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1/22/14
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Lab 6 Part 1: VOIP Basics (Connection)

Purpose
The purpose of this lab is to establish connectivity between two phones using Voice Over IP (VOIP), a skill that is essential in small enterprises or companies.

Background Information on lab concepts
Cisco Unified Communications Manager (CUCM): A calling system designed to manage all All configurations are done through a web interface (supported browsers: Firefox and Internet Explorer). This system was the basis of our lab, due to its ability to manage and help us configure phones and gateways. A possible parallel to the relationship between CUCM and this lab would be that of CPU and a computer: CUCM acts as the central bridge that monitors and manages phone connectivity. CUCM is also Cisco proprietary, meaning that only Cisco devices, including phones, can be managed using this system.

Voice Over IP (VOIP): A protocol that is responsible for transferring voice communications over Internet Protocol (IP) networks. VOIP is commonly used in almost every part of communication between one to another, from connection between phone to phone in the same, wired network to the connection between wireless phones. Examples include H.323, Skype protocol, and Real-time transfer Protocol (RTP)

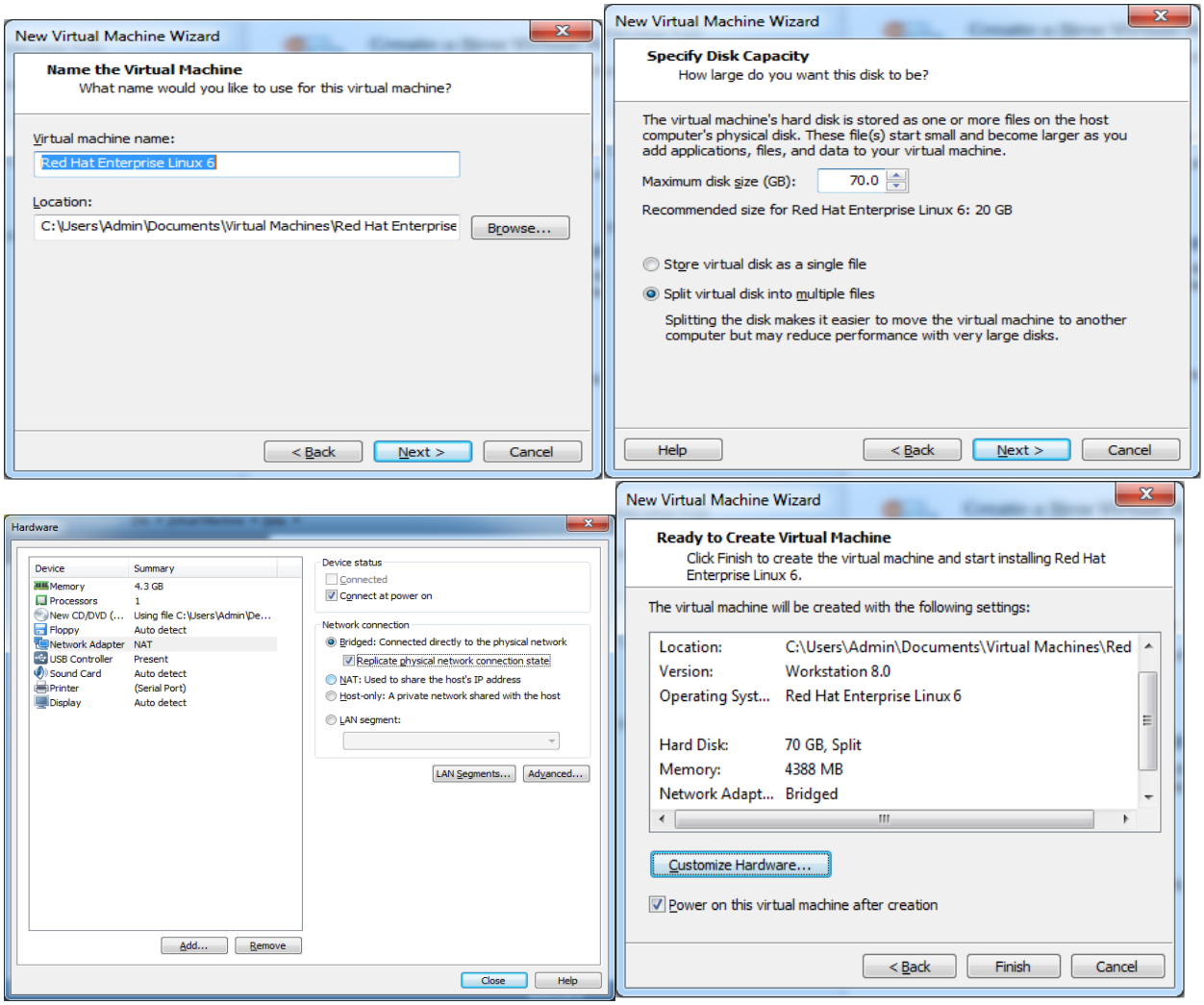
- Another name for VOIP is Internet Telephony. This term indicates communication over public Internet such as fax, SMS, and voice-messaging.

