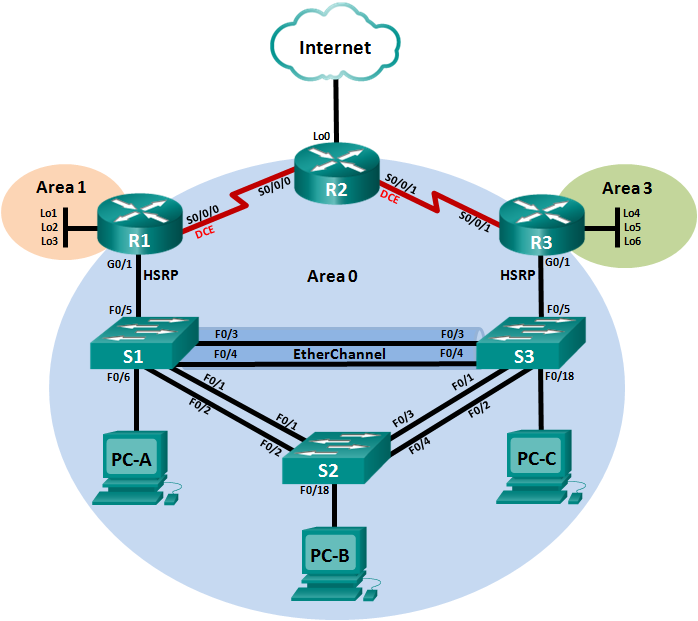
1. CCNA: Scaling Networks

Skills Assessment (OSPF) – Student Training Exam

1. Topology



1. Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| R1 | G0/1 | 172.27.0.1 | 255.255.255.0 | N/A |
|  | S0/0/0 | 172.27.123.1 | 255.255.255.252 | N/A |
|  | Lo1 | 172.27.1.1 | 255.255.255.0 | N/A |
|  | Lo2 | 172.27.2.1 | 255.255.255.0 | N/A |
|  | Lo3 | 172.27.3.1 | 255.255.255.0 | N/A |
| R2 | S0/0/0 | 172.27.123.2 | 255.255.255.252 | N/A |
|  | S0/0/1 | 172.27.123.5 | 255.255.255.252 | N/A |
|  | Lo0 | 209.165.200.225 | 255.255.255.248 | N/A |
| R3 | G0/1 | 172.27.0.3 | 255.255.255.0 | N/A |
|  | S0/0/1 | 172.27.123.6 | 255.255.255.252 | N/A |
|  | Lo4 | 172.27.4.1 | 255.255.255.0 | N/A |
|  | Lo5 | 172.27.5.1 | 255.255.255.0 | N/A |
|  | Lo6 | 172.27.6.1 | 255.255.255.0 | N/A |
| S1 | VLAN 1 | 172.27.0.11 | 255.255.255.0 | 172.27.0.2 |
| S2 | VLAN 1 | 172.27.0.12 | 255.255.255.0 | 172.27.0.2 |
| S3 | VLAN 1 | 172.27.0.13 | 255.255.255.0 | 172.27.0.2 |
| PC-A | NIC | 172.27.0.21 | 255.255.255.0 | 172.27.0.2 |
| PC-B | NIC | 172.27.0.22 | 255.255.255.0 | 172.27.0.2 |
| PC-C | NIC | 172.27.0.23 | 255.255.255.0 | 172.27.0.2 |

1. Assessment Objectives

Part 1: Initialize Devices (10 points, 5 minutes)

Part 2: Configure Device Basic Settings (45 points, 30 minutes)

Part 3: Configure LAN Redundancy and Link Aggregation (28 points, 25 minutes)

Part 4: Configure OSPFv2 Dynamic Routing Protocol (51 points, 30 minutes)

Part 5: Verify Network Connectivity and HSRP Configuration (10 points, 15 minutes)

Part 6: Display IOS Image and License Information (6 points, 5 minutes)

1. Scenario

In this Skills Assessment (SA), you will create a small network. You must connect the network devices, and configure those devices to support IPv4 connectivity, LAN redundancy, and link aggregation. You will then configure OSPFv2 and HSRP on the network and verify connectivity. Finally, you will demonstrate your knowledge of IOS images and licensing.

