Networking

Networking and Communication Trends

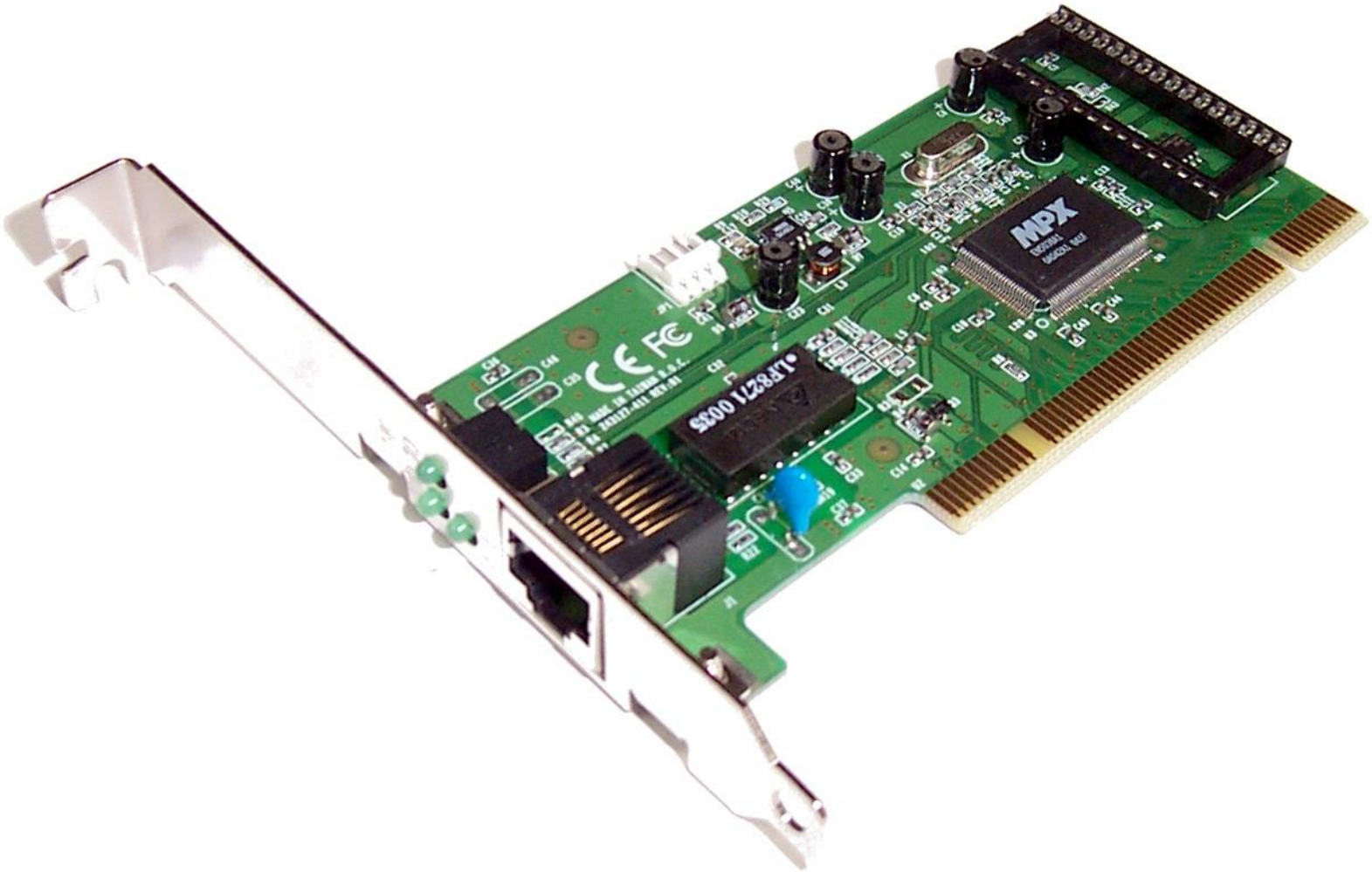
- Convergence (Accessibility)
- Speed
- Stability
- Simplicity*
- Embeddedness

Networking

What is a Computer Network

- General definition
- Related hardware
  - Network Interface Card

- Network Operating System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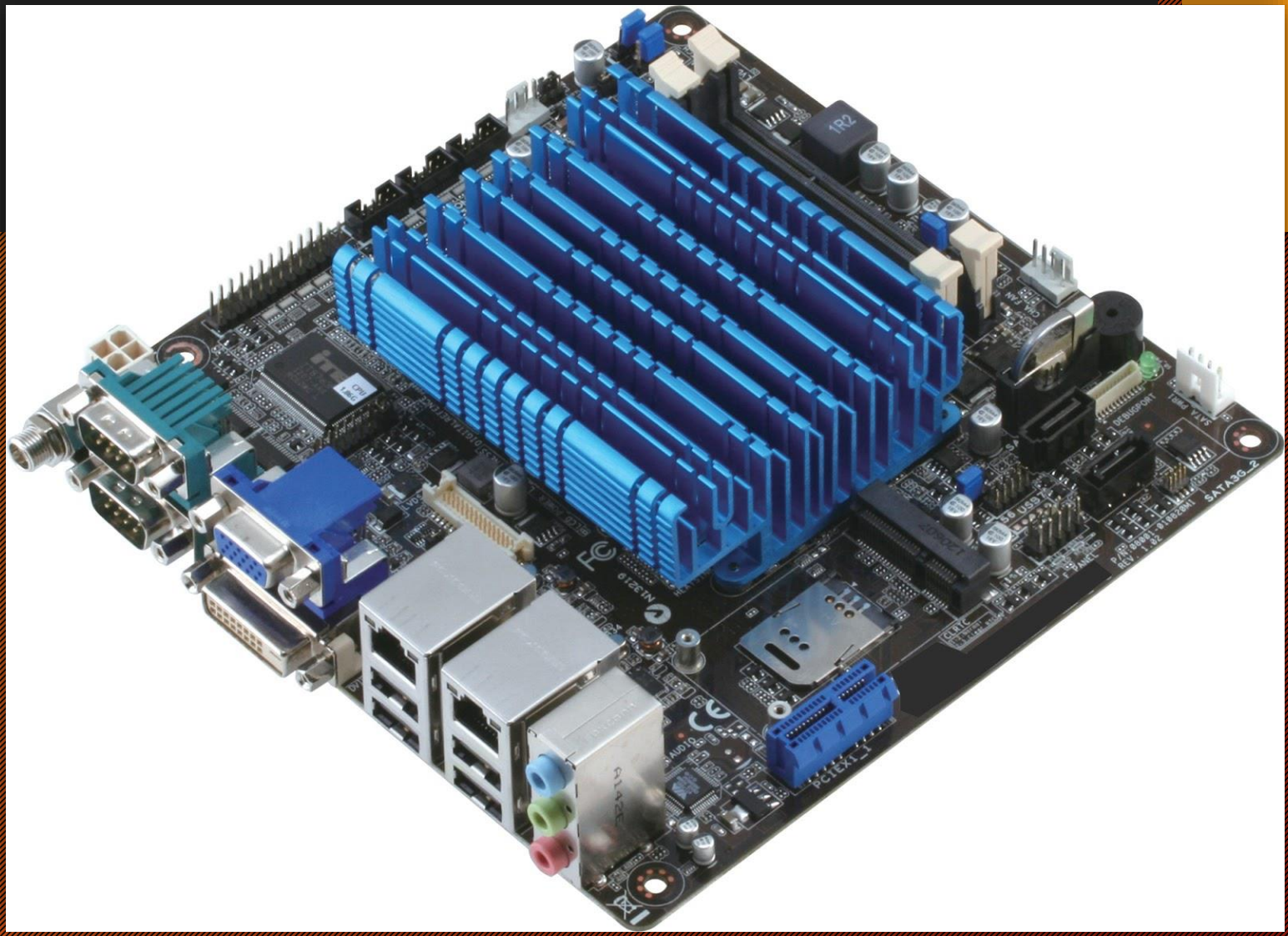
1R2
SATA3G_2
PCIEX1_1

Networking

What is a Computer Network

- General definition
- Related hardware
  - -Network Interface Card
  - -Hub
  - -Switch
  - -Router
- Network Operating System

Networking

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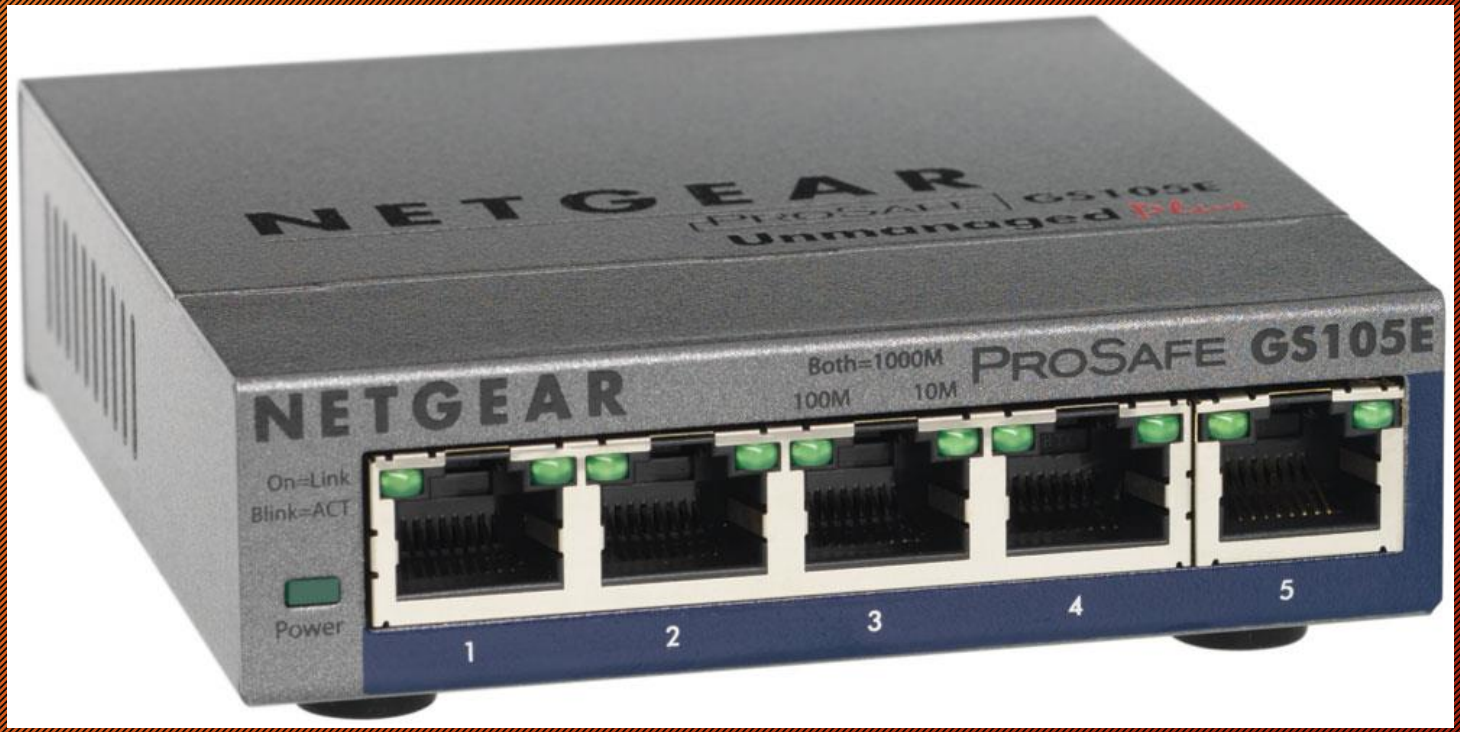
NETGEAR
Unmanaged
NETGEAR
Both=1000M
100M
10M
ProSafe GS105E
On=Link
Blink=ACT
Power
1
2
3
4
5

