NETWORKING and CYBERSECURITY

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AGENDA

Section I: Overview of computer networking: State of the union

- ~50 years for internet
- Impact of computing and networking: The second machine age

Section II: Computer networking fundamentals:

- Types of Networks and Devices in a network
- Network Addressing schemes and Networking protocols
- Software defined networks

Section III: Cybersecurity:

- **T**ypes of vulnerabilities and attacks
- Cryptography: The basics of authentication, authorization and encryption
- Modern techniques of threat detection, mitigation and prevention
- Anatomy of a cyber-attack

Q&A

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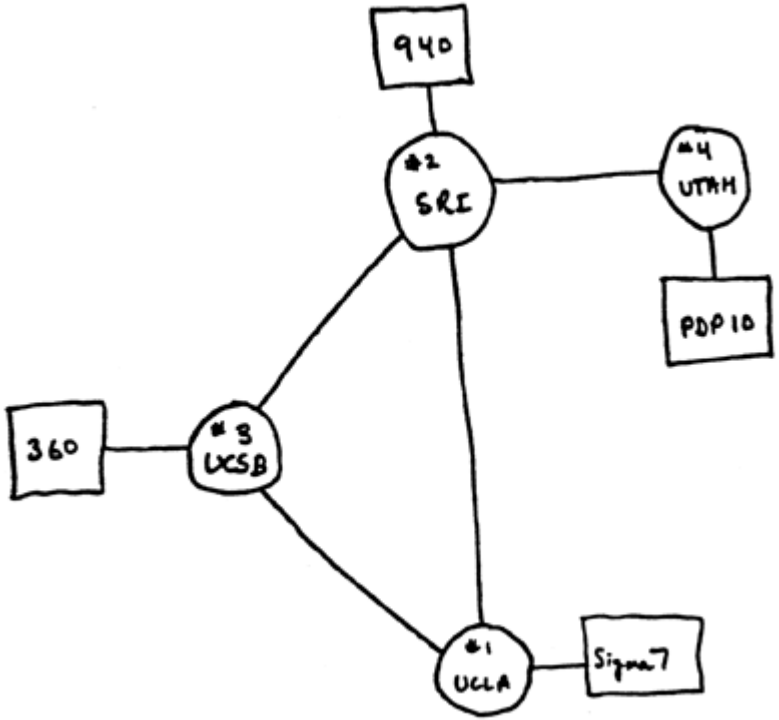
The first 4 node network at ARPANET: 1969



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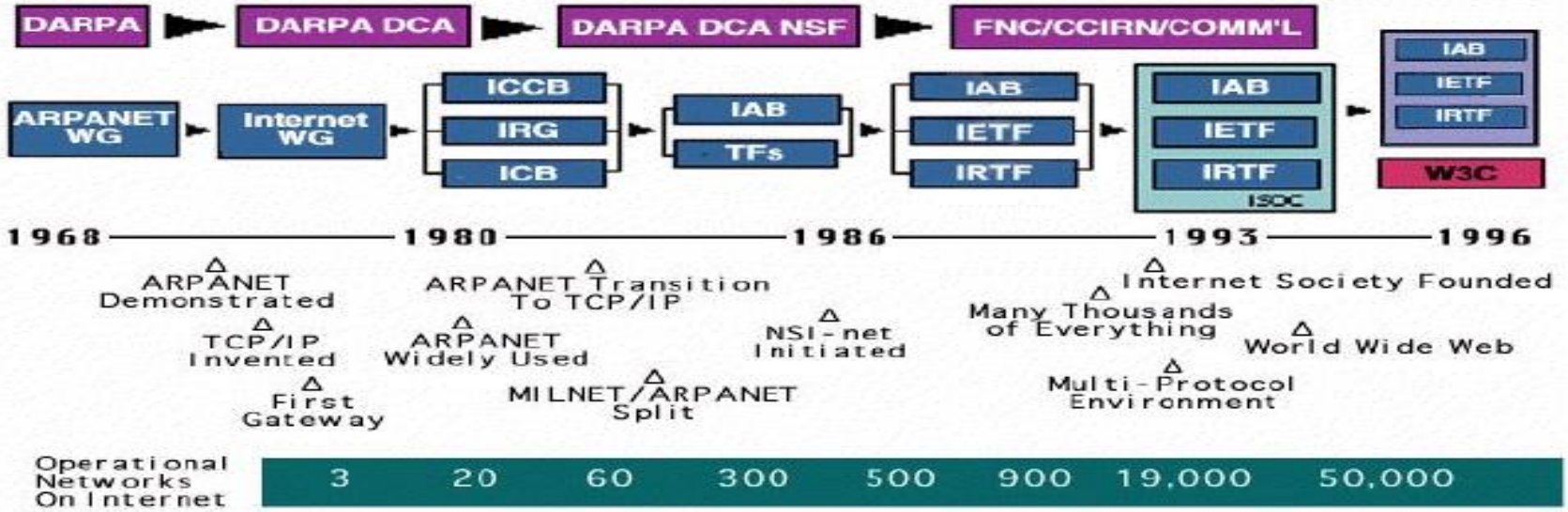

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WHO/WHAT IS CONNECTED?

- Number of people: ~3.5 billion
- Number of devices: ~10 billion
- Number of things (IoT): ~50 billion by 2020 (50 years of internet)

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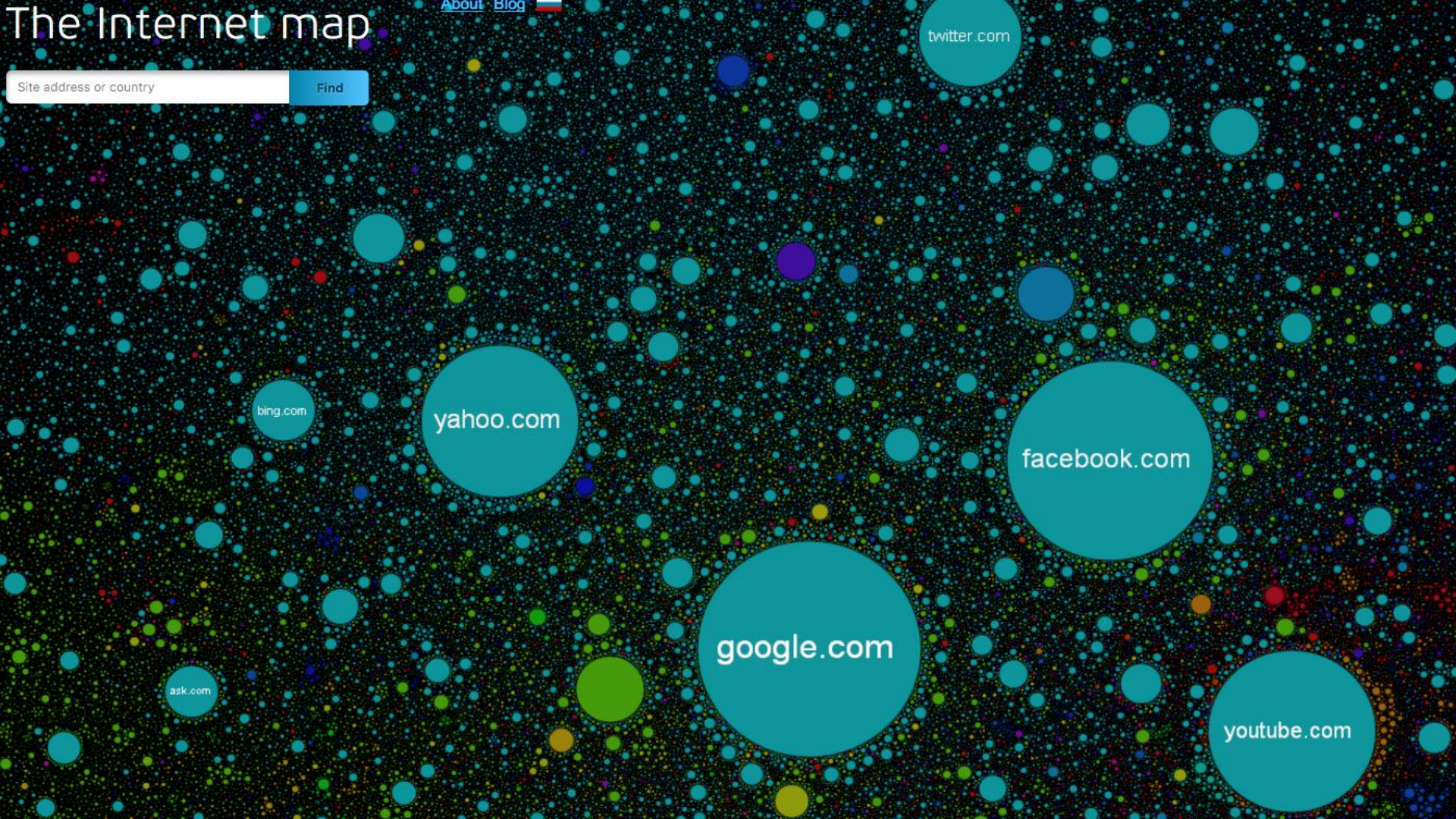
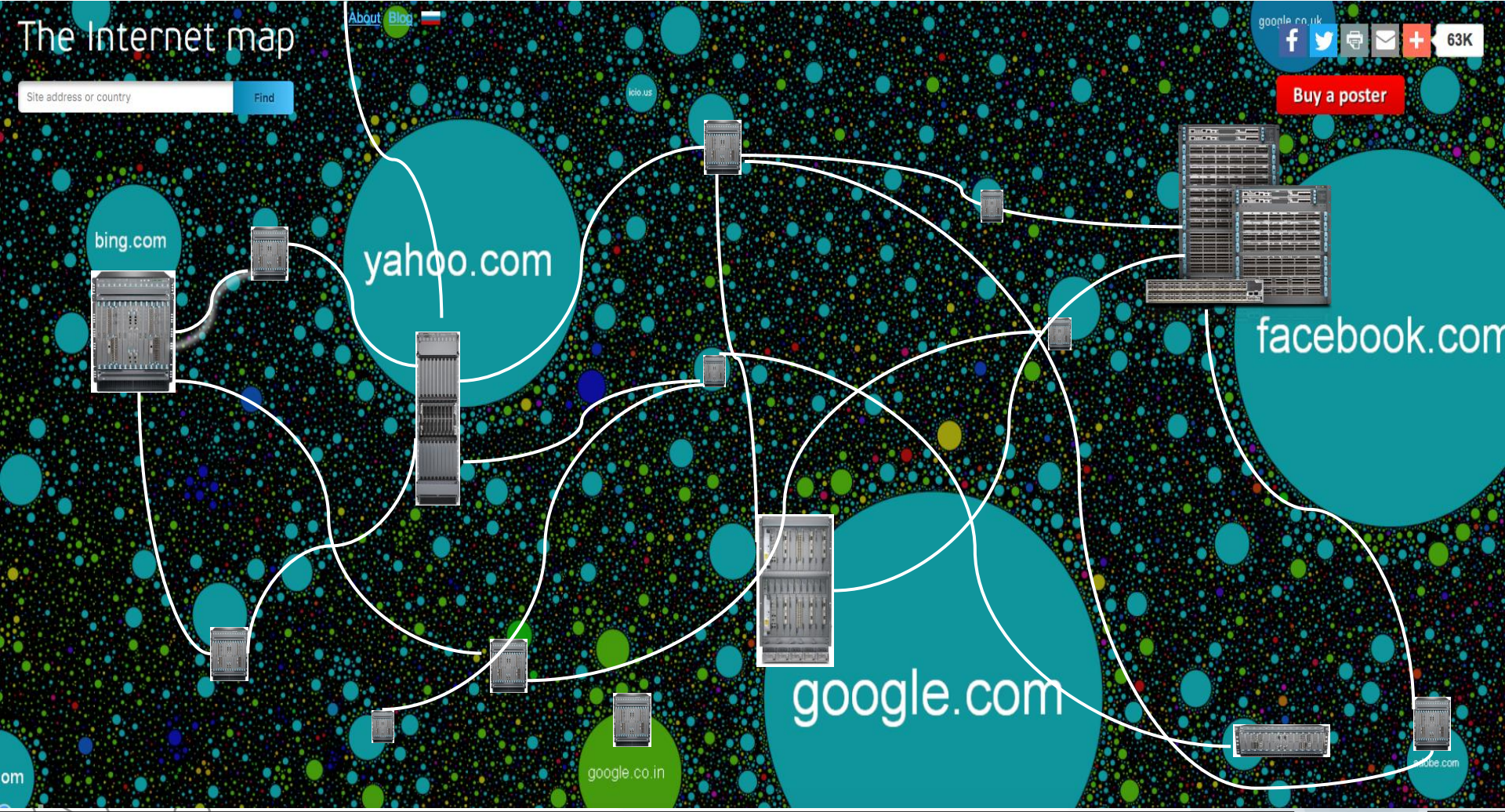
The Internet map

About · Blog

Site address or country

Find





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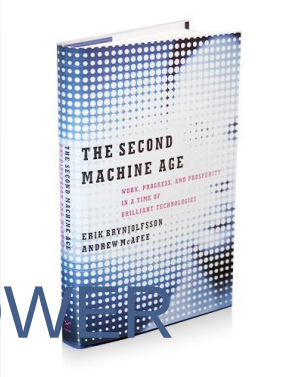
THE SECOND MACHINE AGE

By Erik Brynjolfsson and Andrew McAfee



INDUSTRIAL REVOLUTION = PHYSICAL POWER

Steam Engine, Electricity

Second Machine Age = Mental Power

Computers, Software, Machine Intelligence, Data Science

And

NETWORKS

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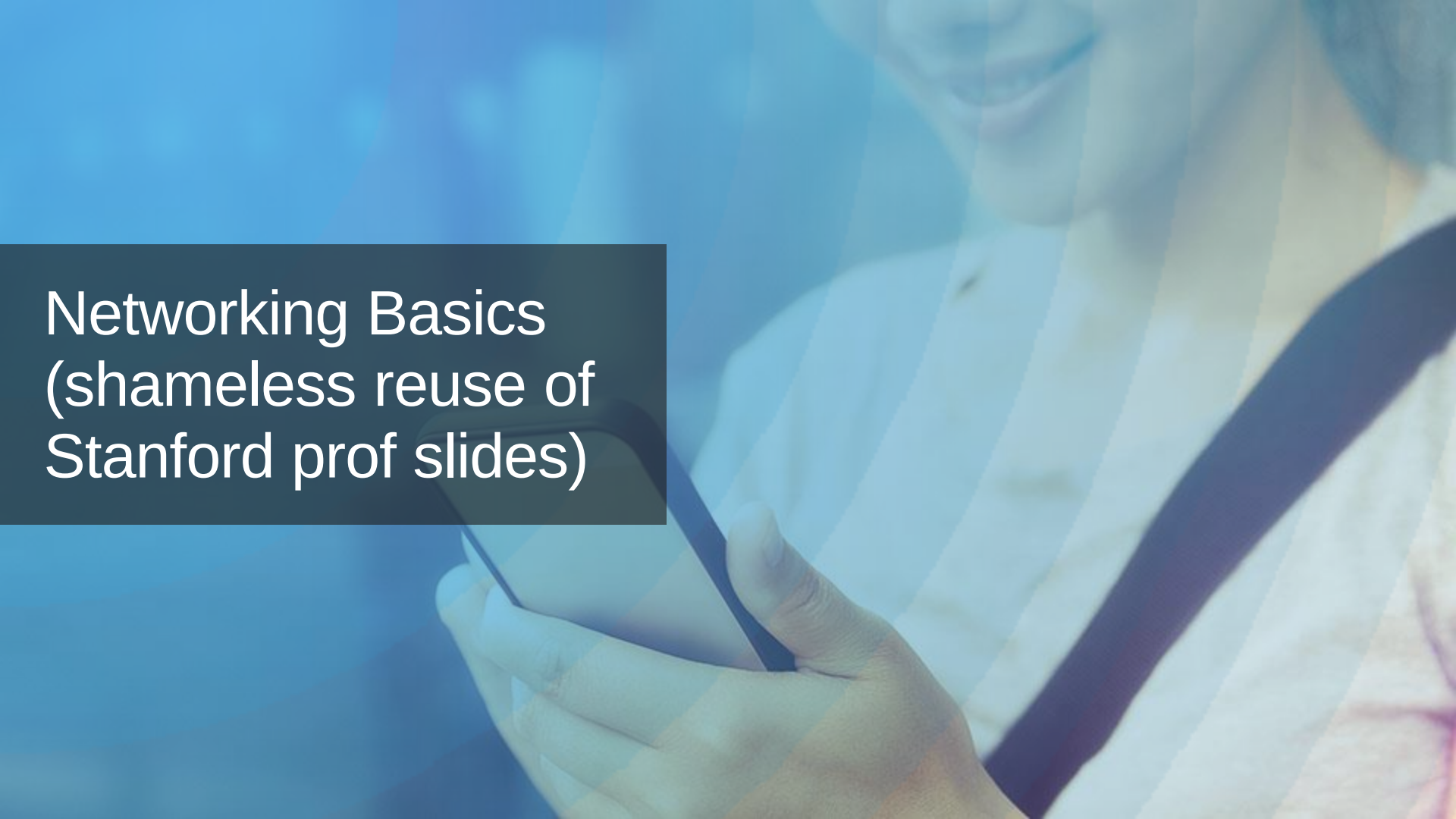
Networking Basics (shameless reuse of Stanford prof slides)



CyberSecurity

WHAT IS CYBERSECURITY?

the state of being protected against the criminal or unauthorized use of electronic data, or the measures taken to achieve this.

