# Computer Networks

Introduciton

#### Content



**Networking Certifications** 

**Networking Devices** 

**Network Simulation Tools** 

### Networking Certifications

#### Cisco

- CCNA: <a href="https://learningnetwork.cisco.com/s/ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics?ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna&dtid=website&oid=cdc-ccna-exam-topics.ccid=ccna-exam-to
- Other IT certifications: <a href="https://www.cisco.com/c/en/us/training-events/training-certifications/certifications.html#">https://www.cisco.com/c/en/us/training-events/training-events/training-certifications/certifications.html#</a>

#### CompTIA

- CompTIA Network+: <a href="https://www.comptia.org/certifications/network">https://www.comptia.org/certifications/network</a>
- Other IT certifications: <a href="https://www.comptia.org/certifications">https://www.comptia.org/certifications</a>

#### Juniper

- JNCIA-Junos: <a href="https://www.juniper.net/us/en/training/certification/tracks/junos/jncia-junos.html">https://www.juniper.net/us/en/training/certification/tracks/junos/jncia-junos.html</a>
- Other IT certifications: <a href="https://www.juniper.net/us/en/training/certification.html">https://www.juniper.net/us/en/training/certification.html</a>
- Palo Alto Networks: <a href="https://www.paloaltonetworks.com/services/education">https://www.paloaltonetworks.com/services/education</a>

#### Content

**Networking Certifications** 



**Networking Devices** 

**Network Simulation Tools** 

### **Networking Devices**

# Networking Devices

Hub Switch Router Bridge Gateway Access Point Firewall Load Balancer

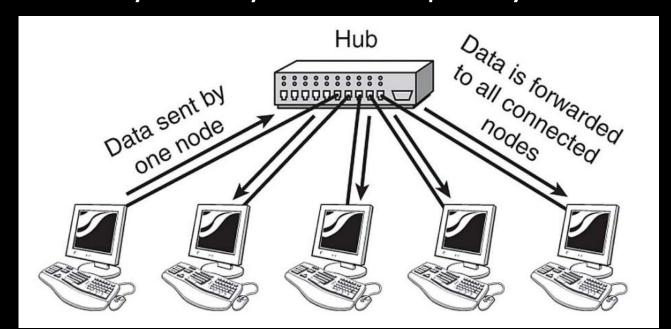
#### Hubs

Hubs connect multiple computer networking devices together.

 A hub also acts as a repeater in that it amplifies signals that deteriorate after traveling long distances over connecting cables.

Hubs operate at the Physical layer of the Open Systems Interconnection

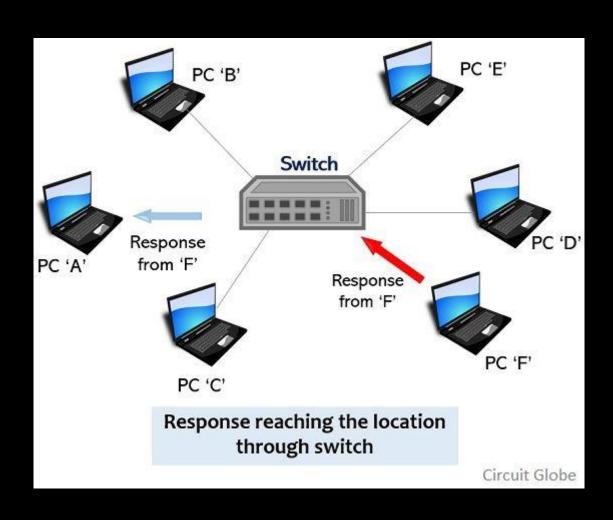
(OSI) model.

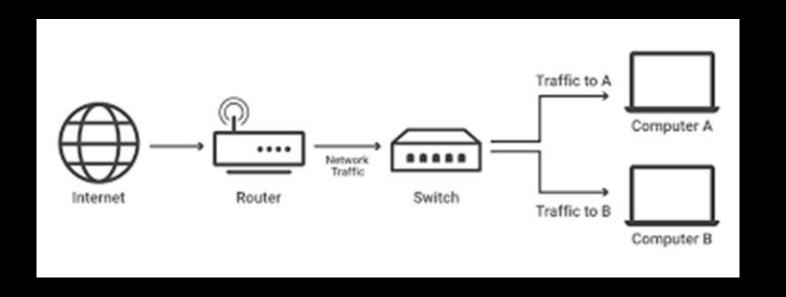


# Hubs



- A network switch forwards data to its destination by examining an incoming frame's MAC address and sending it to the device with the matching address.
  - They examine an incoming frame's MAC address.
- A switch can work at either the Data Link layer or the Network layer of the OSI model.
- A multilayer switch is one that can operate at both layers, which means that it can operate as both a switch and a router.
  - A multilayer switch is a high-performance device that supports the same routing protocols as routers.