Networking

What is a Computer Network

- General definition
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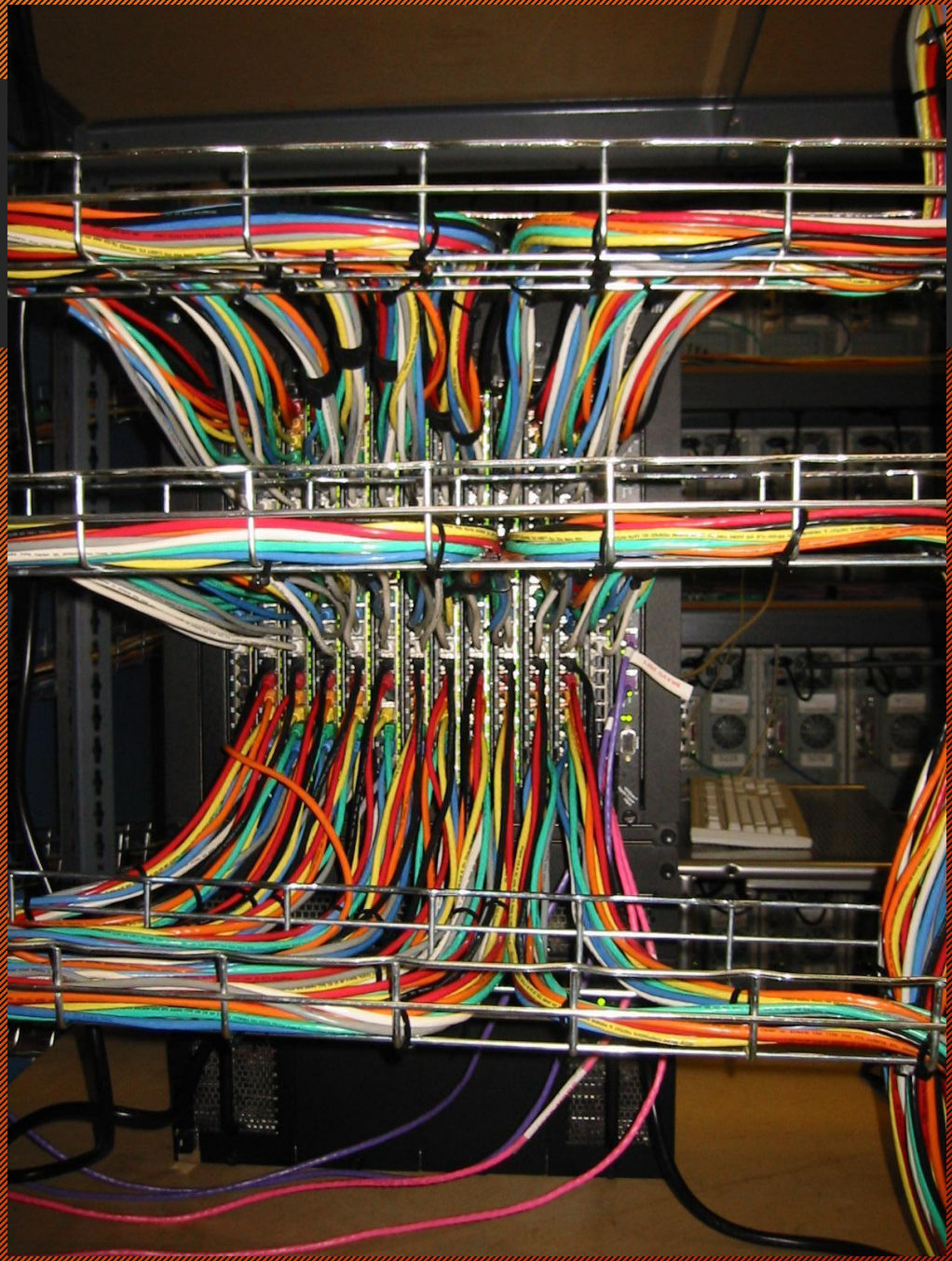
  - -Switch

