

Simple Internetworking: Host Configuration, Error Reporting, and VPN

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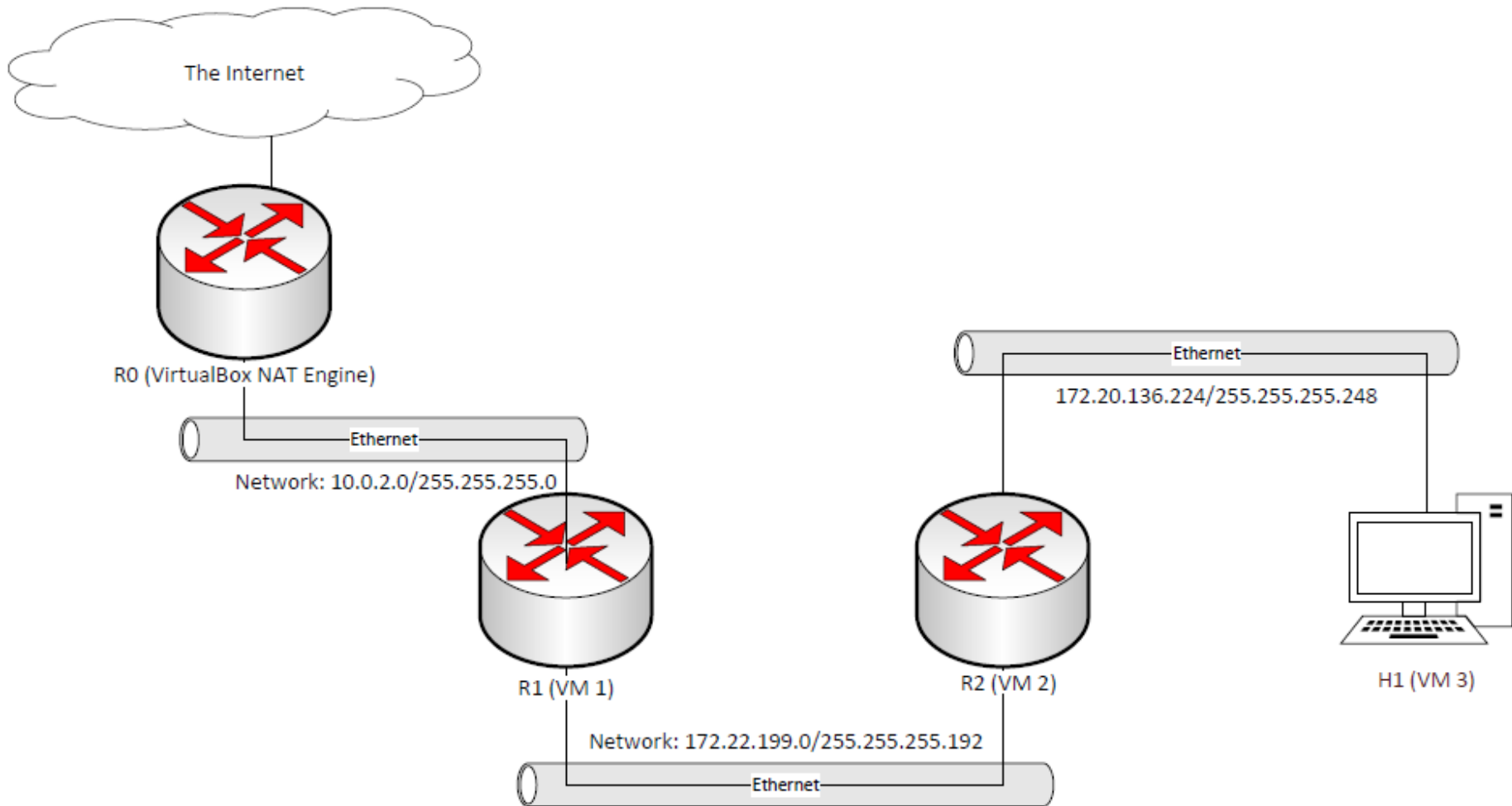
Outline