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Live Cyber Attack Threat Map

https://threatmap.checkpoint.com/ThreatPortal/livemap.html

what is cybersecurity

Most Visited Getting Started

Powered by ThreatCloud Intelligence

THREATCLOUD

LIVE CYBER ATTACK THREAT MAP

Check Point SOFTWARE TECHNOLOGIES, INC.

ATTACKS TODAY

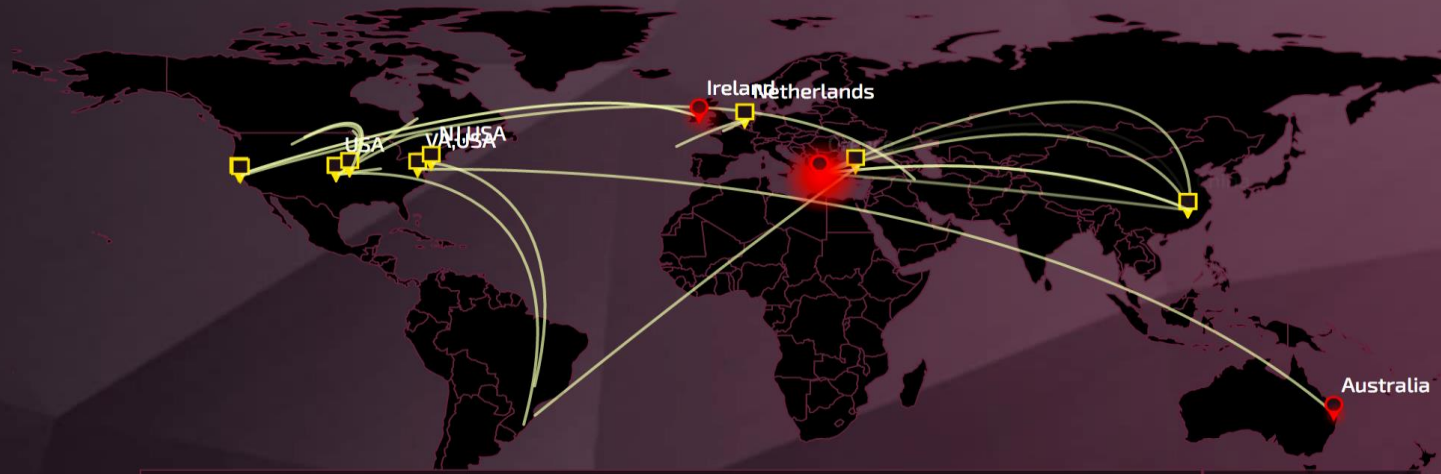
(since 12AM PST)

5,332,147

ATTACKS YESTERDAY

3,641,765

- TOP TARGET COUNTRIES
- TOP ATTACKING COUNTRIES



TIME	ATTACK	ATTACKING COUNTRY	TARGET COUNTRY
23:50:52	Operator.SigUrl.cv	Netherlands	Colombia
23:50:52	Operator.BotnetB.bfhj	Netherlands	Colombia
23:50:52	Trojan-ransom.Win32.Locky.esf	MO,USA	CA,USA
23:50:51	Trojan.Win32.Generic.T.lnhm	USA	NY,USA
23:50:51	Trojan.Win32.Generic.T.lnhm	USA	NY,USA

Attackers

Targets

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TYPES OF ATTACKS

Robert Morris and the first computer worm

Denial-of-service attack

Backdoor

Eavesdropping

Tampering

Direct-access attacks

Spoofing

Phishing

Stuxnet attack

Social engineering

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A Brief History of the World

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HOW DO COMPUTERS AND NETWORKS PROTECT THEMSELVES?

- BASIC CRYPTOGRAPHY
- FIREWALLS
- Virtual Private Networks
- Intrusion Detection and Prevention
- Content Security: Anti-spam, Anti-virus, Anti-malware

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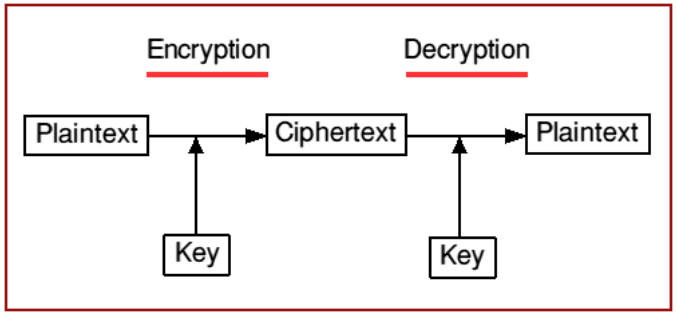
CRYPTOGRAPHY

the art of writing or solving codes.



