



# Virtual Network Devices

CompTIA Network+ (N10-007)

# Virtual Network Devices

- Major shift in the way data centers are designed, fielded, and operated
- Virtualization is everywhere
  - Virtual Servers
  - Virtual Routers
  - Virtual Firewalls
  - Virtual Switches
  - Virtual Desktops
  - Software-Defined Networking
  - VoIP
  - Cloud Computing



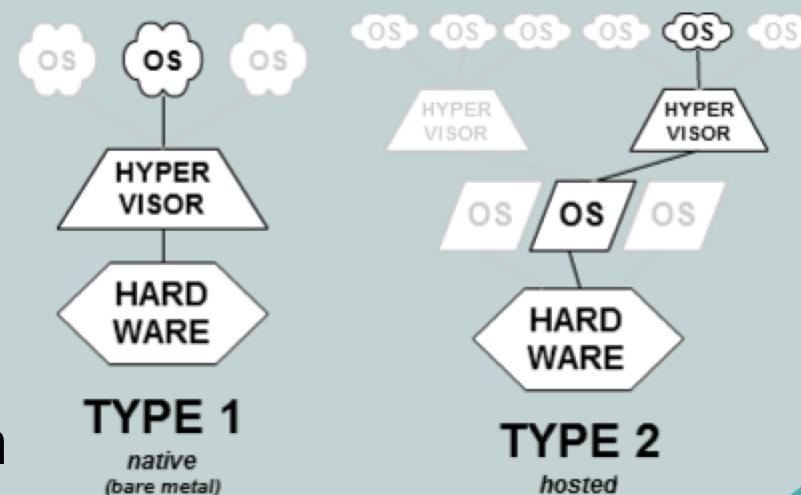
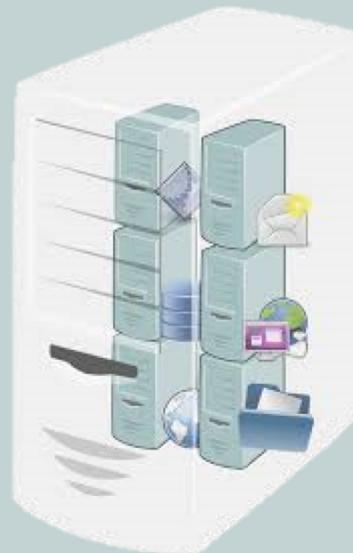
# Virtual Servers

- Multiple virtual instances exist on a single physical server
- Multiple Windows and Linux servers running simultaneously
- Considerable cost savings for an IT budget
- Allows for consolidation of physical servers
- Multiple NICs increase bandwidth available



# Hypervisor

- Specialized software that enables virtualization to occur
- Hypervisor is the software that emulates the physical hardware
- Also called a Virtual Machine Monitor (VMM)
- Examples
  - VMWare ESXi
  - Microsoft Hyper-V
  - Virtual Box
  - VMWare Workstation



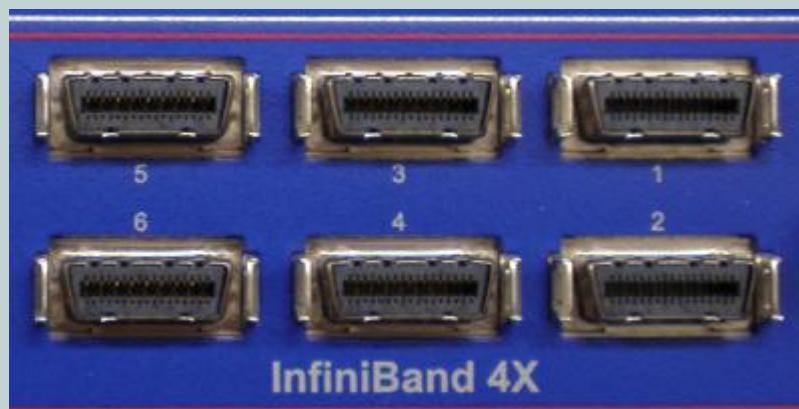
# Virtualized Storage Solutions

- Network Attached Storage (NAS)
  - Disk storage is delivered as a service over TCP/IP
- Storage Area Network (SAN)
  - Specialized LAN designed for data transfer/storage
  - Transfers data at block level with special protocol
  - Fibre Channel (FC)
    - Special purpose hardware providing 1-16 Gbps
  - Fibre Channel over Ethernet (FCoE)
    - Removes need for specialized hardware
    - Runs over your Ethernet networks
  - iSCSI (IP Small Computer System Interface)
    - Lower cost, built using Ethernet switches (<10 Gbps)
    - Relies on configuration allowing jumbo frames over the network