VMWare Workstation 8: A virtual software that allows virtualization of a server without an additional operational system. VMware simulates the CPU of a computer and maximizes the efficiency of simulation. It is crucial that VMware be set up before setting up CUCM, for its virtualization allows an effect simulation.

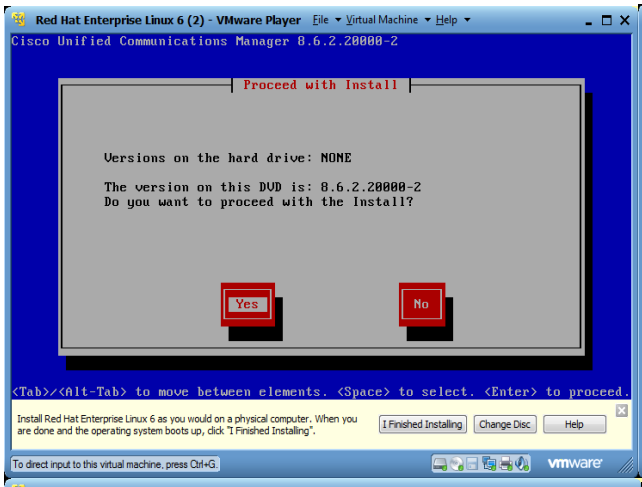
Dynamic Host Control Protocol (DHCP): A networking protocol that automatically (dynamically) assigns IP addresses to devices in the same network as the server. DHCP removes the inconvenience of having to statically configure different IP addresses, especially when it comes to assigning IP addresses to IP phones.

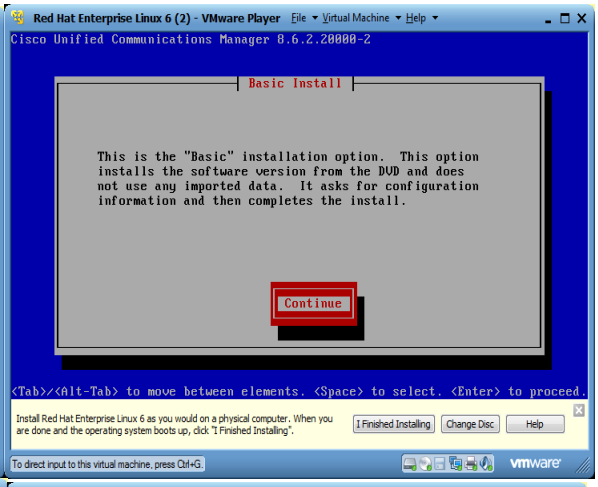
Network Time Protocol (NTP): A networking protocol for synchronizing devices in the same network. NTP provides updates in a peer-to-peer network.