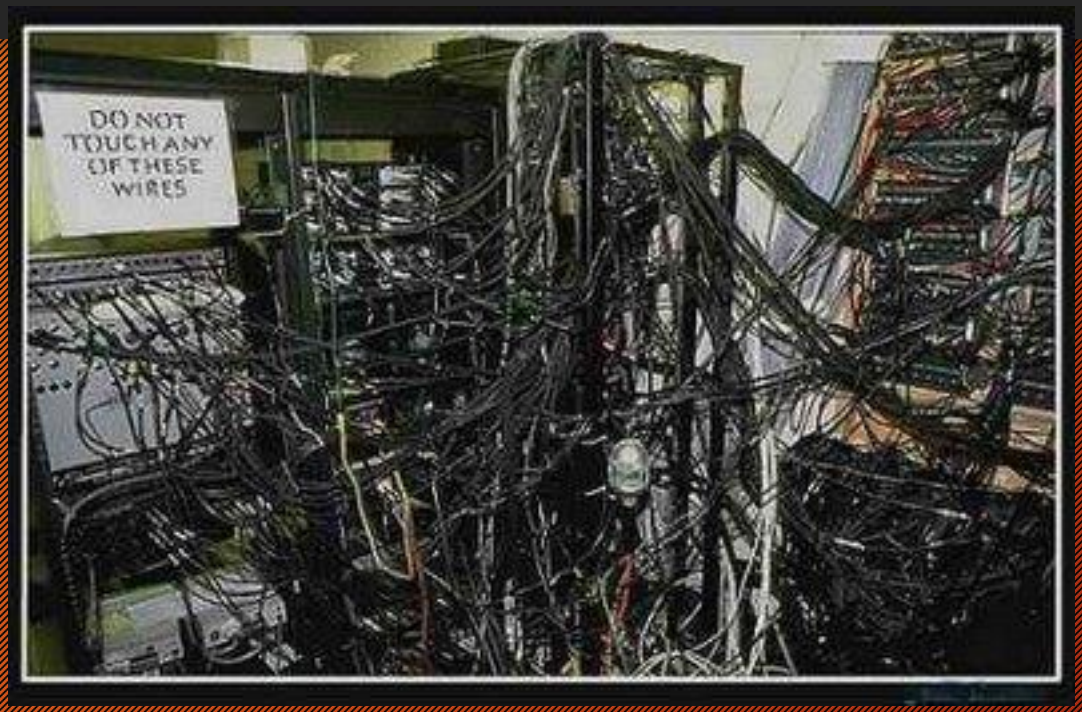
- Network Operating System

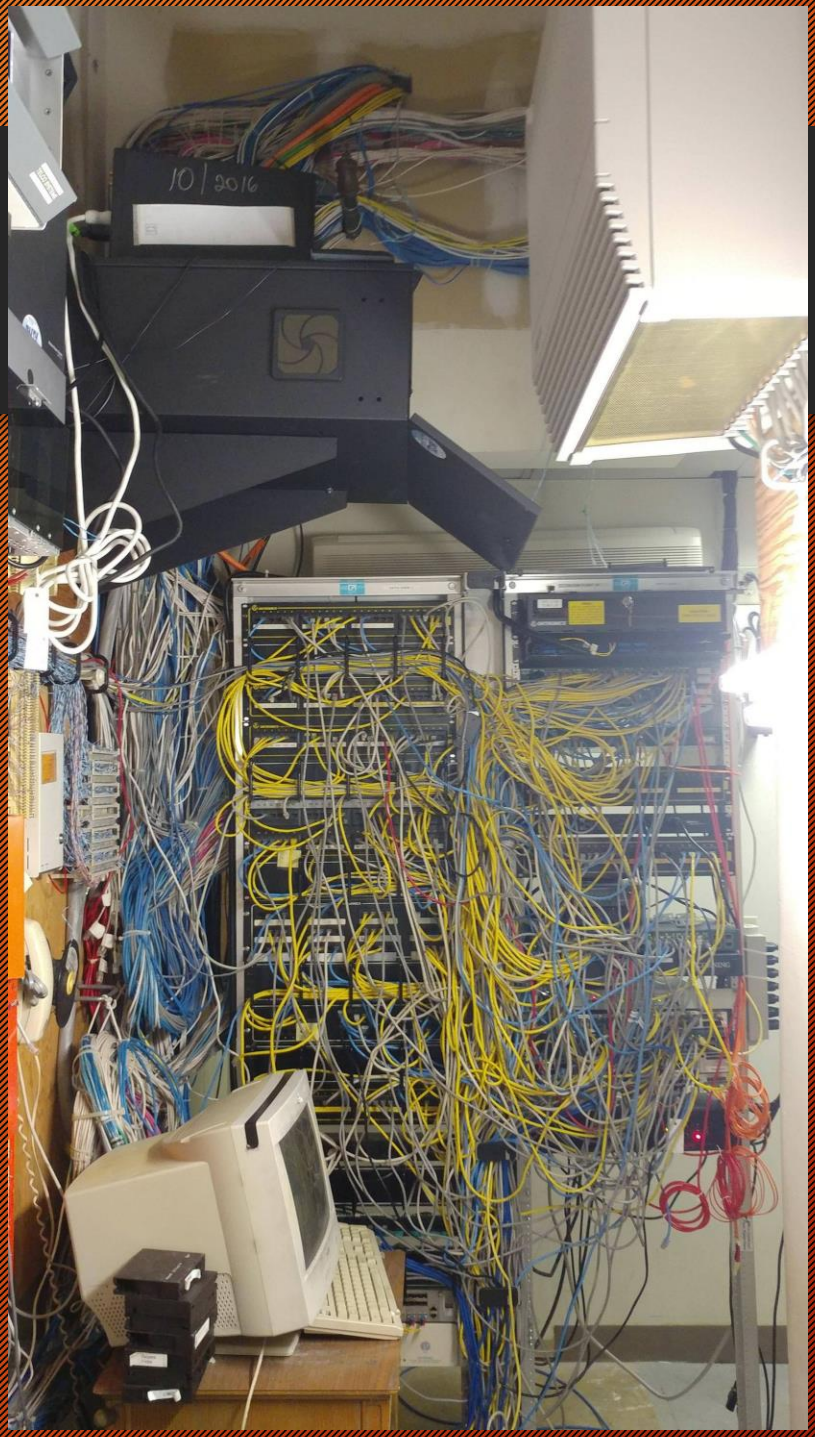

DES-1016R+
10/100 Fast Ethernet Switch
D-Link
DES-1024R+
10/100 Fast Ethernet Switch
D-Link