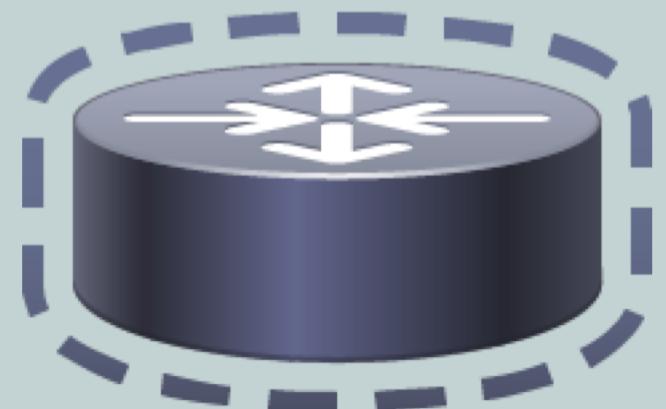
# Infiniband (Virtualized Storage)

- Switched fabric topology for high-performance computing
- Very high throughput (>600 Gbps) with very low latency (0.5 µsec)
- Direct or switched connection between servers and storage systems



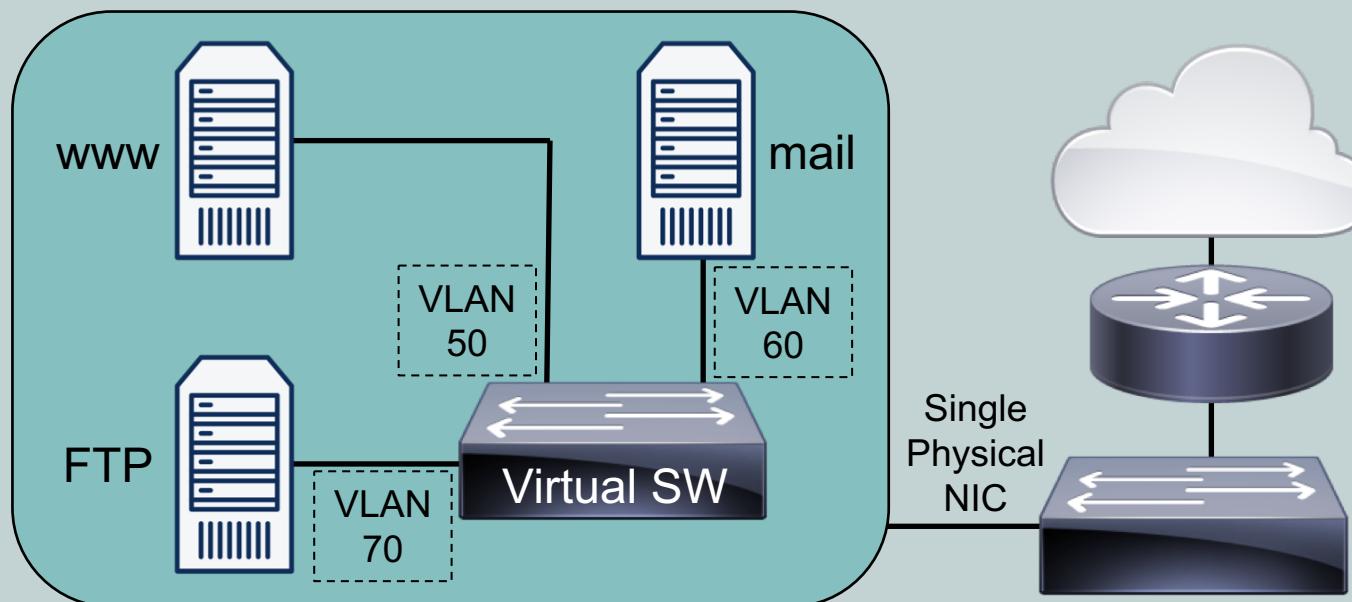
# Virtual Firewalls and Routers

- To fully virtualize your network, you will need a firewall and router
- Manufacturer's offer virtualized versions of their most popular devices
- Virtualized routers and firewalls provides the same features as their physical counterparts



