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10.0.1.2 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   **Date:** _____

Address: 1234 Fifth Street, Anytown,

Customer Contact: Fred Pennypincher, Chief Financial Officer

Phone number: 123-456-7890

Description of work to be performed

Upgrade the existing network 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 though 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: _____

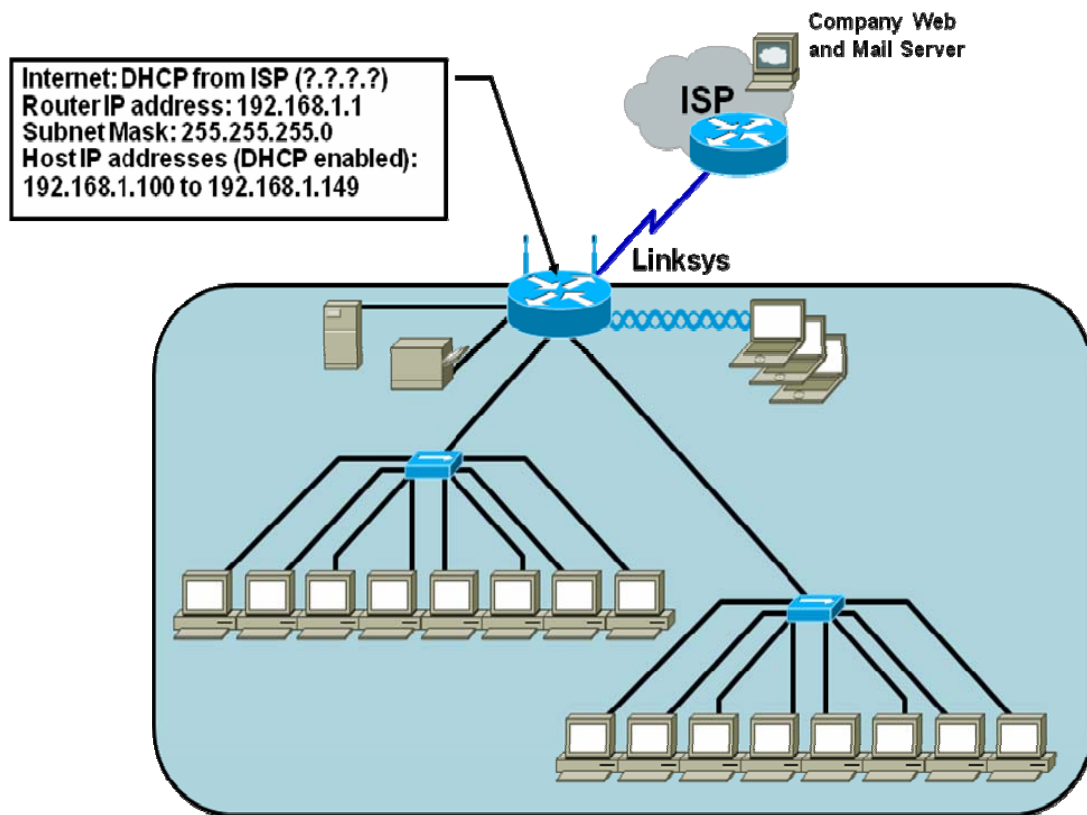The ISP has an IP address of 10.100.1.5 /22 on the serial 0 interface.

Assigned to: **Approved by:**

Guy Netwiz   Bill Broadband, ISP Manager

Customer's Existing Network

Internet: DHCP from ISP (?.?.?.?)
Router IP address: 192.168.1.1
Subnet Mask: 255.255.255.0
Host IP addresses (DHCP enabled):
192.168.1.100 to 192.168.1.149

Company Web
and Mail Server

ISP

Linksys

Part B – Develop the subnet scheme.

The customer, AnyCompany1, has been assigned an IP address and subnet mask: 192.168.111.0 /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.

Subnet 1 (not subnet zero) will be used to provide a range of IP addresses for the wired users, which will connect to FastEthernet 0/0 interface on the Customer Router via the Cisco 2960 switch. Subnet 2 will be used to provide a range of IP addresses for the Linksys external Internet interface and the FastEthernet 0/1 interface on the Customer Router, which are linked.

The router IP addresses on the Fast Ethernet ports for both the wired and wireless network will be the first available IP address from the respective subnetwork. The IP address for the Linksys will be the second available address from the range assigned above.

The wireless network clients will use the default internal 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 ____)

a. The largest subnet must be able to support 30 hosts. To support that many hosts, the number of host bits required is _____.

b. What is the minimum number of subnets required for the new network design that also allows for future growth? _____

c. How many host ID bits are reserved for the subnet ID to allow for this number of subnets with each subnet having 30 hosts? _____

d. What is the maximum possible number of subnets with this scheme? _____

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

a. 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?

b. 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.

Subnet	Subnet Address	Host IP Address Range	Broadcast Address
0			
1			
2			
3			
4			
5			

Subnet	Subnet Address	Host IP Address Range	Broadcast Address
6			
7			

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		ISP Serial 0/0	
Serial 0/0/1			
Fa 0/0		Switch Fa0/1	
Fa 0/1		Linksys Internet interface	

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.

Interface (Linksys)	IP Address / subnet mask	Connects to device / interface	Connects to device IP Address (if applicable)
Internet Interface (external address)		1841 Fa 0/1	
LAN gateway (internal address)		Wireless AP and embedded switch	
DHCP Wireless Hosts address range		Wireless AP	

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.

Launch the Putting it all Together.pka

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

    a. Click on the customer router and verify that is in the factory default state.

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.

    b. Display the running-config of the router.

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	
	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 wired network	Subnet 1: _____	
	Configure Static route to the wireless network		
	Configure a default route to the ISP router		
	Configure RIP version 2 to advertise the customer	Net: _____ Net: _____	

	networks	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. (Points: _____of _____)

a. Click on the Linksys and verify that it is in the factory default state. 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. Change the default Service Set Identifier (SSID) of "linksys" to "AnyCompany1"

c. Change the Internet Connection Type to Static IP and configure the IP address, Subnet Mask, and Default Gateway to be compatible with the 1841 FastEthernet interface F0/1.

Step 4: Verify host PCs are DHCP clients. (Points: _____of _____)

Click on each PC and use the **Config > Global Settings** 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.	Linksys Internet	1841 Fa0/1	
	Connect the 1841 to the ISP router	1841 S0/0/0	ISP s0/0	
	Connect the 1841 to the switch	1841 Fa0/0	Switch Fa0/1	
	Connect wired PC to switch	PC Ethernet NIC	Switch Fa0/2	
	Configure Wireless SSID on both the PC and the Linksys Router.	PC Wireless NIC	Linksys AP SSID	

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.	
	Open a browser and Login to Linksys GUI from wireless host UN: admin Pwd: admin 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.	