- Topic: internetworking
 - Case study: Internet Protocol (IP) Suite
- Simple interworking
 - Overview of **i**nternet and the **I**nternet
 - Global addressing scheme
 - Best effort service model and datagram forwarding
 - Packet fragmentation and assembly
 - Address translation
 - **Host configuration**
 - **Error reporting**

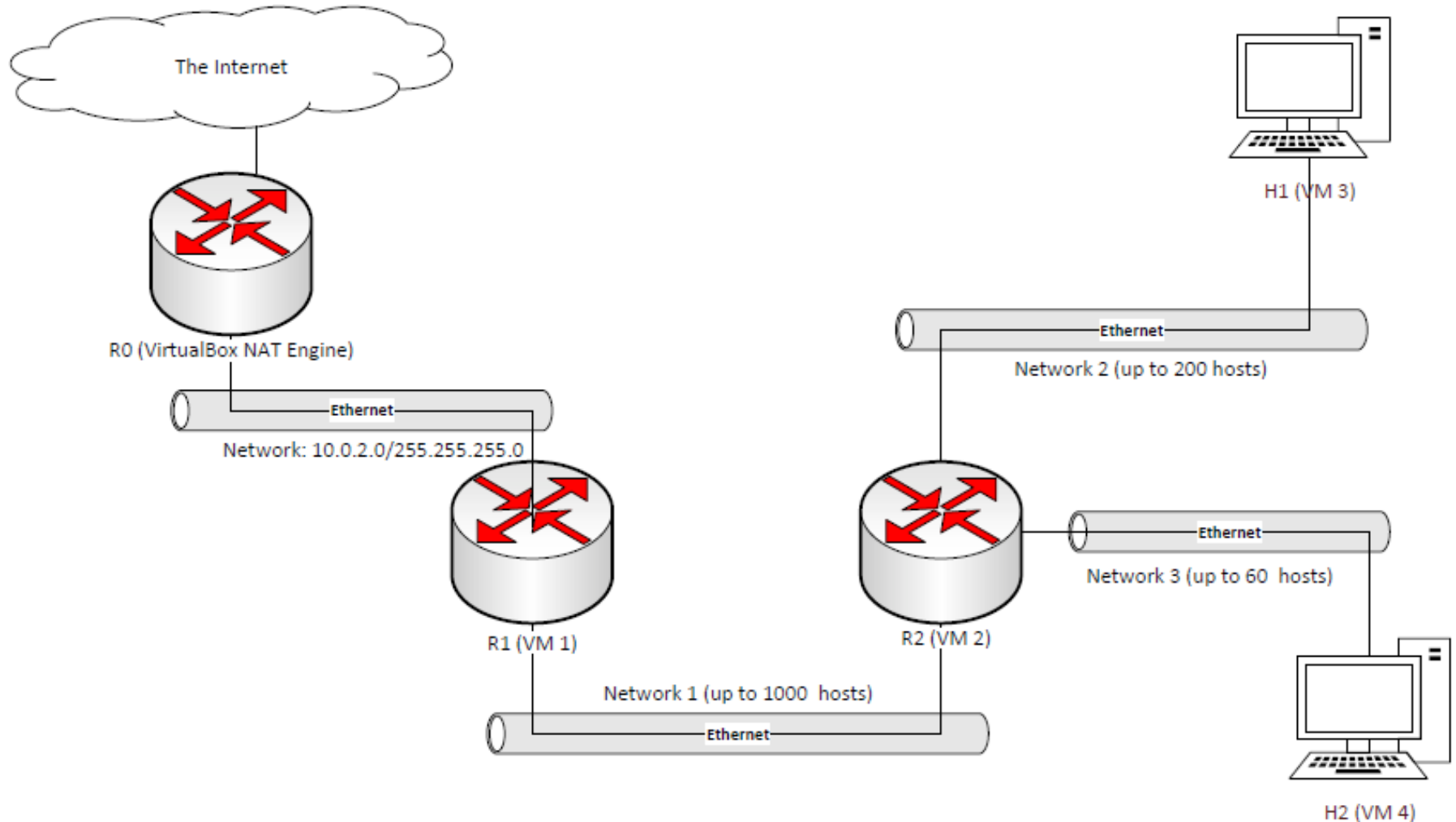
Host Configuration

- Ethernet addresses are configured into network by manufacturer and they are unique
- IP addresses must be unique on a given internetwork but also must reflect the structure of the internetwork
- Most host Operating Systems provide a way to manually configure the IP information for the host
- Drawbacks of manual configuration