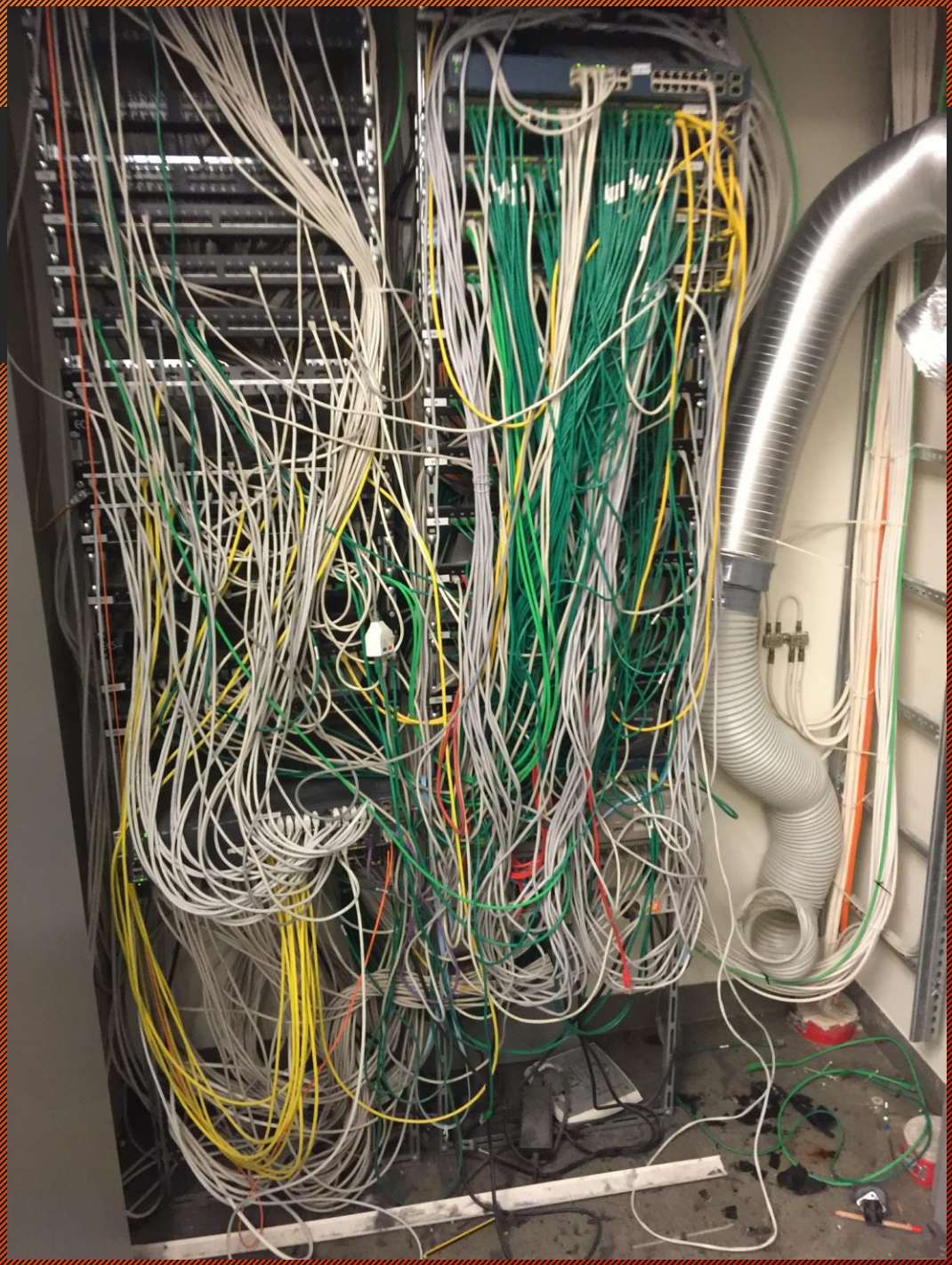


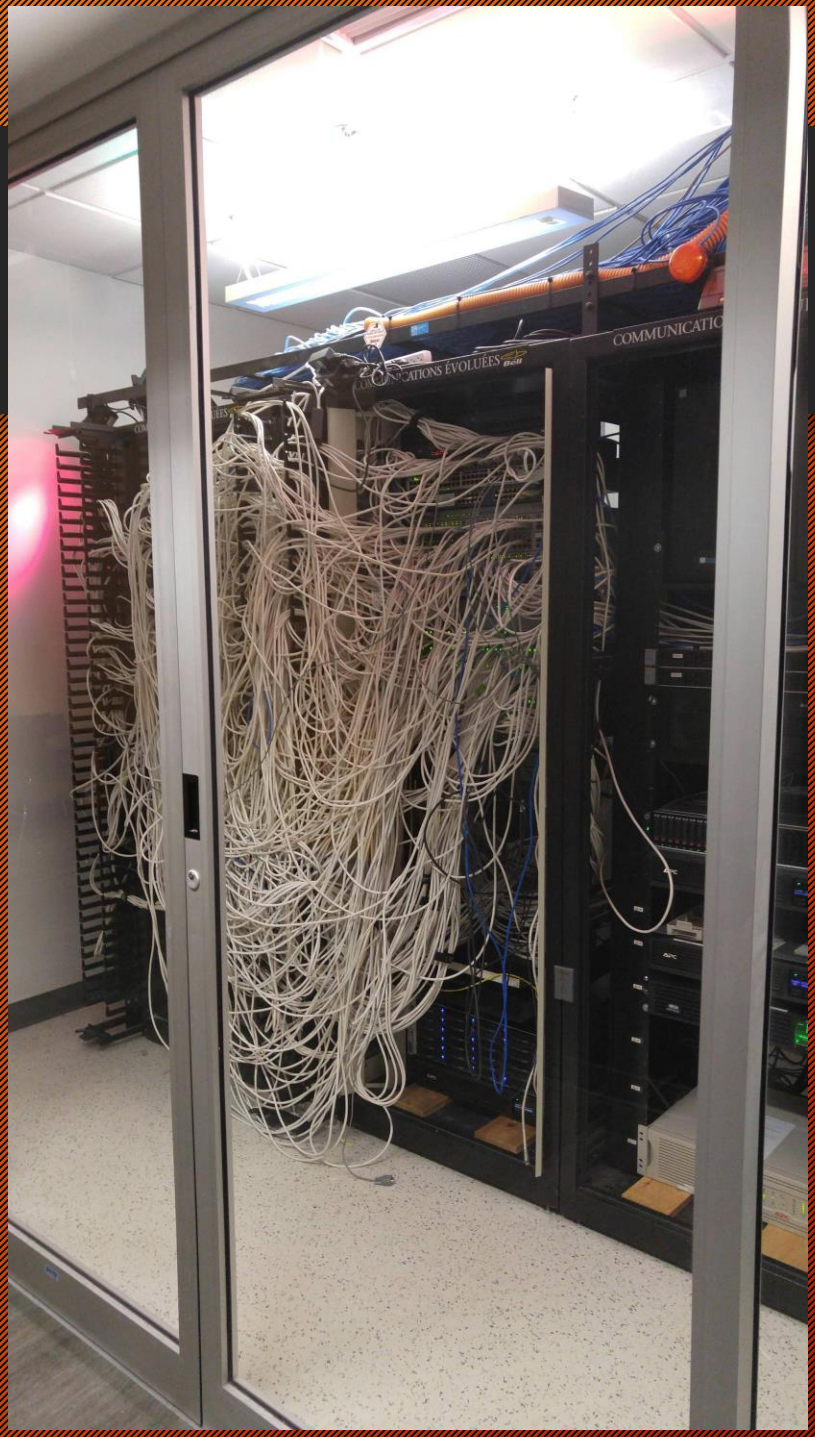

Marcus Ferrell


SALT

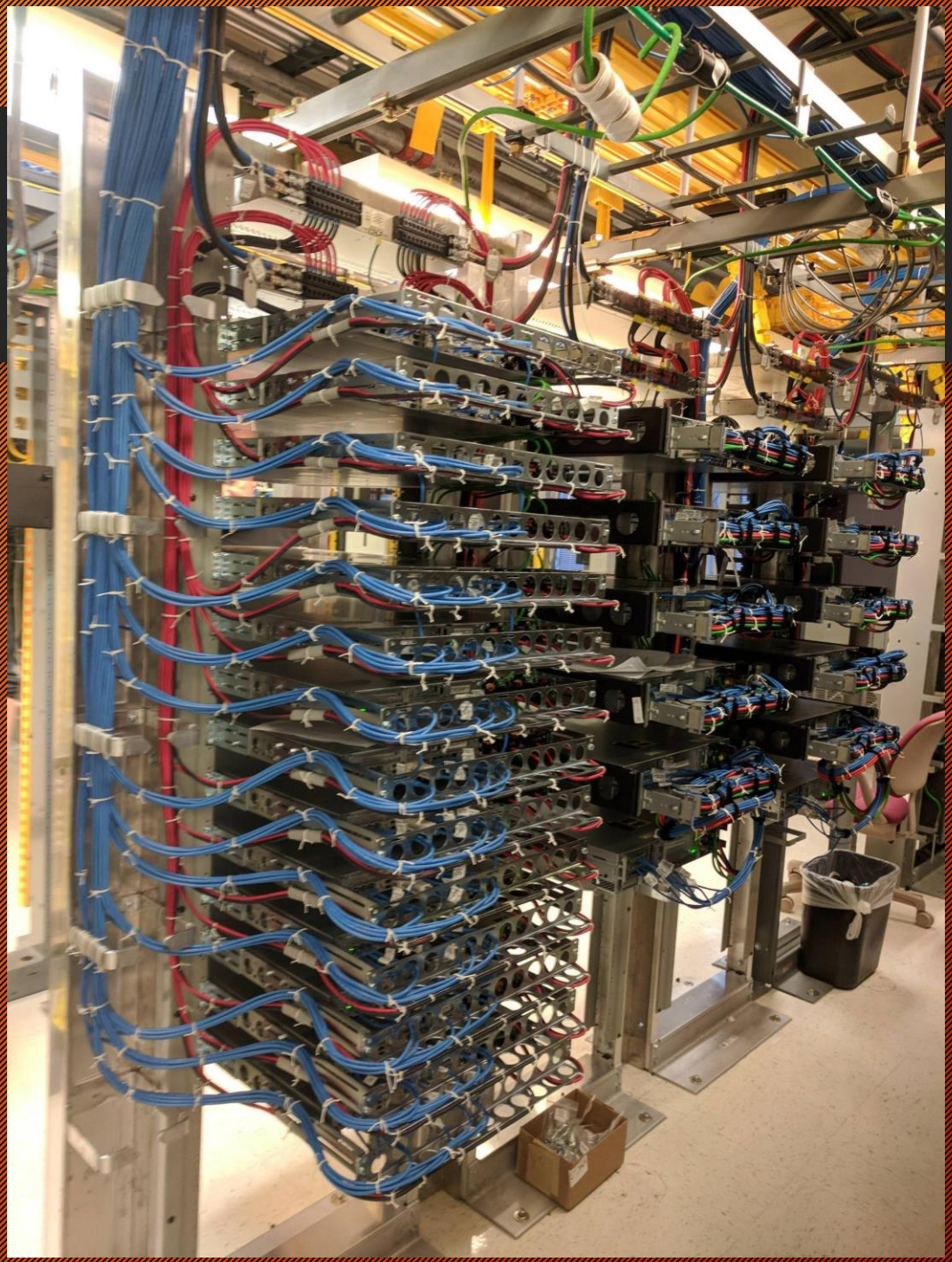

DO NOT
TOUCH ANY
OF THESE
WIRES


10/2016




COMMUNICATIO
CATIONS ÉVOLUÉES


Catalyst
4506-E
4200ACV
IBM



Networking

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Wireless-G 2.4GHz
Broadband Router
LINKSYS
CISCO SYSTEMS
Wireless-G
Power
DMZ
WLAN
1
2
3
4
Internet
Wireless-G
Broadband Router
With 4-Port Switch
Model WRT54G
LINKSYS


WAN
4
3
2
1
Uplink
Power
Power
Reset
EtherFast Cable / DSL Router


LINKSYS
A Division of Cisco Systems, Inc.
Firmware Version: v3.37.2 - HyperWRT 2.0
Administration
Wireless-G Broadband Router with SpeedBooster
WRT54GS
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Management | Log | Diagnostics | Factory Defaults | Firmware Upgrade | Config Management
Router Password
Local Router Access
Router Password:
Re-enter to confirm:
Web Access
Access Server: HTTP HTTPS
Wireless Access Web: Enable Disable
Remote Router Access
Remote Management: Enable Disable
Management Port: 8080
Use https:
UPnP
UPnP: Enable Disable
Command Shell
Command Shell
Telnet Daemon
Telnet Daemon
Startup & Firewall Scripts
Startup
Firewall
Reboot Router
Reboot Router
Local Router Access: You can change the Router's password from here. Enter a new Router password and then type it again in the Re-enter to confirm field to confirm.
Web Access: Allows you to configure access options to the router's web utility.
More...
Remote Router Access: Allows you to access your router remotely. Choose the port you would like to use. You must change the password to the router if it is still using its default password.
UPnP: Used by certain programs to automatically open ports for communication.
More...

Networking

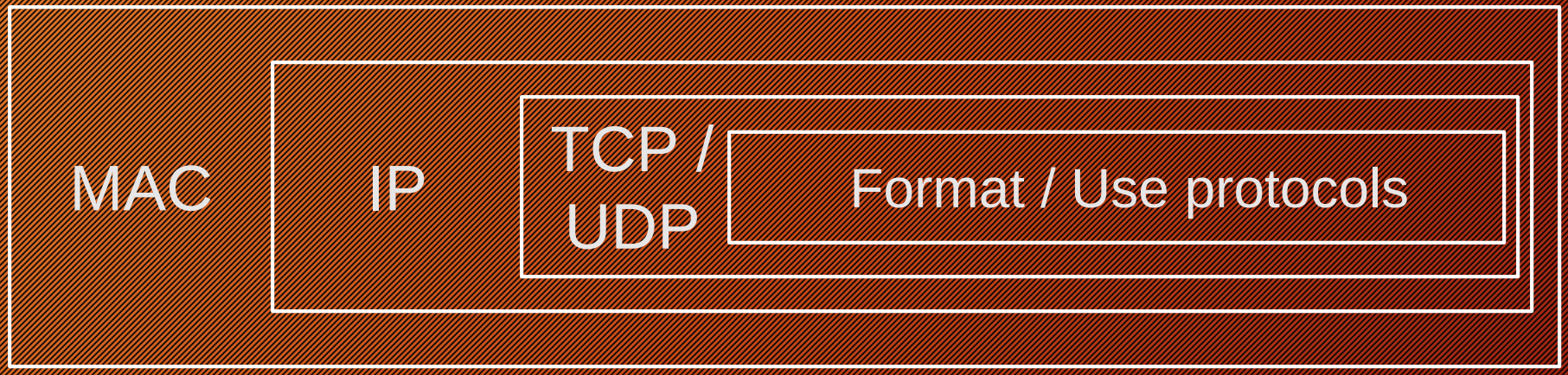
Key Networking Technologies

- Client / Server Computing
- Packet switching
- TCP / IP
  - Has 7 layers
  - Each layer provides a unique service or function

Networking

Key Networking Technologies

- TCP / IP
  - Application
  - Presentation
  - Session
  - Transport
  - Network
  - Data Link
  - Physical


