IP Troubleshooting Small Group Exercise

Activity Overview:

This is a small group activity consisting of an IP troubleshooting exercise consisting of five scenario based questions. The exercise begins with a review of a recommend IP troubleshooting procedure and continues with five scenario based questions.

Simplified IP Troubleshooting Procedures:

Host:

* Verify layer-1 and layer-2
	+ Physical connectivity to the host to connected. Ethernet connection should indicate electrical connectivity with some type of LED indicator light.
	+ Verify OS detecting network interface correctly by verifying drivers installed correctly and OS display the interface as “connected”
	+ If you have access to switching infrastructure ensure that host is assigned to the proper VLAN with the correct interface switching type (access or trunk)
* Verify layer-3
	+ Verify IP address assignment configuration with “ipconfig /all” command on MS Windows OSs
		- IP address and mask correctly assigned?
		- Default gateway; is the host on the same IP subnet as the default gateway?
		- Attempt to ping default gateway,
			* If successful host has layer-3 connectivity to directly connection network
			* If unsuccessful attempt to ping other host on directly connected IP subnet
		- If host is having issues with pinging hosts on directly connected network, verify ARP resolution by using the command ”arp –a” command. This command displays all the dynamic ARP resolutions. If no ARP entries present the host may have hidden layer-2 issues.
	+ Verify IP connectivity to remote networks
		- Review IP default gateway and static routes
			* “ipconfig /all” for Windows hosts for default gateway
			* “netstat –rn” for Window host routing table
		- Unit 7 will expand the troubleshooting tasks for this type of issue
* Verify host name resolution
	+ Utilize the “nslookup” utility to verify host name resolution is working correctly
		- May have incorrect DNS servers configured, verify with “ipconfig /all”
	+ Another method is ping a host by IP address then by name to verify DNS is working correctly.

Router

* Verify layer-1 / physical connectivity to the host to connected.
	+ Ethernet connection should indicate electrical connectivity with some type of LED indicator light.
	+ Serial connections will rely on CSU/DSUs for layer-1 and layer-2 connectivity.
* Verify layer-2 connectivity. This procedure will change depending on the medium being utilized. Frame-Relay, serial, and Ethernet all have different methods.
	+ All mediums will show a “up/up” with the show interface “interface” if both layer-1 and layer-2 are functioning correctly
* Verify layer-3 connectivity
	+ Verify IP address assignment with the “show ip interface brief” command
		- IP address and mask correctly assigned to the various interfaces?
	+ Does the router make use of a default gateway?
		- Attempt to ping default gateway
			* If successful router has layer-3 connectivity to directly connected network between router and default gateway
			* If unsuccessful attempt to ping other host on directly connected IP subnets
	+ Directly connected networks connectivity
		- If router is having issues with pinging hosts on directly connected network, verify ARP resolution by using the command ”show arp” command. This command displays all the dynamic ARP resolutions. If no ARP entries present the router may have hidden layer-2 issues.
	+ Verify IP connectivity to remote networks
		- Review IP routing table “show ip route”
			* Inspect static routes and configuration
			* Inspect dynamic protocols and configuration
	+ Verify IPv4 routing not disabled with the “no ip routing” command

Scenario questions on pages that follow

**Scenario 1:** End user complains of lack of connectivity to any resource not on the directly connected network. The host cannot ping its default gateway. The output of the “ipconfig /all” command is below. Also the IP address assigned to the router for that segment is also displayed below. What do you think the problem is with the configuration of this host?

PC “ipconfig /all” output (summarized)

Ethernet adapter Local Area Connection:

 Physical Address. . . . . . . . . : 00-AB-C5-00-00-00

 DHCP Enabled. . . . . . . . . . . : No

 IPv4 Address. . . . . . . . . . . : 192.168.40.9

 Subnet Mask . . . . . . . . . . . : 255.255.255.128

 Default Gateway . . . . . . . . . : 192.168.40.254

 DNS Servers . . . . . . . . . . . : 8.8.8.8

Router “show ip interface brief”

Router# show ip interface brief

Interface IP-Address OK? Method Status Protocol

GigabitEthernet0/0 192.168.40.254 YES NVRAM up  up

Answer:

**Scenario 2:** One user complains of lack of connectivity to certain resources outside of their directly connected network. The output of the “ipconfig /all” command is below. The IP address configuration for that interface on the router for that segment is also displayed below. What do you think the problem is with the configuration of this host?

PC “ipconfig /all” output (summarized)

Ethernet adapter Local Area Connection:

 Physical Address. . . . . . . . . : 00-AB-C5-00-00-00

 DHCP Enabled. . . . . . . . . . . : No

 IPv4 Address. . . . . . . . . . . : 192.168.1.101

 Subnet Mask . . . . . . . . . . . : 255.255.254.0

 Default Gateway . . . . . . . . . : 192.168.1.1

 DNS Servers . . . . . . . . . . . : 8.8.8.8

Router “show running-configuration”

Router# show running-configuration interface GigabitEthernet0/1

interface GigabitEthernet 0/1

 ip address 192.168.1.1 255.255.255.0

!

