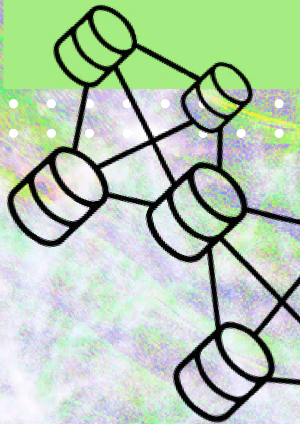
WELCOME TO SESSION 01

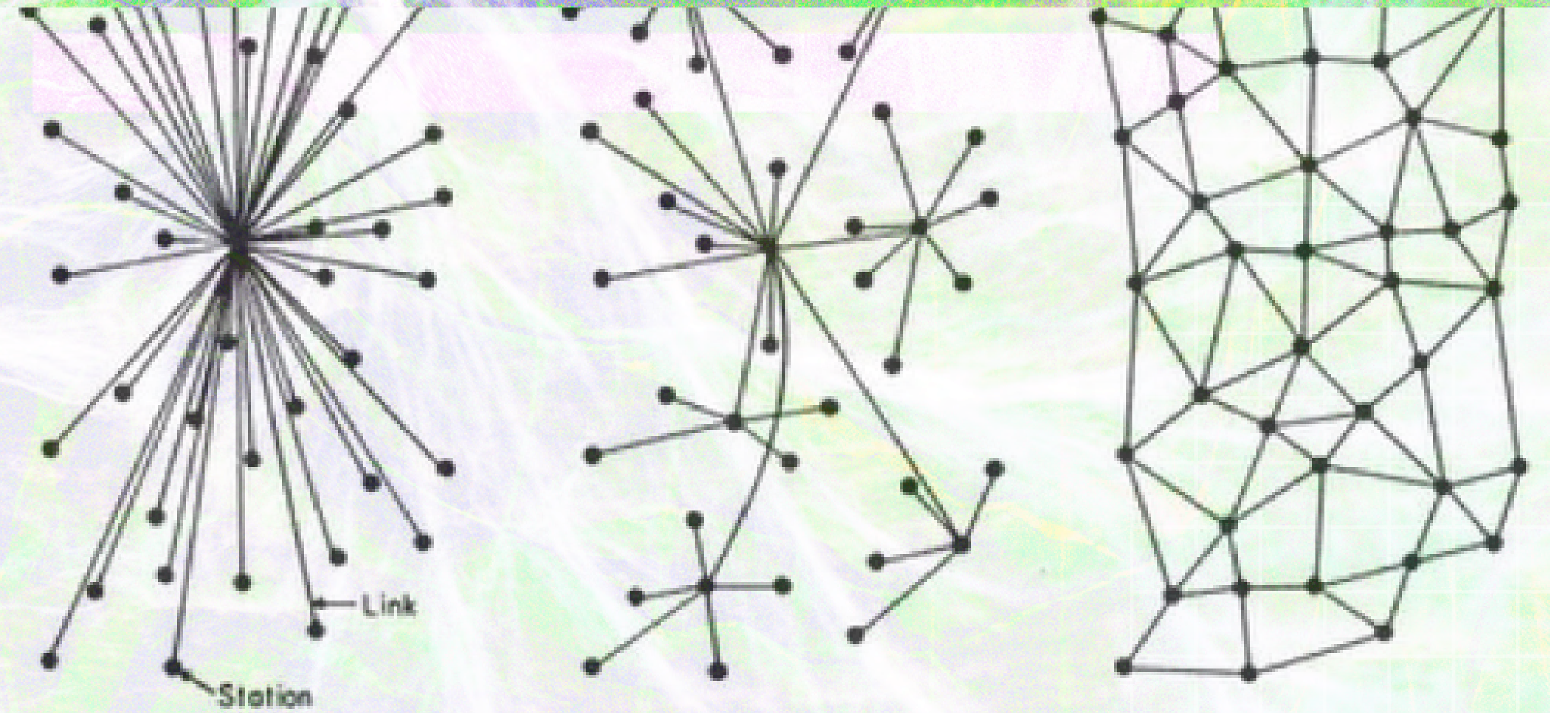
Introduction to Decentralized Web and Its Cultural Foundations

Since Sir Tim Berners Lee invented the World Wide Web in 1989 as a "universal linked information system" the web has grown to become the world's dominant interface with the Internet. Throughout the web's evolution, one of its core tenets has been "decentralization" – that this global network should allow anyone anywhere to create, share, and access digital content. In the 35 years since its inception, the web has fulfilled this promise in many ways. And yet some of its basic features have also proven to be vulnerable to powerful concentrated interests, enabling private and state actors to capture or censor the web.

This session will explore the history of the internet and the World Wide Web while analyzing the technologies, organizations, legislations, and ideologies that shaped the web over the past three and a half decades. We will look at examples of decentralized systems designed and implemented by humans long before the digital age up to the birth of the internet and until the period of time just before the introduction of cryptocurrencies.

OVERVIEW





HOW DO YOU DEFINE DECENTRALIZATION?

THE DIFFERENCE BETWEEN

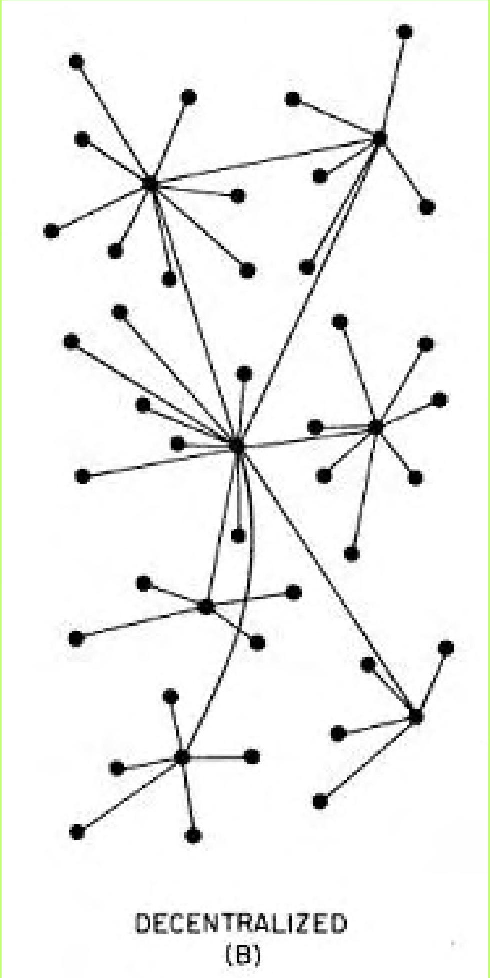
Decentralized

- Each node acts as a router and a server
- All nodes have equal power and can work independently of each other
- Decisions are made by consensus
- Examples: Blockchain, p2p protocols, git

Distributed

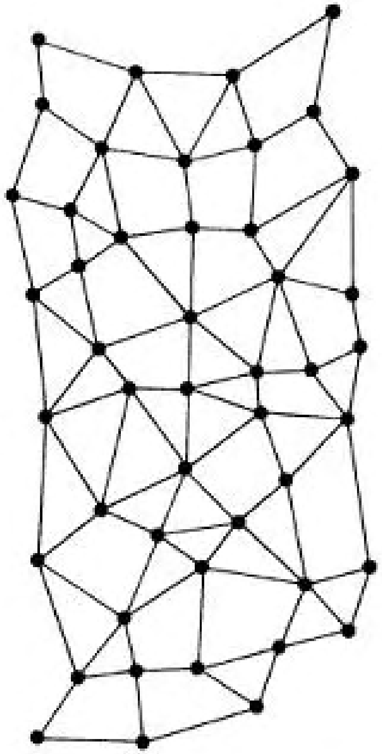
- Data and processing power are shared across all nodes
- There can be a hierarchy of nodes, with some coordinating the actions of others
- Nodes coordinate together so as to act like a single unit
- Examples: bit torrent

DECENTRALIZED



- Each node acts as a router and a server
- All nodes have equal power and can work independently of each other
- Decisions are made by consensus
- Examples: Blockchain, p2p protocols, git

DISTRIBUTED



- Data and processing power are shared across all nodes
- There can be a hierarchy of nodes, with some coordinating the actions of others
- Nodes coordinate together so as to act like a single unit
- Examples: bit torrent

OFFLINE EXAMPLE 01

THE IROQUOIS CONFEDERACY

The Confederacy wasn't a single, unified nation but a league of six sovereign Iroquois nations – Mohawk, Oneida, Onondaga, Cayuga, Seneca, and Tuscarora (joined later). Each nation maintained its own internal governance and cultural identity.

Decisions impacting the entire Confederacy were made through the Grand Council, a representative body with 50 sachems (chiefs) from each nation. This council operated on a consensus basis, requiring agreement from all nations before taking action.

OFFLINE EXAMPLE 02

THE !KUNG SAN

- The !Kung San lack formal leadership positions or hierarchies. Decisions are made through consensus among all adult members of the community, regardless of gender or age. This fosters a horizontal power structure where no individual holds absolute authority over others.

Disputes within the community are addressed through discussion and mediation rather than relying on a central authority figure to impose solutions. This reinforces the principle of collective decision-making and discourages the concentration of power for conflict resolution.

UNITED STATES MOTIVATIONS

THE COLD WAR

- Centralized systems are vulnerable: A single point of failure, like a physical attack or technical breakdown, could cripple the entire network.
- Potential for censorship and control: A centralized system could be easily controlled by a government or other authority, limiting information flow and communication.
- The US Government wanted to create a network that could withstand nuclear attack

ARPANET COMPETITORS AND OTHER NETS

OGAS (USSR)

A nationwide cybernetic network
for monitoring the nation's economy

MINITEL (FRANCE)

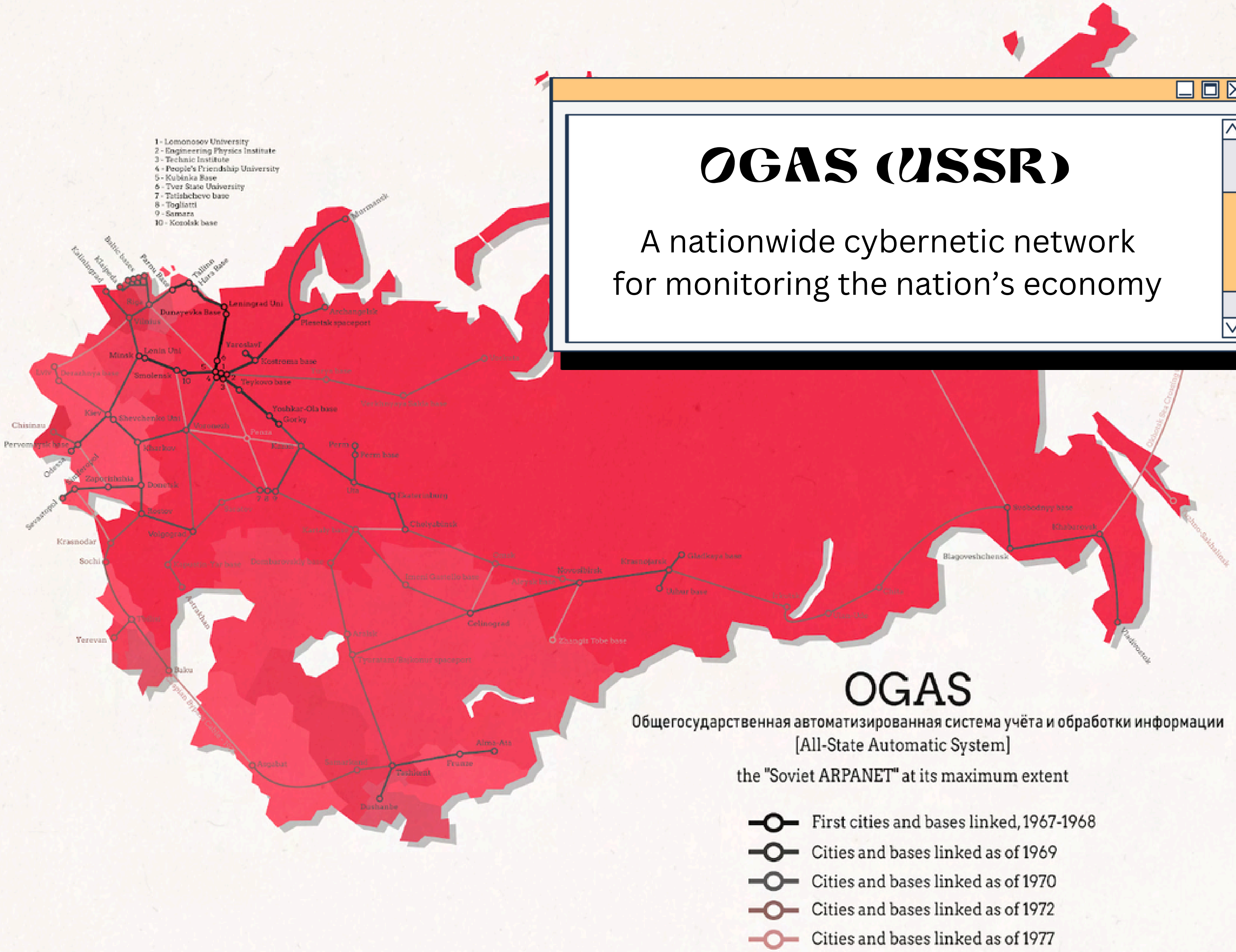
the world's most successful online service
prior to the World Wide Web

CYBERSYN (CHILE)

A workforce maintained
cybernetic network also for
monitoring the nation's economy

OGAS (USSR)

A nationwide cybernetic network
for monitoring the nation's economy



CYBERSYN (CHILE)

A workforce maintained cybernetic network also for monitoring the nation’s economy

MINITEL (FRANCE)

the world's most successful online service prior to the World Wide Web

"THE GALACTIC NETWORK" WHAT WAS ARPANET?

1958

The US Government launches the Advanced Research Projects Agency (ARPA) Launches to compete with the USSR

1966

Bob Taylor, inspired by the vision of J.C.R. Licklider initiates ARPANET. Larry Roberts begins implementation in 1967.

1969

ARPANET successfully connects a terminal at UCLA to a terminal at Stanford.

The ARPANET in December 1969

THE FIRST NODE - UCLA

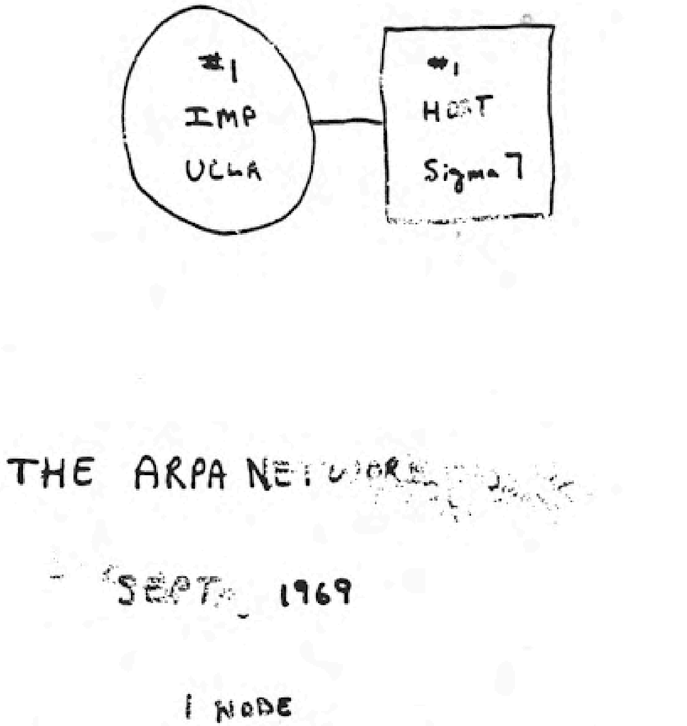


FIGURE 6.1 Drawing of September 1969 (Courtesy of Alex McKenzie)

ARPANET

Advanced Research Projects Agency Network

was the first wide-area packet-switching network with distributed control and one of the first networks to implement the TCP/IP protocol suite. Launched in 1969, it laid the foundation for the internet by connecting academic and research institutions across the United States.

When the National Science Foundation (NSF) took over from ARPANET, it evolved into the NSFNET in the mid-1980s. NSFNET served as a major backbone to connect universities and research institutions across the United States at higher speeds, significantly expanding the network's reach and capacity.

In 1995, when NSF decided to no longer fund the NSFNET. The responsibility for providing the internet's infrastructure shifted to the private sector. Multiple commercial networks took over, interconnecting through Network Access Points (NAPs). This led to the concentration of ownership over network infrastructure that we are left with today.

INTERNET ENGINEERING TASK FORCE (IETF)

"little to do with the technology that's possible, and much to do with the technology that the IETF chooses to create."

The IETF, founded in 1986, is a standards development body that voluntarily creates standards for all functionality on the internet - including network hardware, routing, network security, internet and transport protocols, media applications, and more.

The IETF is also home to the Request For Comments (RFC) archive: https://www.rfc-editor.org/rfc-index-100a.html

Per the IETF's website, approximately 7,000 individuals may be actively contributing to the organization's mission by drafting standards, engaging in email discussions, or attending live meetings.

RFC Index

Num	Information
0001	**Host Software** S. Crocker [April 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0001)
0002	**Host software** B. Duvall [April 1969] (TXT, PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0002)
0003	**Documentation conventions** S.D. Crocker [April 1969] (TXT, HTML) (Obsoleted-By RFC0010) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0003)
0004	**Network timetable** E.B. Shapiro [March 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0004)
0005	**Decode Encode Language (DEL)** J. Rulifson [June 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0005)
0006	**Conversation with Bob Kahn** S.D. Crocker [April 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0006)
0007	**Host-IMP interface** G. Deloche [May 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0007)
0008	**ARPA Network Functional Specifications** G. Deloche [May 1969] (PDF) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0008)
0009	**Host Software** G. Deloche [May 1969] (PDF) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0009)
0010	**Documentation conventions** S.D. Crocker [July 1969] (TXT, HTML) (Obsoletes RFC0003) (Obsoleted-By RFC0016) (Updated-By RFC0024, RFC0027, RFC0030) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0010)
0011	**Implementation of the Host - Host Software Procedures in GORDO** G. Deloche [August 1969] (TXT, PDF, HTML) (Obsoleted-By RFC0033) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0011)
0012	**IMP-Host interface flow diagrams** M. Wingfield [August 1969] (TXT, PS, PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0012)
0013	**Zero Text Length EOF Message** V. Cerf [August 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0013)
0014	Not Issued
0015	**Network subsystem for time sharing hosts** C.S. Carr [September 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0015)
0016	**M.I.T** S. Crocker [August 1969] (TXT, HTML) (Obsoletes RFC0010) (Obsoleted-By RFC0024) (Updated-By RFC0024, RFC0027, RFC0030) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0016)
0017	**Some questions re: Host-IMP Protocol** J.E. Kreznar [August 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0017)
0018	**IMP-IMP and HOST-HOST Control Links** V. Cerf [September 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0018)
0019	**Two protocol suggestions to reduce congestion at swap bound nodes** J.E. Kreznar [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0019)
0020	**ASCII format for network interchange** V.G. Cerf [October 1969] (TXT, PDF, HTML) (Also STD0080) (Status: INTERNET STANDARD) (Stream: Legacy) (DOI: 10.17487/RFC0020)
0021	**Network meeting** V.G. Cerf [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0021)
0022	**Host-host control message formats** V.G. Cerf [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0022)
0023	**Transmission of Multiple Control Messages** G. Gregg [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0023)
0024	**Documentation Conventions** S.D. Crocker [November 1969] (TXT, HTML) (Obsoletes RFC0016) (Updates RFC0010, RFC0016) (Updated-By RFC0027, RFC0030) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0024)
0025	**No High Link Numbers** S.D. Crocker [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0025)
0026	Not Issued
