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IP for Everyone - Part 1

A basic training for IP networking and the supporting devices.

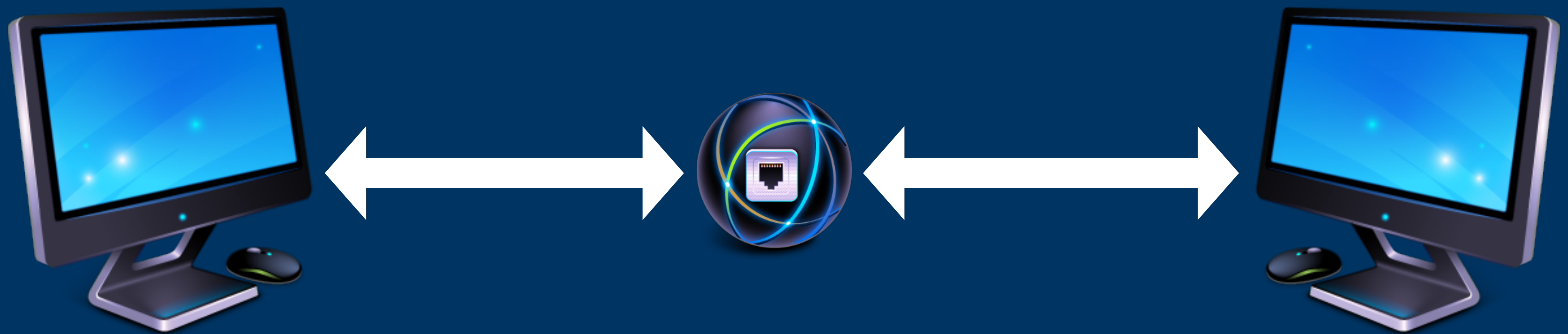
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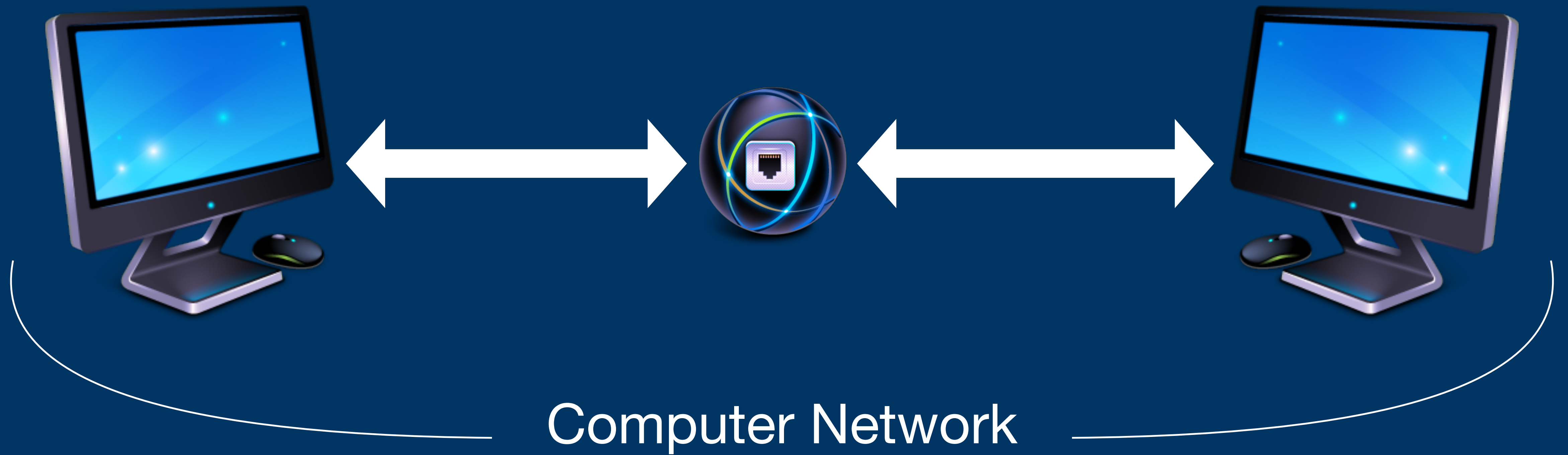


What is IP? What does it really mean?

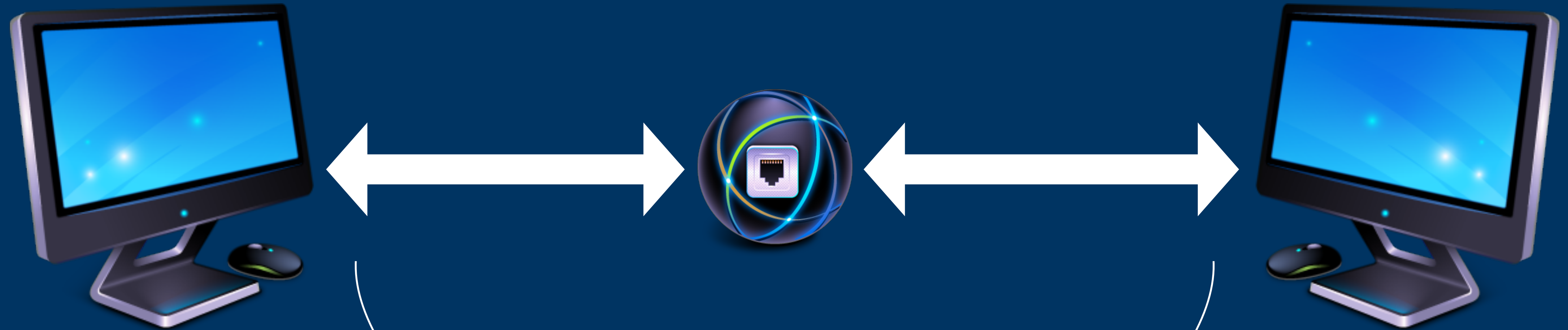
Internet Protocol - Definition:

The method or protocol by which data is sent from one computer to another on a Network.

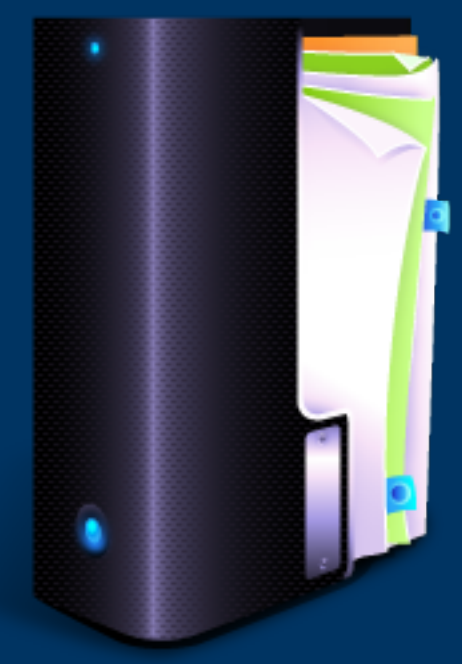




What are the components needed to build a “Computer Network”?



Network Infrastructure



Servers



Switching Hardware



Cabling

Servers



The server, is a piece of software running on a computer. It's a service that's always running. It 'serves' up information, or acts like a butler on a network.

Each server has it's own function.

It's possible (and common) to have multiple servers running on one computer

2 Kinds of Networks

Manually Configured Networks.

Server based, or Automated Networks.



Server Based, or Automated



Requires 2 of the 3 below servers. The third, is generally provided when Internet access is given to the devices on the network.

1. DHCP Server (automatically addresses devices).
2. DNS Server (associates alpha-numeric names with device addresses).
3. Gateway Server (hub or 'gateway' for Internet Traffic).

DHCP Server - Post Office



- The DHCP Server's function is to address every device that's added to the network. The address given to each device is an IP Address.
- In order to communicate with other devices on the network, each device requires 2 addresses, the primary IP Address (typically 192.168.0.1 by default - based on Server's settings). (Like a home address)
- The second address is the NETWORK address the device will be communicating on (you can have multiple "networks" on the same network hardware.) Remember, IP Networks are creations of software, NOT hardware. Generally looks like 255.255.0.0 by default - based on Server's settings. (Like a zip-code)

DHCP Server - Post Office



Typical IPv4 Address will look like this:

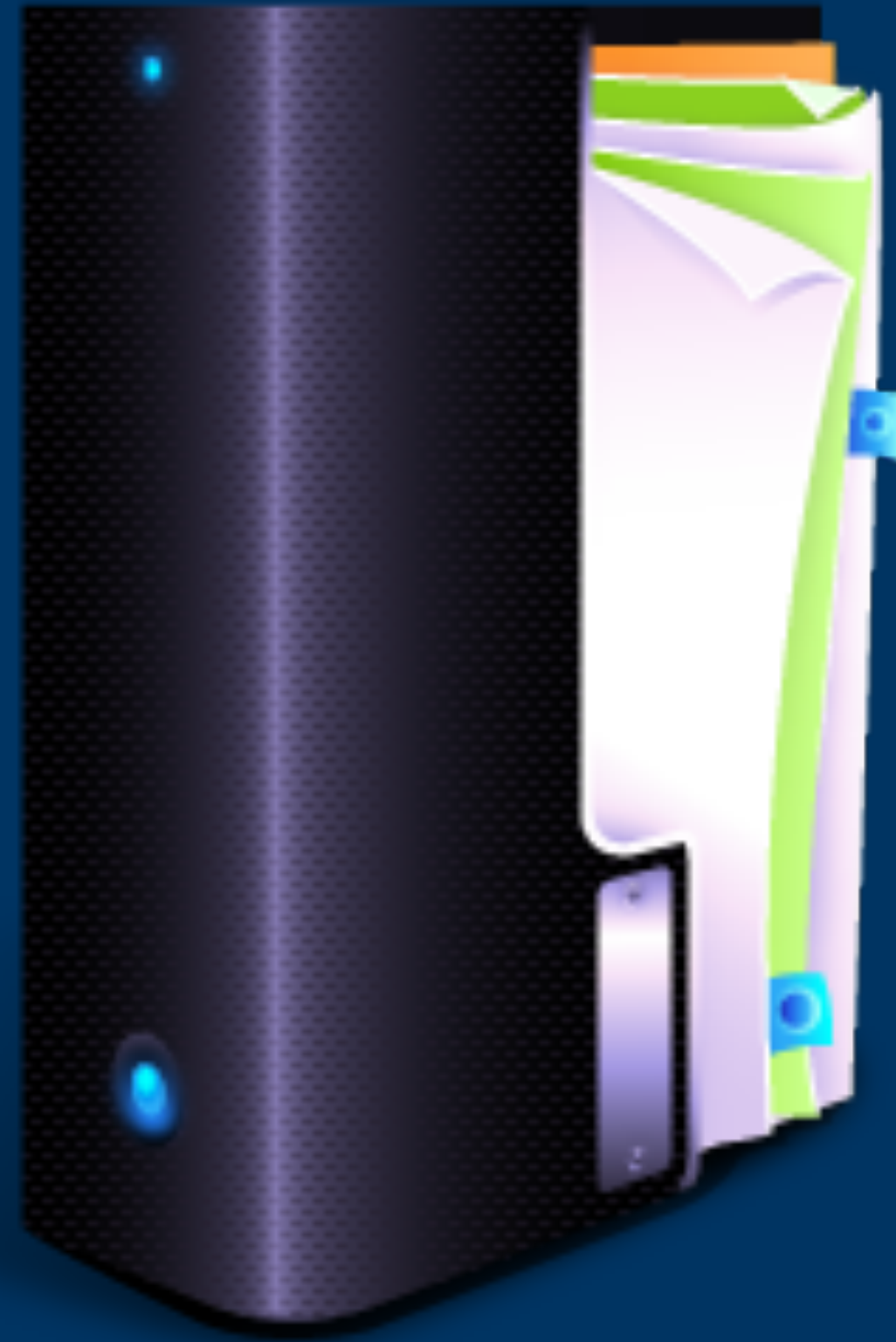
192.168.0.2

255.255.0.0

192.168.0.1 (If connected to internet; this is the gateway server address).

Running IP Config on a computer will give you your address, tell you what network you're on, and give you the gateway (if there is one).

DHCP Server - Post Office



Helpful tools when troubleshooting a network:

Ping: Send a piece of data to another address on the network; verifying you can see that address, and that address can see you!

ipconfig: Check your own IP Address, network address, and gateway information.

Windows: 'ping' from the command line.

Mac OS/Linux/Unix: 'ping' from the command line.

Windows: 'ipconfig' from the command line.

Mac OS/Linux/Unix: 'ifconfig -a' from the command line.



Switching Hardware

There are generally 2 types of Networking hardware: PoE, and NON PoE.

PoE hardware provides power to the device connected to the switch, NON PoE Provides are passive (they don't provide power)

Managed switches can be monitored and configured, UN-Managed don't have the software required to be managed.



Switching Hardware - Speeds

Typical speeds are:

1. 100 Mb/s (Industry standard for VERY long time)
2. 1000 Mb/s (Gigabit speeds)
3. 10000 Mb/s (10 Gigabit speeds - generally only used when linking switches together)

Switching Hardware - Hints

- Switching Hardware can be 'daisy-chained' through any port on the switch, but some switches have an Uplink port (which functions just like any other port)
- PoE switches are generally used to provide power to devices like IP Phones, or IP Cameras. **Keep an eye on your power budget!*



Cabling

MOST Typical types of wire for Networking:

Cat 5E (speeds up to 1 Gb/s).