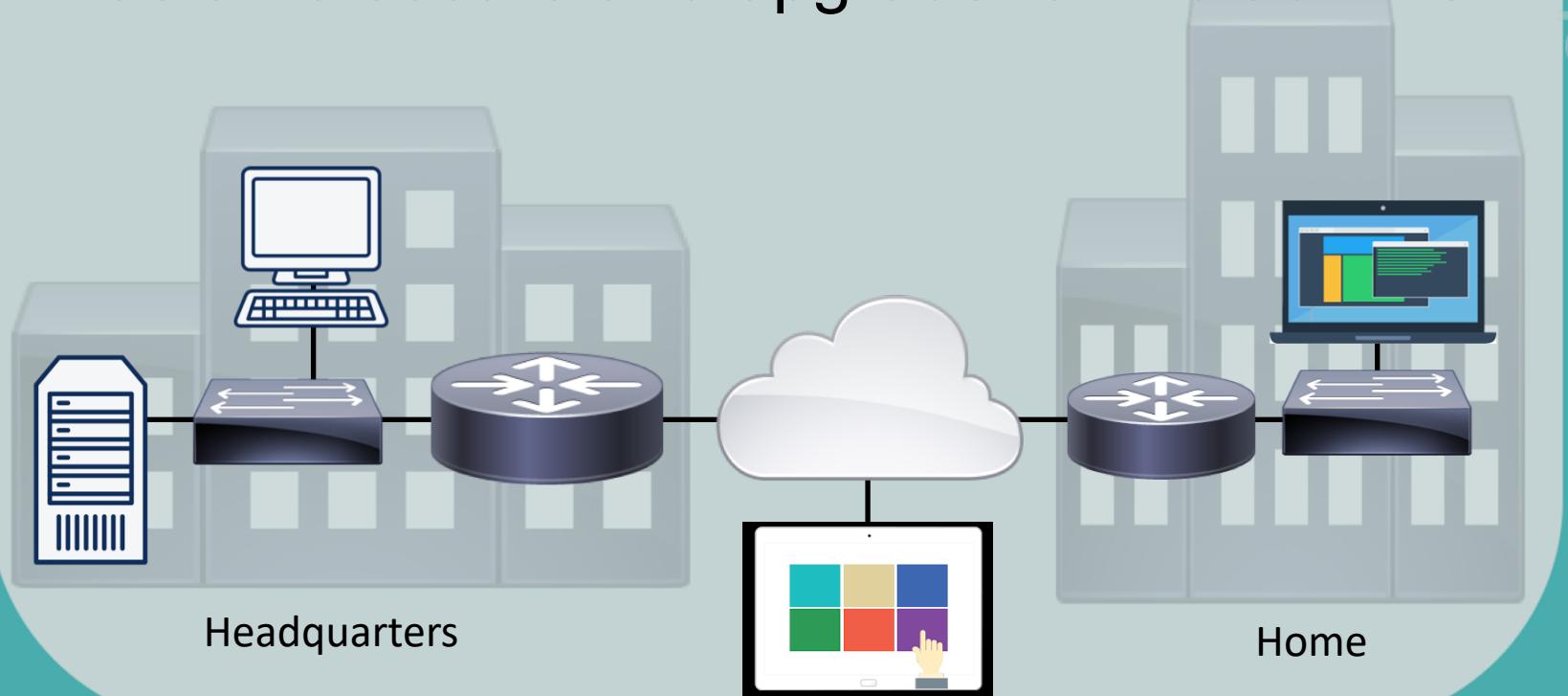
# Virtual Switches

- Overcomes the problem of all virtual servers being on one broadcast domain
- Layer 2 control provides VLANs and trunking
- Provides Quality of Service and security