Juniper EX9200 Switch



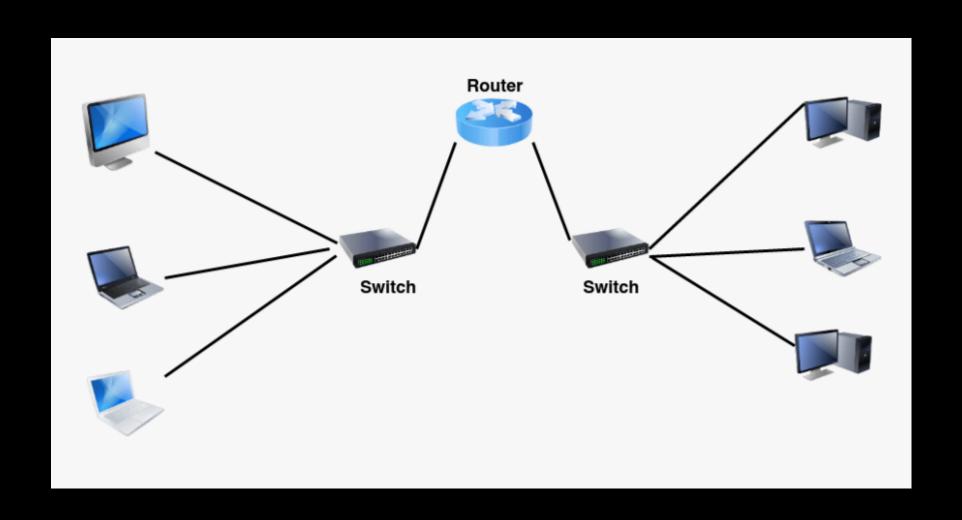


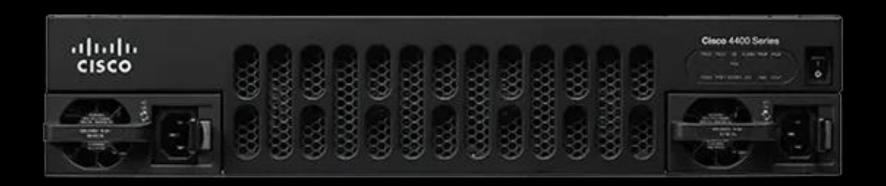
Juniper EX9200 Switch





- A router directs data requests from one network to another.
- Routers examine incoming packets to determine the appropriate destination IP address and then forward the packet to that destination.
- A router can also enable internet access through its connection to a modem, or as a combined modem-router.
- Routers maintain and use routing tables that contain route information, such as IP addresses and interfaces.





