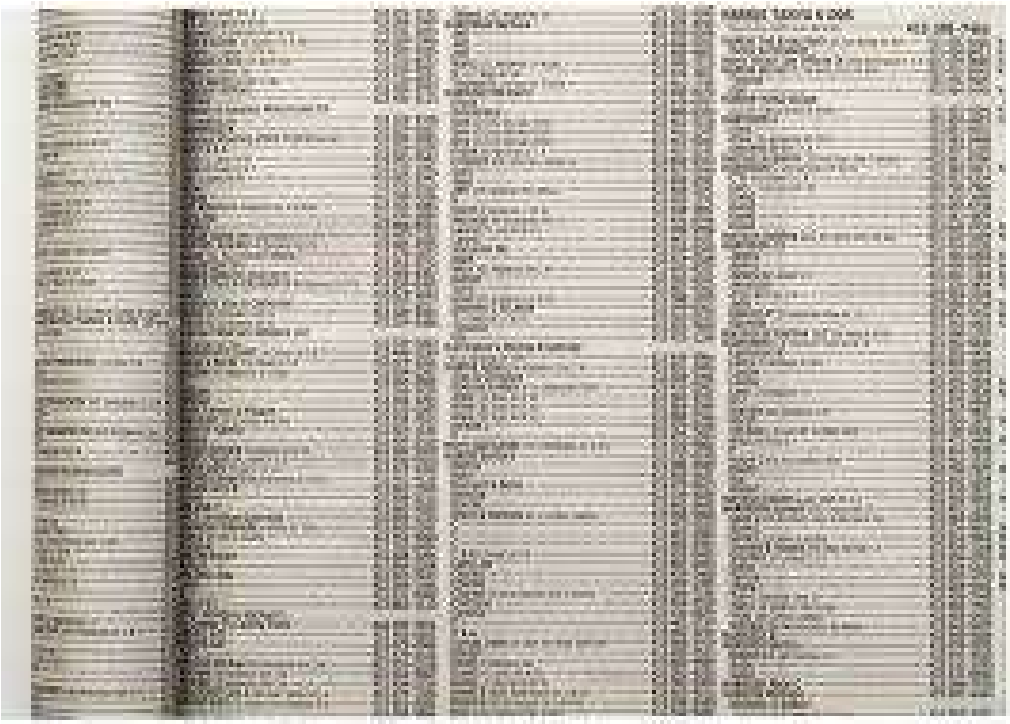


DNS – Electronic telephone book

- Phone number – telephone book

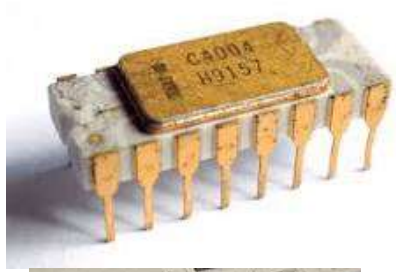
- Domain Name System – translating human readable addresses to ip addresses

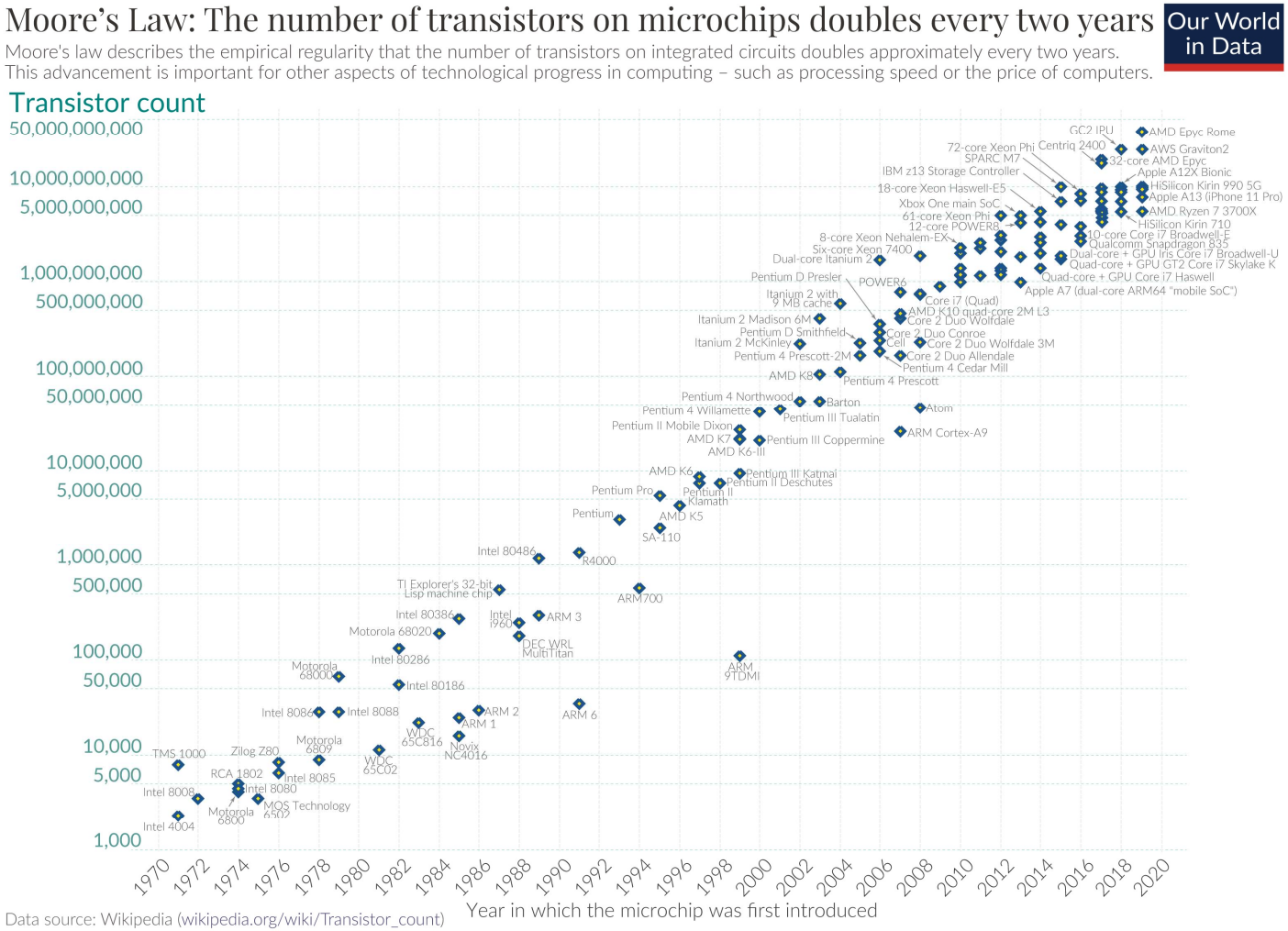
- www.google.com = 142.250.187.228
- 2001:4860:4860::8888