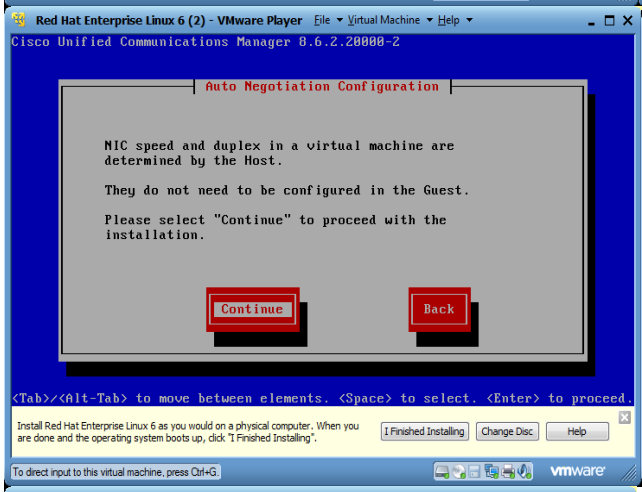
Lab Summary
There are essentially 4 parts to this lab: Setting up VMWare, installing CUCM, setting up CUCM, and configuring CUCM.
VMWare Installation

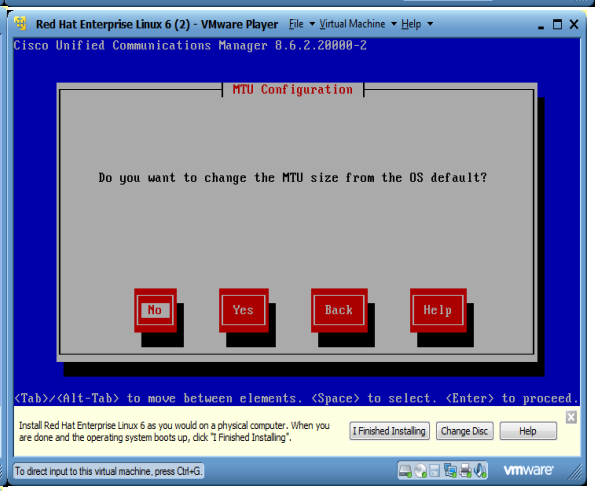


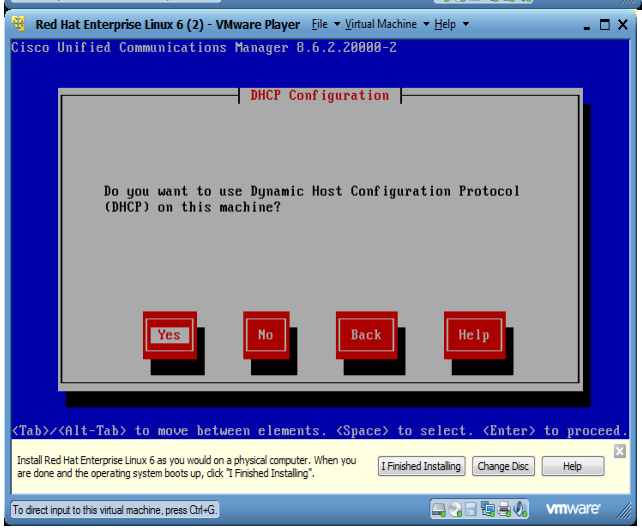
<From left to right, top to bottom>
Select Red Hat Enterprise Linux 6.
Make sure that the maximum disk capacity is at least 70.0GB.
Select “Bridged: Connected directly to the physical network” and click close.
After making sure that the three steps above have been implemented, click Finish. A blue installation screen will appear.