0027	**Documentation Conventions** S.D. Crocker [December 1969] (TXT, HTML) (Updates RFC0010, RFC0016, RFC0024) (Updated-By RFC0030) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0027)
0028	**Time Standards** W.K. English [January 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0028)
0029	**Response to RFC 28** R.E. Kahn [January 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0029)
0030	**Documentation Conventions** S.D. Crocker [February 1970] (TXT, HTML) (Updates RFC0010, RFC0016, RFC0024, RFC0027) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0030)
0031	**Binary Message Forms in Computer** D. Bobrow, W.R. Sutherland [February 1968] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0031)
0032	**Some Thoughts on SRI's Proposed Real Time Clock** J. Cole [February 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0032)
0033	**New Host-Host Protocol** S.D. Crocker [February 1970] (TXT, HTML) (Obsoletes RFC0011) (Updated-By RFC0036, RFC0047) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0033)
0034	**Some Brief Preliminary Notes on the Augmentation Research Center Clock** W.K. English [February 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0034)
0035	**Network Meeting** S.D. Crocker [March 1970] (TXT, HTML) (Status: INFORMATIONAL) (Stream: Legacy) (DOI: 10.17487/RFC0035)
0036	**Protocol Notes** S.D. Crocker [March 1970] (TXT, HTML) (Updates RFC0033) (Updated-By RFC0039, RFC0044) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0036)
0037	**Network Meeting Epilogue, etc** S.D. Crocker [March 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0037)

```
Network Working Group                                   Steve Crocker
Request for Comments: 1                                          UCLA
                                                         7 April 1969

                    Title:   Host Software
                   Author:   Steve Crocker
                     Installation:   UCLA
                     Date:   7 April 1969
        Network Working Group Request for Comment:   1
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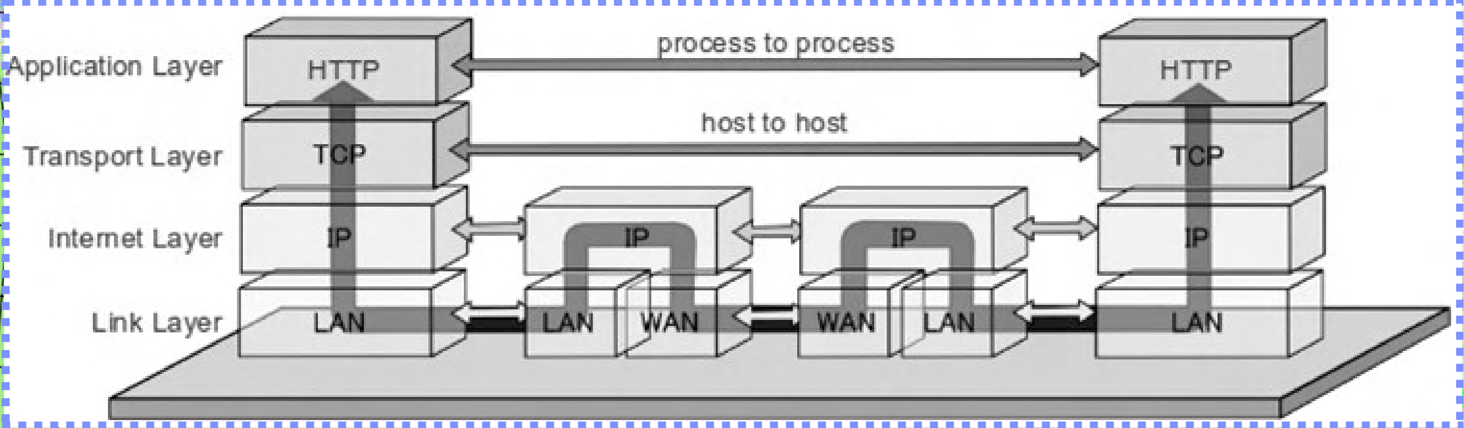
CONTENTS

THE INTERNET PROTOCOL SUITE



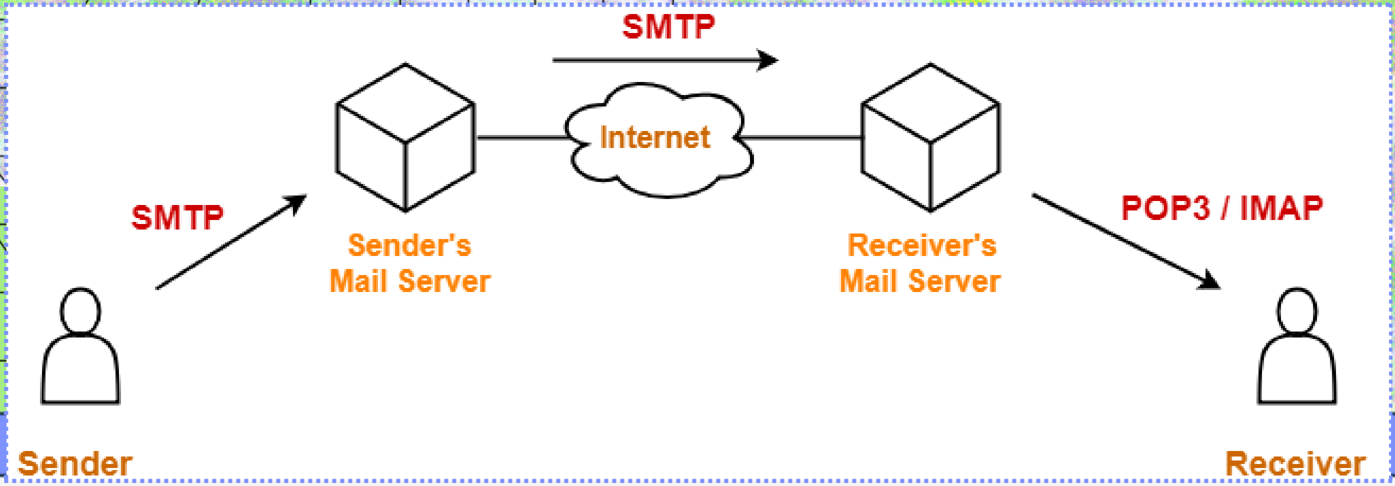
INTERNET PROTOCOL (IP)

Also known as the 'Network Layer' or "layer 3', this protocol is responsible for assigning internet protocol addresses (think - 192.168.2.1) to our sending and receiving machines on across the network of networks, the internet. It is also responsible for figuring out the best routes for a packet to take across the internet.

TRANSMISSION CONTROL PROTOCOL (TCP)

Also known as the 'Transport Layer' or "layer 4', this protocol is responsible for making sure packets reach their destination intact and are able to be reassembled into the original text or binary file that it was originally a part of. Think - a puzzle broken up into its pieces, mailed to another address, and then reassembled into the original puzzle.

E-MAIL && SMTP



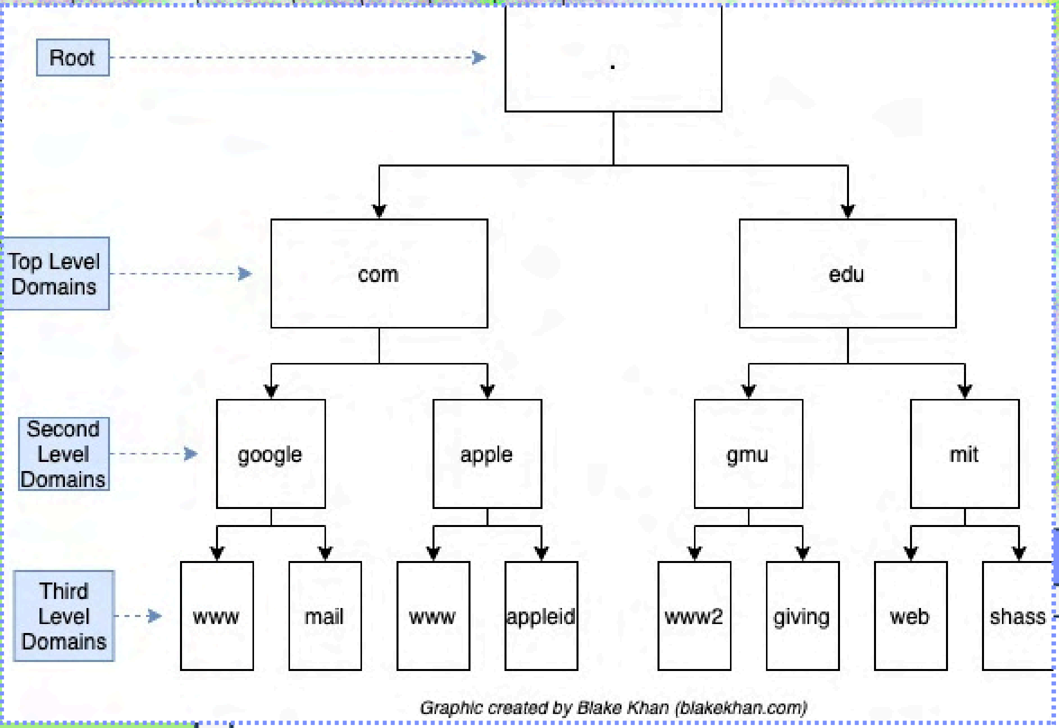
THE ORIGINAL KILLER APP OF THE INTERNET

Sending an electronic message was possible as early as the 1960s, when people could send messages via time-shared mainframe computers. The first ARPANET email was sent in 1971, followed by several proprietary attempts by IBM, Compuserve, Hewlett-Packard, and others. In the same year, a "Mail Protocol" was suggested, but not actually implemented until 1983.