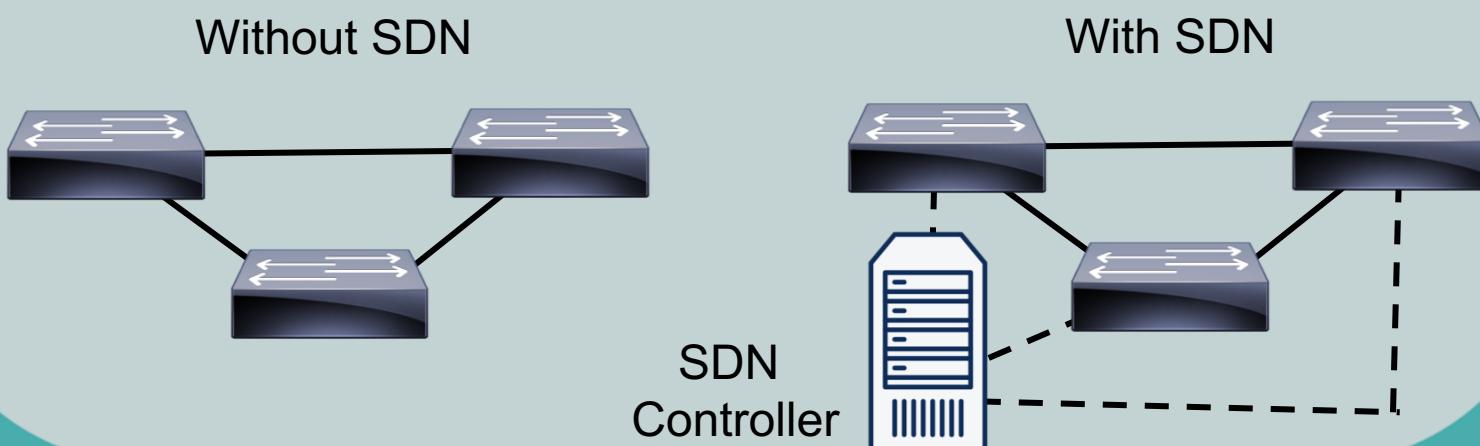
# Virtual Desktops

- User's desktop computer is run in browser
- Used from web, laptop, tablet, or phone
- Easier to secure and upgrade for the admins



# Software-Defined Networking (SDN)

- Provides the administrator with a easy-to-use front end to configure physical and virtual devices throughout the network
- All the configurations are automatically done
- Provides administrator and overview of the entire network





# Voice over IP (VoIP)

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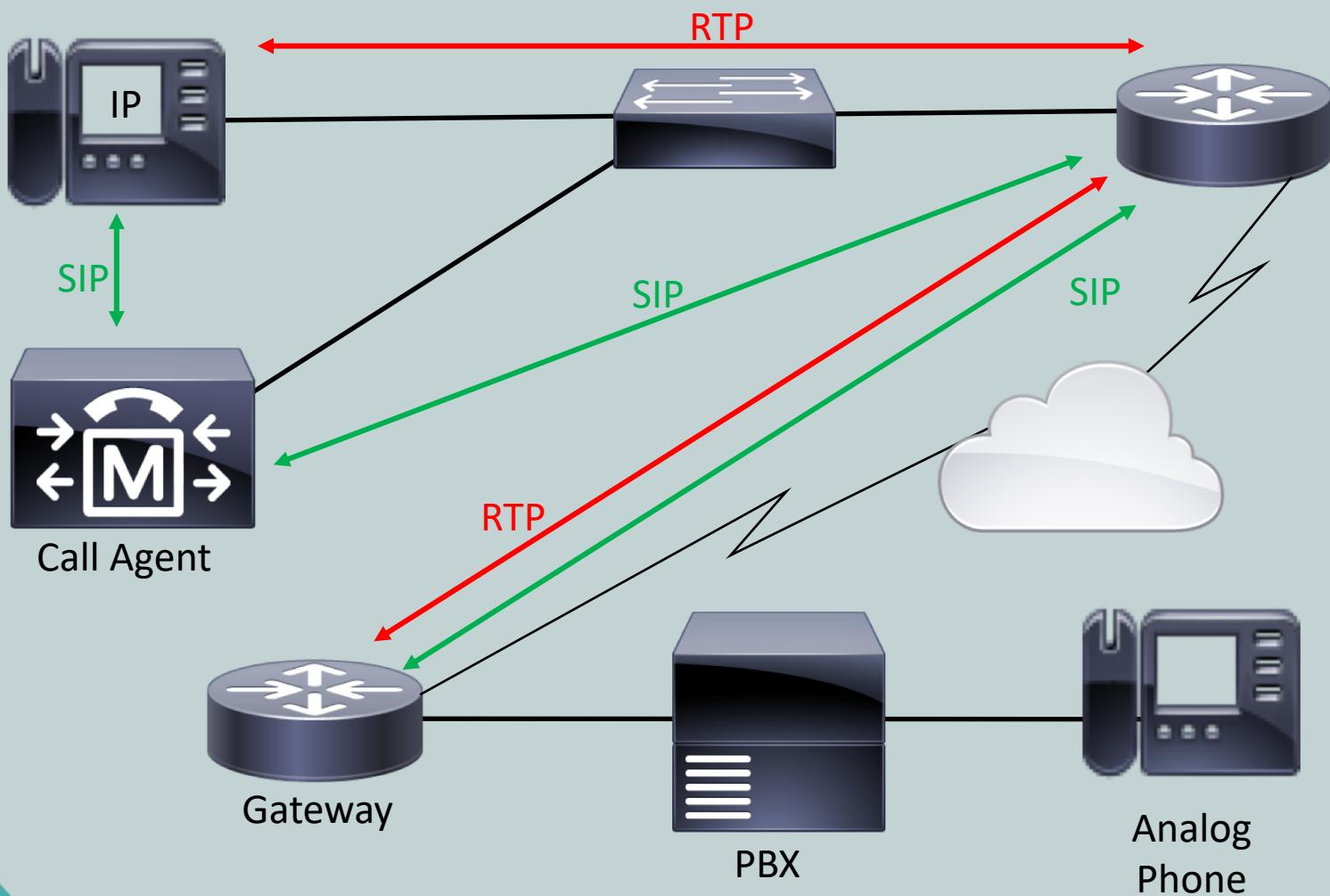
# Voice over IP (VoIP)