 - A lot of work to configure all the hosts in a large network
 - Configuration process is error-prone
- Automated Configuration Process is required

Manual Configuration



Exercise for Manual Configuration

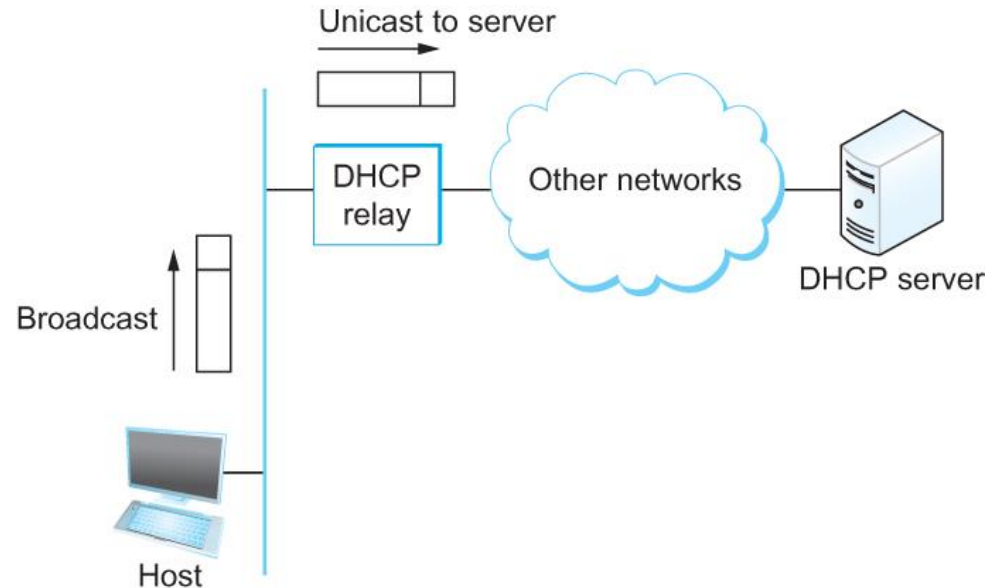


Dynamic Host Configuration Protocol (DHCP)

- DHCP server is responsible for providing configuration information to hosts
- There is at least one DHCP server for an administrative domain
- DHCP server maintains a pool of available addresses

DHCP

- Newly booted or attached host sends DHCPDISCOVER message to a special IP address (255.255.255.255)
- DHCP relay agent unicasts the message to DHCP server and waits for the response



