

Summary Lab 9.0.1 Putting it All Together

Objective(s)

- Create an IP addressing plan for a small network.
- Implement a network equipment upgrade
- Verify device configurations and network connectivity

Background / Preparation

In this activity, you will play the role of an onsite installation and support technician from an ISP. You receive a work order specifying your responsibilities which include analyzing the customer's existing network configuration and implementing a new configuration to improve network performance. You will use additional equipment as necessary and develop an IP subnetting scheme to address the customer's needs. On an earlier site visit, one of the ISP technicians had created a diagram of the customer's existing network as shown below.

The following equipment is required:

- ISP router with 2 Serial and one FastEthernet interface (preconfigured by instructor)
- Ethernet 2960 switch to connect to ISP router (preconfigured by instructor)
- Customer 1841 router (or other router with two FastEthernet interfaces and at least one Serial interface to connect to the ISP)
- Linksys WRT300N (or other Linksys that supports wireless)
- Ethernet 2960 switch to connect wired PCs
- Windows XP-based PC to act as wireless client (wireless NIC)
- Windows XP-based PC to act as wired client (Ethernet NIC)
- Cat 5 cabling as necessary
- Serial cabling as necessary
- ISP work order (in this lab)
- Device Configuration Checklist (in this lab)
- Network Equipment Installation Checklist (in this lab)
- Configuration Verification and Connectivity Checklist (in this lab)

Part A - Review the existing network and customer work order.

Step 1: You have received the following work order from your manager at the ISP.

Review the work order to get a general understanding of what is to be done for the customer.

ABC-XYZ-ISP Inc.

Official Work Order

Customer: AnyCompany1 or AnyCompany2

Date: _____

(Circle the customer name assigned by your instructor)

Address: 1234 Fifth Street, Anytown,

Customer Contact: Fred Pennypincher, Chief Financial Officer

Phone number: 123-456-7890

Description of work to be performed

Review the existing network and upgrade it by adding an 1841 router and standalone 2960 switch to supplement and offload the existing Linksys WRT300N. The new switch will support connections from wired clients on one subnet. The existing Linksys will support wireless clients on another subnet. Configure the 1841 as a DHCP server for the wired network and the Linksys which supports wireless users.

The wired and wireless client traffic from each subnet will be routed through the new 1841 customer router. The RIP v2 routing protocol is to be used between the 1841 and the ISP and the encapsulation on the WAN link between is PPP. The customer router must use a static address and the ISP router serial interface IP address it must communicate with is: _____

If your local network is connected to the ISP as AnyCompany1, the IP address of the ISP serial 0 interface is 10.100.1.5 /22.

If your local network is connected to the ISP as AnyCompany2, the IP address of the ISP serial 1 interface is 172.27.100.25 /22.

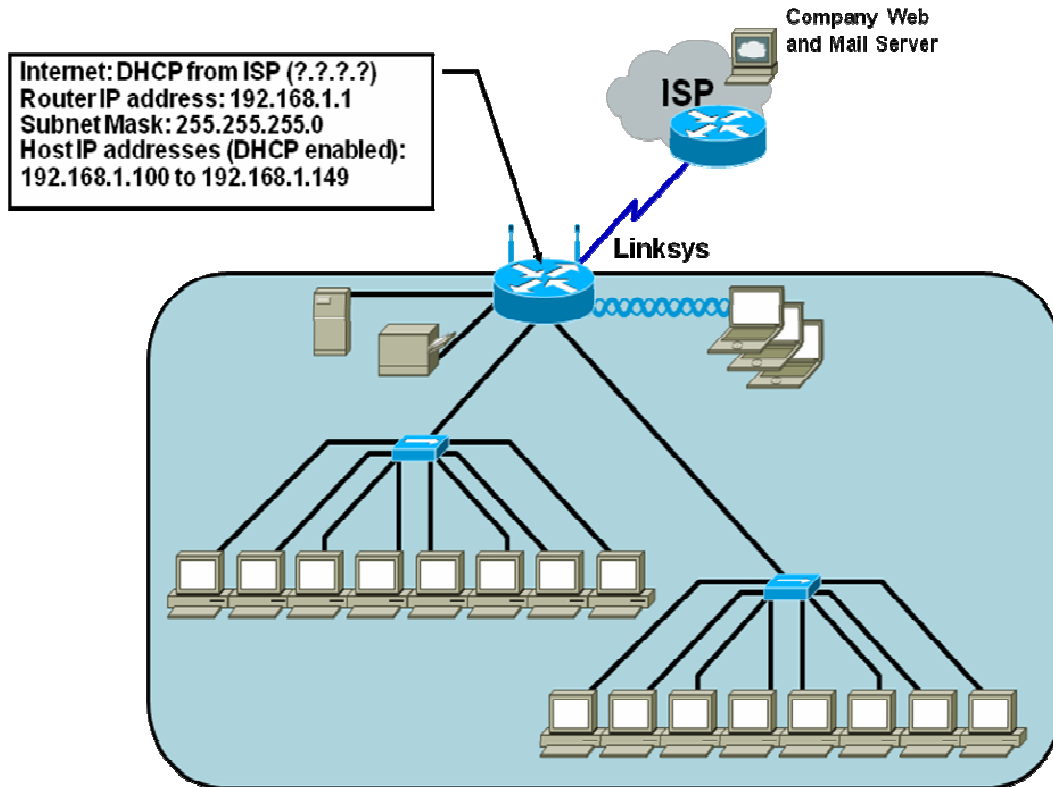
Assigned to:

Guy Netwiz

Approved by:

Bill Broadband, ISP Manager

Customer's Existing Network



Part B – Develop the subnet scheme.

The customer has been assigned an IP address and subnet mask: _____

If local network customer is AnyCompany1, use 192.168.111.0 /24.

If local network customer is AnyCompany2, use 192.168.222.0 /24.

Develop a subnet scheme using this address that will allow the customer network to support two subnets of up to 30 clients each, and allow for growth to as many as 6 subnets in the future.

The first subnet will be used for the wired clients. The second subnet will be used to assign an IP address to the Linksys external Internet interface. The internal wireless network clients will use the default IP addressing (network 192.168.1.0 /24) assigned by the Linksys. The Linksys will use NAT/PAT to convert internal wireless client addresses to the external address. The internal wireless clients will not require a subnet from the base address.

Step 1: Determine the number of hosts and subnets. (Points: ____ of ____)

- The largest subnet must be able to support 30 hosts. To support that many hosts, the number of host bits required is _____.
- What is the minimum number of subnets required for the new network design that also allows for future growth? _____
- How many host ID bits are reserved for the subnet ID to allow for this number of subnets with each subnet having 30 hosts? _____
- What is the maximum possible number of subnets with this scheme? _____

Step 2: Calculate the custom subnet mask. (Points: ____ of ____)

- Now that the number of subnet ID bits is known, the subnet mask can be calculated. A class C network has a default subnet mask of 24 bits, or 255.255.255.0. What will the custom subnet mask be?
- The custom subnet mask for this network will be _____._____._____._____, or /_____.

Step 3: Identify subnet and host IP addresses. (Points: ____ of ____)

- a. Now that the subnet mask is identified, the network addressing scheme can be created. The addressing scheme includes the subnet numbers, the subnet broadcast address, and the range of IP addresses assignable to hosts.
- b. Complete the table showing all the possible subnets for the 192.168.111.0 network (If you are working with AnyCompany1) or 192.168.222.0 network (If you are working with AnyCompany2).

Subnet	Subnet Address	Host IP Address Range	Broadcast Address

Part C – Document network device interfaces and physical topology.

Step 1: Document the 1841 interfaces and Host IP addresses. (Points: ____ of ____)

Fill in the following table with the IP addresses, subnet masks and connection information for the customer router interfaces. If an interface is not used enter N/A. This information will be used in configuring the customer router. If you are using a router other than an 1841, use the interface chart at the end of the lab to determine the proper interface designations.

Interface (1841)	IP Address / subnet mask	Connects to device / interface	Connects to device IP Address (if applicable)
Serial 0/0/0			
Serial 0/0/1			
Fa 0/0			
Fa 0/1			

Step 2: Document the Linksys interfaces and host IP addresses. (Points: ____ of ____)

Fill in the following table with the IP addresses, subnet masks and connection information for the Linksys interfaces.

Note: The Linksys should be reset to its factory default setting and should not be configured, except for changing the SSID.

Interface (Linksys)	IP Address / subnet mask	Connects to device / interface	Connects to device IP Address (if applicable)
Internet Interface (external address)			
LAN gateway (internal address)			
DHCP Wireless Hosts address range			

Step 3: Diagram the upgraded network. (Points: ____ of ____)

In the space provided here, draw a physical network diagram, showing all network devices, PCs and cabling. Identify all devices and interfaces according to the interface chart and indicate the IP address and subnet mask (using /xx format) for each interface, based on the entries from the previous steps.

Part D – Configure devices and verify default settings.

Step 1: Verify default settings for the 1841 customer router.