SIMPLE MAIL TRANSPORT PROTOCOL (SMTP)

is this standard "Mail Protocol" that was finally implemented on the ARPANET, designed to be the standard protocol for exchanging electronic mail in lieu of the many proprietary systems that had come before it. It also replaced the File Transfer Protocol (FTP) as the preferred method for fetching mail.

ICANN AND DNS



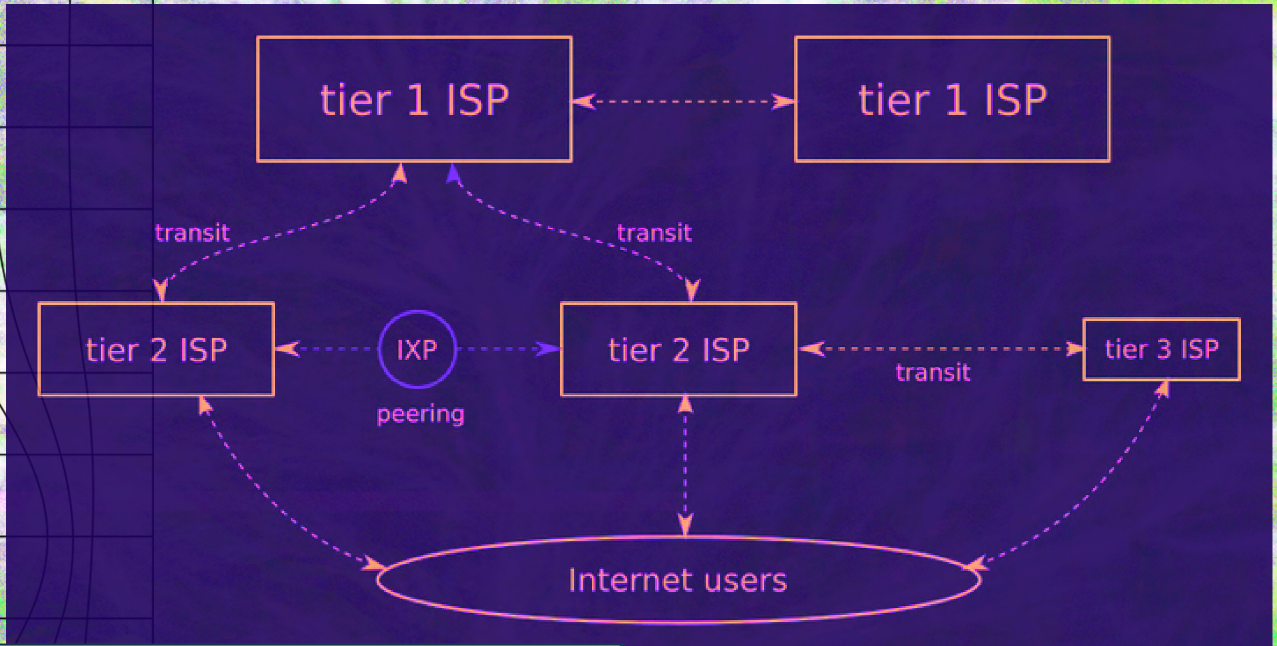
ICANN

Oversees the Domain Name System (DNS), which translates domain names into numerical IP addresses that computers can understand.

DNS: DOMAIN NAME SYSTEM

DNS allows us to use user-friendly domain names so we aren't all having to remember IP addresses to access web pages.

TIERS OF THE INTERNET



TIER 1

Tier 1 networks peer to each other at no cost. They are the landlords of the internet.

TIER 2

Tier 2 networks can sometimes peer to each other, but also need to lease infrastructure from Tier 1's

TIER 3

Tier 3 networks are dependent upon leasing infrastructure from Tier 2 networks

BREAK

COMMUNITY-CREATED NETWORKS

Freifunk (Germany)

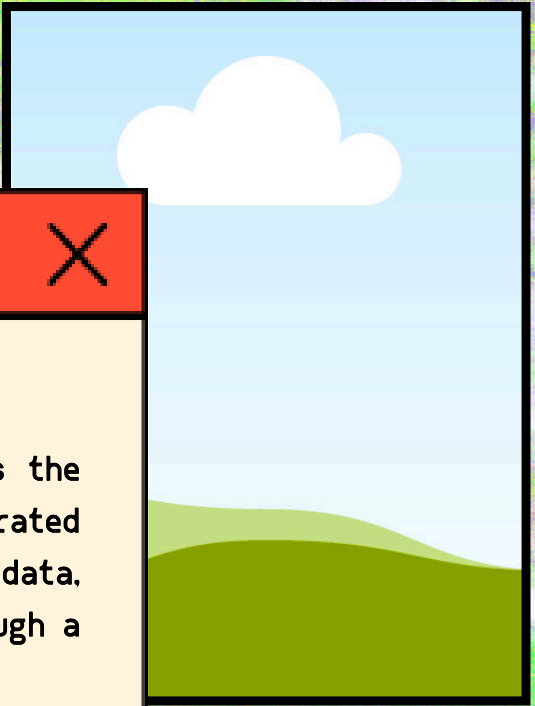
guifi.net (Spain)

NYC Mesh (USA)

Athens Wireless Metropolitan Network (Greece)

NYC MESH

TOR, VPNS, SCRAMBLING



THE ONION ROUTER (TOR)

is a decentralized system that enables anonymous communication across the internet. It directs internet traffic through a worldwide, volunteer-operated network consisting of more than seven thousand relays. By encrypting the data, including the destination IP address, multiple times and sending it through a series of relays, TOR masks a user's location and usage.

VIRTUAL PRIVATE NETWORK (VPN)

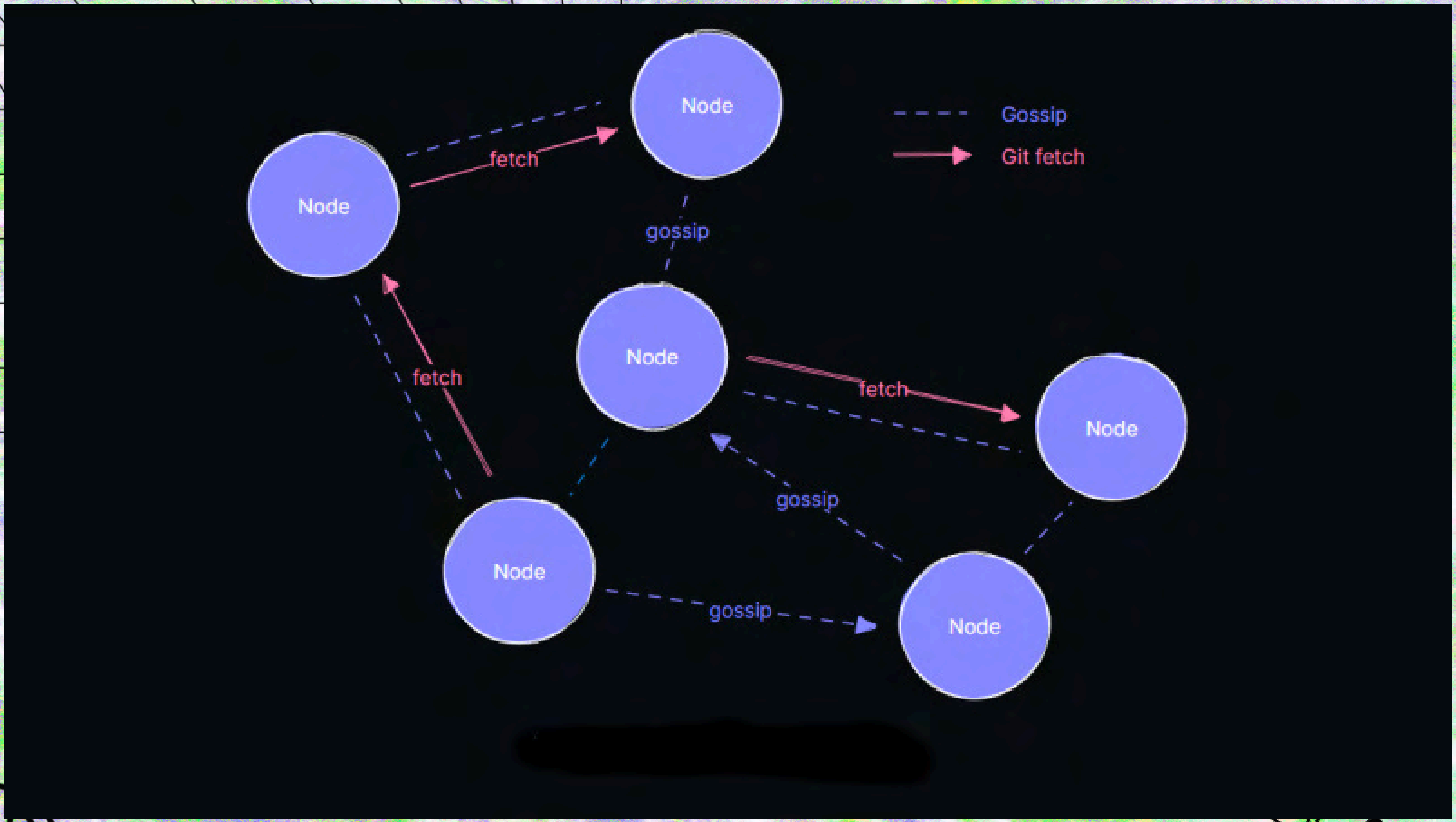
is a service that creates a secure, encrypted connection over a less secure network, such as the internet. It allows users to send and receive data across shared or public networks as if their computing devices were directly connected to a private network. By routing the data traffic through VPN servers, the originating IP address of the user is masked.

PEER-TO-PEER (P2P)

"Peer-to-Peer" (P2P) refers to a decentralized network architecture where each participant (node) in the network shares a part of their resources, such as processing power, disk storage, or network bandwidth, directly with other participants. These resources are shared without the need for centralized coordination by servers or stable hosts. Instead, each node in a P2P network acts as both a "client" (consuming resources) and a "server" (providing resources), with equal privileges and responsibilities.

Examples include: Git, Interplanetary file system (ipfs), Secure Scuttlebutt (SSB), Hyphanet (formerly Freenet), Radicle, and Napster

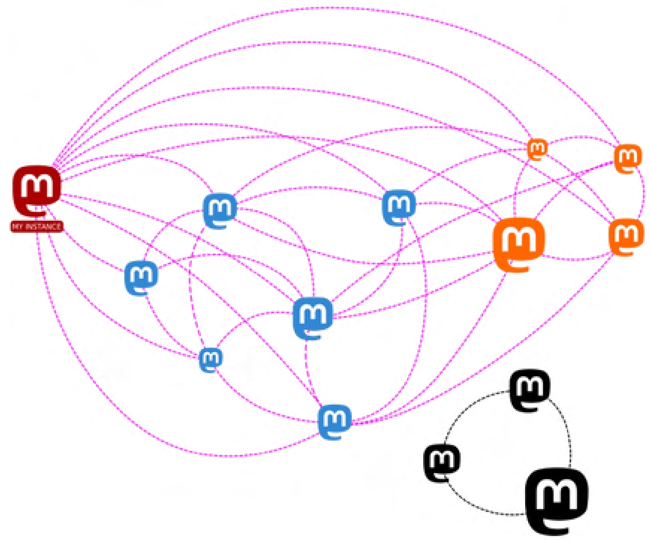
RADICLE



Node
Node
Node
Node
Node
Node
Gossip
Git fetch
fetch
gossip
fetch
fetch
gossip
gossip

FEDERATED NETWORKS

A federated network is a group of independent entities working together to achieve a common goal, but each entity maintains individual control over its own data and operations.



Mastodon: Text-based social media similar to Twitter

Pixelfed: Image-sharing platform similar to Instagram