Microchips

- 1971 Intel invents 4004
- 4 bit microprocessor
- Gordon Moore – Moores Law

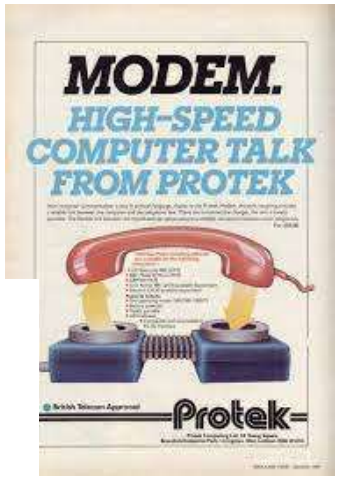




1980's – Personal Computers

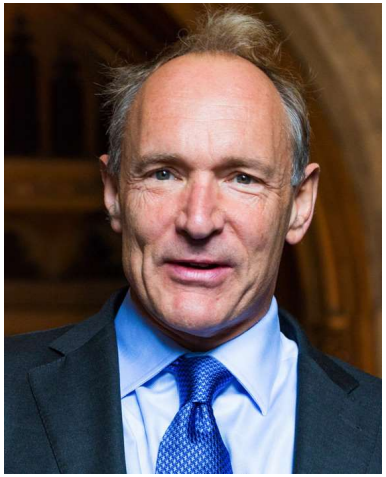
- Computers
  - home computer
  - Sinclair ZX80
  - PC – IBM / Microsoft
  - Apple II

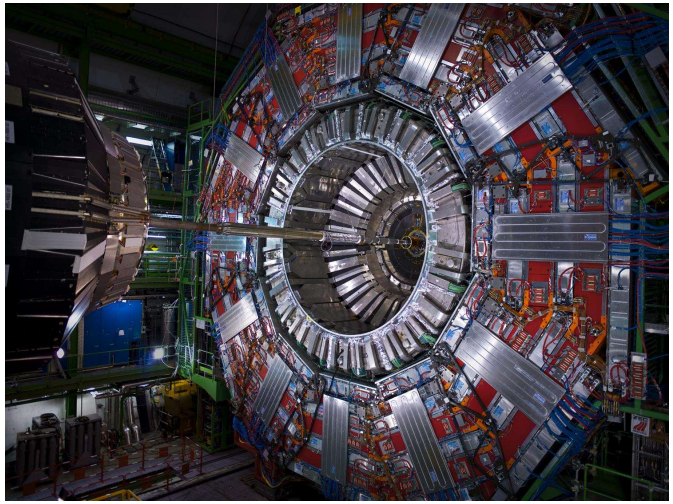
- Phones
  - digital lines / analogue phone
  - Modems
- Private networks – hobby
  - AOL etc



Sir Tim Berners-Lee - inventor WWW

- n 1989, CERN was the largest Internet node in Europe and Berners-Lee saw an opportunity to join hypertext with the Internet:

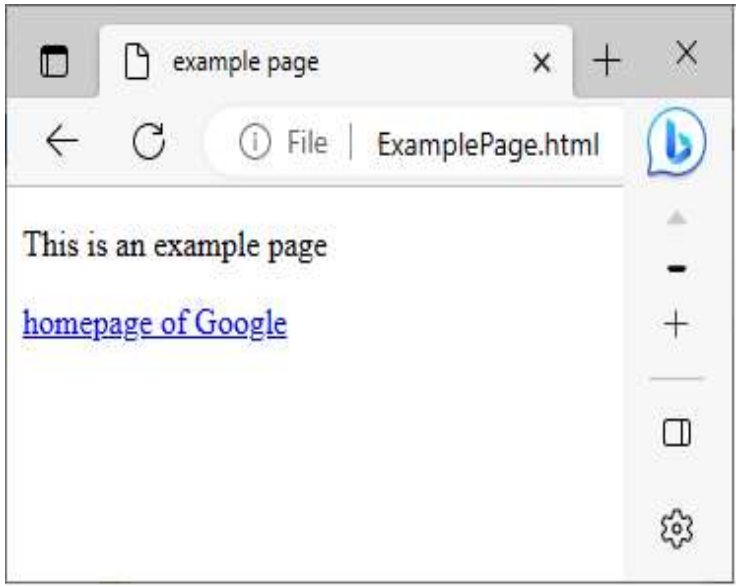




- I just had to take the hypertext idea and connect it to the TCP and DNS ideas and—ta-da!—the World Wide Web.
- — Tim Berners-Lee[33]

HTML and HTTP

- HTTP
  - Combine DNS domain name with a path to the page
  - http:\\example.dns.page\ExamplePage.html
- HTML
  - Simple way to describe a document



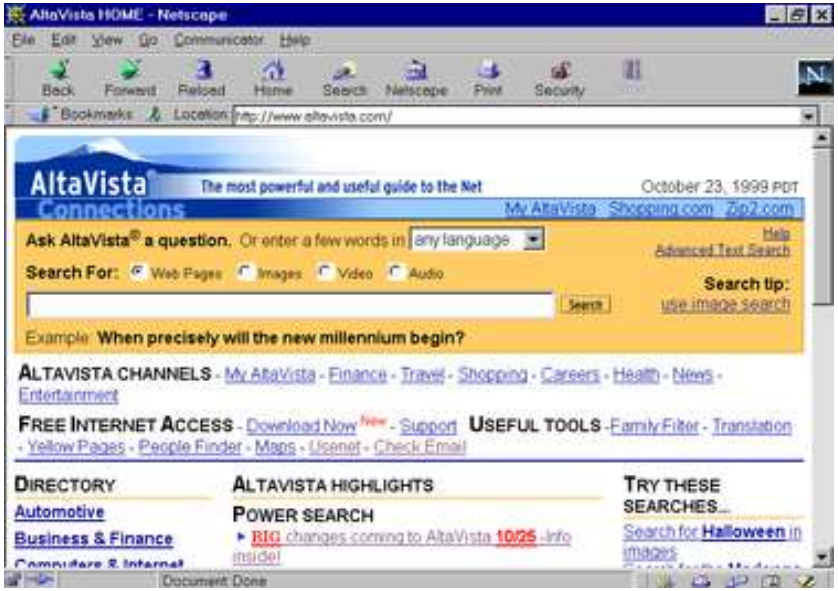

```
<!DOCTYPE html>
<html>
<head>
   <title>example page</title>
</head>
<body>
<p>This is an example page</p>

<a href="https://www.google.com/" >homepage of Google</a>

</body>
</html>
```

Search

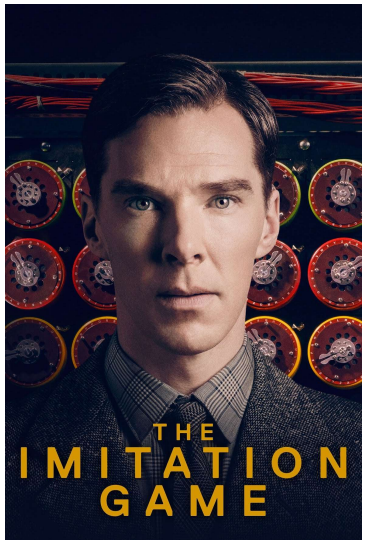
- Indexing is a problem
  - AltaVista was a Web search engine established in 1995. It became one of the most-used early search engines,
- Google
  - 1995 at Stanford University.
  - Larry Page Sergey Brin
  - Page Rank Algorithm
  - August 1998, Sun co-founder Andy Bechtolsheim wrote Larry and Sergey a check for $100,000, and Google Inc was born

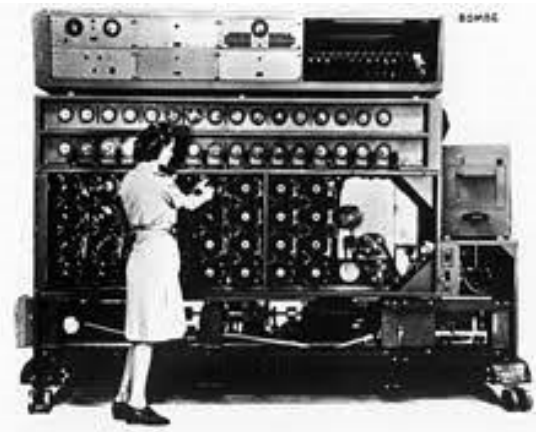


Encryption

- Alan Turing
  - WW2 – invented the Bombe which could decode enigma machine messages through a bruit force attack
  - Bletchley Park in Buckinghamshire
  - Invented the Turing machine – core concepts for a modern computer

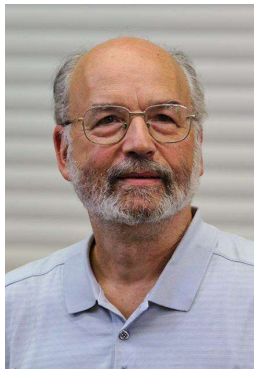
- Electronic commerce needed
  - Secure communications
  - Guarantee you are talking to the correct machine or person
  - A way to securely distribute keys

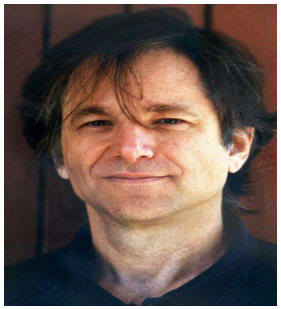




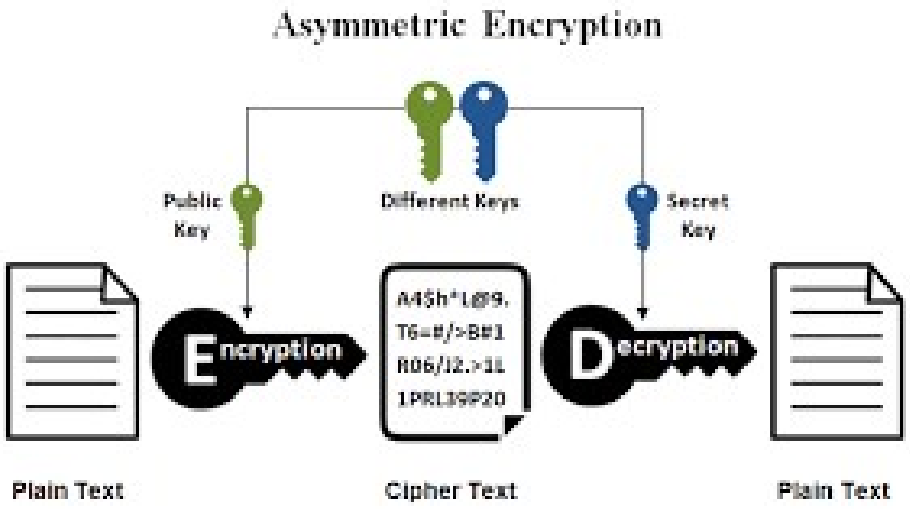
Asymmetric Encryption

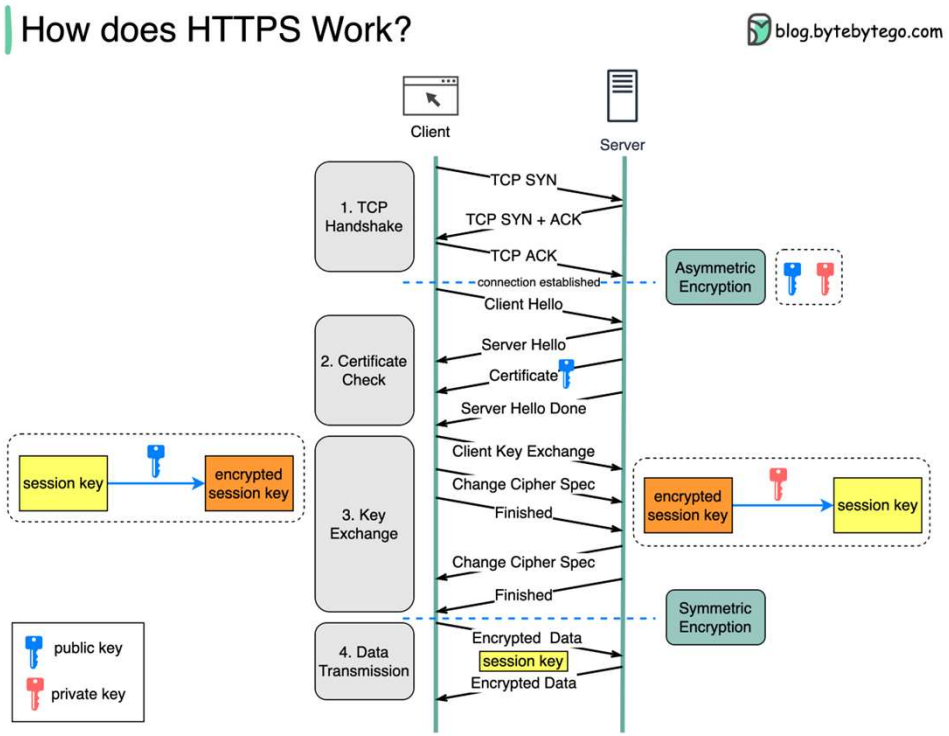
- GCHQ – successor to Bletchley Park in Buckinghamshire
- RSA algorithm for asymmetric encryption and decryption was discovered by Clifford Cocks in 1973 – secret for 22 years
- while working at the United Kingdom Government Communications Headquarters (GCHQ), he invented a public-key cryptography algorithm equivalent to what would become RSA
- the RSA algorithm was independently invented by Ronald Rivest, Adi Shamir, and Leonard Adleman in 1977 RSA





Public Private Key





E-Commerce takes off

- In 1994, Bezos left his job as a vice president at D. E. Shaw & Co., a Wall Street firm, to work on a business plan[6] for what would become Amazon.com.
- Amazon was founded in the garage of Bezos' rented home in Bellevue, Washington.
- Bezos' parents invested almost $250,000 in the start-up.
- On July 16, 1995, Amazon opened as an online bookseller, selling the world's largest collection of books to anyone with World Wide Web access

Open Source – a way to share

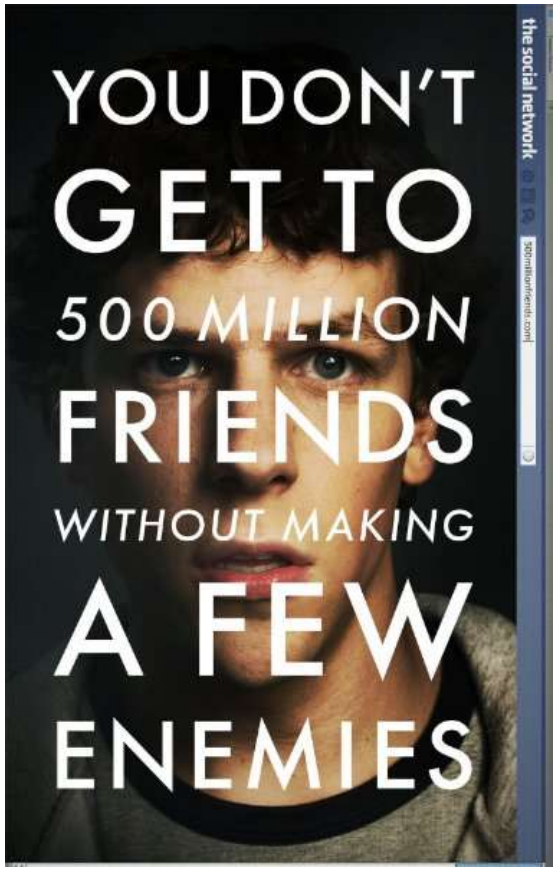
- Richard Stallman
  - Open Source
  - Copy left Licence (GPL)
- Linus Torvalds
  - Inventor of Linux
  - Cheap computing

Sharing content creation

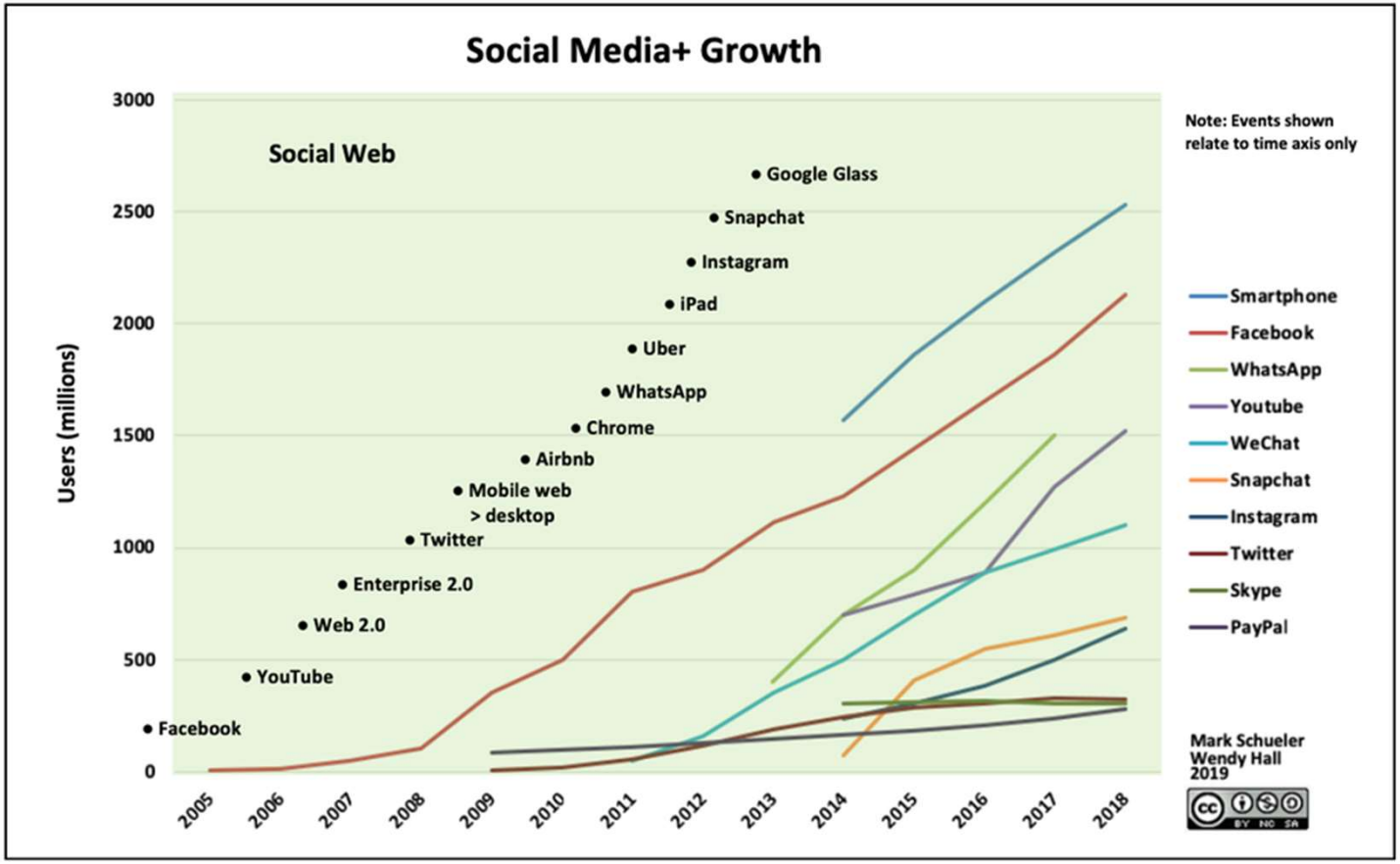
- Wikipedia 15 January 2001
  - Jimmy Wales