Cat 6/6A/6E (speeds up to 10 Gb/s) *if jobsite requires 'TIA Industry Standard' Cat 6E isn't adopted as one, but it's supposedly a better solution.

MOST IP Devices require (at a maximum 1 Gb/s). Currently, 10 Gb/s is generally only used when tying main networking hardware together.

MOST IP Devices - including IP Cameras - have 100 Mb/s network interface cards.



Cabling - 2 more things....

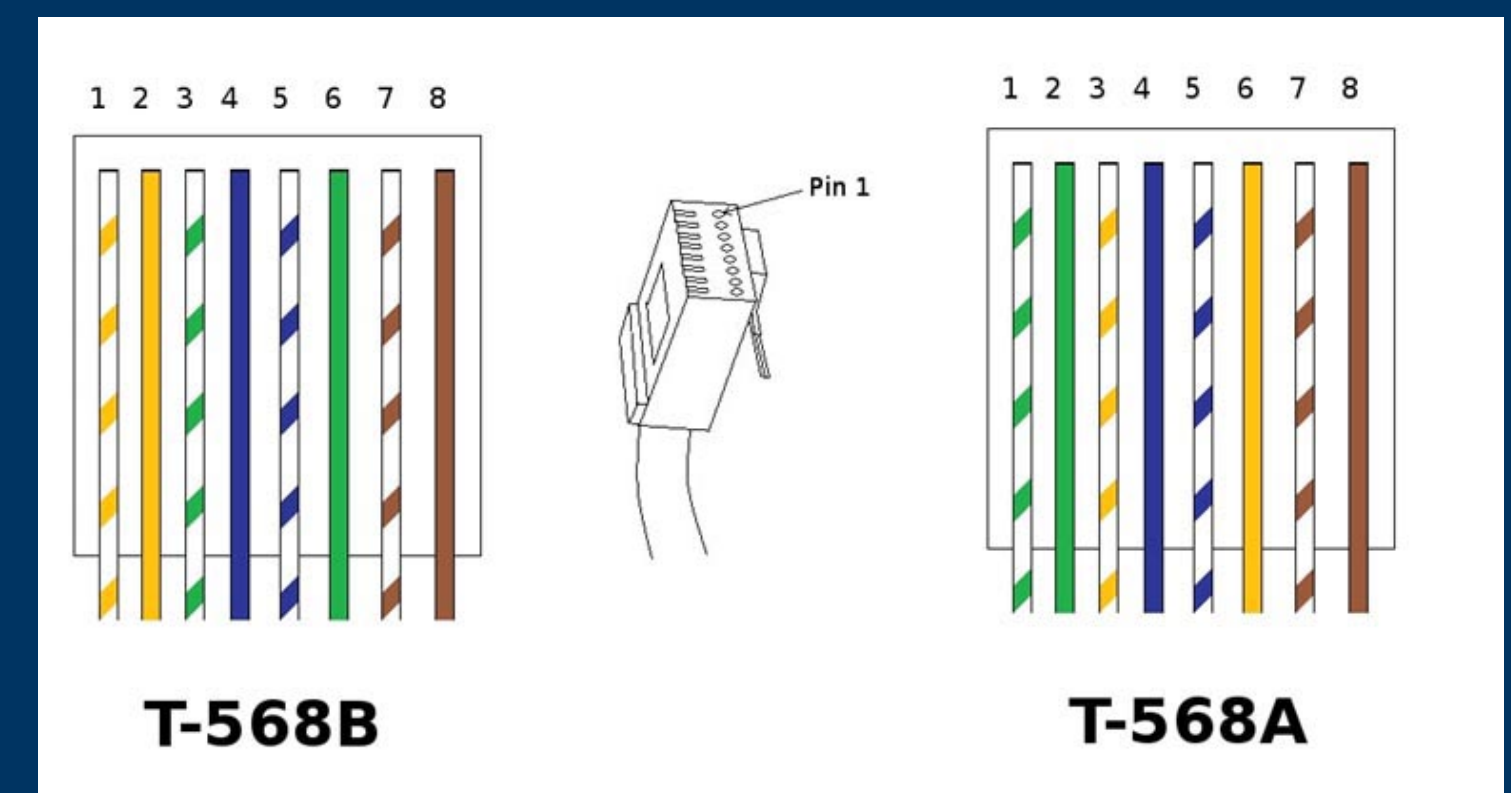
The standard for cable lengths is 300 feet between IP endpoints.