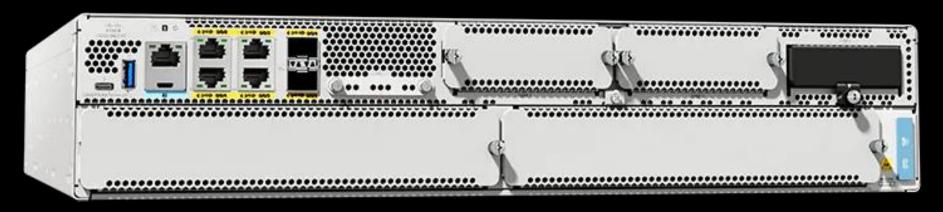




• Catalyst 8300-1N1S-6T



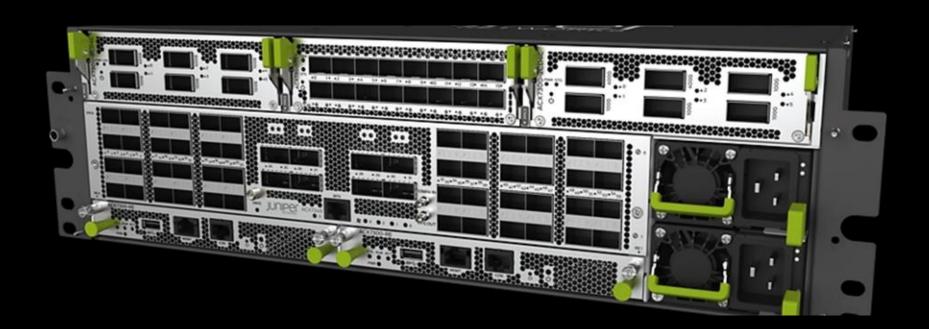
• Catalyst 8300-2N2S-6T



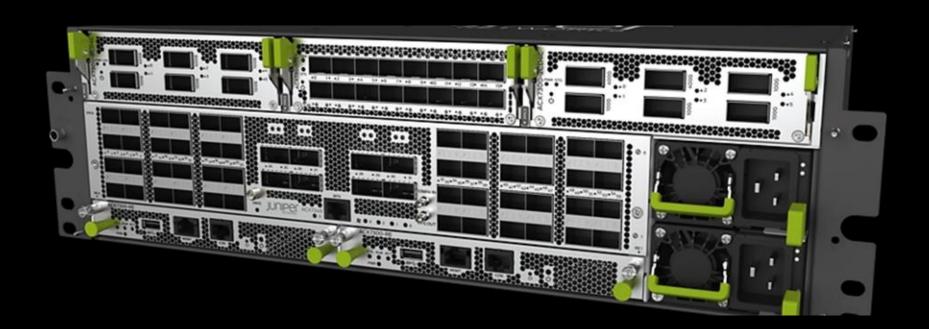
• Catalyst IR1800



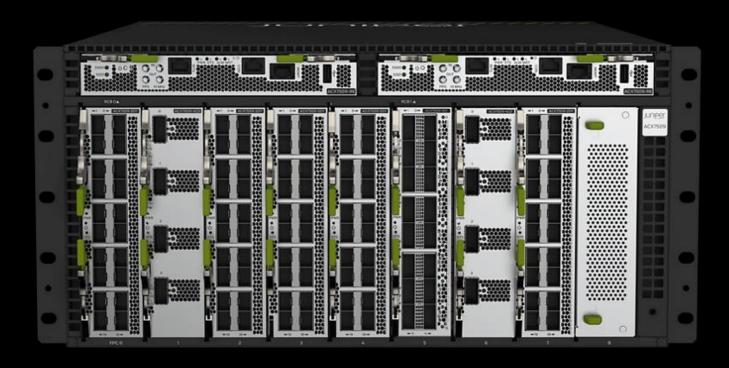
• Juniper ACX7348 Cloud Metro Router



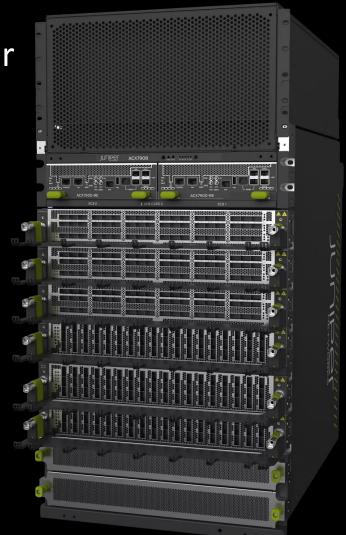
• Juniper ACX7348 Cloud Metro Router



• Juniper ACX7509 Cloud Metro Router



• ACX7908 Cloud Metro Router



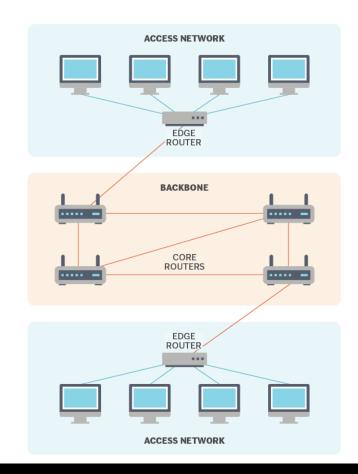


• MX304 Universal Routing Platform



#### **Core router vs. edge router**

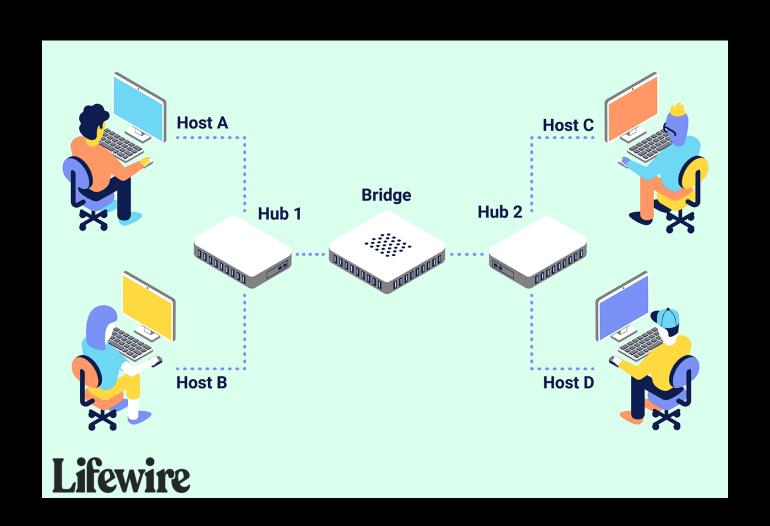
Both core and edge routers move packets between networks. However, since the two devices are placed in different parts of the network, their routing duties are vastly different. Core routers move packets as fast as possible, while edge routers encounter more complex configuration and security issues.



#### Bridges

- Bridges work only at the Physical and Data Link layers of the OSI model.
- Bridges are used to divide larger networks into smaller sections by sitting between two physical network segments and managing the flow of data between the two.
- They use hardware Media Access Control (MAC) addresses for transferring frames.

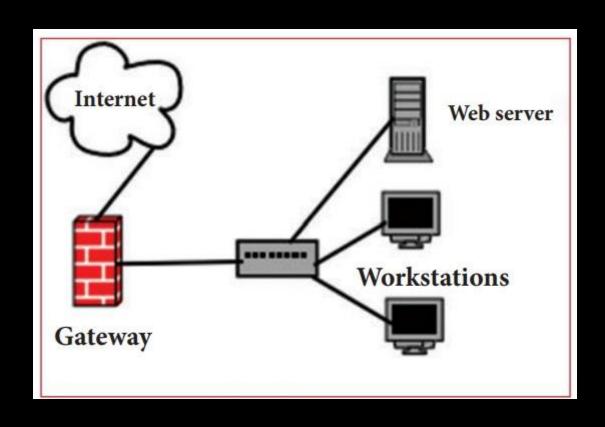