MAC
IP
TCP / UDP
Format / Use protocols

Network Packet Structure

Layer 2 – Data Link Layer
Check MAC address

Layer 3 – Network Layer
Check IP address

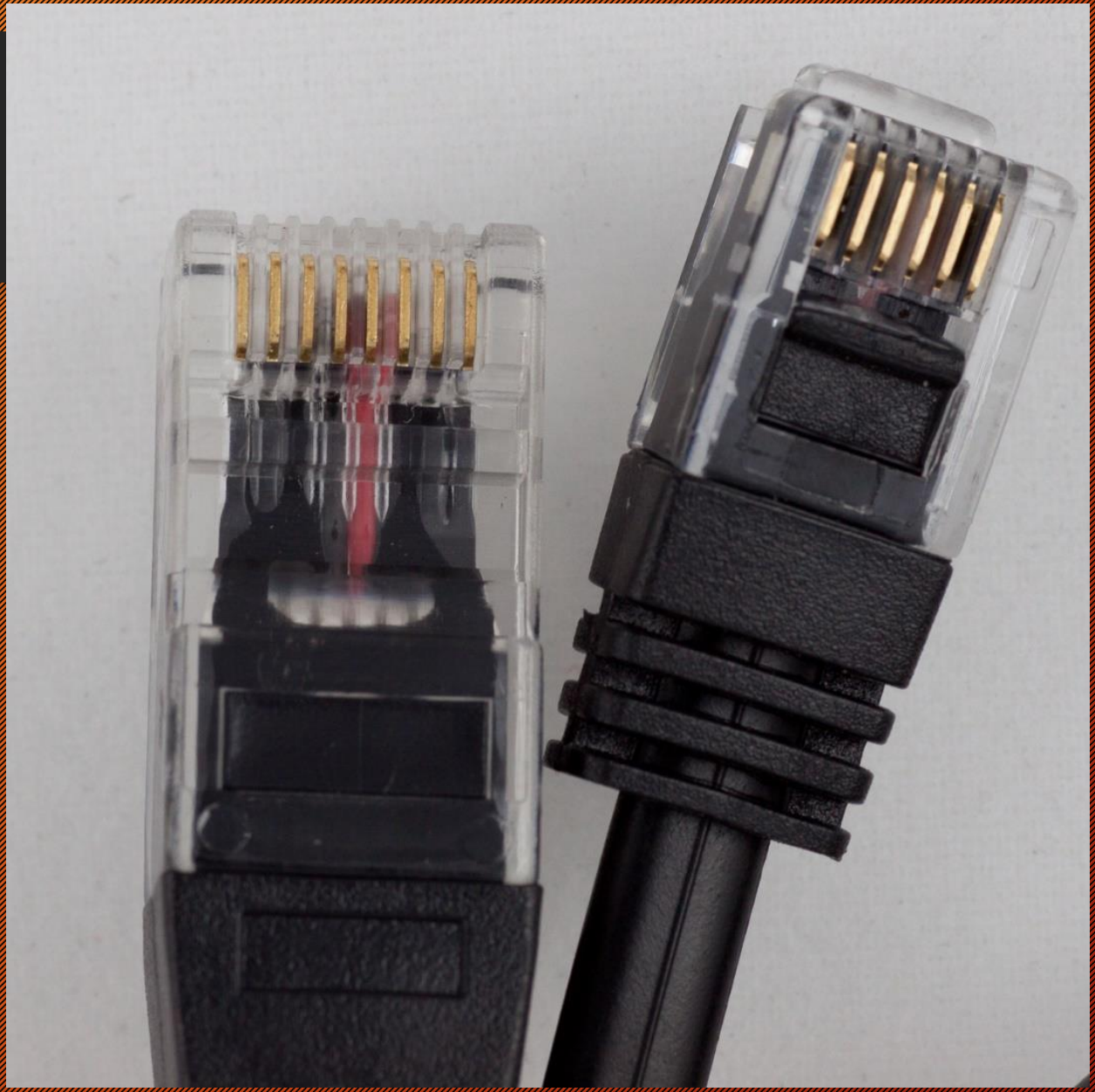
Layer 4 – Transport
TCP / UDP

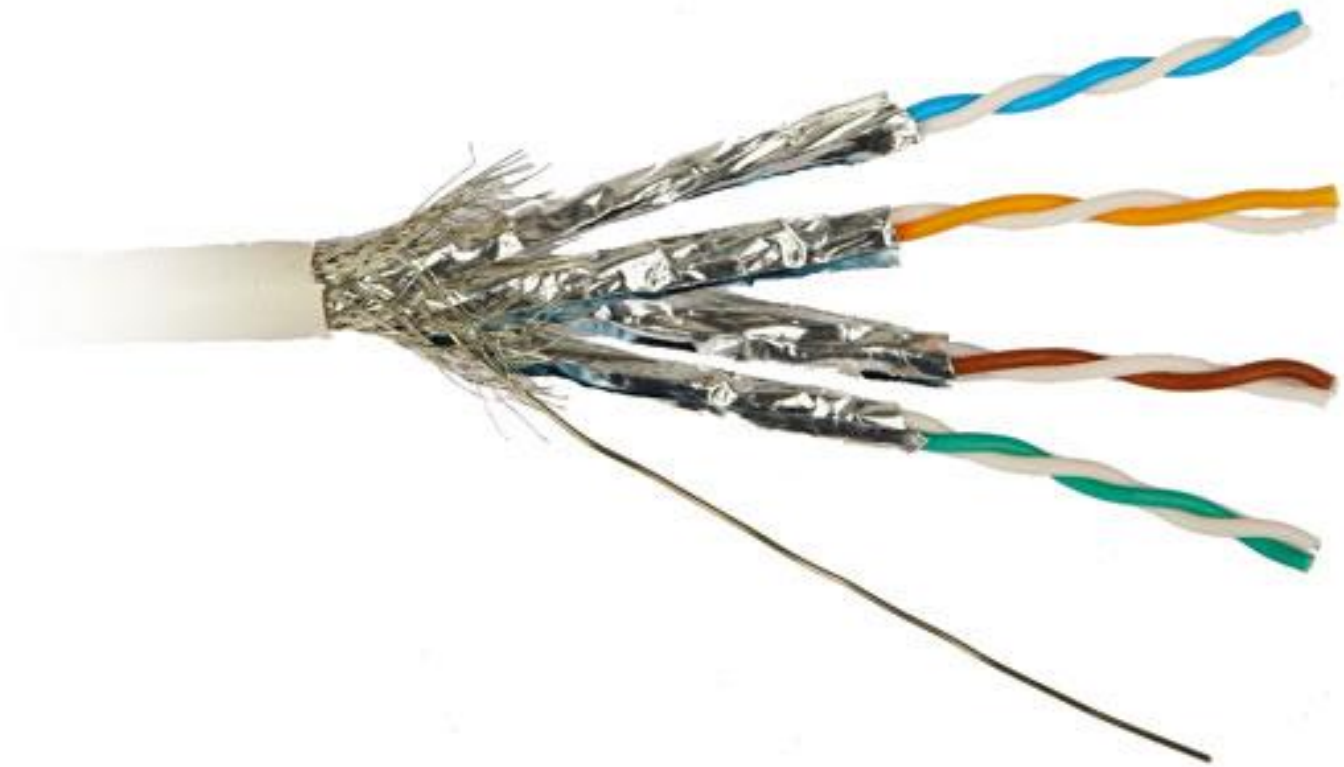
Layer 5 - 7
Format / Use / Nav

Networking

Physical Transmission Media

- Twisted wire (twisted pair)
  - Analog signal
  - Digital signal
  - MODEM





Networking

Physical Transmission Media

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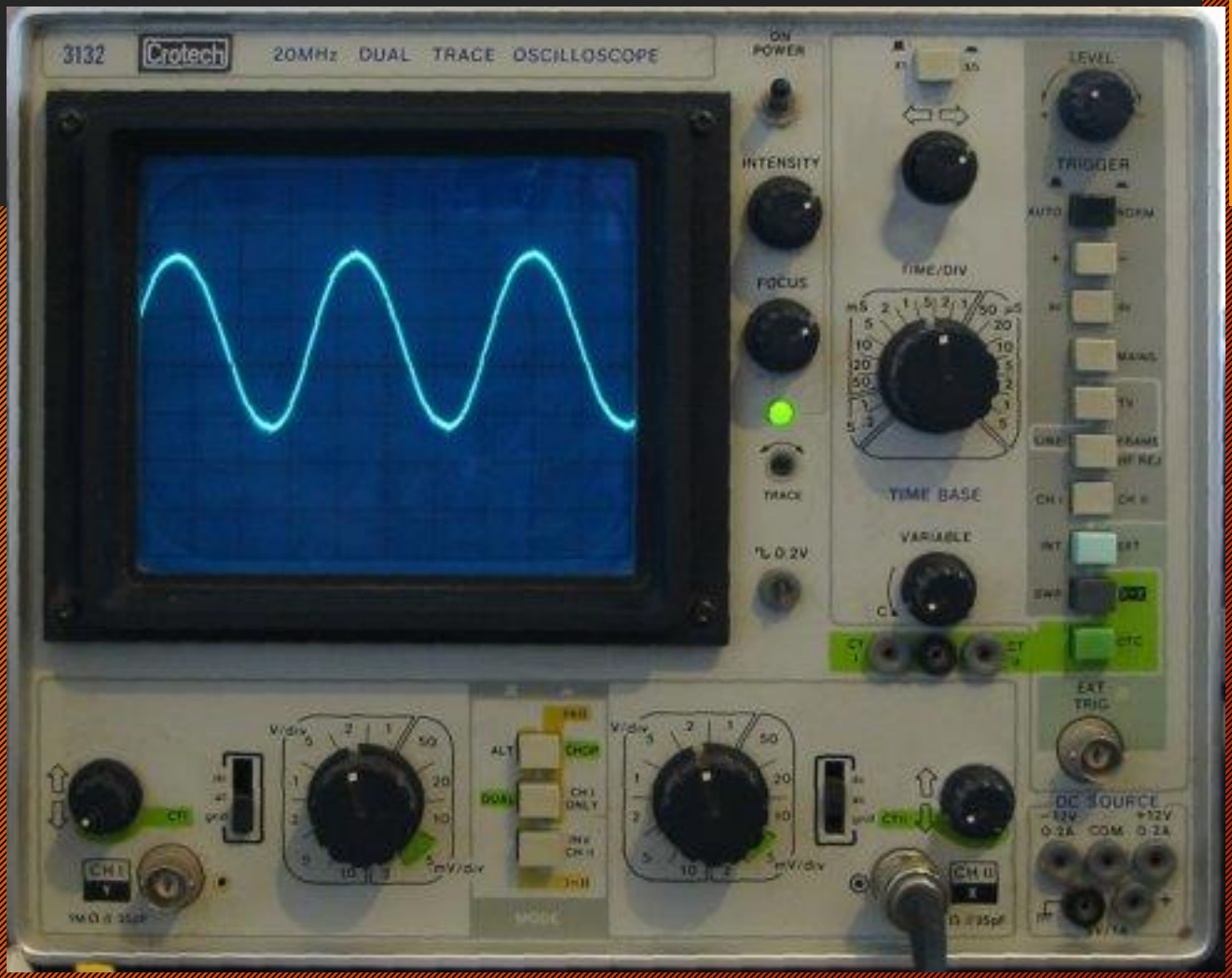

3132
Crotech
20MHz DUAL TRACE OSCILLOSCOPE
ON POWER
INTENSITY
FOCUS
TRACE
0.2V
TIME/DIV
TIME BASE
VARIABLE
LEVEL
TRIGGER
AUTO
NORM
TV
LINE
FRAME
CH I
CH II
INT
EXT
EXT TRIG
V/div
mV/div
ALT
CHOP
DUAL
CH I ONLY
CH II
ADD
MODE
DC SOURCE
-12V
+12V
0.2A
COM
0.2A