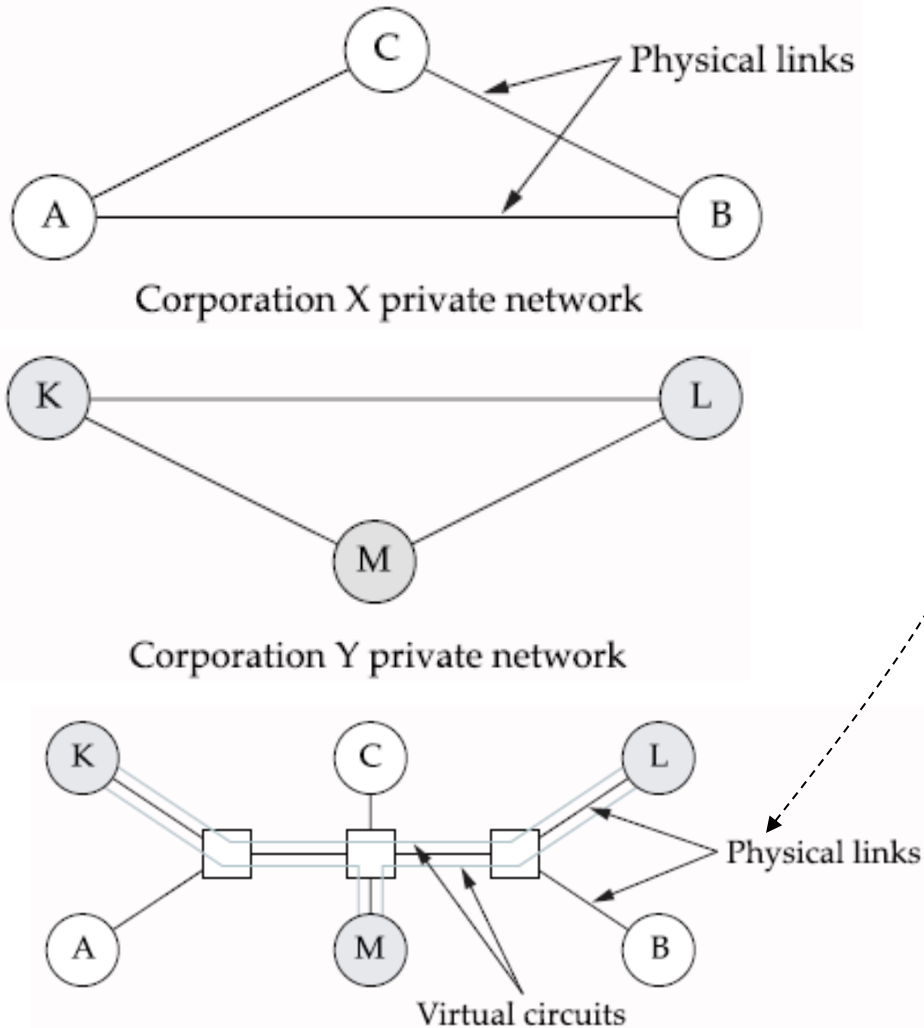
Internet Control Message Protocol (ICMP)

- Defines a collection of error messages that are sent back to the source host whenever a router or host is unable to process an IP datagram successfully
 - Destination host unreachable due to link /node failure
 - Reassembly process failed
 - TTL had reached 0 (so datagrams don't cycle forever)
 - IP header checksum failed
- ICMP-Redirect
 - From router to a source host
 - With a better route information