# Bridges



#### Gateway

- Gateways perform all of the functions of routers and more.
- Gateways connect two or more autonomous networks.
- Gateways provide translation between networking technologies such as Open System Interconnection (OSI) and Transmission Control Protocol/Internet Protocol (TCP/IP).
  - o a router with added translation functionality is a gateway.

## Gateway



- An access point (AP) is a device that sends and receives data wirelessly over radio frequencies.
- An AP works at the second OSI layer, the Data Link layer.
- It can operate either as a bridge connecting a standard wired network to wireless devices or as a router passing data transmissions from one access point to another.

• Linksys LAPAC1300CE



• Linksys LAPAC1300C



Juniper AP32





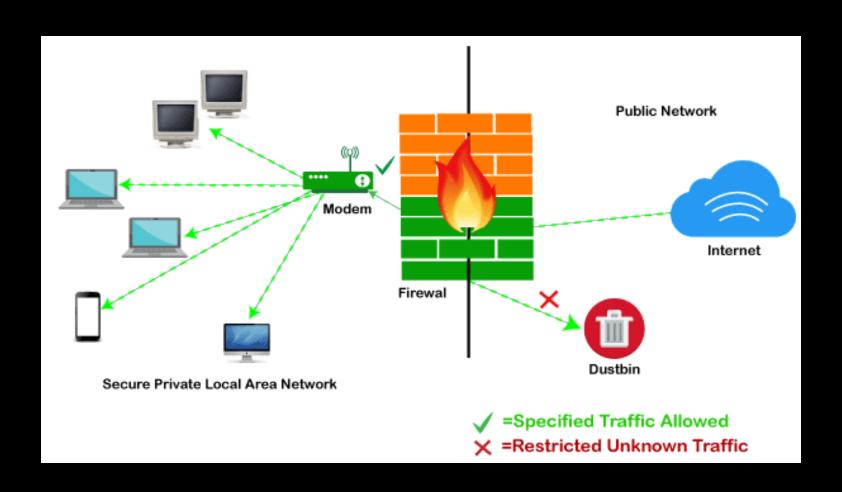
• Cisco Catalyst 9100 Access Points



#### **Firewall**

- A firewall is a network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules.
- A firewall can be hardware, software, software-as-a service (SaaS), public cloud, or private cloud (virtual).
- It works at layer 3 and 4 of the OSI model.
  - Layer 3 is the Network Layer where IP works.
  - Layer 4 is the Transport Layer, where TCP and UDP function.