Networking

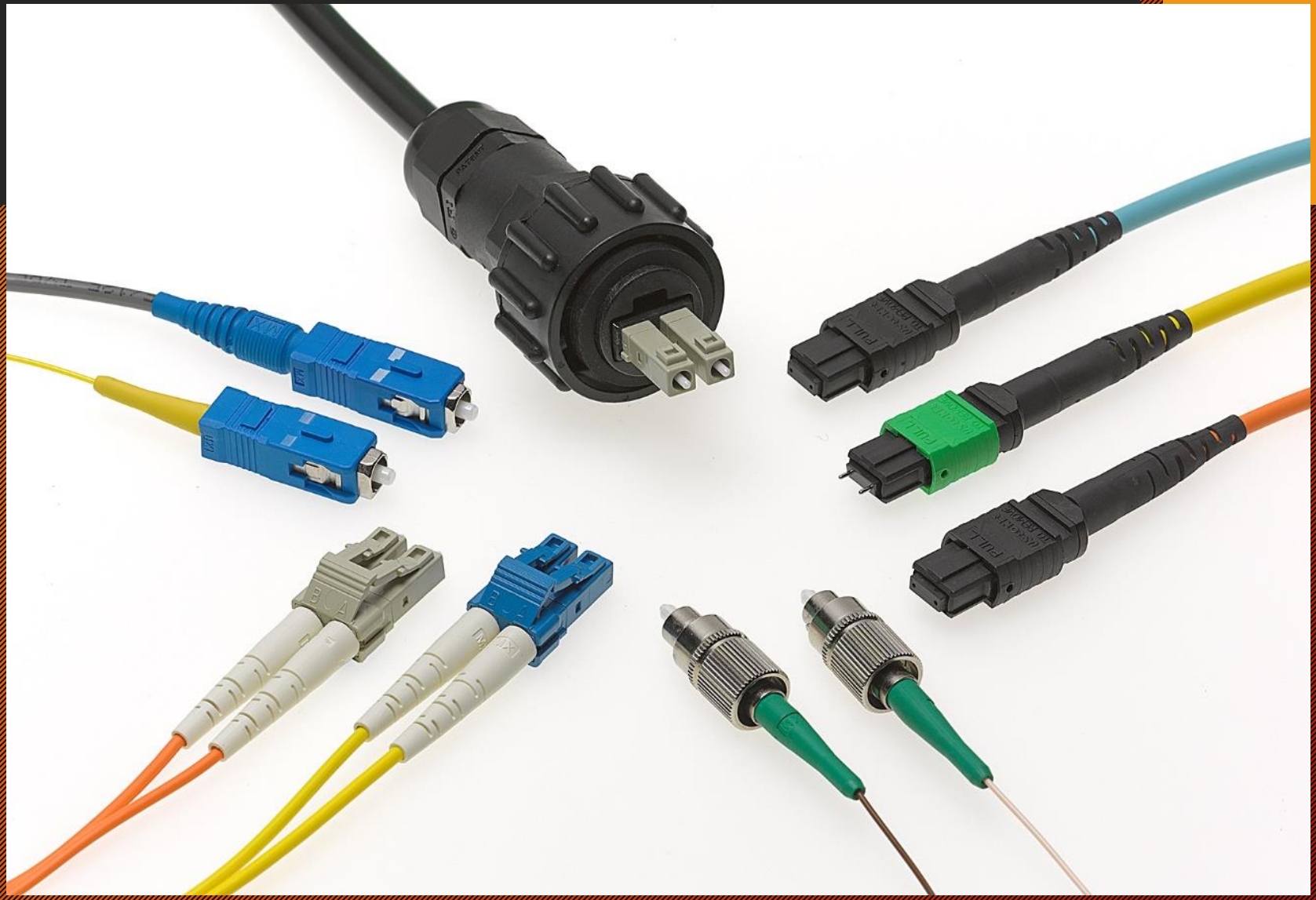
Physical Transmission Media

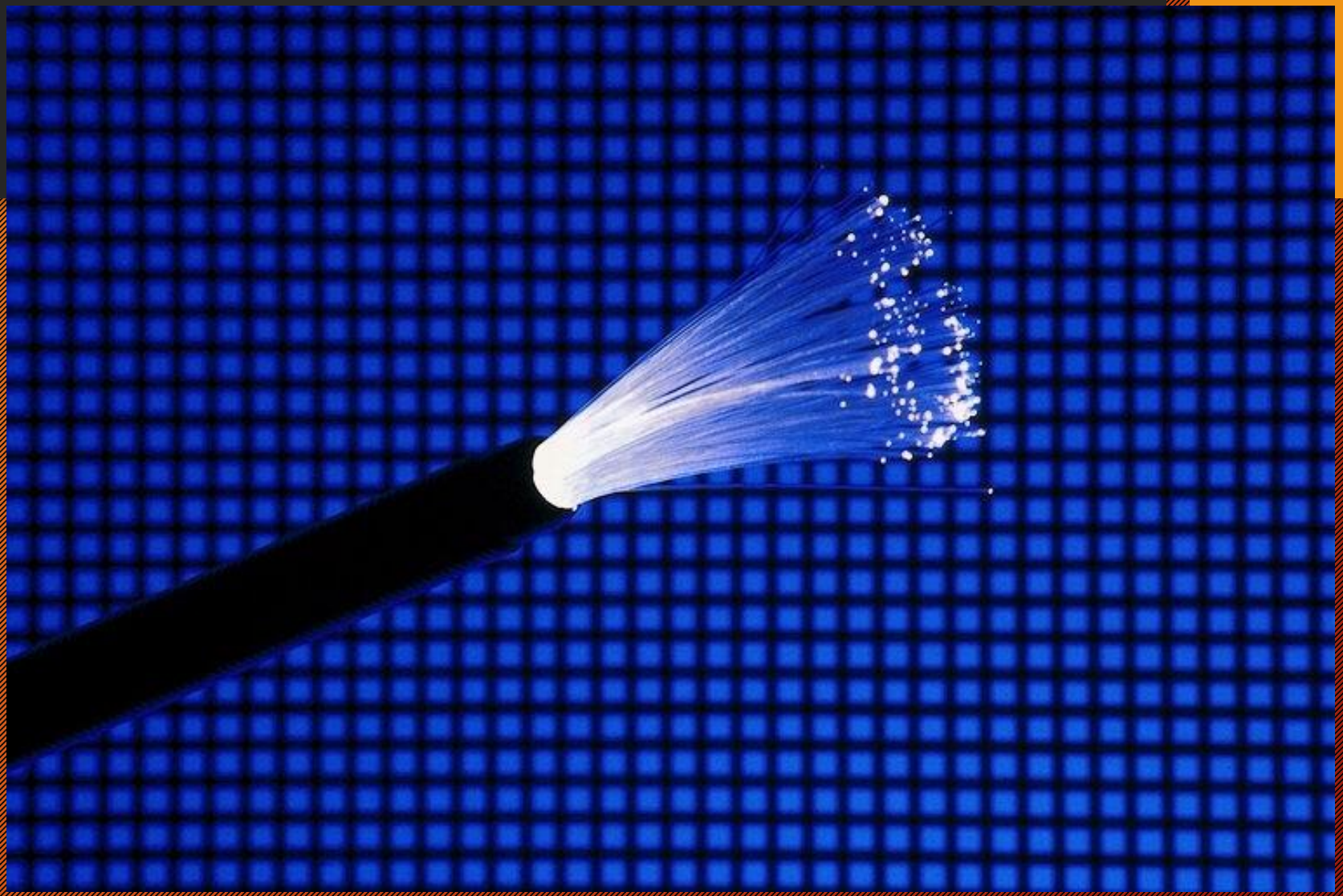
- Twisted wire (twisted pair)
  - Analog signal
  - Digital signal
  - MODEM
- Coaxial cable

Networking

Physical Transmission Media

- Fiber optics and optical media
  - Fiber optic cable
  - Backbone
  - Optical networks



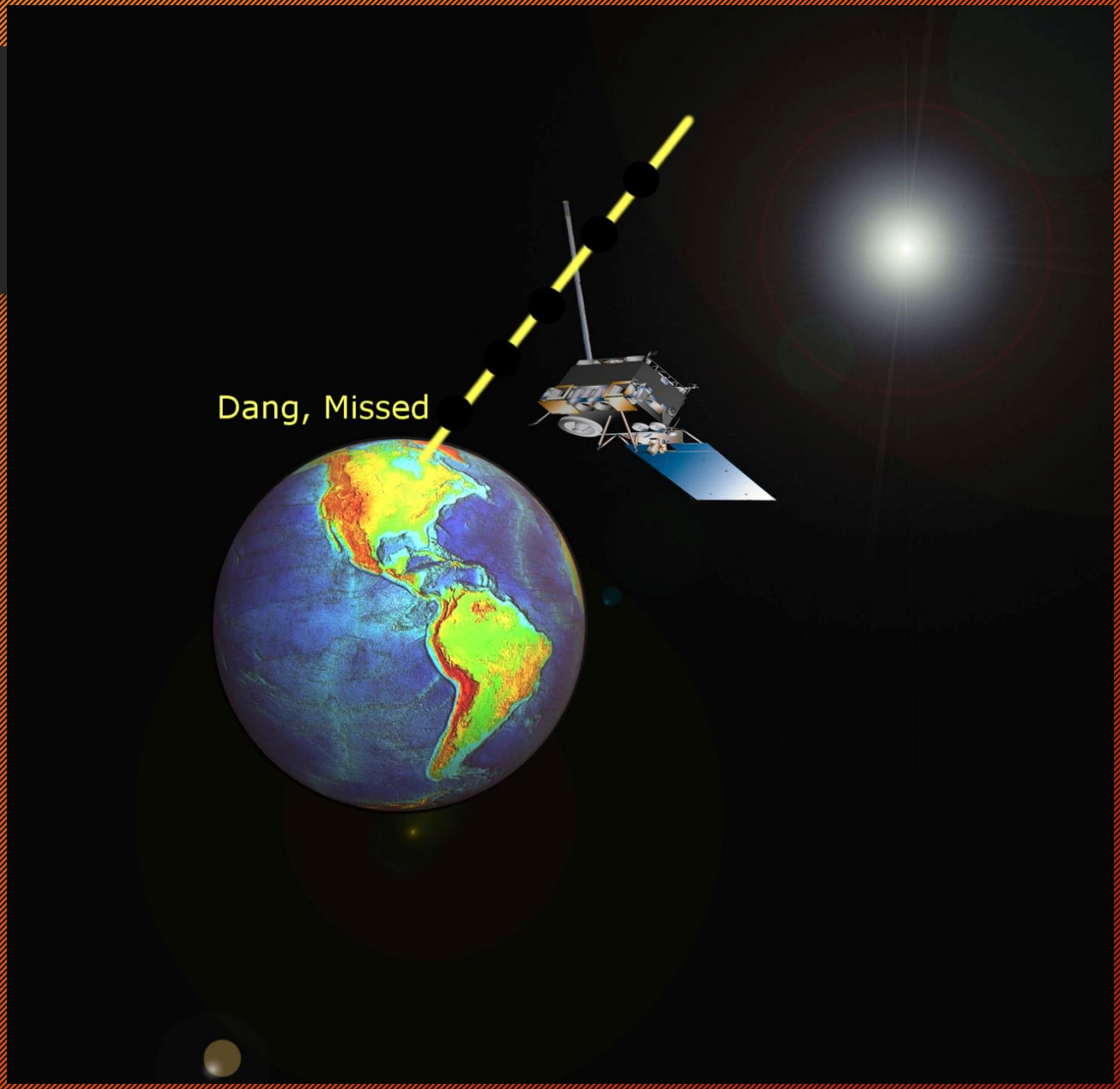


Networking

Physical Transmission Media

- Fiber optics and optical media
  - Fiber optic cable
  - Backbone
  - Optical networks
- Wireless transmission
  - -Microwave systems
  - -Satellites
  - -Cell towers


dish
500
GETTY IMAGES


Dang, Missed

Networking

Physical Transmission Media

- Fiber optics and optical media
  - Fiber optic cable
  - Backbone
  - Optical networks
- Wireless transmission
  - -Microwave systems
  - -Satellites
  - -Cell towers