*(UNV is the exception; they're claiming with their Ultra H.265 video compression technology you can have up to 1000 ft between cameras and the NVR - assuming the cabling is run properly)

Two -standard- ways to terminate the RJ45 jacks used in networking:

T-568B, and T-568A.

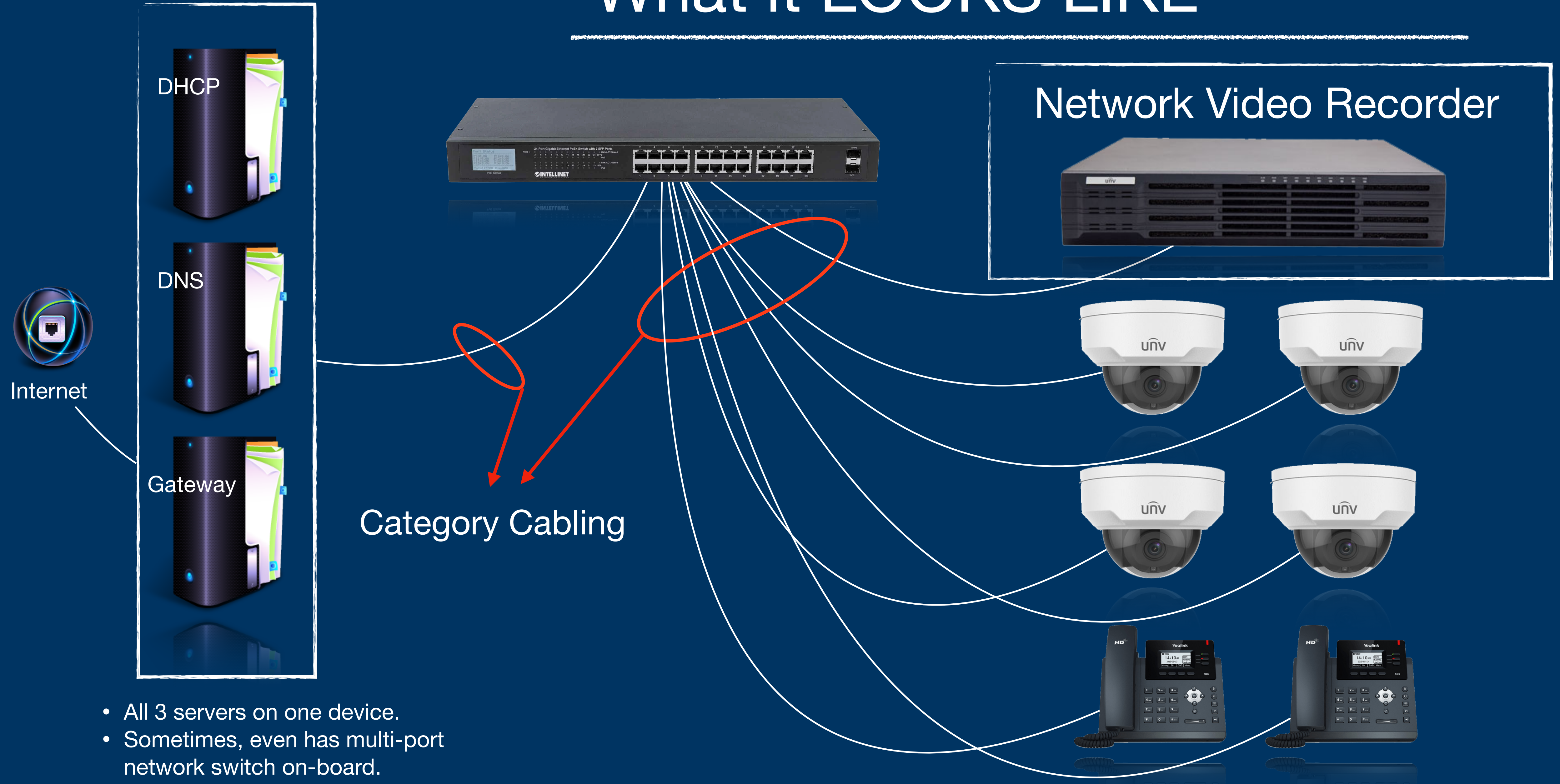
*Professionals Recommend T-568B for most installations.



Router

What it LOOKS LIKE

Network Video Recorder



- All 3 servers on one device.
- Sometimes, even has multi-port network switch on-board.

Docketed for next week:

IP for Everyone - Part 2

Hardware demonstrations including terminations (installing RJ45 jacks, and actual networking hardware demonstrations).

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