### **Firewall**



## Firewall

• Cisco Secure Firewall ISA3000



Cisco Firepower 2100



• Cisco Firepower 9300



• Cisco Firepower 1000



• Juniper SRX1500 Firewall



• SRX4600 Firewall



• SRX5600 Firewall



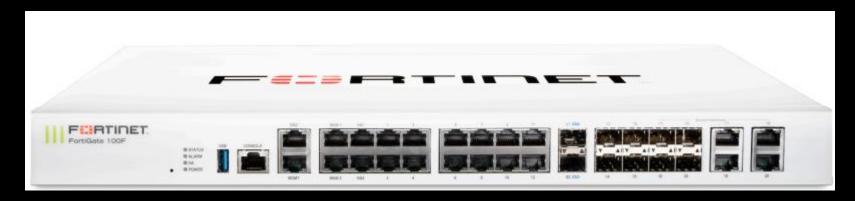


• SRX5800 Firewall





• FortiGate 100F Series



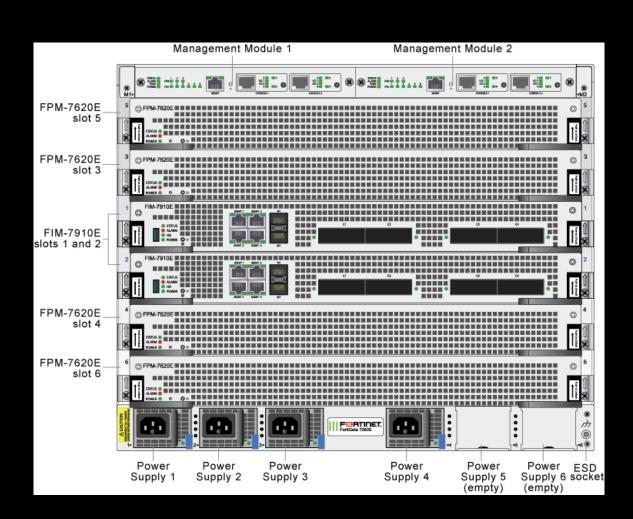
• FortiGate 3600E



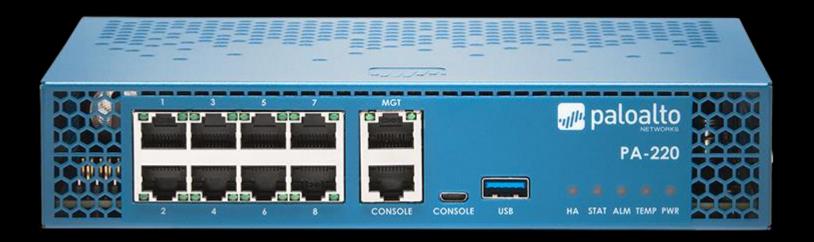
FortiGate Firewall 2600F



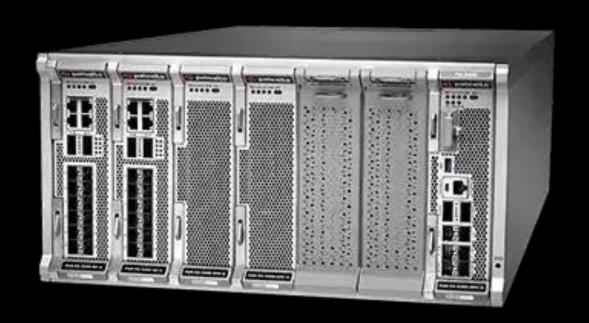
FortiGate-7000



• Palo Alto Networks Enterprise Firewall PA-220



• PA-5450



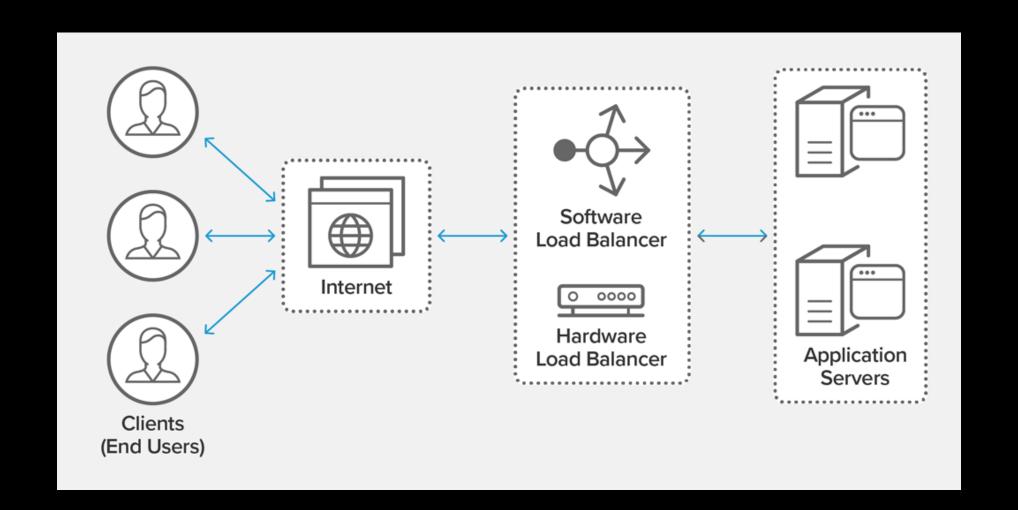
• PA-3200 Series



• PA-400 Series



- A load balancer is a device that distributes network or application traffic across a number of servers.