PeerTube: Video platform similar to YouTube

EARLY SOCIAL NETWORKS

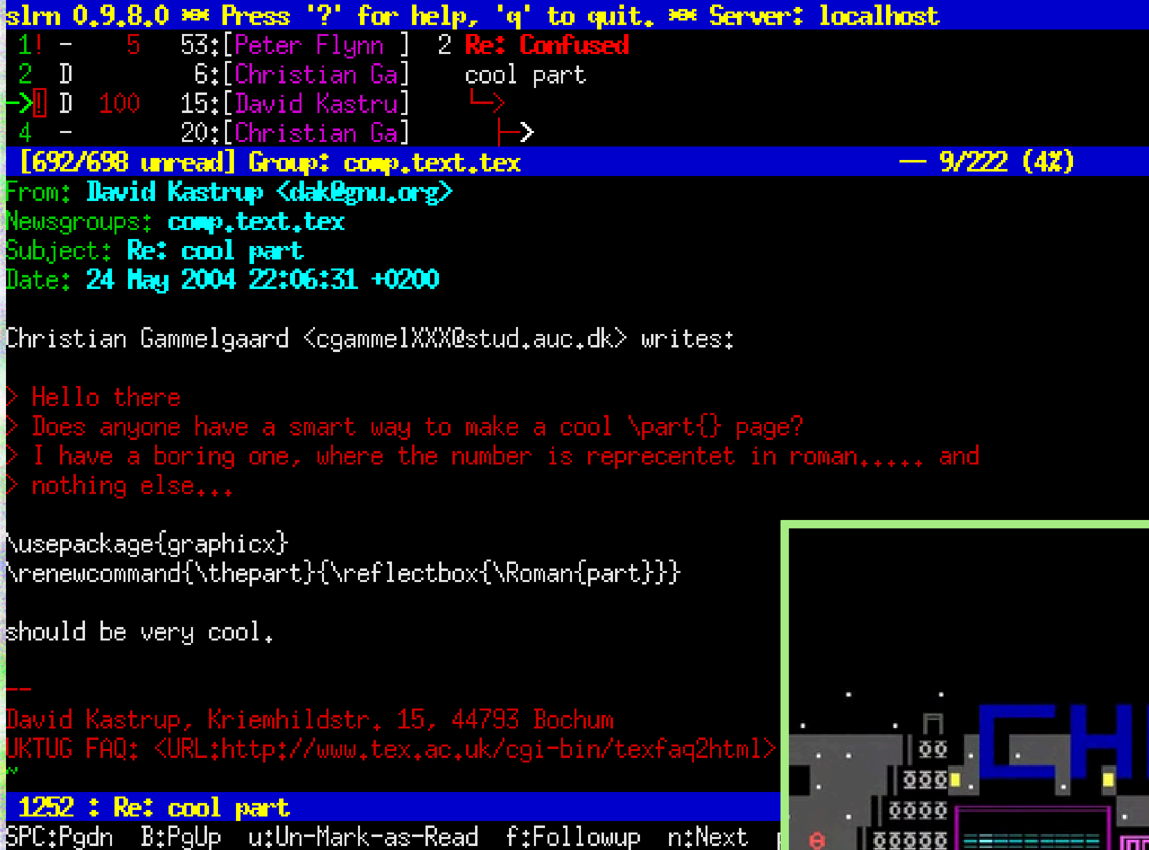
THE WELL (CA)
(The Whole Earth 'Lectronic Link)

THE ECHO NYC

USENET
(Decentralized Newsgroups)

vs.

BBS
(Bulletin Board Service)

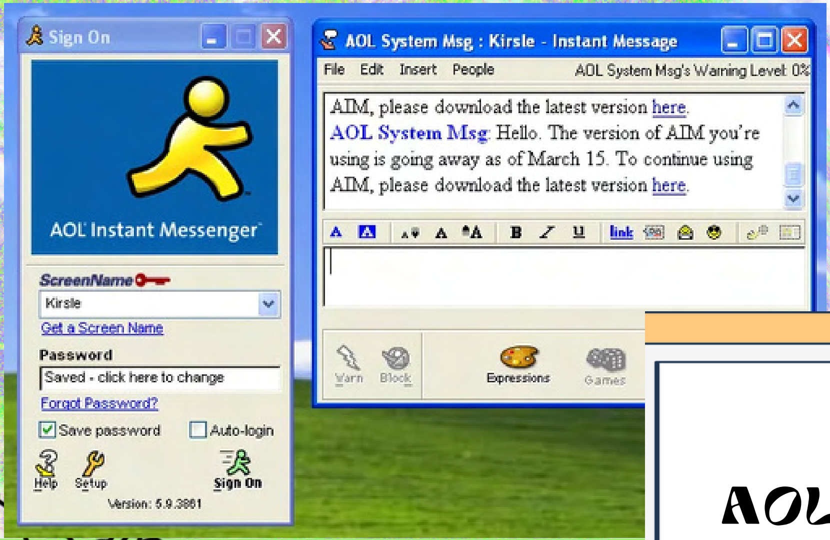

slrn 0.9.8.0 ** Press '?' for help, 'q' to quit. ** Server: localhost
1! - 5 53:[Peter Flynn] 2 Re: Confused
2 D 6:[Christian Ga] cool part
->! D 100 15:[David Kastru]
4 - 20:[Christian Ga]
[692/698 unread] Group: comp.text.tex — 9/222 (4%)
From: David Kastrup <dak@gnu.org>
Newsgroups: comp.text.tex
Subject: Re: cool part
Date: 24 May 2004 22:06:31 +0200
Christian Gammelgaard <cgammelXXX@stud.auc.dk> writes:
> Hello there
> Does anyone have a smart way to make a cool \part{} page?
> I have a boring one, where the number is reprecentet in roman..... and
> nothing else...
\usepackage{graphicx}
\renewcommand{\thepart}{\reflectbox{\Roman{part}}}
should be very cool.
--
David Kastrup, Kriemhildstr. 15, 44793 Bochum
UKTUG FAQ: <URL:http://www.tex.ac.uk/cgi-bin/texfaq2html>
1252 : Re: cool part
SPC:Pgdn B:PgUp u:Un-Mark-as-Read f:Followup n:Next


CHICAGO
SysOp : Shabbir Damani
Speed : 3/12/24/96 HST MNP
Time : 24 Hours a Day
Phone : 312-728-9722/728-4152
WELCOME TO THE WORLD OF
786
3 lines supporting upto 9600 BPS
INFO-MAT Magazine
Member of INTERLINK
260MB on line for downloads
Conf SysOp,Language,Network,Database&
Runing on NOVEL NETWARE 2.1 Qmodem

THE CENTRALIZED WEB : ISPS

MCI MAIL

COMPUSERVE



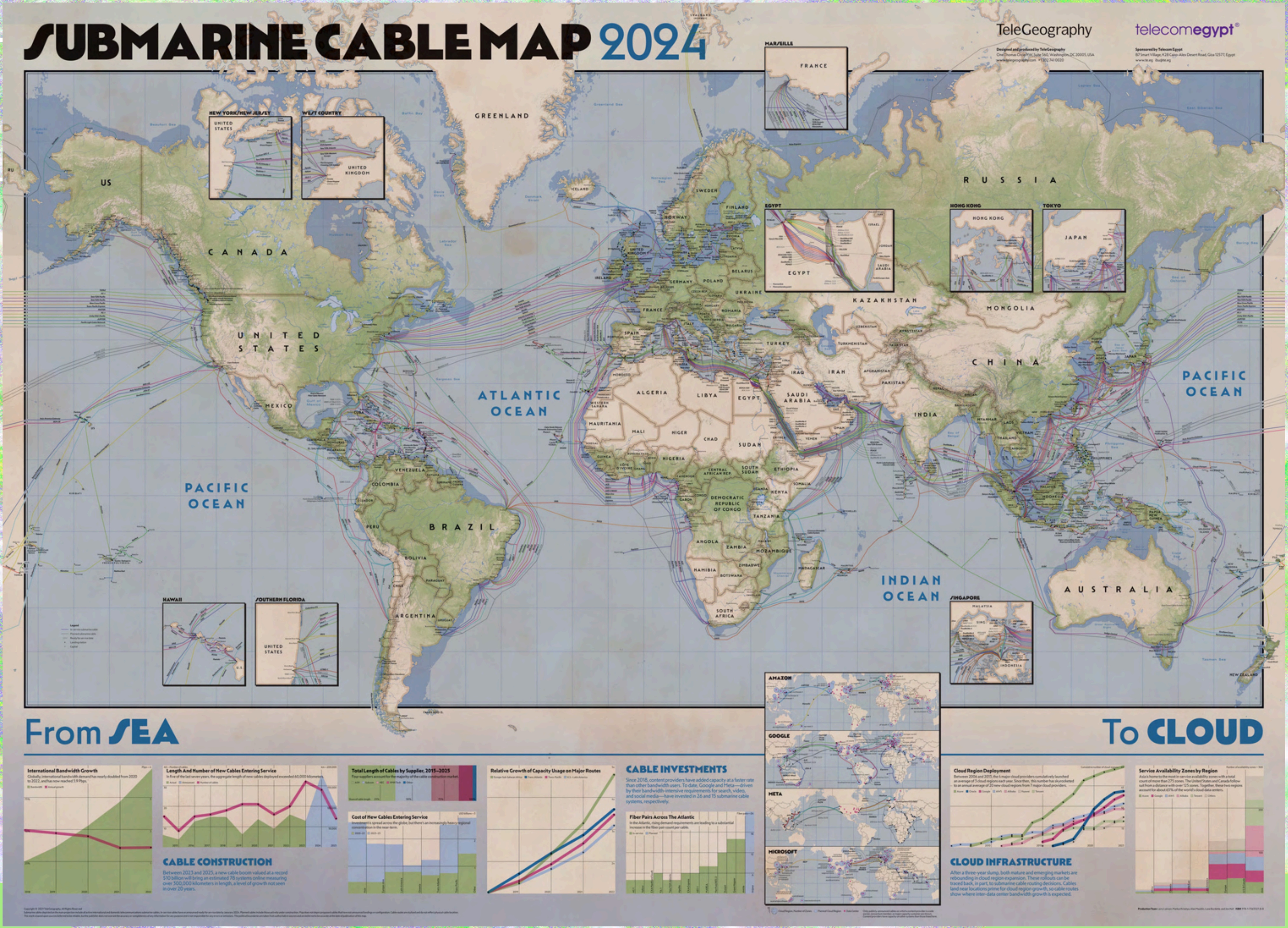
AOL INSTANT MESSENGER

THE CENTRALIZED WEB : WEB 2.0

GOOGLE (ALPHABET)

META

AMAZON



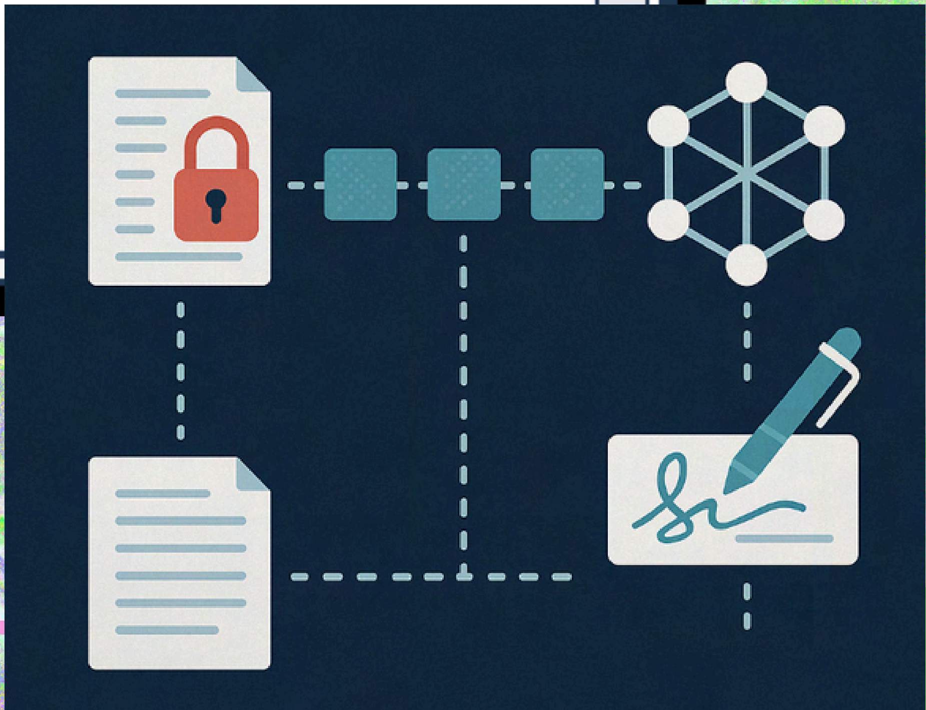
SUBMARINE CABLE MAP 2024
TeleGeography
telecomegypt
GREENLAND
US
CANADA
UNITED STATES
MEXICO
RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
INDIA
IRAN
IRAQ
SAUDI ARABIA
EGYPT
LIBYA
ALGERIA
MAURITANIA
MALI
NIGER
CHAD
SUDAN
NIGERIA
ETHIOPIA
SOMALIA
KENYA
TANZANIA
DEMOCRATIC REPUBLIC OF CONGO
ANGOLA
ZAMBIA
MOZAMBIQUE
NAMIBIA
BOTSWANA
SOUTH AFRICA
MADAGASCAR
VENEZUELA
COLOMBIA
PERU
BRAZIL
BOLIVIA
ARGENTINA
AUSTRALIA
TURKEY
FRANCE
SPAIN
GERMANY
POLAND
UKRAINE
BELARUS
SWEDEN
FINLAND
NORWAY
ICELAND
IRELAND
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
NEW YORK/NEW JERSEY
WEST COUNTRY
MARSEILLE
EGYPT
HONG KONG
TOKYO
JAPAN
HAWAII
SOUTHERN FLORIDA
SINGAPORE
From SEA
To CLOUD
International Bandwidth Growth
Length And Number of New Cables Entering Service
Total Length of Cables by Supplier, 2015–2025
Cost of New Cables Entering Service
Relative Growth of Capacity Usage on Major Routes
CABLE INVESTMENTS
Since 2018, content providers have added capacity at a faster rate than other bandwidth users. To date, Google and Meta—driven by their bandwidth-intensive requirements for search, video, and social media—have invested in 26 and 15 submarine cable systems, respectively.
Fiber Pairs Across The Atlantic
In the Atlantic, rising demand requirements are leading to a substantial increase in the fiber pair count per cable.
CABLE CONSTRUCTION
Between 2023 and 2025, a new cable boom valued at a record $10 billion will bring an estimated 78 systems online measuring over 300,000 kilometers in length, a level of growth not seen in over 20 years.
AMAZON
GOOGLE
META
MICROSOFT
Cloud Region Deployment