- Digitizes voice traffic so that it can be treated like other data on the network
- Uses the SIP (Session Initiation Protocol) to setup, maintain, and tear down calls
- VoIP can save a company money and provide enhanced services over a traditional PBX solution



# VoIP Topology

- User's desktop computer is run in browser



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# Virtual Private Branch Exchange (PBX) and VoIP

- Ability to outsource your telephone system
- Utilizes VoIP to send all data to provider, then provider connects it to telephone system





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# Cloud Computing

- Private Cloud
  - Systems and users only have access with other devices inside the same private cloud or system
- Public Cloud
  - Systems and users interact with devices on public networks, such as the Internet and other clouds
- Hybrid Cloud
  - Combination of private and public



# 4 Models of Cloud Computing

- Network as a Service (NaaS)
- Infrastructure as a Service (IaaS)
- Software as a Service (SaaS)
- Platform as a Service (PaaS)



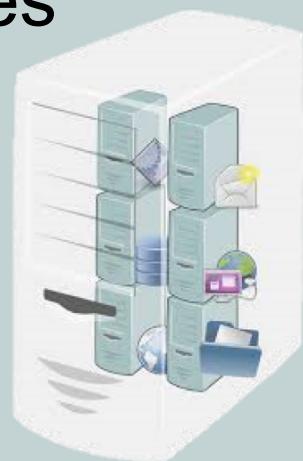
# Network as a Service (NaaS)

- Allows outsourcing of the of a network to a service provider
- Hosted off-site at the service provider's data center and the customer is billed for usage
- Charged by hours, processing power, or bandwidth used like a utility services
- Amazon's VPC or Route 53 offerings



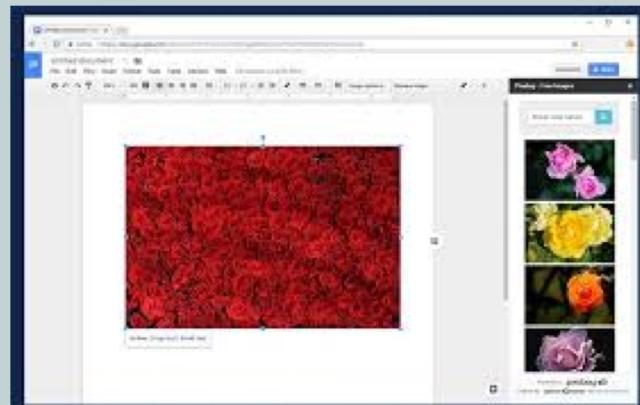
# Infrastructure as a Service (IaaS)

- Allows outsourcing of the infrastructure of the servers or desktops to a service provider
- Hosted off-site at the service provider's data center and the customer is billed for usage
- Charged by hours, processing power, or bandwidth used like a utility services
- Examples
  - Amazon Web Services (AWS)
  - Microsoft's Azure



# Software as a Service (SaaS)

- User interacts with a web-based application
- Details of how it works are hidden from users
- Examples:
  - Google Docs
  - Office 365



# Platform as a Service (PaaS)

- Provides a development platform for companies that are developing applications without the need for infrastructure
  - Dion Training uses PaaS for our courses
  - Examples:
    - Pivotal
    - OpenShift
    - Apprenda