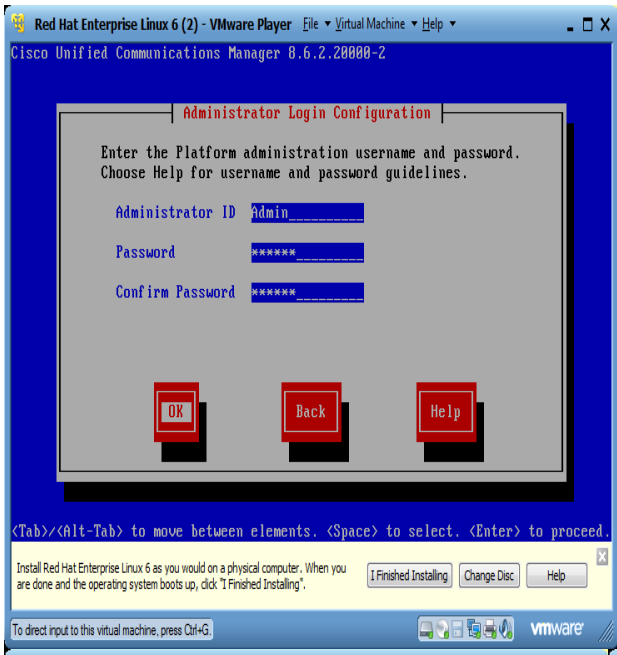

Red Hat Enterprise Linux 6 (2) - VMware Player
File
Virtual Machine
Help
Cisco Unified Communications Manager 8.6.2.20000-2
Proceed with Install
Versions on the hard drive: NONE
The version on this DVD is: 8.6.2.20000-2
Do you want to proceed with the Install?
Yes
No
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware

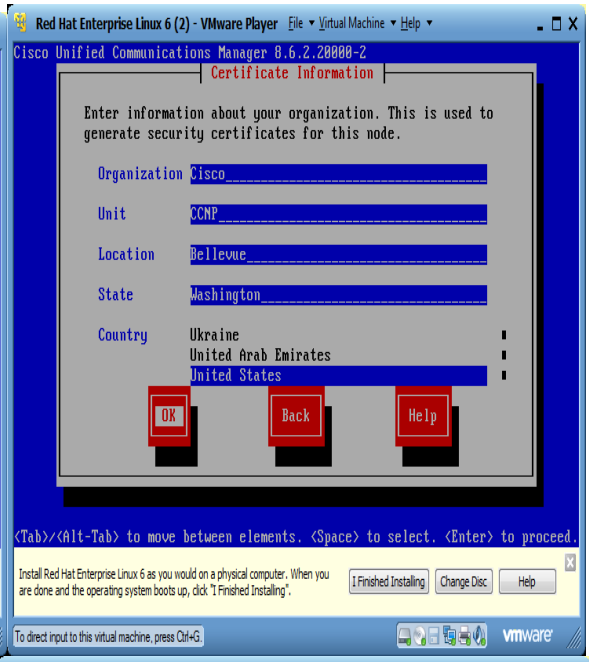

Red Hat Enterprise Linux 6 (2) - VMware Player
File
Virtual Machine
Help
Cisco Unified Communications Manager 8.6.2.20000-2
Basic Install
This is the "Basic" installation option. This option installs the software version from the DVD and does not use any imported data. It asks for configuration information and then completes the install.
Continue
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware


Red Hat Enterprise Linux 6 (2) - VMware Player
File
Virtual Machine
Help
Cisco Unified Communications Manager 8.6.2.20000-2
Auto Negotiation Configuration
NIC speed and duplex in a virtual machine are determined by the Host.
They do not need to be configured in the Guest.
Please select "Continue" to proceed with the installation.
Continue
Back
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware

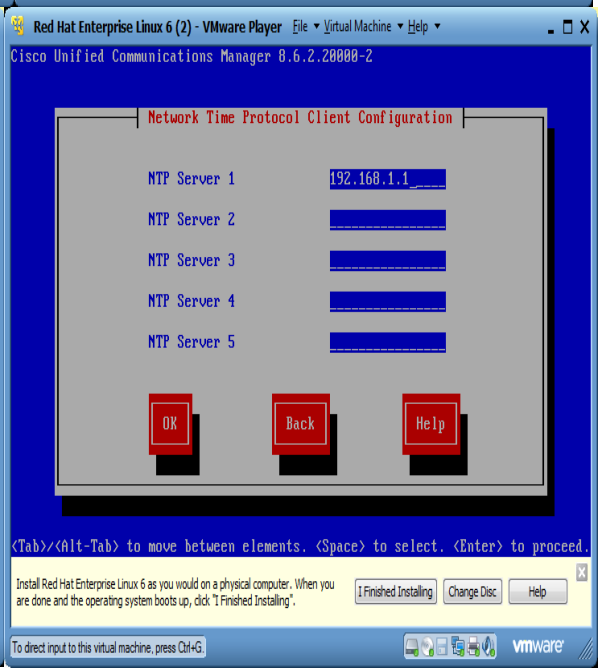

Red Hat Enterprise Linux 6 (2) - VMware Player
File
Virtual Machine
Help
Cisco Unified Communications Manager 8.6.2.20000-2
MTU Configuration
Do you want to change the MTU size from the OS default?
No
Yes
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware

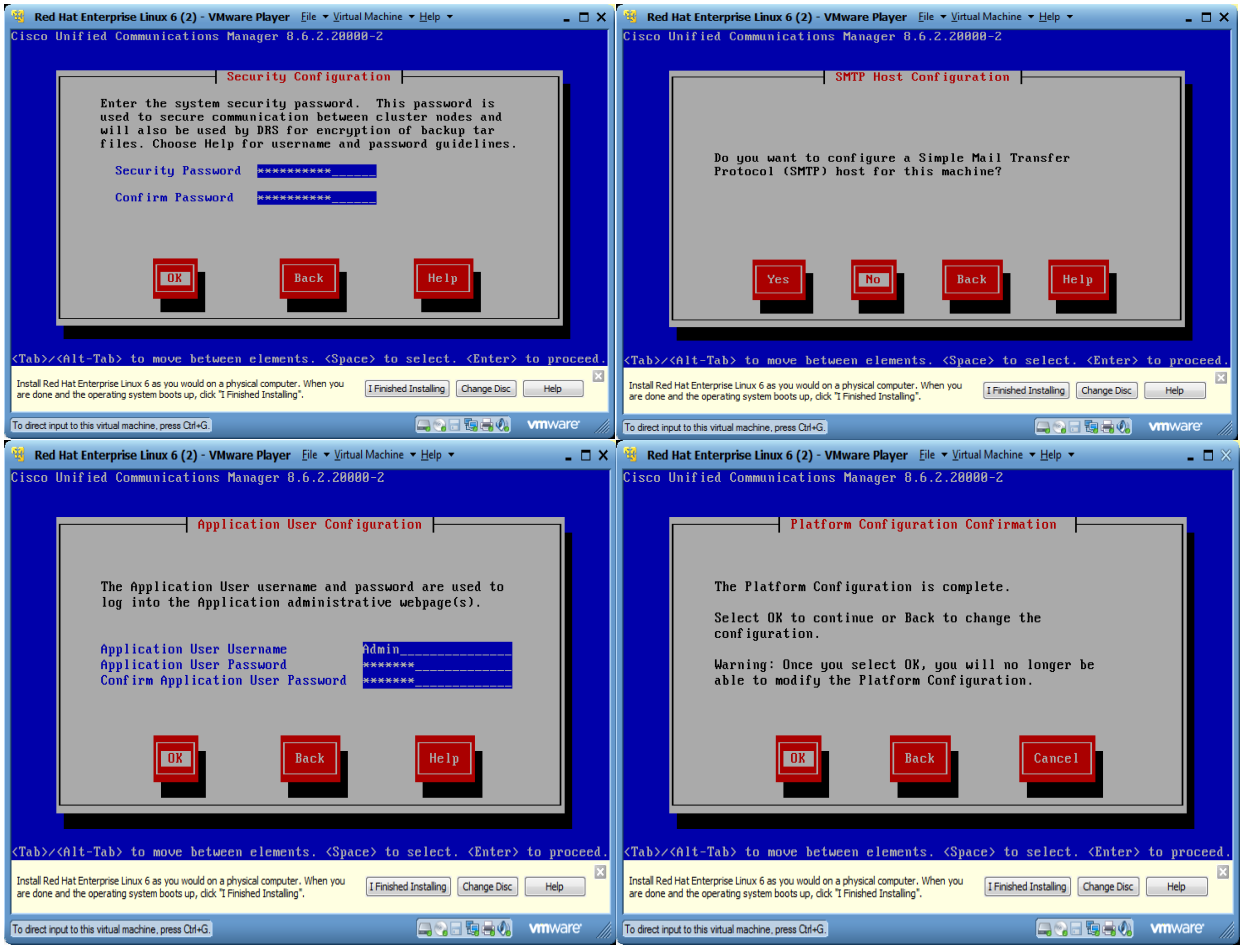

Red Hat Enterprise Linux 6 (2) - VMware Player
File
Virtual Machine
Help
Cisco Unified Communications Manager 8.6.2.20000-2
DHCP Configuration
Do you want to use Dynamic Host Configuration Protocol (DHCP) on this machine?
Yes
No
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware


Red Hat Enterprise Linux 6 (2) - VMware Player
File ▾ Virtual Machine ▾ Help ▾
Cisco Unified Communications Manager 8.6.2.20000-2
Administrator Login Configuration
Enter the Platform administration username and password.
Choose Help for username and password guidelines.
Administrator ID
Admin
Password
******
Confirm Password
******
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware


Red Hat Enterprise Linux 6 (2) - VMware Player
File ▾ Virtual Machine ▾ Help ▾
Cisco Unified Communications Manager 8.6.2.20000-2
Certificate Information
Enter information about your organization. This is used to generate security certificates for this node.
Organization
Cisco
Unit
CCMP
Location
Bellevue
State
Washington
Country
Ukraine
United Arab Emirates
United States
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware


Red Hat Enterprise Linux 6 (2) - VMware Player
File ▾ Virtual Machine ▾ Help ▾
Cisco Unified Communications Manager 8.6.2.20000-2
First Node Configuration
Is this server the First Node in the cluster?
Yes
No
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware


Red Hat Enterprise Linux 6 (2) - VMware Player
File ▾ Virtual Machine ▾ Help ▾
Cisco Unified Communications Manager 8.6.2.20000-2
Network Time Protocol Client Configuration
NTP Server 1
192.168.1.1
NTP Server 2
NTP Server 3
NTP Server 4
NTP Server 5
OK
Back
Help
<Tab>/<Alt-Tab> to move between elements. <Space> to select. <Enter> to proceed.
Install Red Hat Enterprise Linux 6 as you would on a physical computer. When you are done and the operating system boots up, click "I Finished Installing".
I Finished Installing
Change Disc
Help
To direct input to this virtual machine, press Ctrl+G.
vmware



For every step, click the highlighted option (options that are marked with a white box)
<From Top to bottom, left to right>
Start installation.
Do not change the MTU size from the default.
Select the option Yes for configuring DHCP.
Enter the administrative username and password.
Select Yes for the question regarding the First Node Cluster.
Enter the IP address of the NTP Server (in this case, the router).
Create an administrative password consisting of capital and lowercase letters, symbols, and numbers.
Select No for the question regarding SMTP. SMTP is not needed for this lab.
Set the application username and password.
Click Ok. A blue installation screen will appear.