mfut nblf tdjfodf hsfbu bhbjo

↓

CEASAR CIPHER

↓

Lets make SCIENCE great again

- Symmetric encoding
- One way functions
- Hashing algorithms
- Public and Private Key Algorigthms
- Digital Signature

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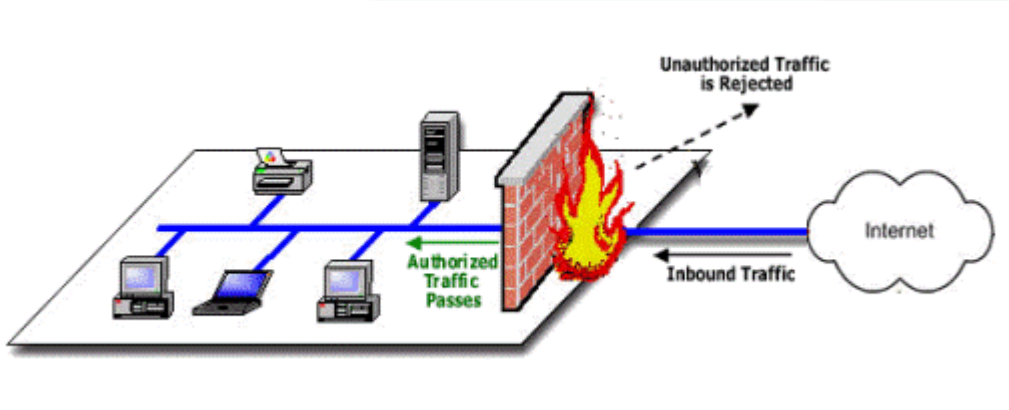
FIREWALLS

- Firewalls are network devices that provide mechanisms to protect a private (secure) network while still allowing legitimate access from public (less secure) networks.



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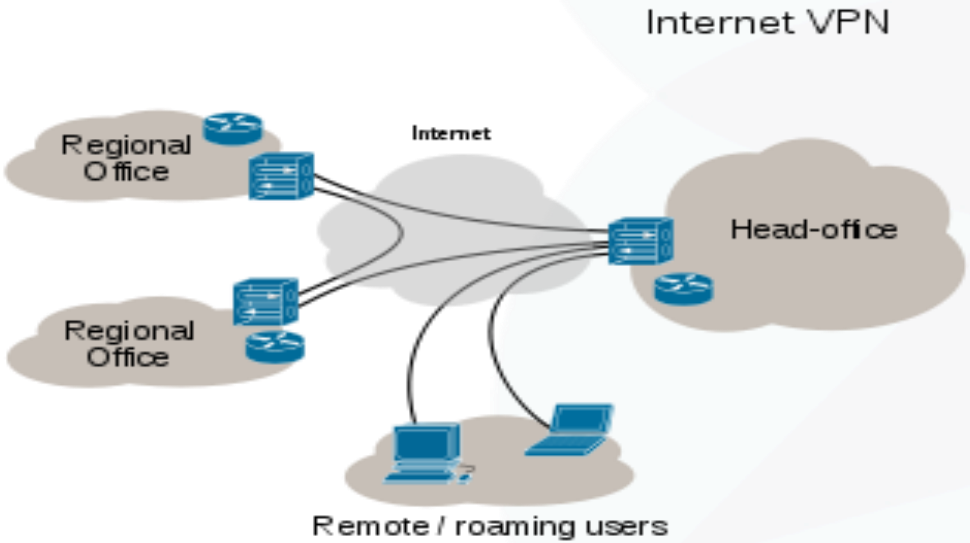
Virtual Private Networks (VPNs)

- a method employing encryption to provide secure access to a remote computer over the Internet.