- Load balancers are used to increase capacity (concurrent users) and reliability of applications.



• F5 BIG-IP 6400



• F5 Network Big-IP 2000



#### Content

**Networking Certifications** 

**Networking Devices** 



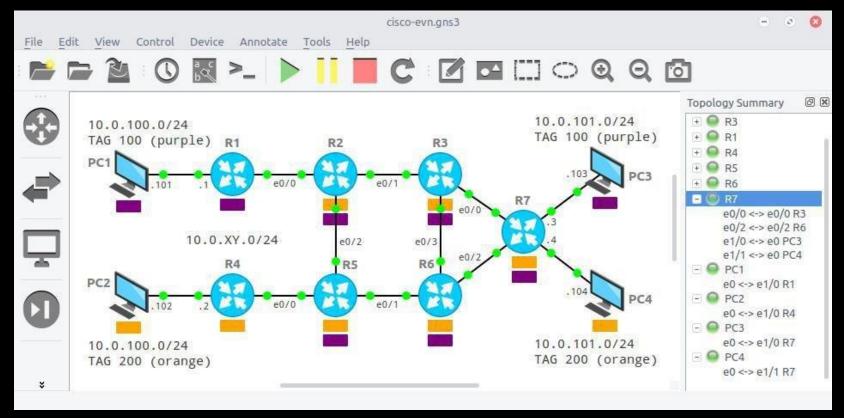
**Network Simulation Tools** 

### **Network Simulation Tools**

#### **GNS3 – Graphical Network System 3**

• GNS3 is used to emulate, configure, test and troubleshoot virtual and real

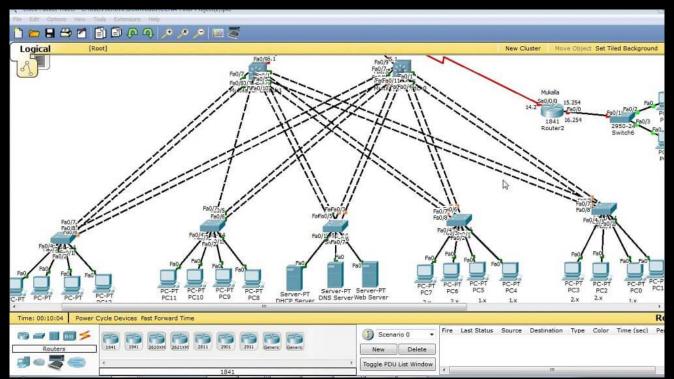
networks.



### **Network Simulation Tools**

#### **Cisco Packet Tracer**

• The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface.



### **Network Simulation Tools**

#### **EVE-NG**

• EVE-NG PRO is a clientless multivendor network emulation software.