Networking

Physical Transmission Media

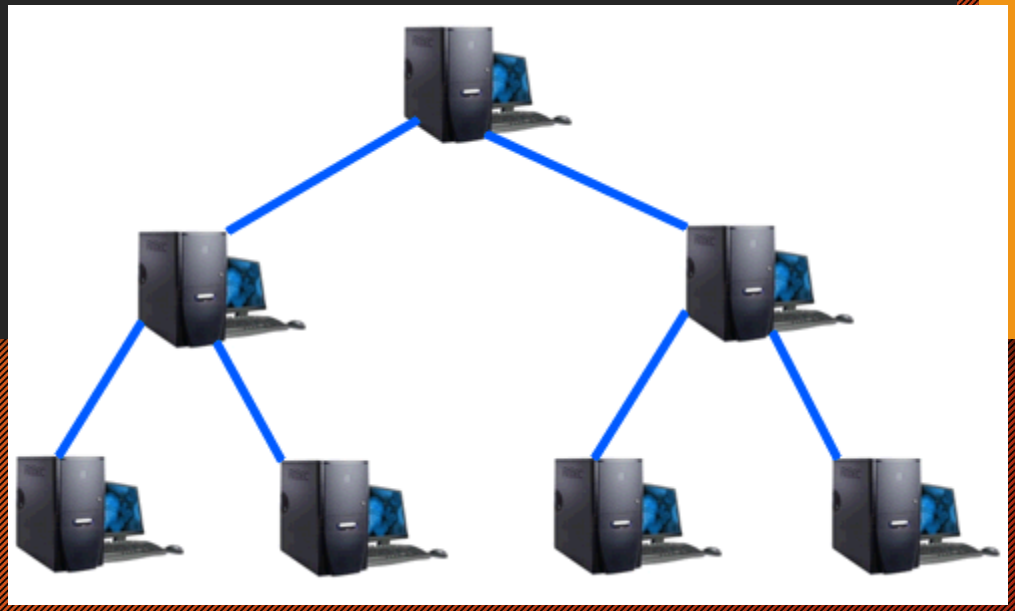
- Transmission speeds
  - BPS / Baud
  - Hertz
  - Bandwidth

Networking

Types of Networks

- LAN
- WAN
- Peer to Peer (P2P)
- Topologies
  - Hierarchical

Networking

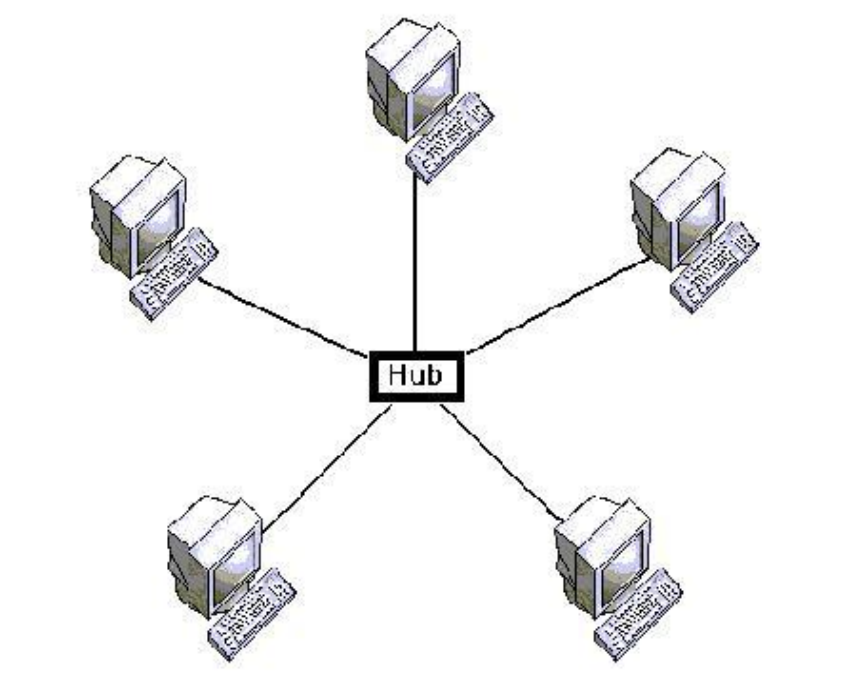


Networking

Types of Networks

- LAN
- WAN
- Peer to Peer (P2P)
- Topologies
  - Hierarchical
  - Star

Networking



Networking

Types of Networks

- LAN
- WAN
- Peer to Peer (P2P)
- Topologies
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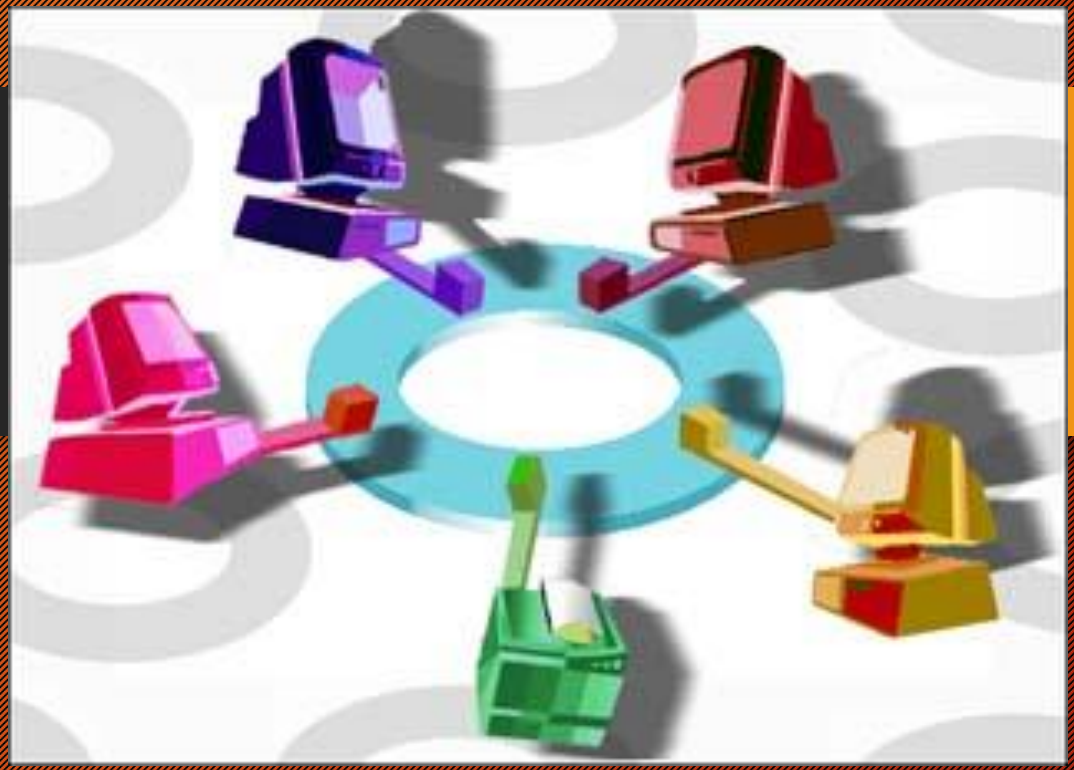
  - Star
  - Ring

Networking

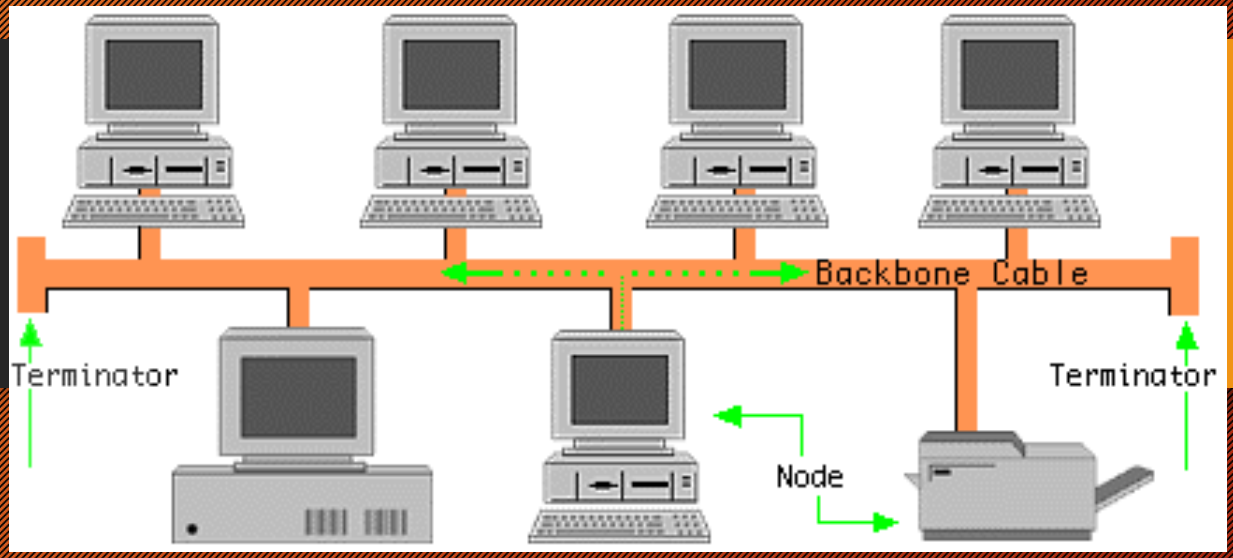


Networking

Types of Networks

- LAN
- WAN
- Peer to Peer (P2P)
- Topologies
  - Hierarchical
  - Star
  - Ring
  - Bus

Networking

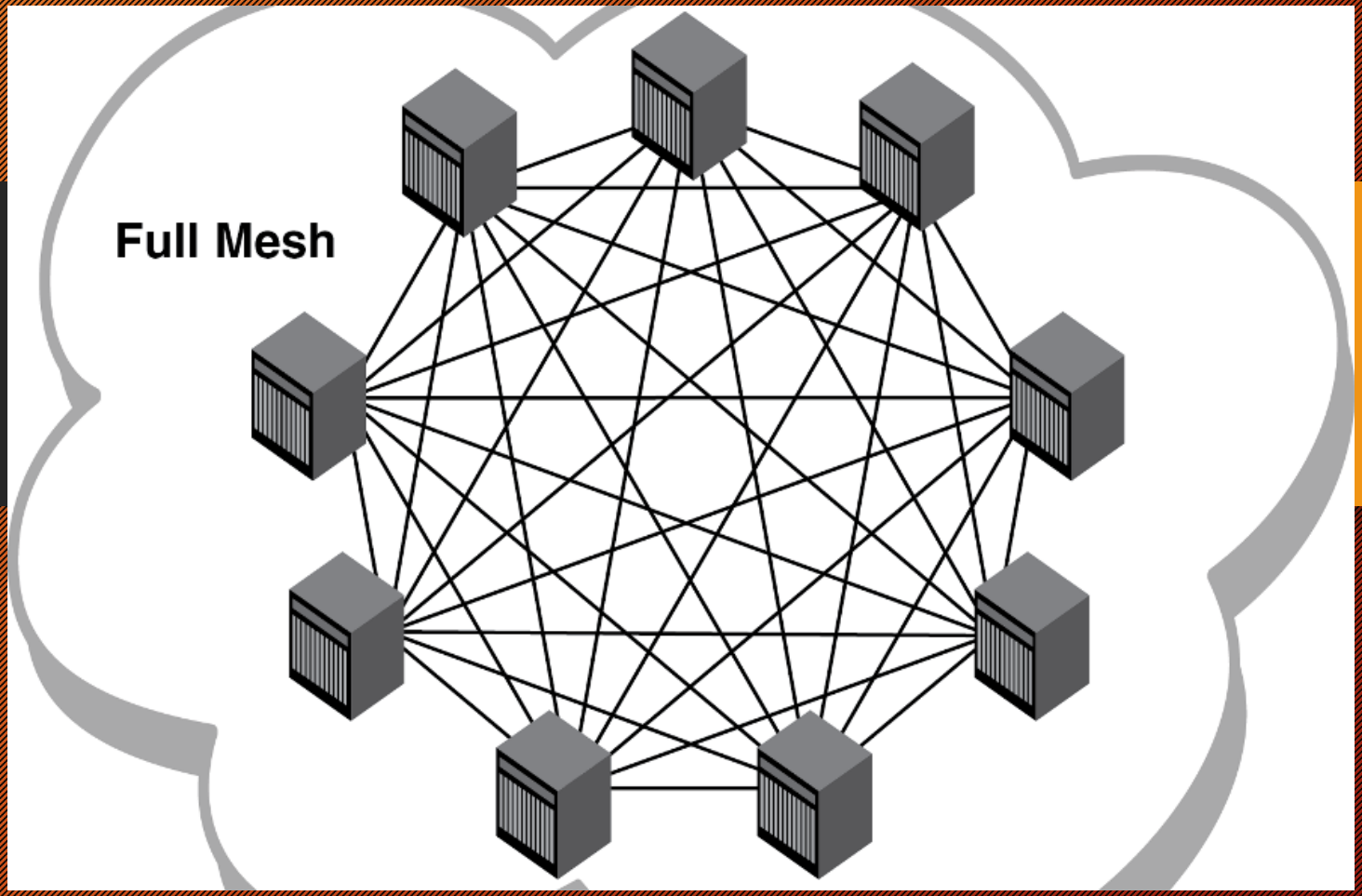


Networking

Types of Networks

- LAN
- WAN
- Peer to Peer (P2P)
- Topologies
  - Hierarchical
  - Star
  - Ring
  - Bus
  - Mesh

Networking



Networking

Internet Addressing and Architecture

- Uses the TCP / IP
- Internet Protocol address
  - IPv4 – 131.216.144.22
  - IPv6 – 2002:83D8:9016:0:0:0:0:0
- Types of IP address
  - Static
  - Dynamic (Requires DHCP)

Networking

Internet Addressing and Architecture

- 340,282,366,920,938,000,000,000,000,000,000,000

Networking

Internet Addressing and Architecture

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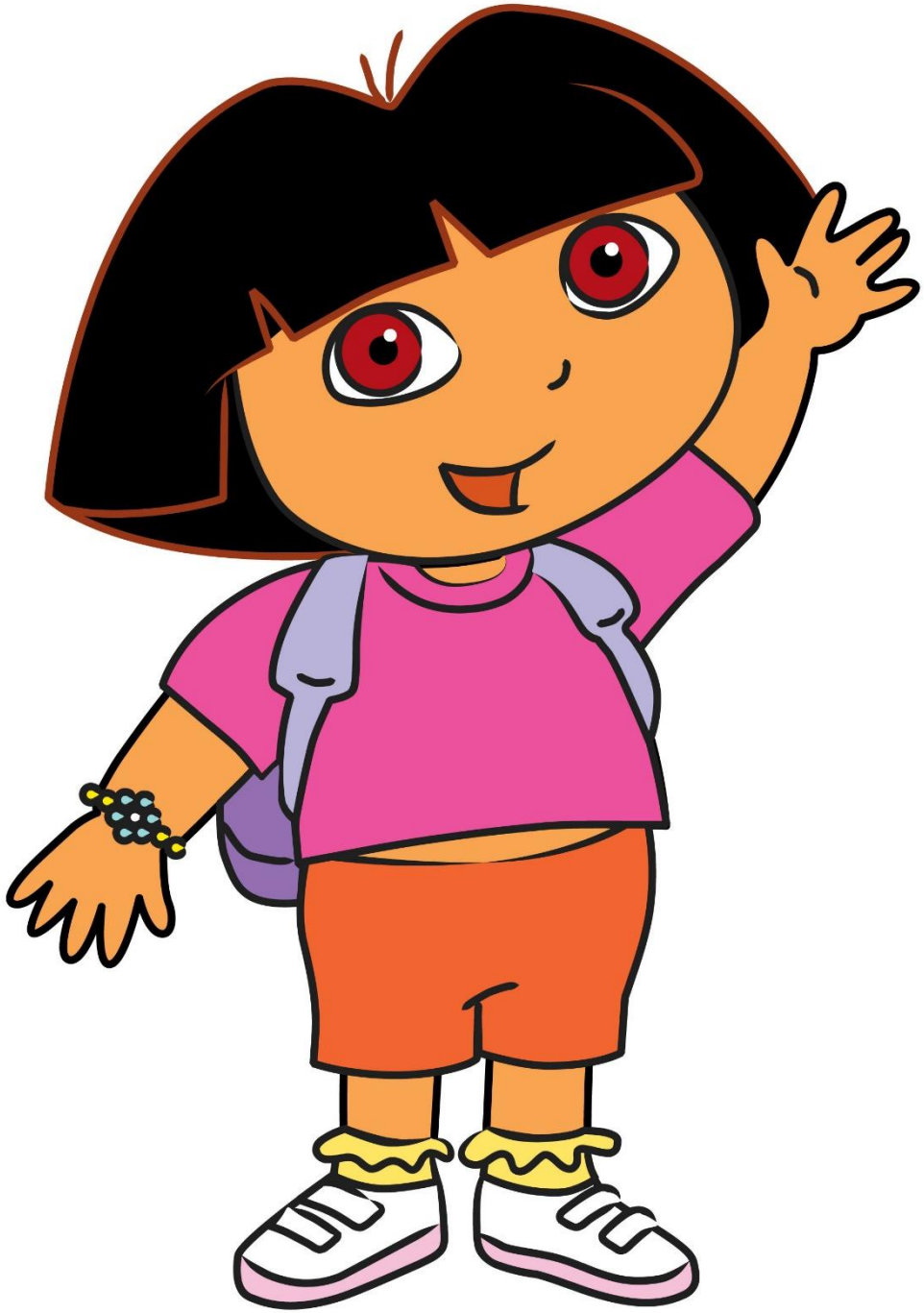

Networking – IP Addresses

- DORA for DHCP
  - Discover
  - Offer
  - Request
  - Acknowledge

Networking – IP Classes

- Class A
  - Leading bit: 0
  - 1.0.0.0 to 126.0.0.0
  - 8 bits for network ID
- Class B
  - Leading bits: 10
  - 128.0.0.0 – 191.255.255.0
  - 16 bits for network ID
- Class C
  - Leading bits: 110
  - 192.0.0.0 – 223.255.255.0

Networking – IP Addresses

- Reserved IP numbers within max range
  - 0.0.0.0
  - 255.255.255.255
  - 127.0.0.1
  - 169.254.0.1 to 169.254.255.254

Networking

- Domain Name System (DNS)
  - English-ish name, usually
  - Domain extensions
  - Reading addresses
  - DNS Servers

Networking

Internet Addressing and Architecture

- Internet architecture and governance
  - Internet Architecture Board
  - Internet Corporation for Assigned Names and Numbers
  - World Wide Web Consortium

Networking

Internet Services

- Email
- Newsgroups
- LISTSERVs
- Instant / video / Text messaging
- Telnet
- File Transfer Protocol
- IoT

Networking

IoT Protocols

- Bluetooth
- ZigBee
- NFC
- MQTT
- LowPAN
- XMPP

Networking

Some notes on web pages and languages

- Hypertext
  - HTML
  - HTTP
  - URL
    - DOI – Digital Object Identifier

Networking

Wireless Networks and Internet Access

- Bluetooth / Personal Area Networks
- Wi - Fi
  - Infrastructure Mode
  - Access Points
  - Ad-Hoc Mode
  - Wireless NICs
  - Hotspots
  - Wi-Max
- Radio Frequency

Networking

One more thing:

- The Cloud
  - What is it?
  - Where is it?
  - Who owns it?
  - What happens if…?