Service Availability Zones by Region
CLOUD INFRASTRUCTURE
After a three-year slump, both mature and emerging markets are rebounding in cloud region expansion. These rollouts can be traced back, in part, to submarine cable routing decisions. Cables land near locations prime for cloud region growth, so cable routes show where inter-data center bandwidth growth is expected.

BLOCKCHAIN

In his 1982 David Chaum proposed a concept he called "blind signatures." and mentioned a "cryptographically secured chain of blocks" for timestamps".

In 1991, Haber and Stornetta published a paper titled "How to Time-Stamp Digital Documents." They proposed a system for securing and timestamping digital documents using cryptographic techniques.Their system involved creating a chain of "cryptographic hash functions," where each block in the chain linked back to the previous one, forming a tamper-proof chain.

Neither proposed system was envisioned as decentralized in infrastructure



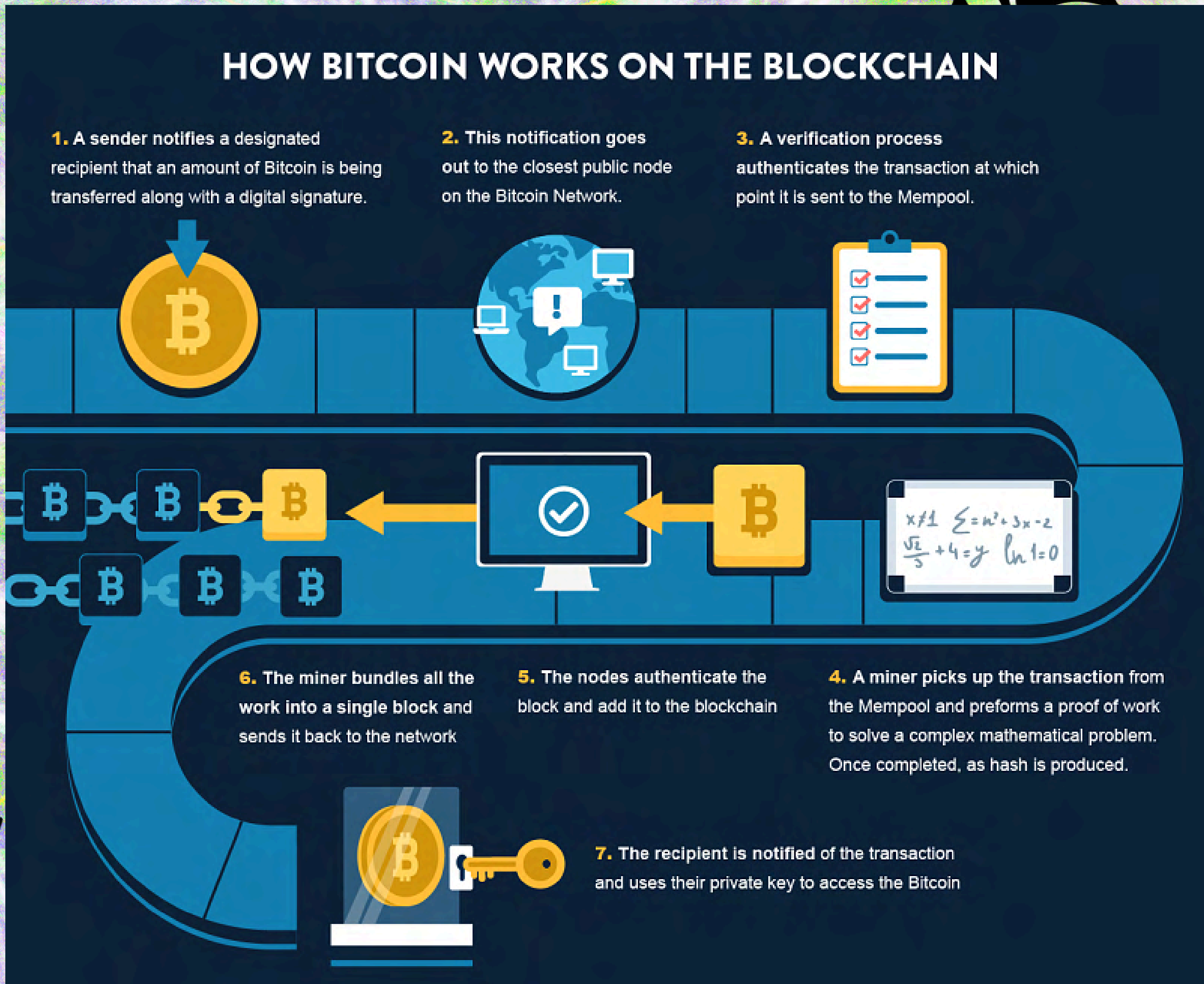
Broadly Speaking...

Transaction data is not stored on a single server controlled by a central authority, but rather on a distributed ledger replicated across a network of computers (nodes) worldwide.

nodes in the network constantly verify and agree upon the validity of transactions using a process called proof-of-work. This eliminates the need for a central authority to validate transactions and ensures a secure and transparent system.

- Hardware: The type of mining hardware used plays a significant role. High-powered, specialized mining rigs designed for efficient PoW problem solving are expensive compared to using personal computers.
- Electricity: The computational power required for PoW consumes significant electricity, and the cost varies depending on location and electricity rates.
- Mining difficulty: The difficulty of the PoW puzzle is adjusted automatically to maintain a specific block creation rate. As more miners join the network, the difficulty increases, requiring more computing power and consequently, higher electricity costs.

BITCOIN

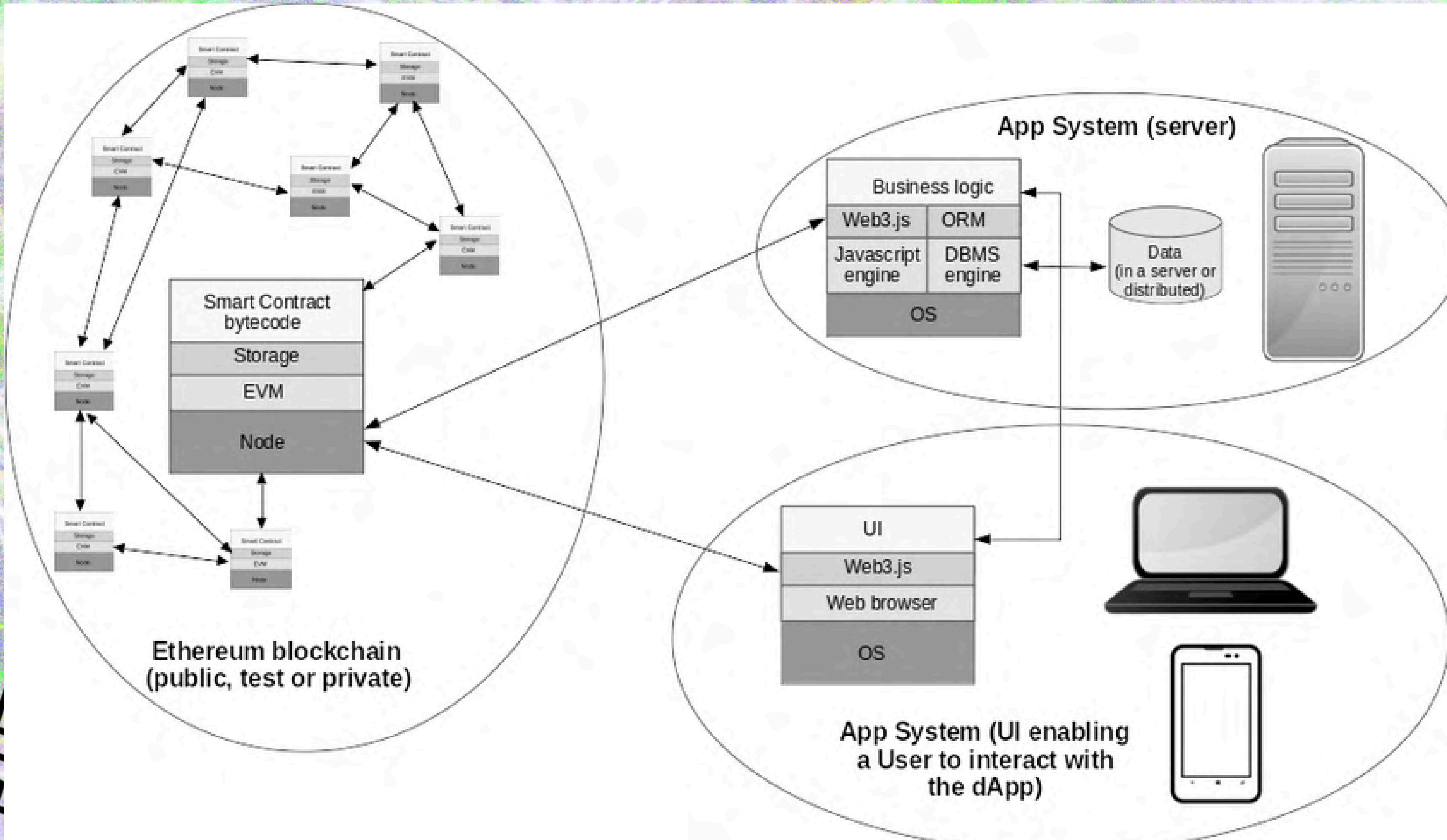

HOW BITCOIN WORKS ON THE BLOCKCHAIN
1. A sender notifies a designated recipient that an amount of Bitcoin is being transferred along with a digital signature.
2. This notification goes out to the closest public node on the Bitcoin Network.
3. A verification process authenticates the transaction at which point it is sent to the Mempool.
4. A miner picks up the transaction from the Mempool and preforms a proof of work to solve a complex mathematical problem. Once completed, as hash is produced.
5. The nodes authenticate the block and add it to the blockchain
6. The miner bundles all the work into a single block and sends it back to the network
7. The recipient is notified of the transaction and uses their private key to access the Bitcoin

ETHEREUM

dApps (Decentralized applications) don't rely on a single entity to control their operation. The code, data, and governance mechanisms are distributed across the network of nodes running the Ethereum blockchain.

Proof of Stake or PoS validators are selected to create new blocks and verify transactions based on the number of coins they hold and are willing to "stake" as collateral. The likelihood of being chosen to validate transactions correlates with the size of one's stake, thus incentivizing validators to act honestly to avoid losing their stake as a penalty for malicious actions. This mechanism reduces energy usage by eliminating the need for competitive, computationally intensive mining.

ETHEREUM



Smart Contract
bytecode
Storage
EVM
Node
Ethereum blockchain
(public, test or private)
App System (server)
Business logic
Web3.js
ORM
Javascript
engine
DBMS
engine
OS
Data
(in a server or
distributed)
UI
Web3.js
Web browser
OS
App System (UI enabling
a User to interact with
the dApp)

TEZOS

Designed for forkless upgrades through a built-in on-chain governance mechanism. This allows the network to evolve and improve without splitting, offering greater stability and predictability.

Utilizes a delegation system where XTZ holders can delegate their staking rights to bakers. This allows even those with smaller holdings to participate in securing the network.

Node operators staked currency is liquid

lower gas fees

TEZOS


Tezos Upgrades
MAY 2019
Athens
OCT 2019
Babylon
MAR 2020
Carthage
SEP 2020
Delphi
FEB 2021
Edo
MAY 2021
Florence
AUG 2021
Granada
DEC 2021
Hangzhou
APR 2022
Ithaca
JUNE 2022
Jakarta
SEP 2022
Kathmandu
DEC 2022
Lima
MAR 2023
Mumbai
JUNE 2023
Nairobi
FEB 2024
Oxford

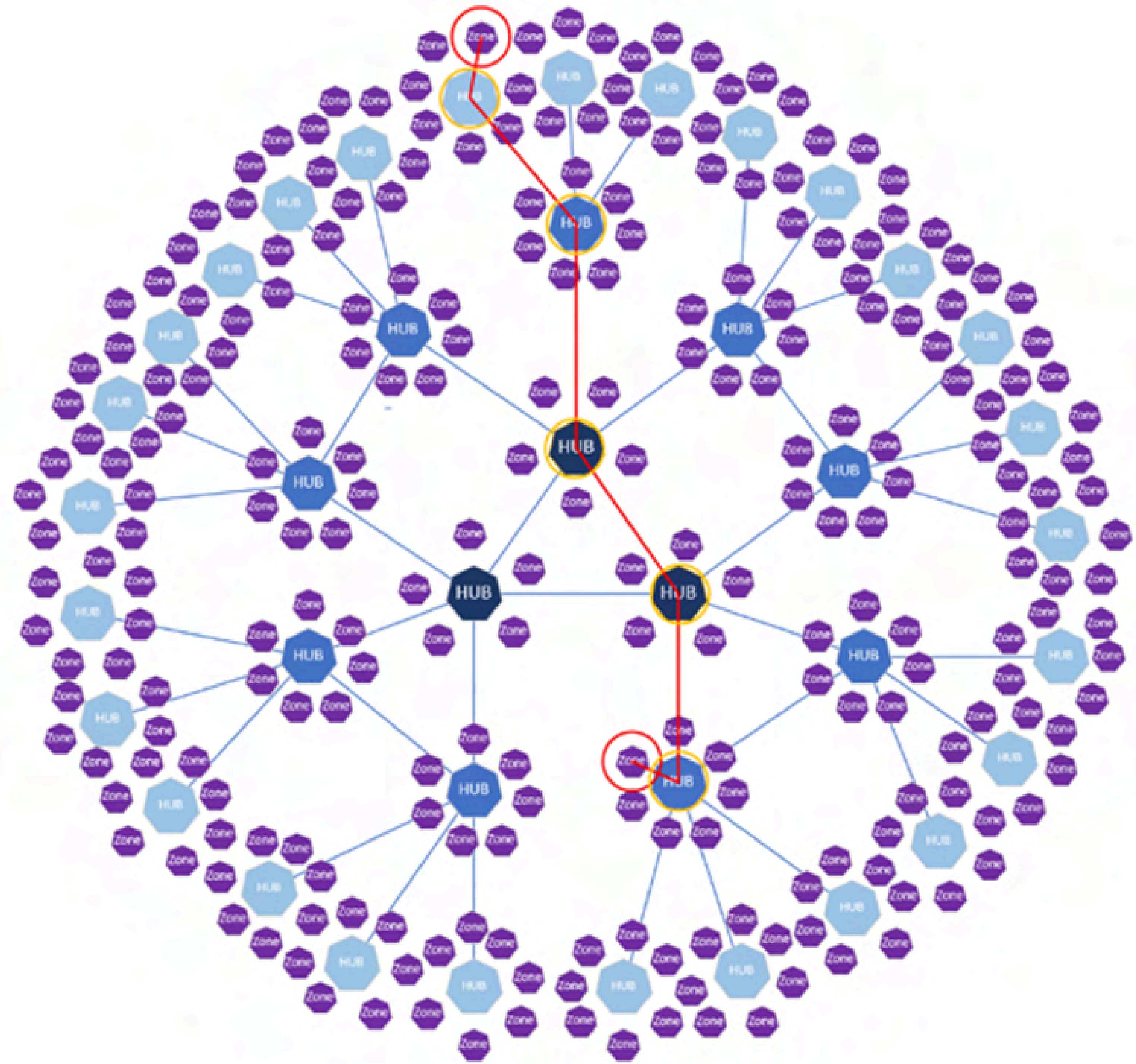
COSMOS

Cosmos allows developers to create independent blockchains tailored to specific needs. This promotes decentralization by fostering a multi-chain ecosystem where each chain can have its own governance model and consensus mechanism.

Allows developers to choose from various pre-built functionalities, increasing customization and flexibility.

Enables the creation of specialized blockchains for diverse use cases, contributing to a more decentralized and interoperable blockchain landscape compared to single-chain solutions like Ethereum and Tezos.

COSMOS



SIDE CHAINS AND LAYER 2S

The two-way peg mechanism that facilitates asset transfer between the main chain and the sidechain can be a security risk. If the peg is compromised, it could allow attackers to mint new assets on the sidechain without actually depositing them on the main chain. This could lead to inflation and a devaluation of the sidechain's assets.

Bridges are the communication channels between the main chain and the sidechain, facilitating asset transfers. These bridges can be complex and present potential security vulnerabilities if not implemented correctly. Hackers might exploit these vulnerabilities to steal assets being transferred between the chains.

CUSTODIAL CHAINS

Custodial chains, like Flow and Solana, differ from prominent blockchains like Bitcoin, Ethereum, and Tezos in their approach to decentralization. While they leverage blockchain technology for features like transparency and immutability. They incorporate centralized elements in their governance and consensus mechanisms. These chains often have a limited number of validators controlled by the platform operators, raising concerns about centralization and potential censorship. However, this approach can offer faster transaction processing times and lower fees

BLOCKCHAIN NODE PROVIDERS

- INFURA
- ALCHEMY
- ANKR
- HETZNER
- DIGITAL OCEAN
- AMAZON

FINAL QUESTIONS?

Anna Katrina