- Youtube 2005
  - It was launched on February 14, 2005, by Steve Chen, Chad Hurley, and Jawed Karim.

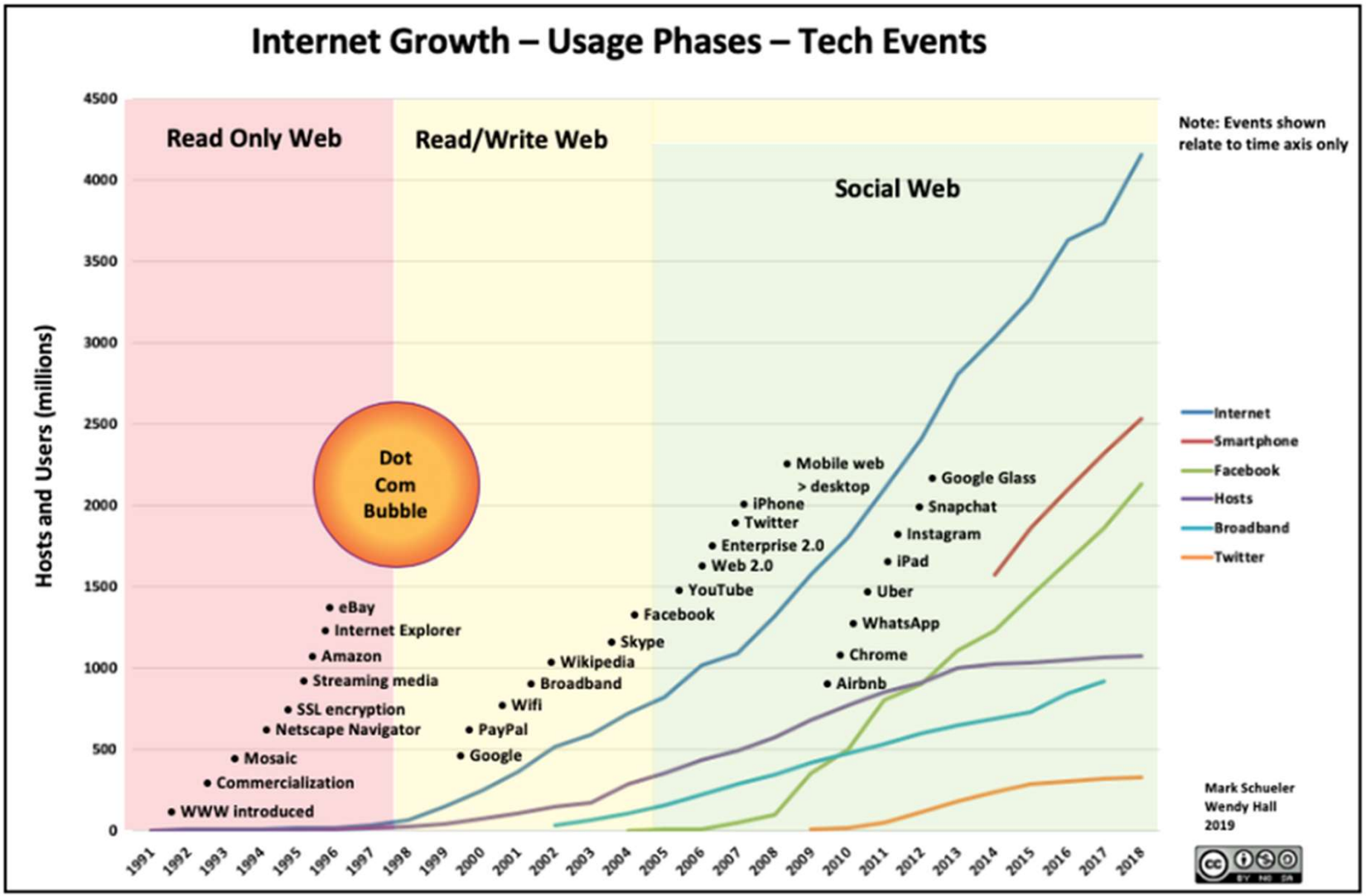
Social Networks



social media growth



Internet Growth



- https://growthchart.weebly.com/
- Wendy Hall / Matt Shuller

The Cloud is born

- Amazon Web Services
- Microsoft Azure
- Google Cloud

The internet Archive

- In 500 years will this be the digital dark ages?