CUCM Setup

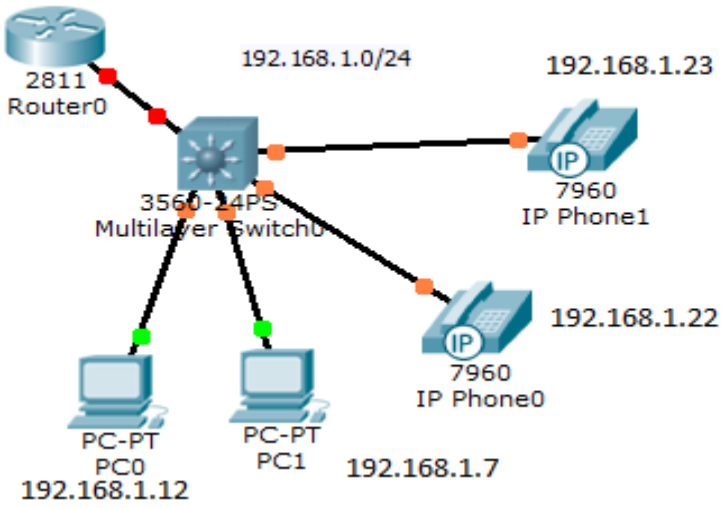
Lab Commands

Commands for configuring DHCP

ip dhcp excluded-address	Avoids conflict with any statically assigned

	IP addresses
ip dhcp pool Voip	Enters DHCP Configuration Mode
network [network-address] [prefix]	Configures network address of DHCP
default-router [ip address of the router]	Configures default router (exit interface)
dns-server [ip address of the dns server]	Configures DNS server
domain-name [name]	Configures domain name
option 150 ip [ip address of the DHCP server]	Binds the TFTP server to the DHCP server
ntp master	Establishes Router as Central NTP
ntp server [ip address of the TFTP server]	Establishes the TFTP as an NTP server

Network Diagram with IP's



Configurations

Show run on R1

```
hostname R1
!
memory-size iomem 10
clock timezone PST -8
no network-clock-participate slot 1
!
no ip dhcp use vrf connected
ip dhcp excluded-address 192.168.1.1
ip dhcp excluded-address 192.168.1.5
ip dhcp excluded-address 192.168.1.6
!
ip dhcp pool Voip
   network 192.168.1.0 255.255.255.0
   dns-server 192.168.1.1
   default-router 192.168.1.1
   domain-name Voip
   option 150 ip 192.168.1.6
!
ip domain name Voip
ip name-server 192.168.1.1
!
voice-card 0
```

```
 no dspfarm
!
voice-card 1
 no dspfarm
!
voice service voip
 allow-connections h323 to h323
 h323
!
voice class h323 1
 h225 timeout tcp establish 3
!
interface FastEthernet0/1
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
 h323-gateway voip bind srcaddr 192.168.1.1
!
ip classless
!
voice-port 0/3/0
!
voice-port 0/3/1
!
voice-port 0/3/2
!
voice-port 0/3/3
!
voice-port 1/0/0
!
voice-port 1/0/1
!
dial-peer voice 10 pots
 destination-pattern 9...........
 port 0/3/0
 forward-digits all
!
scheduler allocate 20000 1000
ntp broadcastdelay 10
ntp source FastEthernet0/0
ntp master 4
ntp update-calendar
ntp server 192.168.1.1
!
end
```

Problem

The main problem that I encountered during this lab was managing CUCM. CUCM is a system that I have never encountered before when I was a CCNA. Initially I did not know what each of the categories in the top right corner – Cisco Unified Serviceability, Cisco Unified Reporting, Disaster Recovery System, Cisco Unified Serviceability, and Cisco Unified OS Administration. Therefore, I had to research every one of these categories and figured out what each category did. The worst part was having to recognize them and think about how I could use each category to establish connection between the two IP phones.

Also, the overall installation process was somewhat confusing. I did not know what an NTP server, a first node, nor a MTU size, thinking that installation is a simple process. Therefore, I had to go through extensive research to gain both the spec and the general picture of

the lab. I realized one thing: background knowledge is crucial to performing a lab before starting it.

Conclusion

Overall, I managed how to establish connection between two IP phones using VOIP, for I was able to call one phone from another. Although I had some trouble figuring out how to install and manage CUCM, the overall lab was not difficult. I learned how to configure a phone - a skill that is crucial to enterprises and companies.