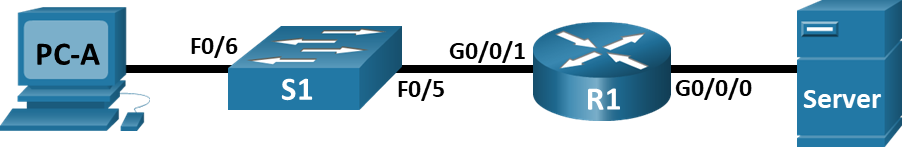


**Packet Tracer - Configure Basic Router Settings - Physical Mode Topology**



# Addressing Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address / Prefix** | **Default Gateway** |
| R1  *R1*  *R1* | G0/0/0  *G0/0/0*  *G0/0/0* | 192.168.0.1 /24 | N/A  *N/A*  *N/A*  *N/A*  *N/A*  *N/A*  *N/A*  *N/A*  *N/A* |
| 2001:db8:acad::1 /64 |
| fe80::1 |
| *R1* | G0/0/1 | 192.168.1.1 /24 |
| *R1* | *G0/0/1* | 2001:db8:acad:1::1 /64 |
| *R1* | *G0/0/1* | fe80::1 |
| *R1* | Loopback0 | 10.0.0.1 /24 |
| *R1* | *Loopback0* | 2001:db8:acad:2::1 /64 |
| *R1* | *Loopback0* | fe80::1 |
| PC-A | NIC | 192.168.1.10 /24 | 192.168.1.1 |
| *PC-A* | *NIC* | 2001:db8:acad:1::10 /64 | fe80::1 |
| Server | NIC | 192.168.0.10 /24 | 192.168.0.1 |
|  |  | 2001:db8:acad::10 /64 | fe80::1 |
| *Server* | *NIC* |  |  |

*Blank Line - no additional information*

# Objectives

**Part 1: Set Up the Topology and Initialize Devices**

**Part 2: Configure Devices and Verify Connectivity Part 3: Display Router Information**

# Background / Scenario

This is a comprehensive Packet Tracer Physical Mode (PTPM) activity to review previously covered IOS router commands. In Parts 1 and 2, you will cable the equipment and complete basic configurations and interface settings on the router.

In Part 3, you will use SSH to connect to the router remotely and use the IOS commands to retrieve information from the device to answer questions about the router.

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For review purposes, this activity provides the commands necessary for specific router configurations.

# Instructions

## Part 1: Set Up the Topology and Initialize Devices

**Step 1: Cable the network as shown in the topology.**

a. Click and drag the **Cisco 4321 ISR**, the **Cisco 2960 Switch**, and the **Server** from the **Shelf** to the **Rack**. b. Click and drag the **PC** from the **Shelf** to the **Table**.

1. Cable the devices as specified in the topology diagram. Use **Copper Straight-through** cables for network connections.
2. From the **PC**, connect a **Console Cable** to the **Cisco 4321 ISR**.
3. Power on the **Cisco 4321 ISR**, **PC-A**, and **Server**. The power button for **Server** is on the bottom right.

## The 2960 switch should power on automatically. Part 2: Configure Devices and Verify Connectivity

**Step 1: Configure the PC interfaces.**

1. Configure the IP address, subnet mask, and default gateway settings on **PC-A**.
2. Configure the IP address, subnet mask, and default gateway settings on **Server**.

**Step 2: Configure the router.**

*Open configuration window*

1. Console into the router and enable privileged EXEC mode.

Router> **enable**

1. Enter configuration mode.

Router# **config terminal**

1. Assign a device name to the router.

Router(config)# **hostname R1**

1. Set the router’s domain name as ccna-lab.com.

R1(config)# **ip domain name ccna-lab.com**

1. Encrypt the plaintext passwords.

R1(config)# **service password-encryption**

1. Configure the system to require a minimum 12-character password.

R1(config)# **security passwords min-length 12**

1. Configure the username **SSHadmin** with an encrypted password of **55Hadm!n2020**.

R1(config)# **username SSHadmin secret 55Hadm!n2020**

1. Generate a set of crypto keys with a 1024 bit modulus.

R1(config)# **crypto key generate rsa general-keys modulus 1024**

1. Assign **$cisco!PRIV\*** as the privileged EXEC password.

R1(config)# **enable secret $cisco!PRIV\***

1. Assign **$cisco!!CON\*** as the console password. Configure sessions to disconnect after four minutes of inactivity, and enable login.

R1(config)# **line console 0**

R1(config-line)# **password $cisco!!CON\***

R1(config-line)# **exec-timeout 4 0**

R1(config-line)# **login**

1. Assign **$cisco!!VTY\*** as the vty password. Configure the vty lines to accept SSH connections only. Configure sessions to disconnect after four minutes of inactivity, and enable login using the local database.

R1(config)# **line vty 0 4**

R1(config-line)# **password $cisco!!VTY\***

R1(config-line)# **exec-timeout 4 0**

R1(config-line)# **transport input ssh**

R1(config-line)# **login local**

1. Create a banner that warns anyone accessing the device that unauthorized access is prohibited. m. Enable IPv6 routing.

R1(config)# **banner motd $ Authorized Users Only! $**

1. Configure all three interfaces on the router with the IPv4 and IPv6 addressing information from the addressing table above. Configure all three interfaces with descriptions. Activate all three interfaces.

The router should not allow vty logins for two minutes if three failed login attempts occur within 60 seconds.

R1(config)# **interface g0/0/0**

R1(config-if)# **ip address 192.168.0.1 255.255.255.0**

R1(config-if)# **ipv6 address fe80::1 link-local**

R1(config-if)# **ipv6 address 2001:db8:acad::1/64**

R1(config-if)# **description Connection to Server**

R1(config-if)# **no shutdown**

R1(config-if)# **exit**

R1(config)# **interface g0/0/1**

R1(config-if)# **ip address 192.168.1.1 255.255.255.0**

R1(config-if)# **ipv6 address fe80::1 link-local**

R1(config-if)# **ipv6 address 2001:db8:acad:1::1/64**

R1(config-if)# **description Connection to S1**

R1(config-if)# **no shutdown**

R1(config-if)# **exit**

R1(config)# **interface loopback0**

R1(config-if)# **ip address 10.0.0.1 255.255.255.0**

R1(config-if)# **ipv6 address fe80::1 link-local**

R1(config-if)# **ipv6 address 2001:db8:acad:2::1/64**

R1(config-if)# **description loopback adapter**

R1(config-if)# **no shutdown**

R1(config-if)# **exit**

1. Set the clock on the router.

R1# **clock set 17:34:00 20 Jan 2022**

1. Save the running configuration to the startup configuration file.

R1# **copy running-config startup-config**

Question:

What would be the result of reloading the router prior to completing the **copy running-config startupconfig** command? ***Typ***

**The contents of the running configuration in RAM would be erased during reload. As a result, the router would boot up without a startup configuration and the user would be asked if they would like to enter initial configuration dialog.*e your answers here.***

*Close configuration window*

**Step 3: Verify network connectivity.**

1. Using the command line at **PC-A**, ping the IPv4 and IPv6 addresses for **Server**.

Question:

Were the pings successful?

**Yes**

***Type your answers here.***

1. From **PC-A**, remotely access **R1** using the Telnet / SSH client.

Using the Telnet / SSH client on PC-A, open an SSH session to the R1 Loopback interface IPv4 address. Ensure that the Connection Type is set to **SSH** and use **SSHadmin** as the username. When prompted, enter the password **55Hadm!n2020**.

Question:

Was remote access successful?

Yes

***Type your answers here.***

1. Using the Telnet / SSH client on **PC-A**, open an SSH session to the R1 Loopback interface IPv6 address. Ensure that the Connection Type is set to **SSH** and use **SSHadmin** as the username. When prompted, enter the password **55Hadm!n2020**.

Questions:

Was remote access successful?

**Yes**

***Type your answers here.***

Why is the Telnet protocol considered to be a security risk?

**A Telnet session can be seen in plaintext. It is not encrypted. Passwords can easily be seen using a packet sniffer.**

***Type your answers here.***

## Part 3: Display Router Information

In Part 3, you will use **show** commands from an SSH session to retrieve information from the router.

**Step 1: Establish an SSH session to R1.**

Using Telnet / SSH client on PC-A, open an SSH session to the R1 Loopback interface IPv6 address and log in as **SSHadmin** with the password **55Hadm!n2020**.

**Step 2: Retrieve important hardware and software information.**

1. Use the **show version** command to answer questions about the router.

R1# **show version**

Cisco IOS XE Software, Version 03.16.05.S – Extended Support Release

Cisco IOS Software, ISR Software (X86\_64\_LINUX\_IOSD-UNIVERSALK9-M), Version Version 15.5 (3)S5, RELEASE SOFTWARE (fc2)

Technical Support: http://www.cisco.com/techsupport

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Compiled Thu 19-Jan-17 11:24 by mcpre

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with ABSOLUTELY NO WARRANTY.You can redistribute and/or modify such

GPL code under the terms of GPL Version 2.0.For more details, see the

documentation or “License Notice” file accompanying the IOS-XE software,

or the applicable URL provided on the flyer accompanying the IOS-XE

software.

ROM: IOS-XE ROMMON

Router uptime is 1 days, 23 hours, 24 minutes, 3 seconds

Uptime for this control processor is 1 days, 23 hours, 24 minutes, 3 seconds

System returned to ROM by power-on

System image file is “bootflash:/isr4300-universalk9.03.16.05.S.155-3.S5-ext.SPA.bin”

Last reload reason: PowerOn

This product contains cryptographic features and is subject to United

States and local country laws governing import, export, transfer and

use. Delivery of Cisco cryptographic products does not imply

third-party authority to import, export, distribute or use encryption.

Importers, exporters, distributors and users are responsible for

compliance with U.S. and local country laws. By using this product you

agree to comply with applicable laws and regulations. If you are unable

to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:

http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to

export@cisco.com.

Suite License Information for Module:’esg’

——————————————————————————–

SuiteSuite CurrentTypeSuite Next reboot

——————————————————————————–

FoundationSuiteK9NoneNoneNone

securityk9

appxk9

AdvUCSuiteK9NoneNoneNone

uck9

cme – srst

cube

Technology Package License Information:

————————————————————————

TechnologyTechnology-packageTechnology-package

CurrentTypeNext reboot

————————————————————————

appxk9NoneNoneNone

uck9NoneNoneNone

securityk9securityk9Permanentsecurityk9

ipbaseipbasek9Permanentipbasek9

securitysecurityk9Permanentsecurityk9

ipbaseipbasek9Permanentipbasek9

cisco ISR4321/K9 (1RU) processor with 1687137K/6147K bytes of memory.

Processor board ID FLM2041W2HD

2 Gigabit Ethernet interfaces

32768K bytes of non-volatile configuration memory.

4194304K bytes of physical memory.

3223551K bytes of flash memory at bootflash:.

Configuration register is 0x2102

Questions:

What is the name of the IOS image that the router is running?

**Image version may vary but in this PTLC, it is isr4300-universalk9.03.16.05.S.155-3.S5-ext.SPA.bin.**

***Type your answers here.***

How much non-volatile random-access memory (NVRAM) does the router have?

**it is 32768K bytes of NVRAM.**

***Type your answers here.***

How much Flash memory does the router have?

**3223551K bytes of flash memory.**

***Type your answers here.***

1. The **show** commands often provide multiple screens of outputs. Filtering the output lets you display certain sections of the output. To enable the filtering command, enter a pipe (**|**) character after a **show** command, followed by a filtering parameter and a filtering expression. You can match the output to the filtering statement by using the **include** keyword to display all lines from the output that contain the filtering expression. Filter the **show version** command, using **show version | include register** to answer the following question

R1# **show version | include register**

Configuration register is 0x2102

Question:

What would be the boot process for the router on the next reload if the configuration register was 0x2142?

**In most cases the configuration register will have a value of 0x2102 signifying that the router will undergo a normal boot, load the IOS from the Flash memory, and load the startup configuration from the NVRAM if present. If the config register is 0x2142, the router will bypass the startup config and begin at the user-mode command prompt. If the initial boot fails, the router goes into ROMMON mode.**

***Type your answers here.***

**Step 3: Display the startup configuration.**

1. Use the **show startup-config** command on the router to answer the following question.

R1# **show start**

1. Using 1520 bytes
2. !
3. version 15.4
4. no service timestamps log datetime msec
5. no service timestamps debug datetime msec
6. service password-encryption
7. security passwords min-length 12
8. !
9. hostname R1
10. !
11. login block-for 120 attempts 3 within 60
12. !
13. !
14. enable secret 5 $1$mERr$2q6B19eTeuK92k7m8Bhgz/
15. !
16. !
17. no ip cef
18. ipv6 unicast-routing
19. !
20. no ipv6 cef
21. !
22. !
23. username SSHadmin secret 5 $1$mERr$fuFUxOtVJZMfnQOcoB7vt/
24. !
25. !
26. no ip domain-lookup
27. ip domain-name ccna-lab.com
28. !
29. !
30. spanning-tree mode pvst
31. !
32. !
33. interface Loopback0
34. description loopback adapter
35. ip address 10.0.0.1 255.255.255.0
36. ipv6 address FE80::1 link-local
37. ipv6 address 2001:DB8:ACAD:2::1/64
38. !
39. interface GigabitEthernet0/0/0
40. description Connection to Server
41. ip address 192.168.0.1 255.255.255.0
42. duplex auto
43. speed auto
44. ipv6 address FE80::1 link-local
45. ipv6 address 2001:DB8:ACAD::1/64
46. !
47. interface GigabitEthernet0/0/1
48. description Connection to S1
49. ip address 192.168.1.1 255.255.255.0
50. duplex auto
51. speed auto
52. ipv6 address FE80::1 link-local
53. ipv6 address 2001:DB8:ACAD:1::1/64
54. !
55. interface Vlan1
56. no ip address
57. shutdown
58. !
59. ip classless
60. !
61. ip flow-export version 9
62. !
63. !
64. ip access-list extended sl\_def\_acl
65. deny tcp any any eq telnet
66. deny tcp any any eq www
67. deny tcp any any eq 22
68. permit tcp any any eq 22
69. !
70. banner motd ^C Authorized Users Only! ^C
71. !
72. !
73. line con 0
74. exec-timeout 4 0
75. password 7 08654F471A1A0A565328232A60
76. login
77. !
78. line aux 0
79. !
80. line vty 0 4
81. exec-timeout 4 0
82. password 7 08654F471A1A0A56533D383D60
83. login local
84. transport input ssh
85. !
86. !
87. end
88. !

Question:

How are passwords presented in the output?

**Passwords are encrypted because of the service password-encryption command.**

***Type your answers here.***

1. Use the **show running-config | section vty** command.

Question:

What is the result of using this command?

**A user receives the startup configuration output, beginning with the line that includes the first instance of the filtering expression.**

***Type your answers here.***

**Step 4: Display the routing table on the router.**

Use the **show ip route** command on the router to answer the following questions.

R1# **show ip route**

Codes: L – local, C – connected, S – static, R – RIP, M – mobile, B – BGP

D – EIGRP, EX – EIGRP external, O – OSPF, IA – OSPF inter area

N1 – OSPF NSSA external type 1, N2 – OSPF NSSA external type 2

E1 – OSPF external type 1, E2 – OSPF external type 2

i – IS-IS, su – IS-IS summary, L1 – IS-IS level-1, L2 – IS-IS level-2

ia – IS-IS inter area, \* – candidate default, U – per-user static route

o – ODR, P – periodic downloaded static route, H – NHRP, l – LISP

a – application route

+ – replicated route, % – next hop override, p – overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C10.0.0.0/24 is directly connected, Loopback0

L10.0.0.1/32 is directly connected, Loopback0

192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks

C192.168.0.0/24 is directly connected, GigabitEthernet0/0/0

L192.168.0.1/32 is directly connected, GigabitEthernet0/0/0

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks

C192.168.1.0/24 is directly connected, GigabitEthernet0/0/1

L192.168.1.1/32 is directly connected, GigabitEthernet0/0/1

Questions:

What code is used in the routing table to indicate a directly connected network?

**The C designates a directly connected subnet. An L designates a local interface. Both answers are correct.**

***Type your answers here.***

How many route entries are coded with a C code in the routing table?

**3**

***Type your answers here.***

**Step 5: Display a summary list of the interfaces on the router.**

1. Use the **show ip interface brief** command on the router to answer the following question.

R1# **show ipv6 interface brief**

GigabitEthernet0/0/0 [up/up]

FE80::1

2001:DB8:ACAD::1

GigabitEthernet0/0/1 [up/up]

FE80::1

2001:DB8:ACAD:1::1

Loopback0 [up/up]

FE80::1

2001:DB8:ACAD:2::1

Vlan1 [administratively down/down]

unassigned

Question:

What command changed the status of the Gigabit Ethernet ports from administratively down to up?

**The [up/up] status reflects the Layer 1 and Layer 2 status of the interface and does not rely on Layer 3 for status.**

***Type your answers here.***

1. Use the **show ipv6 int brief** command to verify IPv6 settings on R1.

Question:

What is the meaning of the [up/up] part of the output?

**Answers will vary. IPv6 address of 2001:db8:acad:a:d428:7de2:997c:b05a**

***Type your answers here.***

1. On **Server**, change its configuration so that it no longer has a static IPv6 address. Then, issue the **ipconfig** command on **Server** to examine the IPv6 configuration.

Questions:

What is the IPv6 address assigned to Server?

***Type your a*** **Pv6 address of 2001:db8:acad:a:d428:7de2:997c:b05a*here.***

What is the default gateway assigned to **Server**?

***Type your answers*** **fe80::1 *here.***

From **PC-B**, issue a ping to the **R1** default gateway link local address. Was it successful?

***Type your ans*** **Yes*wers here.***

From **Server**, issue a ping to the **R1** IPv6 unicast address 2001:db8:acad::1. Was it successful?

***Type your answers here*** **Yes*.***

# Reflection Questions

1. In researching a network connectivity issue, a technician suspects that an interface was not enabled. What **show** command could the technician use to troubleshoot this issue?

**show ip interface brief or show interfaces or show startup-config would provide the information.**

***Type your answers here.***

1. In researching a network connectivity issue, a technician suspects that an interface was assigned an incorrect subnet mask. What **show** command could the technician use to troubleshoot this issue?

**how startup-config or show running-config or show interfaces or show protocols will provide the information.**

***Type your answers here.***

*End of document*