- As of January 1, 2023, the Internet Archive holds over
- 36 million books and texts,
- 11.6 million movies, videos and TV shows and clips,
- 950 thousand software programs,
- 15 million audio files,
- 4.5 million images,
- 251 thousand concerts,
- and 780 billion web pages in the Wayback Machine.

INTERNET ARCHIVE
WayBackMachine

INTERNET
ARCHIVE

Dark internet

Mindgeek 115 million visitors per day

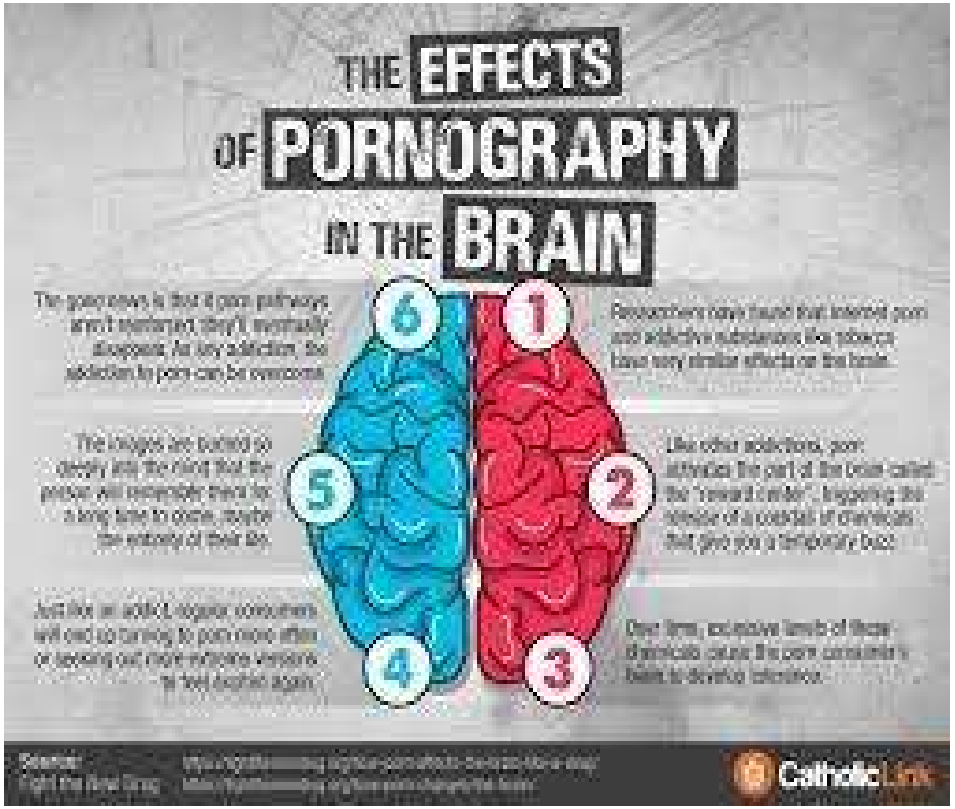
- Founded June 2004
- Owner Ethical Capital Partners
- Solomon Friedman
- Cornell University

- TOR router
  - Privacy and anonymity
  - Illegal content – paedophile rings
- Cyber Criminals
  - Viruses , Phish, Denial of Service

The Future

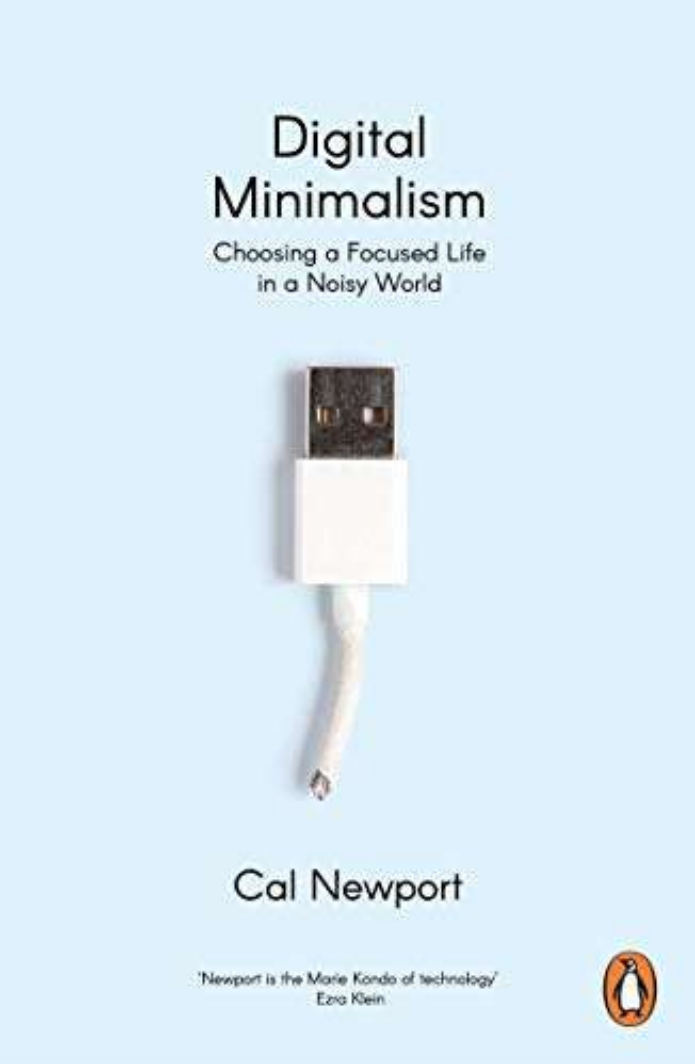
FIGHT THE NEW DRUG

- https://fightthenewdrug.org/
- Fight the New Drug exists to raise awareness on the harmful effects of porn using only science, facts, and personal accounts.
- 1 in 4 young adults5 list pornography as the most helpful source to learn how to have sex, and 53% of boys and 39% of girls6 believe that pornography is a realistic depiction of sex.