- a. Connect to the customer router and verify that is in the factory default state.
- b. If using SDM to configure basic settings, use the Reset to Factory Defaults option from the SDM GUI main menu. Also verify that your router has SDM version 2.4 or later installed. If not, contact your instructor.
- c. If using IOS CLI to configure the router, erase the startup-config and issue the reload command from privileged mode.

NOTE: If the startup-config is erased in an SDM router, SDM will no longer come up by default when the router is restarted. It will be necessary to build a basic config. Contact your instructor if this is the case.

Step 2: Configure the 1841 customer router. (Points: ____ of ____)

- a. Use the following checklist to assist in configuring the 1841 customer router. Check off the configuration items as you complete them. Note that some of the basic router settings can be configured using SDM if available.
- b. Display the running-config of the router and save it as a file for reference.

Device Configuration Checklist

Device Manuf. / Model Number: _____ IOS version: _____

	Configuration Item	Configuration value	Notes / IOS Commands or SDM used
	Configure the router host name	AnyCompany1 or AnyCompany2	
	Configure passwords	Console: cisco Enable: cisco Enable Secret: class VTY terminals: cisco	
	Configure FastEthernet interface 0/0	IP Addr: _____ SN mask: _____	
	Configure FastEthernet interface 0/1	IP Addr: _____ SN mask: _____	
	Configure the WAN interface Serial 0/0/0 (ISP provides clock rate, encapsulation PPP)	IP Addr: _____ SN mask: _____	
	Configure DHCP server for internal networks (wired and linksys wireless pools)	Subnet 1: _____ Subnet 2: _____	
	Configure Static route to the wireless network		
	Configure a default route to the ISP router		
	Configure RIP version 2 to advertise the customer networks	Net: _____ Net: _____ Net: _____	
	Display the running-config and verify all settings		
	Save running-config to startup-config		

Step 3: Verify default settings for the Linksys and set the SSID.

- a. Log in to the Linksys and verify that it is in the factory default state. Use the factory default of no user ID and password of admin. The router internal IP address should be set to 192.168.1.1 and a subnet mask of 255.255.255.0. The DHCP address range should be 192.168.1.100 through 192.168.1.149. All security settings should be default, with no MAC filtering etc.
- b. If necessary, reset the ISR using the **Administration** tab and the **Factory Defaults** option.
- c. Change the default Service Set Identifier (SSID) of linksys to AnyCompany1 (or AnyCopmany2) and ensure that it is broadcast.

Step 4: Verify default settings for the 2960 switch.

Log in to the switch and verify that it is in the factory default state. Use IOS CLI to reset the switch by deleting vlan.dat, erasing the startup-config and issuing the reload command from privileged mode. It may be necessary to power cycle the switch for the changes to take effect.

Step 5: Verify host PCs are DHCP clients.

Use the **Control Panel > Network Connections** option to verify that both the wired and wireless host PCs are set to obtain their IP addresses automatically via DHCP.

Part E – Connect network devices and verify connectivity.

Step 1: Connect the network devices. (Points: ____ of ____)

Use the following checklist to assist in connecting network devices using the proper cables. Check off the installation items as you complete them.

Network Equipment Installation Checklist

	Devices connected	From Device /Interface	To Device /Interface	Cable type
	Connect the Linksys to the 1841.			
	Connect the 1841 to the ISP router			
	Connect the 1841 to the switch			
	Connect wired PC to switch			
	Connect wireless PC to Linksys SSID entered in Part D Step 2			

Step 2: Verify device configurations and network connectivity. (Points: ____ of ____)

Use the following checklist to verify the IP configuration of each host and test network connectivity. You will also display the various running-configs and routing tables. Check off the items as you complete them.

Configuration Verification and Connectivity Checklist

	Verification Item	Record results here
	From command prompt of wired PC, display the IP address, subnet mask and default gateway.	
	From command prompt of wireless PC, display the IP address, subnet mask and default gateway.	
	Login to Linksys GUI from wireless host and record the LAN IP address and subnet mask, the Internet IP address and subnet mask and default gateway	
	Ping from the wired host to 1841 default gateway	
	Ping from the wired host to ISP S0/0 interface	
	Ping from the wired host to ISP Lo0 interface	
	Ping from the wireless host to 1841 default gateway	
	Ping from the wireless host to ISP S0/0 interface	
	Ping from the wireless host to ISP Lo0 interface	
	Display the IP routing table for the customer router. What routes are known and how were they learned?	
	Capture the running-config from the customer 1841 router in a text file on the desktop to show to the instructor. Name the file using your initials.	

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	Fast Ethernet 0 (FA0)	Fast Ethernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
1800	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
NOTE: In order to find out exactly how the router is configured, look at the interfaces. Doing this will identify the type of router as well as how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.				