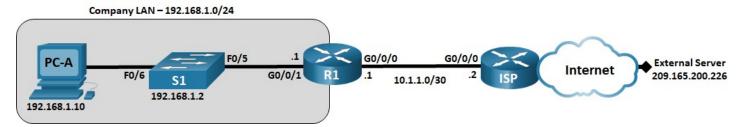# Lab - Troubleshoot Connectivity Issues

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0/0/1	192.168.1.1	255.255.255.0	N/A
	G0/0/0	10.1.1.1	255.255.255.252	N/A
ISP	G0/0/0	10.1.1.2	255.255.255.252	N/A
	Lo0	209.165.200.226	255.255.255.255	N/A
S1	VLAN 1	192.168.1.2	255.255.255.0	192.168.1.1
PC-A	NIC	192.168.1.10	255.255.255.0	192.168.1.1

Objectives

Part 1: Identify the Problem

Part 2: Implement Network Changes

Part 3: Verify Full Functionality

Part 4: Document Findings and Configuration Changes

Background / Scenario

In this lab, the company that you work for is experiencing problems with their Local Area Network (LAN). You have been asked to troubleshoot and resolve the network issues. In Part 1, you will connect to devices on the LAN and use troubleshooting tools to identify the network issues, establish a theory of probable cause, and test that theory. In Part 2, you will establish a plan of action to resolve and implement a solution. In Part 3, you will verify full functionality has been restored. Part 4 provides space for you to document your troubleshooting findings along with the configuration changes that you made to the LAN devices.

Note: The routers used with CCNA hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

Required Resources

- 2 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 1 PC (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology\

Troubleshooting Configuration

The following settings must be configured on the devices shown in the topology. Paste the configurations onto the specified devices prior to starting the lab.

S1:

```
no ip domain-lookup
hostname S1
ip domain-name ccna-lab.com
username admin01 privilege 15 secret cisco12345
interface FastEthernet0/1
 shutdown
interface FastEthernet0/2
 shutdown
interface FastEthernet0/3
 shutdown
interface FastEthernet0/4
 shutdown
interface FastEthernet0/5
 speed 10
 duplex half
interface Vlan1
 ip address 192.168.1.2 255.255.255.0
ip default-gateway 192.168.1.0
banner motd $ Authorized Users Only! $
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login local
 transport input ssh
crypto key generate rsa general-keys modulus 1024
end
```

R1:

```
hostname R1
no ip domain lookup
ip domain name ccna-lab.com
username admin01 privilege 15 secret cisco12345
interface GigabitEthernet0/0/1
```

```
     ip address 192.168.1.1 255.255.255.0
     no negotiation auto
     speed 100
     no shutdown
    interface GigabitEthernet0/0/0
     ip address 10.1.1.1 255.255.255.252
     no shutdown
    banner motd $ Authorized Users Only! $
    line vty 0 4
     login local
     transport input ssh
    crypto key generate rsa general-keys modulus 1024
    end
```

ISP:

```
hostname ISP
no ip domain lookup
interface GigabitEthernet0/0/0
 ip address 10.1.1.2 255.255.255.252
 no shut
interface Lo0
 ip address 209.165.200.226 255.255.255.255
ip route 0.0.0.0 0.0.0.0 10.1.1.1
end
```

Part 1: Identify the Problem.

The only available information about the network problem is that the users are experiencing slow response times and that they are not able to reach an external device on the internet at IP address 209.165.200.226. To determine probable cause(s) for these network issues, you will need to utilize network commands and tools on the LAN equipment shown in the topology.

Note: The user name **admin01** with a password of **cisco12345** will be required to log into the network equipment.

Step 1: Troubleshoot the network.

Use the tools available to you to troubleshoot the network, keeping in mind that the requirement is to restore connectivity to the external server and the eliminate slow response times.

Note: While using SSH to connect to network devices, issue the **terminal monitor** privileged exec command to enable log output to the SSH console.

Step 2: Document the probable causes.

List the probable causes for the network problems that employees are experiencing.

Part 2: Implement Network Changes

You have communicated the problems that you discovered in Part 1 to your supervisor. She has approved these changes and has requested that you implement them.

Part 3: Verify Full Functionality

Verify that full functionality has been restored. PC-A, S1, and R1 should be able to reach the external server, and ping replies from PC-A to the external server should exhibit no significant variation in response times.

Part 4: Document Findings and Configuration Changes

Use the space provided below to document the issues found during your troubleshooting and the configurations changes made to resolve those issues.

Reflection Question

This lab had you troubleshoot all devices before making any changes. Is there another way to apply the troubleshooting methodology?

Router Interface Summary Table

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0	Gigabit Ethernet 0/0/1	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
	(G0/0/0)	(G0/0/1)		

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table 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 Cisco IOS commands to represent the interface.