Digital Minimalism

- Ofcom 2018
  - found that 93% of eight to eleven-year-olds were online for around 13.5 hours per week, and 74% played video games for 10 hours a week.
- recommended (Twinkle)
  - that children under five spend less than an hour per day using screens, and some health experts have recommended
  - children aged five to 17 should limit their daily screen time to 2 hours.

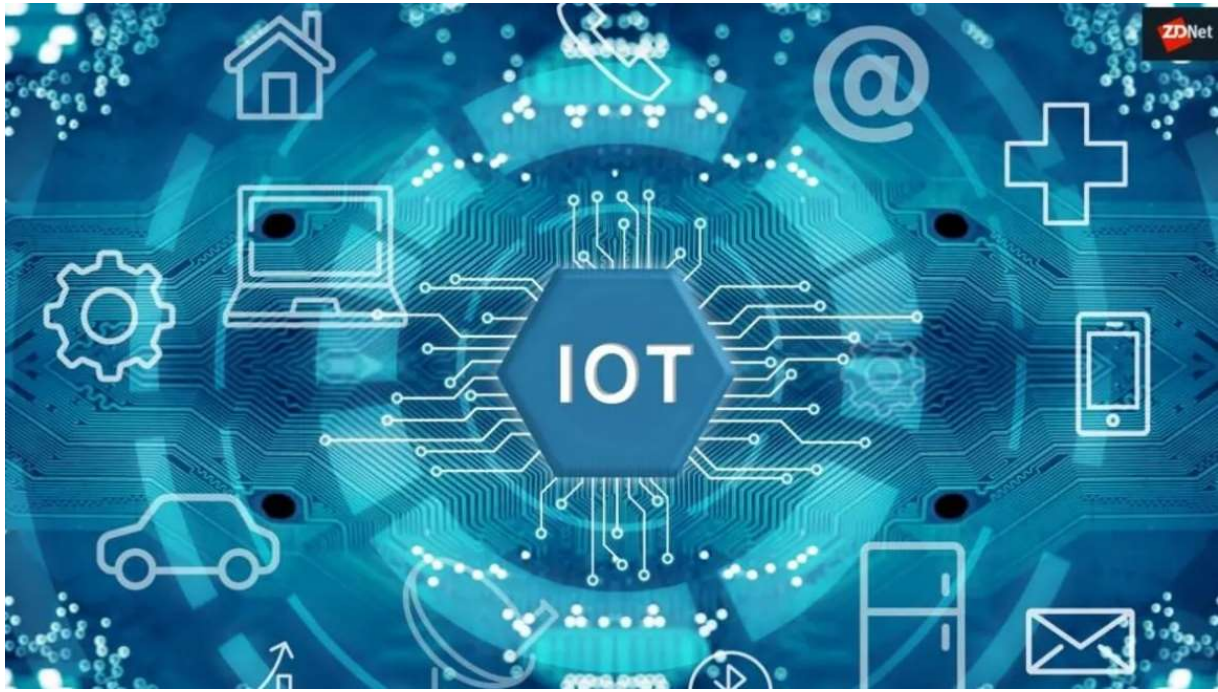


Bitcoin – Block Chain

- first launched in January 2009
- Satoshi Nakamoto is the pseudonym used by the creator or creators of Bitcoin.
- The identity of Satoshi Nakamoto is not publicly known.

Internet Of Things

- The point when more machines than humans communicated on the internet
- Sensors
- Drones
- Cameras
- Implanted ID chips

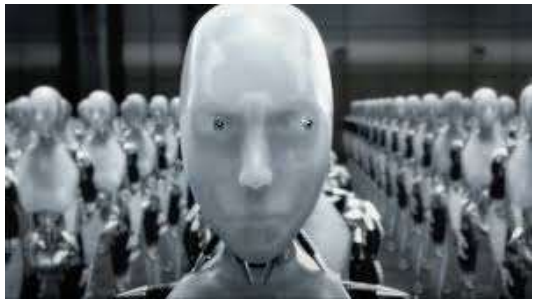


AI Machine Learning

- Image Recognition
- Surveillance
- Deep Fakes
- Loss of Jobs

ChatGP
T

- Can you trust what you see and hear?



think about

- Its not free - you are the product
- Privacy
- Search bubble
- Information
- Knowledge
- Wisdom
- Facebook friends are not friends
- Influencers are not benign
- Manipulating the internet
- The great firewall of China
- Legal but harmful
- Censorship vs permissive policies

The End

(or perhaps just the beginning?)