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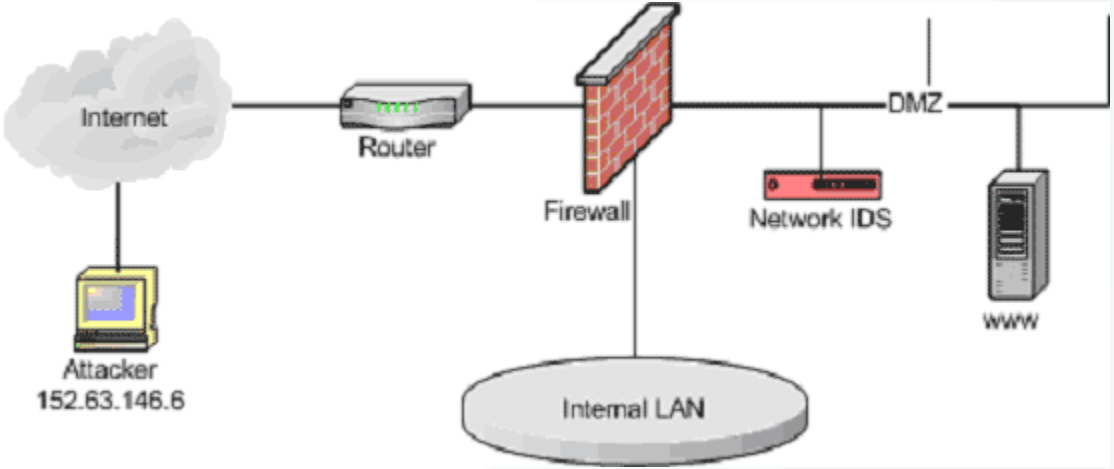
Intrusion Detection and Prevention

- Detects and prevents malicious activities on the network (typically looks for signatures)



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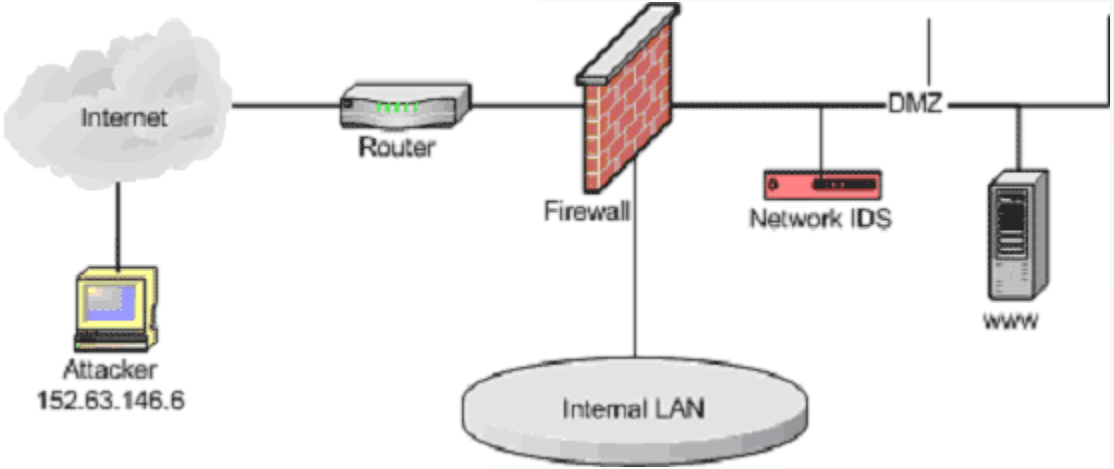
Content Security and Filtering

- Detects viruses, malwares, spams and other malicious and/or prevented content
- Uses signatures, reputation databases, analytics