Virtual Networks and Tunnels

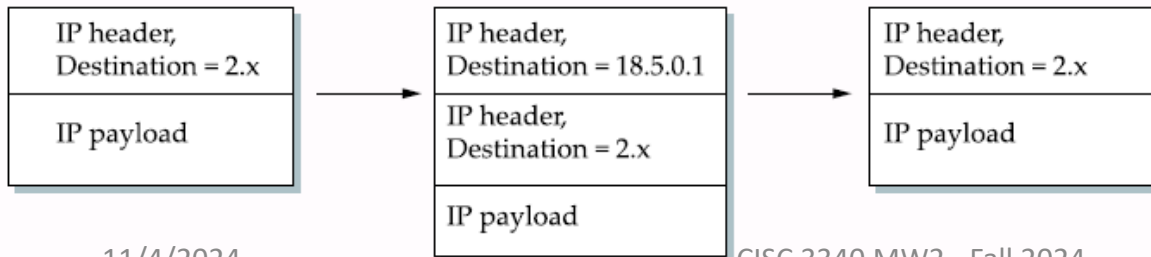
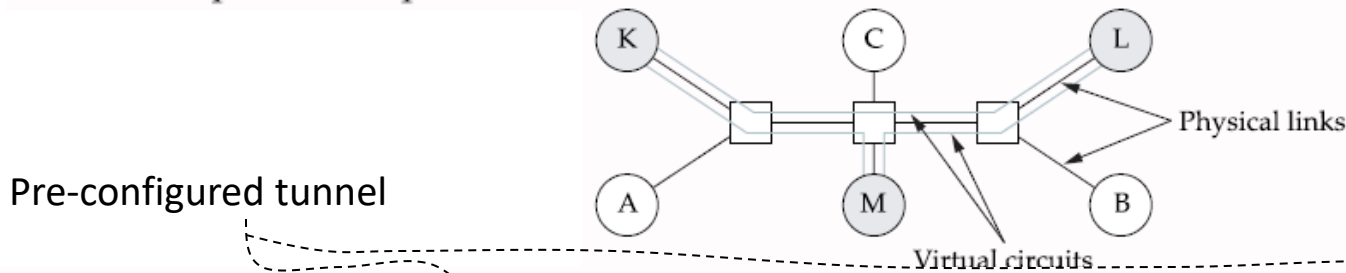
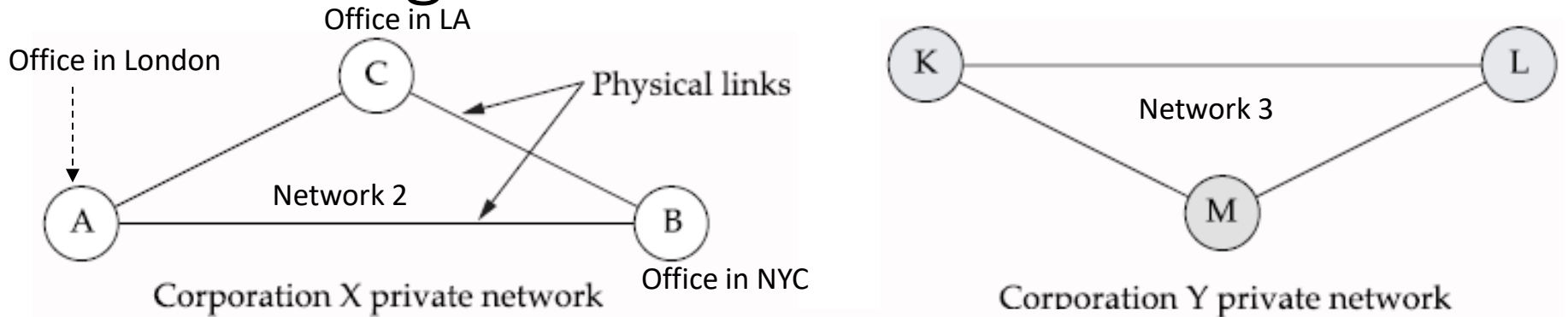
- Internetworks often have shared infrastructure networks
- Data packets may not be forwarded without restriction
- Virtual Private Networks (VPN)
 - VPN is a heavily overused and definitions vary
 - An “private” network utilizing an shared network infrastructure

Virtual Private Networks: Example



- Corporations X and Y want their own networks via “leased lines” belonging to other networks
- X wants to keep their data private
- So does Y
- X and Y have “virtual” private networks
- “virtualization” can be done on different layers
 - Layer 2 VPN
 - Layer 3 VPN

Virtual Private Networks via IP Tunneling



Forwarding Table at R1

NetworkNum	NextHop
1	Interface 0
2	Virtual interface 0
Default	Interface 1

Summary

- internet and the Internet
- Global addressing scheme
- Packet fragmentation and assembly
- Best effort service model and datagram forwarding
- Address translation
- Host configuration
- Error reporting