1. Required Resources

* 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
* 3 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
* 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
* Console cable to configure the Cisco IOS devices via the console ports
* Ethernet and Serial cables as shown in the topology

1. Initialize Devices

**Total points: 10**

**Time: 5 minutes**

* 1. Initialize and reload the routers and switches.

Erase the startup configurations and reload the devices.

Before proceeding, have your instructor verify device initializations.

|  |  |  |
| --- | --- | --- |
| Task | IOS Command | Points |
| Erase the startup-config file on all routers. | R1# erase startup-config | (2 points) |
| Reload all routers. | R1# reload | (2 points) |
| Erase the startup-config file on all switches and remove the old VLAN database. | S1# erase startup-config  S1# delete vlan.dat | (2 points) |
| Reload all switches. | S1# reload | (2 points) |
| Verify VLAN database is absent from flash on all switches. | S2# show flash | (2 points) |

**Instructor Sign-off Part 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_\_ of 10**

1. Configure Device Basic Settings

**Total points: 45**

**Time: 30 minutes**

* 1. Configure R1.

Configuration tasks for R1 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Disable DNS lookup | no ip domain lookup | (1/2 point) |
| Router name | R1 | (1/2 point) |
| Encrypted privileged EXEC password | class | (1/2 point) |
| Console access password | cisco | (1/2 point) |
| Telnet access password | cisco | (1/2 point) |
| Encrypt the plain text passwords. | service password-encryption | (1/2 point) |
| MOTD banner | banner motd #Belepni TILOS# | (1/2 point) |
| Interface G0/1 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Activate Interface | (1 point) |
| Interface S0/0/0 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Set a clocking rate of 128000.  Activate Interface | (1 points) |
| Interface Loopback 1 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | (1/2 point) |
| Interface Loopback 2 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | (1/2 point) |
| Interface Loopback 3 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | (1/2 point) |

* 1. Configure R2.

Configuration tasks for R2 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Disable DNS lookup | no ip domain lookup | no ip domain lookup |
| Router name | R2 | (1/2 point) |
| Encrypted privileged EXEC password | class | (1/2 point) |
| Console access password | cisco | (1/2 point) |
| Telnet access password | cisco | (1/2 point) |
| Encrypt the plain text passwords. | service password-encryption | (1/2 point) |
| MOTD banner | banner motd #Belepni TILOS# | (1/2 point) |
| Interface S0/0/0 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Activate Interface | (1 point) |
| Interface S0/0/1 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Set a clocking rate of 128000.  Activate Interface | (1 point) |
| Interface Loopback 0 (Simulated Internet connection) | Set the description.  Set the Layer 3 IPv4 address to 209.165.200.225/29. | (1 point) |
| Default route | Configure a default route out Lo0. | (1/2 point) |

* 1. Configure R3.

Configuration tasks for R3 include the following:

|  |  |  |  |
| --- | --- | --- | --- |
| Configuration Item or Task | Specification | Points | |
| Disable DNS lookup | no ip domain lookup | (1/2 point) | |
| Router name | R3 | (1/2 point) | |
| Encrypted privileged EXEC password | class | (1/2 point) | |
| Console access password | cisco | (1/2 point) | |
| Telnet access password | cisco | (1/2 point) | |
| Encrypt the plain text passwords. | service password-encryption | (1/2 point) | |
| MOTD banner | banner motd #Belepni TILOS# | (1/2 point) | |
| Interface G0/1 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Activate Interface | | (1 point) |
| Interface S0/0/1 | Set the description  Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information.  Activate Interface | | (1 point) |
| Interface Loopback 4 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | | (1/2 point) |
| Interface Loopback 5 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | | (1/2 point) |
| Interface Loopback 6 (LAN) | Set the Layer 3 IPv4 address. Refer to the Addressing Table for IPv4 address information. | | (1/2 point) |

* 1. Configure S1.

Configuration tasks for S1 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Disable DNS lookup | no ip domain lookup | (1/2 point) |
| Switch name | S1 | (1/2 point) |
| Encrypted privileged EXEC password | class | (1/2 point) |
| Console access password | cisco | (1/2 point) |
| Telnet access password | cisco | (1/2 point) |
| Encrypt the plain text passwords. | service password-encryption | (1/2 point) |
| MOTD banner | Unauthorized Access is Prohibited! | (1/2 point) |
| Assign an IPv4 address to the default SVI. | Refer to the Addressing Table for IPv4 address information. | (1/2 point) |
| Assign the default-gateway. | Refer to the Addressing Table. | (1/2 point) |
| Force trunking on interfaces connected to S2 and S3. | Use VLAN 1 as the native VLAN. | (1 point) |
| Disable the Dynamic Trunking Protocol (DTP) on all other ports. | Make sure ports are configured as access ports. | (1 point) |
| Shutdown all unused ports. |  | (1 point) |

* 1. Configure S2.

Configuration tasks for S2 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Disable DNS lookup | no ip domain lookup | (1/2 point) |
| Switch name | S2 | (1/2 point) |
| Encrypted privileged exec password | class | (1/2 point) |
| Console access password | cisco | (1/2 point) |
| Telnet access password | cisco | (1/2 point) |
| Encrypt the clear text passwords. | service password-encryption | (1/2 point) |
| MOTD banner | Unauthorized Access is Prohibited! | (1/2 point) |
| Assign an IPv4 address to the default SVI. | Refer to the Addressing Table for IPv4 address information. | (1/2 point) |
| Assign the default-gateway. | Refer to the Addressing Table. | (1/2 point) |
| Force trunking on interfaces connected to S1 and S3. | Use VLAN 1 as the native VLAN. | (1 point) |
| Disable the Dynamic Trunking Protocol (DTP) on all other ports. | Make sure ports are configured as access ports. | (1 point) |
| Shutdown all unused ports. |  | (1 point) |

* 1. Configure S3

Configuration tasks for S3 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Disable DNS lookup | no ip domain lookup | (1/2 point) |
| Switch name | S3 | (1/2 point) |
| Encrypted privileged EXEC password | class | (1/2 point) |
| Console access password | cisco | (1/2 point) |
| Telnet access password | cisco | (1/2 point) |
| Encrypt the plain text passwords. | service password-encryption | (1/2 point) |
| MOTD banner | Unauthorized Access is Prohibited! | (1/2 point) |
| Assign an IPv4 address to the default SVI. | Refer to the Addressing Table for IPv4 address information. | (1/2 point) |
| Assign the default-gateway. | Refer to the Addressing Table. | (1/2 point) |
| Force trunking on interfaces connected to S1 and S2. | Use VLAN 1 as the native VLAN. | (1 point) |
| Disable the Dynamic Trunking Protocol (DTP) on all other ports. | Make sure ports are configured as access ports. | (1 point) |
| Shutdown all unused ports. |  | (1 point) |

* 1. Configure IPv4 addresses on PCs.

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure static IPv4 address information on PC-A | Refer to Addressing Table for IPv4 address information. | (1/2 point) |
| Configure static IPv4 address information on PC-B | Refer to Addressing Table for IPv4 address information. | (1/2 point) |
| Configure static IPv4 address information on PC-C | Refer to Addressing Table for IPv4 address information. | (1/2 point) |

**Instructor Sign-off Part 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_ of 45**

1. Configure LAN Redundancy and Link Aggregation

**Total points: 28**

**Time: 25 minutes**

* 1. Configure Spanning Tree on S1.

Configuration tasks for S1 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure Rapid PVST+. | spanning-tree mode rapid-pvst spanning-tree vlan 1 root primary | (2 points) |
| Configure as primary root bridge for VLAN 1. | int f0/6  spanning-tree portfast  spanning-tree bpduguard enable | (2 points) |
| Configure PortFast and BPDU Guard on the interface connected to PC-A. | spanning-tree bpduguard enable | (2 points) |

* 1. Configure Spanning Tree on S2.

Configuration tasks for S2 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure Rapid PVST+. | spanning-tree mode rapid-pvst | (2 points) |
| Configure PortFast and BPDU Guard on the interface connected to PC-B. | int f0/18  spanning-tree portfast | (2 points) |
|  | spanning-tree bpduguard enable |  |

* 1. Configure Spanning Tree on S3.

Configuration tasks for S3 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure Rapid PVST+. | spanning-tree mode rapid-pvst | (2 points) |
| Configure as secondary root bridge for VLAN 1. | spanning-tree vlan 1 root secondary | (2 points) |
| Configure PortFast and BPDU Guard on the interface connected to PC-C. | spanning-tree bpduguard enable | (2 points) |

* 1. Configure HSRP on R1.

Configuration tasks for R1 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure the HSRP virtual IP address on interface G0/1. | int g0/1  standby 1 ip 172.27.0.2  standby 1 priority 150  standby 1 preempt | (2 points) |
| Make this the primary HSRP router. | standby 1 priority 150 | (2 points) |
| Configure so this router becomes the primary HSRP router on a reboot. | standby 1 preempt | (2 points) |

* 1. Configure HSRP on R3.

Configuration tasks for R3 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| Configure the HSRP virtual IP address on interface G0/1. | Group: 1  Virtual IP address: 172.27.0.2 | (2 points) |

* 1. Configure an LACP EtherChannel between S1 and S3.

Configuration tasks include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| On S1, configure an LACP EtherChannel on interfaces connected to S3. | Use group 1 and enable LACP unconditionally. | (2 points) |
| On S3, configure an LACP EtherChannel on interfaces connected to S1. | Use group 1 and enable LACP only if a LACP device is detected. | (2 points) |

**Instructor Sign-off Part 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_ of 28**

1. Configure OSPFv2 Dynamic Routing Protocol

**Total points: 51**

**Time: 30 minutes**

* 1. Configure OSPFv2 on R1.

Configuration tasks for R1 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| OSPF Process ID | 1 | (1 point) |
| Router ID | 1.1.1.1 | (1 point) |
| Advertise directly connected networks. | Use classless network addresses.  Assign S0/0/0 and G0/1 interfaces to Area 0.  Assign Loopback interfaces to Area 1. | (2 points) |
| Set all LAN interfaces as passive. |  | (2 points) |
| Configure an inter-area summary route for the networks in area 1. |  | (2 points) |
| Change the default cost reference bandwidth to support Gigabit interface calculations. | 1000 | (2 points) |
| Set the bandwidth on S0/0/0. | 128 Kb/s | (1 point) |
| Adjust the metric cost of S0/0/0. | Cost: 7500 | (1 point) |
| Create an OSPF MD5 key on S0/0/0. | Key: **1**  Password: **CISCO** | (2 points) |
| Apply MD5 authentication to S0/0/0. |  | (2 points) |

* 1. Configure OSPFv2 on R2.

Configuration tasks for R2 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| OSPF Process ID | 1 | (1 point) |
| Router ID | 2.2.2.2 | (1 point) |
| Advertise directly connected networks. | Use classless network addresses.  All connected networks should be assigned to Area 0 except the Lo0 network. | (2 points) |
| Propagate the default route to all other OSPF routers. |  | (2 points) |
| Change the default cost reference bandwidth to allow for Gigabit interfaces. | 1000 | (2 points) |
| Set the bandwidth on all serial interfaces. | 128 Kb/s | (1 point) |
| Adjust the metric cost of S0/0/0. | Cost: 7500 | (1 point) |
| Create an OSPF MD5 key on the serial interfaces. | Key: **1**  Password: **CISCO** | (2 points) |
| Apply MD5 authentication on the serial interfaces. |  | (2 points) |

* 1. Configure OSPFv2 on R3.

Configuration tasks for R3 include the following:

|  |  |  |
| --- | --- | --- |
| Configuration Item or Task | Specification | Points |
| OSPF Process ID | 1 | (1 point) |
| Router ID | 3.3.3.3 | (1 point) |
| Advertise directly connected networks. | Use classless network addresses  Assign S0/0/1 and G0/1 interfaces to Area 0  Assign Loopback interfaces to Area 3 | (2 points) |
| Set all LAN interfaces as passive. |  | (2 points) |
| Configure an inter-area summary route for the networks in area 3. |  | (2 points) |
| Change the default cost reference bandwidth to support Gigabit interface calculations. | 1000 | (2 points) |
| Set the serial interface bandwidth. | 128 Kb/s | (1 point) |
| Create an OSPF MD5 key on S0/0/1. | Key: **1**  Password: **CISCO** | (2 points) |
| Apply MD5 authentication to S0/0/1. |  | (2 points) |

* 1. Verify network connectivity.

Verify that OSPF is functioning as expected. Enter the appropriate CLI command to discover the following information:

|  |  |  |
| --- | --- | --- |
| Question | Response | Points |
| What command will display all connected OSPFv2 routers? | Show IP OSPF neighbor | (1 point) |
| What command displays a summary list of OSPF interfaces that includes a column for the cost of each interface? | Show IP protocols | (1 point) |
| What command displays the OSPF Process ID, Router ID, Address summarizations, Routing Networks, and Passive Interfaces configured on a router? | Show IP OSPF interface | (1 point) |
| What command displays only OSPF routes? | Show IP protocols | (1 point) |
| What command displays detailed information about the OSPF interfaces, including the authentication method? | Show IP route OSPF | (1 point) |
| What command displays the OSPF section of the running-configuration? | Show IP route OSPF | (1 point) |

**Instructor Sign-off Part 4: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_ of 51**

1. Verify Network Connectivity and HSRP Configuration

**Total points: 10**

**Time: 15 minutes**

Use the listed command to verify that network is working as expected.

* 1. Verify end-to-end connectivity.

Take corrective action if results are other than expected.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| From | Command | To | Expected Results | Points |
| PC-A | ping | PC-C | Ping should be successful. | (1 point) |
| PC-B | ping | PC-A | Ping should be successful. | (1 point) |
| PC-B | ping | PC-C | Ping should be successful. | (1 point) |
| PC-B | ping | Default Gateway | Ping should be successful. | (1 point) |
| PC-B | ping | 209.165.200.225 | Ping should be successful. | (1 point) |
| PC-B | tracert | 209.165.200.225 | Trace should route through R1. | (1 point) |

**Note**: It may be necessary to disable the PC firewall for pings to be successful.

* 1. Verify HSRP is working as expected.

Issue the **shutdown** command on R1 G0/1, and then re-issue the following commands to verify that HSRP is working as expected:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| From | Command | To | Expected Results | Points |
| PC-B | ping | 172.27.0.1 | Ping should **not** be successful. | (1 point) |
| PC-B | ping | Default Gateway | Ping should be successful. | (1 point) |
| PC-B | ping | 209.165.200.225 | Ping should be successful. | (1 point) |
| PC-B | tracert | 209.165.200.225 | Trace should route through R3. | (1 point) |

**Note:** Wait a few seconds before testing after shutting down the interface on R1.

**Instructor Sign-off Part 5: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_ of 10**

1. Display IOS Image and License Information

**Total points: 6**

**Time: 5 minutes**

Enter the appropriate CLI command to discover the following information:

|  |  |  |
| --- | --- | --- |
| Question | Response | Points |
| What command displays the IOS image that is currently being used by the network device? | Show version | (1 point) |
| What command displays the size of an IOS image loaded on a network device? | show flash | (1 point) |
| What command displays a summary list of the Technology Package licenses on an ISR-G2 device that includes the current the state of each of those licenses? | show version | (1 point) |
| What command displays the amount of space available to install an additional IOS image to a network device? | show flash | (1 point) |
| What command displays a list of all the licenses on an ISR-G2 device? | show license | (1 point) |
| What command would you use to accept the end user license agreement? | config t license accept end user agreement | (1 point) |

**Instructor Sign-off Part 6: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Points: \_\_\_\_\_\_\_\_\_ of 6**

1. Cleanup

NOTE: DO NOT PROCEED WITH CLEANUP UNTIL YOUR INSTRUCTOR HAS GRADED YOUR SKILLS EXAM AND HAS INFORMED YOU THAT YOU MAY BEGIN CLEANUP.

Before turning off power to the routers, remove the NVRAM configuration files (if saved) from all devices.

Disconnect and neatly put away all cables that were used in the SA exam.

1. Router Interface Summary Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Router Interface Summary | | | | |
| 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 (S0/0/1) |
| 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) |
| **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. | | | | |