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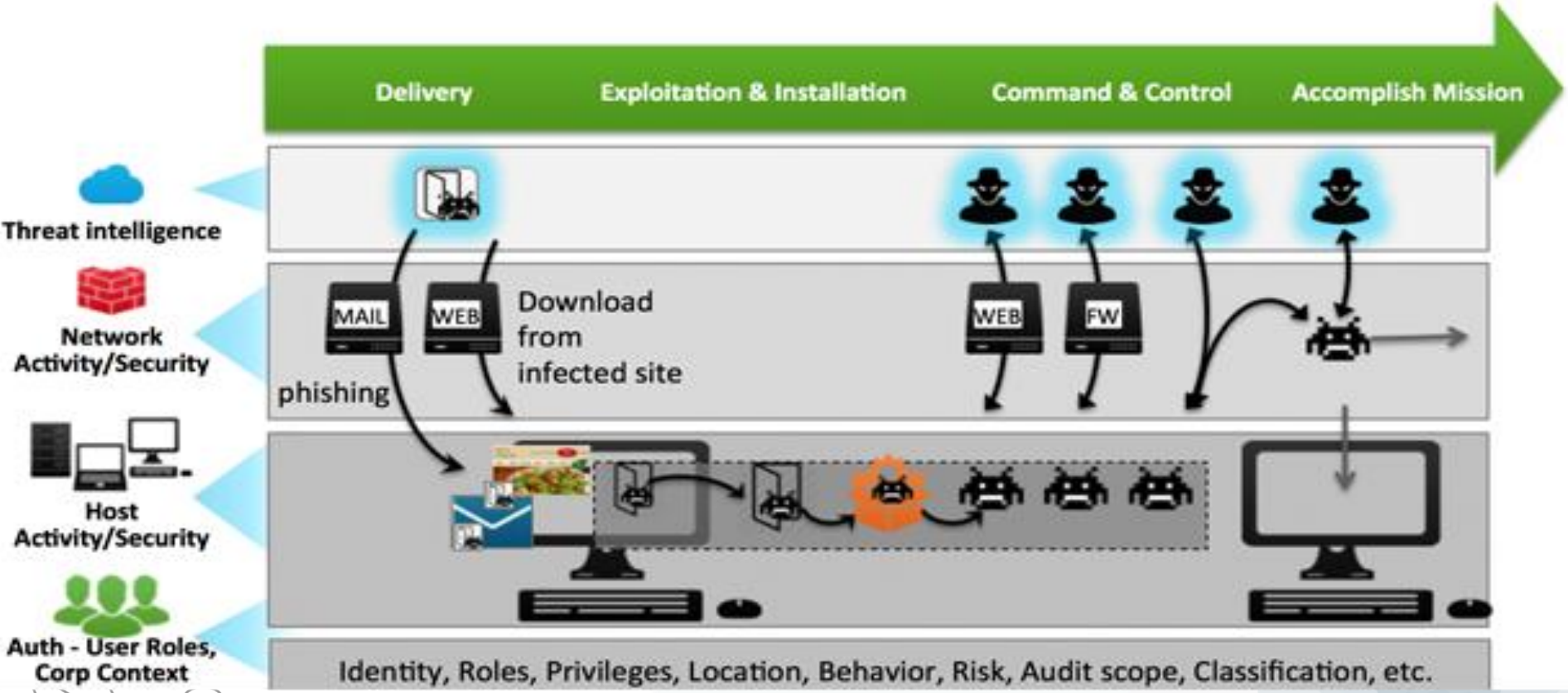
Advanced threat detection and prevention



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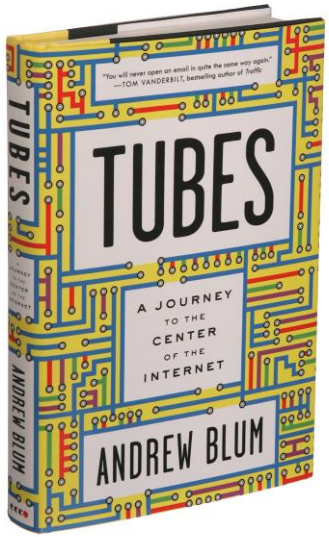
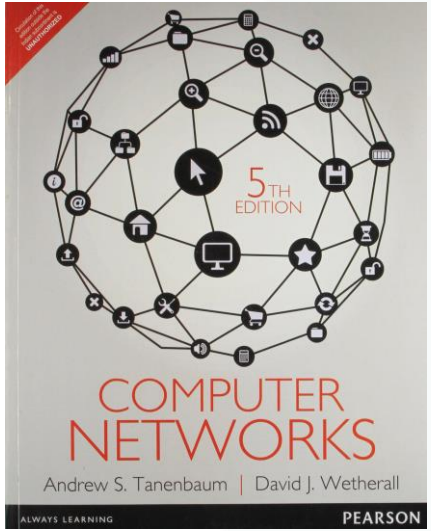
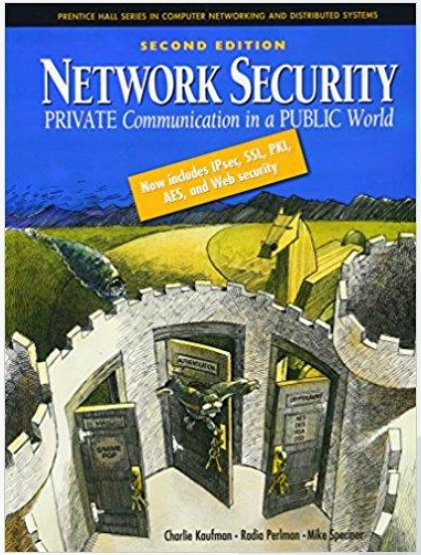
TUBES: A Journey to the center of the Internet: By Andrew Blum



COMPUTER NETWORKS: By Andrew S. Tanenbaum



Network Security: Private Communications in a PUBLIC world: Charlie Kaufman, Radia Perlman, Mike Speciner:



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Thank you