Answer:

**Scenario 3:** Numerous users on a segment lose connectivity to any resource that is not on the directly connected network. Output is provided for a “ipconfig /all” from a host that is having connectivity issues, and output for a ping attempt to the default gateway. Finally the output is provided of a “show ip interface brief” from the router that is the default gateway for that segment and the output of “show ip route” from that router. What do you think is the problem?

PC “ipconfig /all” output (summarized):

Ethernet adapter Local Area Connection:

 Physical Address. . . . . . . . . : 00-AB-C5-00-00-00

 DHCP Enabled. . . . . . . . . . . : No

 IPv4 Address. . . . . . . . . . . : 192.168.1.110

 Subnet Mask . . . . . . . . . . . : 255.255.255.0

 Default Gateway . . . . . . . . . : 192.168.1.1

 DNS Servers . . . . . . . . . . . : 8.8.8.8

PC “ping default-gateway” output:

C:\Users\ITT>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=49ms TTL=63

Reply from 192.168.1.1: bytes=32 time=46ms TTL=63

Reply from 192.168.1.1: bytes=32 time=63ms TTL=63

Reply from 192.168.1.1: bytes=32 time=59ms TTL=63

Ping statistics for 192.168.1.1:

 Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

 Minimum = 46ms, Maximum = 63ms, Average = 54ms

Router “show ip interface brief”

Router# show ip interface brief

Interface IP-Address OK? Method Status Protocol

GigabitEthernet0/0 192.168.1.1  YES NVRAM  up  up

Serial0/1 10.10.10.2 YES NVRAM up down

Router “show ip route”

Router#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

 + - replicated route, % - next hop override

Gateway of last resort is 10.10.10.2 to network 0.0.0.0

S\* 0.0.0.0/0 [254/0] via 10.10.10.2

C 10.10.0.0/24 is directly connected, Serial0/1

C 192.168.1.0/24 is directly connected, GigabitEthernet0/1

Answer:

**Scenario 4:** End user complains of lack of connectivity to any resource not on the directly connected network. The host cannot ping its default gateway, plus he explains that he is getting a weird error message about IP addresses. The output of the “ipconfig /all” command is below. Also the IP address assigned to the router for that segment is also displayed below. What do you think the problem is with the configuration of this host?

PC “ipconfig /all” output (summarized)

Ethernet adapter Local Area Connection:

 Physical Address. . . . . . . . . : 00-AB-C5-00-00-00

 DHCP Enabled. . . . . . . . . . . : No

 IPv4 Address. . . . . . . . . . . : 192.168.4.254

 Subnet Mask . . . . . . . . . . . : 255.255.255.0

 Default Gateway . . . . . . . . . : 192.168.4.1

 DNS Servers . . . . . . . . . . . : 8.8.8.8

Router “show ip interface brief”

Router# show ip interface brief

Interface IP-Address OK? Method Status Protocol

GigabitEthernet0/0 192.168.4.254  YES NVRAM up  up

Answer:

**Scenario 5:** Numerous users on a segment lose connectivity to any resource that is not on the directly connected network. Output is provided for an “ipconfig /all” and a “arp –a” from a host that is having connectivity issues, and output for a ping attempt to the default gateway. Lastly the output is provided of a “show ip interface brief” from the router that is the default gateway for that segment. What do you think is the problem?

PC “ipconfig /all” output (summarized):

Ethernet adapter Local Area Connection:

 Physical Address. . . . . . . . . : 00-AB-C5-00-00-00

 DHCP Enabled. . . . . . . . . . . : No

 IPv4 Address. . . . . . . . . . . : 192.168.1.110

 Subnet Mask . . . . . . . . . . . : 255.255.255.0

 Default Gateway . . . . . . . . . : 192.168.1.1

 DNS Servers . . . . . . . . . . . : 8.8.8.8

PC “ping default-gateway” output:

C:\Users\ITT>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Request timed out.

Request timed out.

Request timed out.

Request timed out.

Ping statistics for 192.168.1.1:

 Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC “arp –a” output:

C:\Windows\system32>arp -a

Interface: 192.168.254.110

 Internet Address Physical Address Type

 192.168.254.1 00-24-d3-5d-2a-9c dynamic

Router “show ip interface brief”

Router# show ip interface brief

Interface IP-Address OK? Method Status Protocol

GigabitEthernet0/0 192.168.1.1  YES NVRAM  up  up

Router “show interface gigabitethernet0/0” output (truncated):

Router#show interface GigabitEthernet 0/0

GigabitEthernet0 is up, line protocol is up

 Hardware is PQII\_PRO\_UEC, address is 0025.4545.42c4 (bia 0025.4545.42c4)

 Internet address is 75.62.47.105/22

 MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,

 reliability 255/255, txload 1/255, rxload 1/255

 Encapsulation ARPA, loopback not set

 Keepalive set (10 sec)

 Full Duplex, 100Mbps, media type is RJ45

Answer: