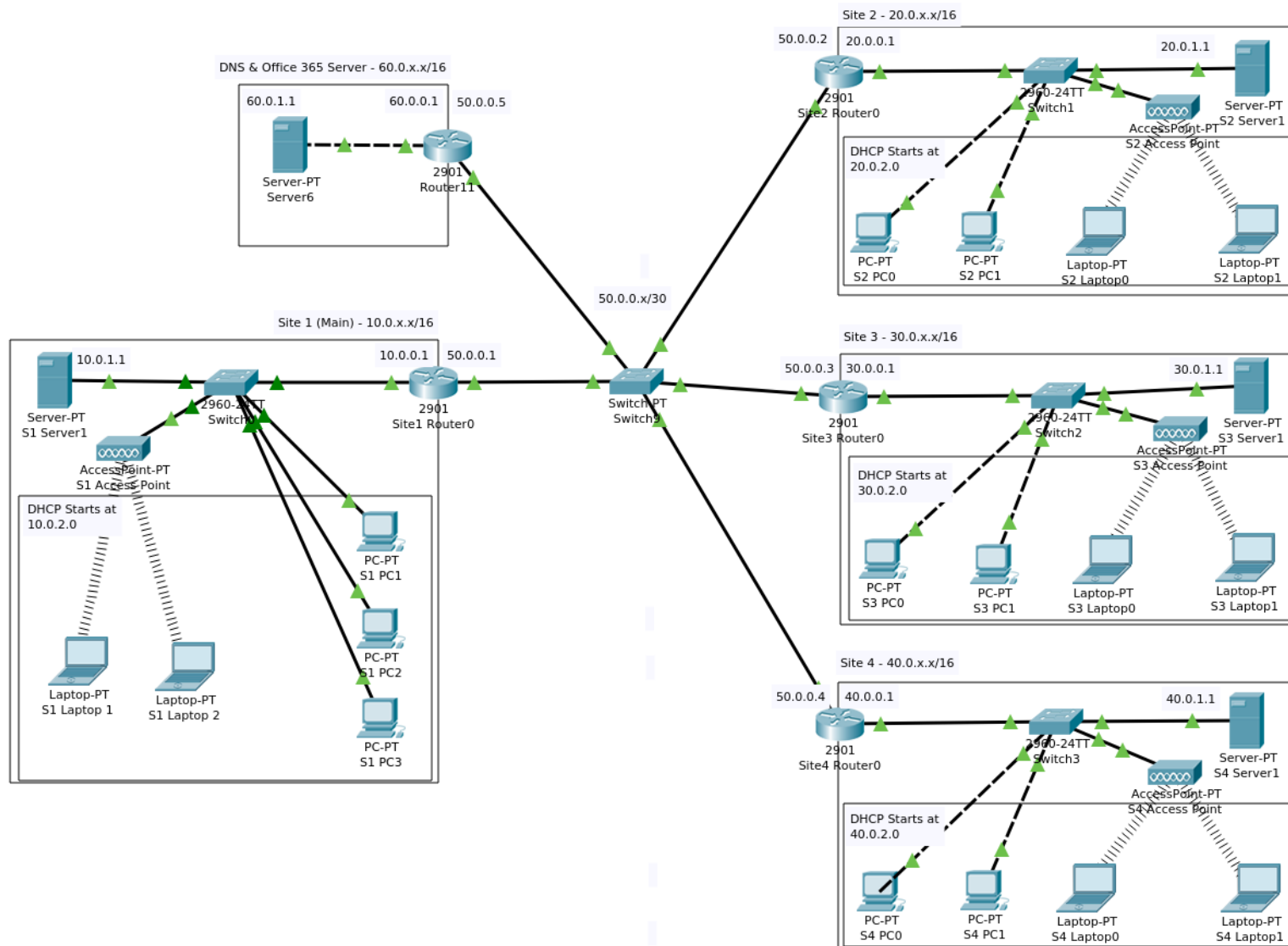
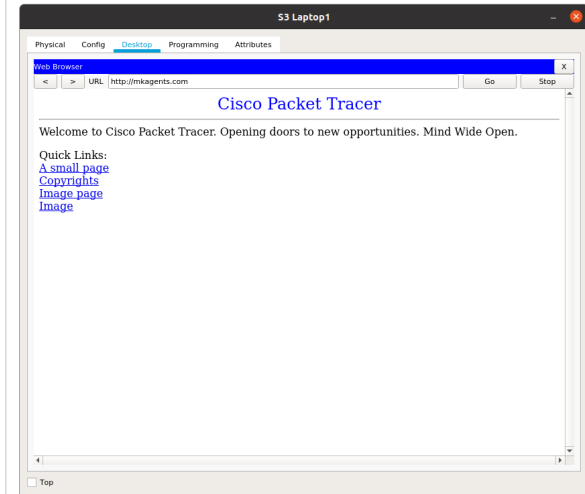
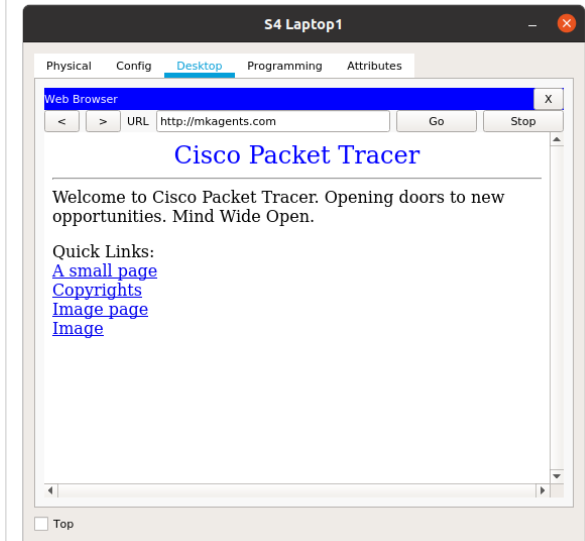


Networking Test Plan




Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
10.0.2.x device connecting to mkagents.com	<input checked="" type="checkbox"/> Client System is assigned DNS settings from DHCP <input checked="" type="checkbox"/> DNS server is correctly configured to 60.0.1.1 <input type="checkbox"/> 60.0.1.1 is reachable from the device <input type="checkbox"/> 10.0.1.1 is reachable from the device <input type="checkbox"/> In the web browser, mkagents.com should load the webpage hosted on 10.0.1.1 server	The DHCP settings are correctly applied, the DNS server is reachable, and the webpage loads normally.	The webpage does not load, because 60.0.1.1 is unreachable for the client.	Fail.
20.0.2.x device connecting to mkagents.com	<input checked="" type="checkbox"/> Client System is assigned DNS settings from DHCP <input checked="" type="checkbox"/> DNS server is correctly configured to 60.0.1.1 <input checked="" type="checkbox"/> 60.0.1.1 is reachable from the device <input type="checkbox"/> 10.0.1.1 is reachable from the device <input type="checkbox"/> In the web browser, mkagents.com should load the webpage hosted on 10.0.1.1 server	The DHCP settings are correctly applied, the DNS server is reachable, and the webpage loads normally.	The webpage does not load. 60.0.1.1 is reachable, however pinging 10.0.1.1 times out.	Fail.

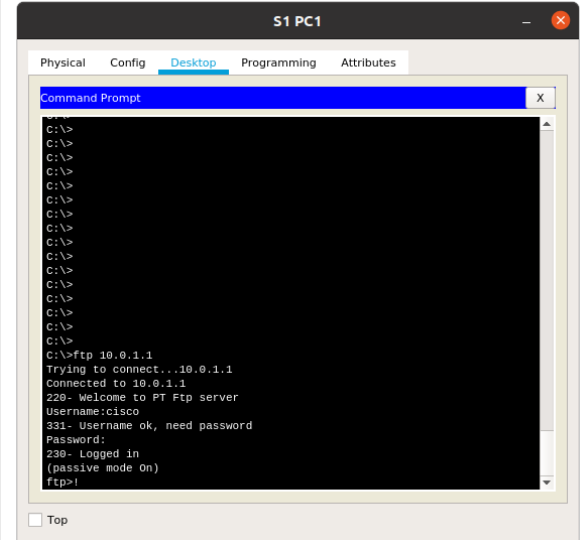
Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
30.0.2.x device connecting to mkagents.com	<ul style="list-style-type: none"> ☑ Client System is assigned DNS settings from DHCP ☑ DNS server is correctly configured to 60.0.1.1 ☑ 60.0.1.1 is reachable from the device ☑ 10.0.1.1 is reachable from the device ☑ In the web browser, mkagents.com should load the webpage hosted on 10.0.1.1 server 	The DHCP settings are correctly applied, the DNS server is reachable, and the webpage loads normally.	The webpage loads normally. Both 60.0.1.1 and 10.0.1.1 are reachable, DNS is correctly configured, meaning DHCP is configured correctly, and the DNS server resolves the IP correctly. The 10.0.1.1 server then serves the webpage required.	Pass 
40.0.2.x device connecting to mkagents.com	<ul style="list-style-type: none"> ☑ Client System is assigned DNS settings from DHCP ☑ DNS server is correctly configured to 60.0.1.1 ☑ 60.0.1.1 is reachable from the device ☑ 10.0.1.1 is reachable from the device ☑ In the web browser, mkagents.com should load the webpage hosted on 10.0.1.1 	The DHCP settings are correctly applied, the DNS server is reachable, and the webpage loads normally.	The webpage loads normally. Both 60.0.1.1 and 10.0.1.1 are reachable, DNS is correctly configured, meaning DHCP is configured correctly, and the DNS server resolves the IP correctly. The 10.0.1.1 server then serves the webpage required.	Pass 

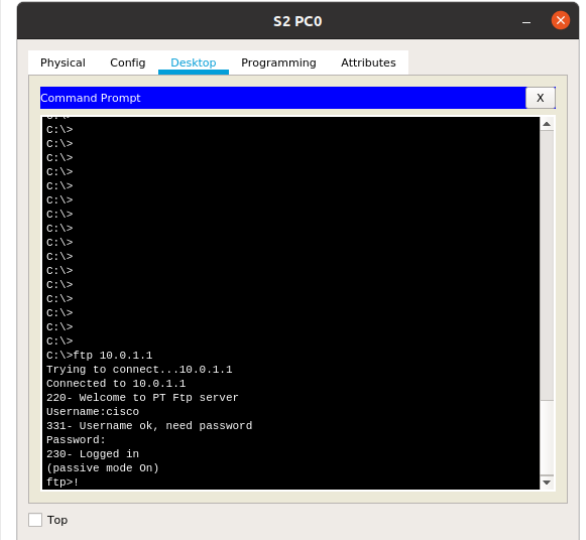
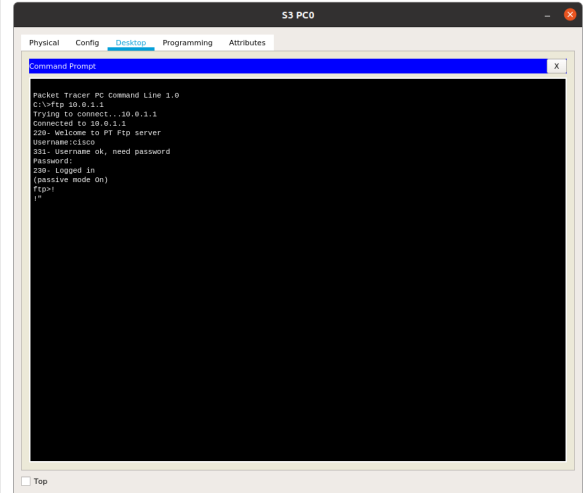
Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
10.0.2.x device Ping Test	<ul style="list-style-type: none"> ☑ Device can ping to the 10.0.x.x range ☑ Device can ping to the 20.0.x.x range ☑ Device can ping to the 30.0.x.x range ☑ Device can ping to the 40.0.x.x range ☑ Device can ping to the 60.0.x.x range 	The device can ping to all available address ranges	The device can successfully ping to all available address ranges	Pass <div data-bbox="1512 239 2094 1428"> <p>The screenshot shows a Windows Command Prompt window titled 'S1 PC1'. The window has tabs for 'Physical', 'Config', 'Desktop' (selected), 'Programming', and 'Attributes'. The Command Prompt displays the following output:</p> <pre> C:\>ping 10.0.0.1 Pinging 10.0.0.1 with 32 bytes of data: Reply from 10.0.0.1: bytes=32 time<1ms TTL=255 Reply from 10.0.0.1: bytes=32 time<1ms TTL=255 Reply from 10.0.0.1: bytes=32 time<1ms TTL=255 Reply from 10.0.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 10.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms C:\>ping 20.0.0.1 Pinging 20.0.0.1 with 32 bytes of data: Reply from 20.0.0.1: bytes=32 time<1ms TTL=254 Reply from 20.0.0.1: bytes=32 time=26ms TTL=254 Reply from 20.0.0.1: bytes=32 time<1ms TTL=254 Reply from 20.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 20.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 26ms, Average = 6ms C:\>ping 30.0.0.1 Pinging 30.0.0.1 with 32 bytes of data: Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 30.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms C:\>ping 40.0.0.1 Pinging 40.0.0.1 with 32 bytes of data: Reply from 40.0.0.1: bytes=32 time=17ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 40.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 17ms, Average = 4ms C:\>ping 60.0.0.1 Pinging 60.0.0.1 with 32 bytes of data: Reply from 60.0.0.1: bytes=32 time=7ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 60.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 7ms, Average = 1ms C:\> </pre> </div>

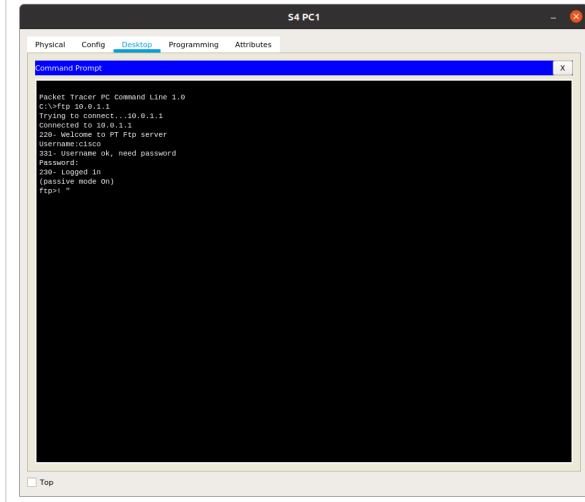
Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
20.0.2.x device Ping test	<ul style="list-style-type: none"> ☑ Device can ping to the 10.0.x.x range ☑ Device can ping to the 20.0.x.x range ☑ Device can ping to the 30.0.x.x range ☑ Device can ping to the 40.0.x.x range ☑ Device can ping to the 60.0.x.x range 	The device can ping to all available address ranges	The device can successfully ping to all available address ranges	Pass <div data-bbox="1512 239 2094 1428"> <p>The screenshot shows a Windows Command Prompt window titled 'S2 PC0'. The window has tabs for 'Physical', 'Config', 'Desktop' (selected), 'Programming', and 'Attributes'. The Command Prompt displays the following text:</p> <pre> C:\>ping 10.0.0.1 Pinging 10.0.0.1 with 32 bytes of data: Reply from 10.0.0.1: bytes=32 time<1ms TTL=254 Reply from 10.0.0.1: bytes=32 time<1ms TTL=254 Reply from 10.0.0.1: bytes=32 time<1ms TTL=254 Reply from 10.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 10.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 1ms, Average = 0ms C:\>ping 20.0.0.1 Pinging 20.0.0.1 with 32 bytes of data: Reply from 20.0.0.1: bytes=32 time<2ms TTL=255 Reply from 20.0.0.1: bytes=32 time<1ms TTL=255 Reply from 20.0.0.1: bytes=32 time<1ms TTL=255 Reply from 20.0.0.1: bytes=32 time<1ms TTL=255 Ping statistics for 20.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 2ms, Average = 0ms C:\>ping 30.0.0.1 Pinging 30.0.0.1 with 32 bytes of data: Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Reply from 30.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 30.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms C:\>ping 40.0.0.1 Pinging 40.0.0.1 with 32 bytes of data: Reply from 40.0.0.1: bytes=32 time<15ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Reply from 40.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 40.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 15ms, Average = 4ms C:\>ping 60.0.0.1 Pinging 60.0.0.1 with 32 bytes of data: Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Reply from 60.0.0.1: bytes=32 time<1ms TTL=254 Ping statistics for 60.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms C:\> </pre> </div>

Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
30.0.2.x device Ping test	<ul style="list-style-type: none"> ☑ Device can ping to the 10.0.x.x range ☑ Device can ping to the 20.0.x.x range ☑ Device can ping to the 30.0.x.x range ☑ Device can ping to the 40.0.x.x range ☑ Device can ping to the 60.0.x.x range 	The device can ping to all available address ranges	The device can successfully ping to all available address ranges	Pass 

Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
40.0.2.x device Ping test	<ul style="list-style-type: none"> ☑ Device can ping to the 10.0.x.x range ☑ Device can ping to the 20.0.x.x range ☑ Device can ping to the 30.0.x.x range ☑ Device can ping to the 40.0.x.x range ☑ Device can ping to the 60.0.x.x range 	The device can ping to all available address ranges	The device can successfully ping to all available address ranges	Pass <div data-bbox="1512 239 2094 1428"> <pre> S4 Laptop0 Physical Config Desktop Programming Attributes Command Prompt C:\>ping 10.0.0.1 Pinging 10.0.0.1 with 32 bytes of data: Reply from 10.0.0.1: bytes=32 time=50ms TTL=254 Reply from 10.0.0.1: bytes=32 time=19ms TTL=254 Reply from 10.0.0.1: bytes=32 time=22ms TTL=254 Reply from 10.0.0.1: bytes=32 time=23ms TTL=254 Ping statistics for 10.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 19ms, Maximum = 50ms, Average = 28ms C:\>ping 20.0.0.1 Pinging 20.0.0.1 with 32 bytes of data: Reply from 20.0.0.1: bytes=32 time=35ms TTL=254 Reply from 20.0.0.1: bytes=32 time=19ms TTL=254 Reply from 20.0.0.1: bytes=32 time=24ms TTL=254 Reply from 20.0.0.1: bytes=32 time=18ms TTL=254 Ping statistics for 20.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 18ms, Maximum = 35ms, Average = 22ms C:\>ping 30.0.0.1 Pinging 30.0.0.1 with 32 bytes of data: Reply from 30.0.0.1: bytes=32 time=33ms TTL=254 Reply from 30.0.0.1: bytes=32 time=15ms TTL=254 Reply from 30.0.0.1: bytes=32 time=21ms TTL=254 Reply from 30.0.0.1: bytes=32 time=7ms TTL=254 Ping statistics for 30.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 7ms, Maximum = 33ms, Average = 19ms C:\>ping 40.0.0.1 Pinging 40.0.0.1 with 32 bytes of data: Reply from 40.0.0.1: bytes=32 time=47ms TTL=255 Reply from 40.0.0.1: bytes=32 time=28ms TTL=255 Reply from 40.0.0.1: bytes=32 time=15ms TTL=255 Reply from 40.0.0.1: bytes=32 time=23ms TTL=255 Ping statistics for 40.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 15ms, Maximum = 47ms, Average = 28ms C:\>ping 60.0.0.1 Pinging 60.0.0.1 with 32 bytes of data: Reply from 60.0.0.1: bytes=32 time=13ms TTL=254 Reply from 60.0.0.1: bytes=32 time=20ms TTL=254 Reply from 60.0.0.1: bytes=32 time=18ms TTL=254 Reply from 60.0.0.1: bytes=32 time=16ms TTL=254 Ping statistics for 60.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 13ms, Maximum = 20ms, Average = 16ms C:\> </pre> </div>

Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
10.0.2.x device FTP test	<ul style="list-style-type: none"> ☑ Device can reach 10.0.1.1 ☑ Device can utilise ftp in the command line to connect and login 	The device can use FTP normally	The device can connect with the FTP command	Pass 

Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
20.0.2.x device FTP test	<ul style="list-style-type: none"> ☑ Device can reach 10.0.1.1 ☑ Device can utilise ftp in the command line to connect and login 	The device can use FTP normally	The device can connect with the FTP command	Pass 
30.0.2.x device FTP test	<ul style="list-style-type: none"> ☑ Device can reach 10.0.1.1 ☑ Device can utilise ftp in the command line to connect and login 	The device can use FTP normally	The device can connect with the FTP command	Pass 

Test Name	Acceptance Criteria	Expected Result	Actual Result	Pass/Fail
40.0.2.x device FTP test	<input checked="" type="checkbox"/> Device can reach 10.0.1.1 <input checked="" type="checkbox"/> Device can utilise ftp in the command line to connect and login	The device can use FTP normally	The device can connect with the FTP command	Pass 

User Feedback

This feedback comes from a screen-sharing session involving the demonstration of systems included in the network design. These features include:

- An allegory for a 'real' DNS server
- Multiple DHCP servers
- Routing tables
- Routers connecting internal site ranges with an external ip range
- Two web servers
- FTP server
- WiFi access points with encryption



the dhcp ranges seem a little arbitrary, as 10.0.0.0/24 and 10.0.1.0/24 are hardly used at all.

This is true, in another context I would plan the DHCP range to be start at 10.0.0.8 or something, though this requires more knowledge about the quantities of routers, firewalls, other networking equipment, and servers on the network. For the purposes of this network I decided to give networking equipment their own range (10.0.0.0/24) and servers their own range too (10.0.1.0/24), with all other equipment ending up between 10.0.2.0 and 10.0.255.255



The in-between addresses shouldn't follow the same convention as the internal addresses

This feedback is interesting as it shows an issue in my philosophy behind assigning the IP ranges; I added the 6th pseudo-site (60.0.0.0/16) after setting up the routers to communicate with each other using public addresses in the 50.0.0.0/16 range. This is an issue because further sites past the original four would be in the 60 or 70 or 80 ip range. Additionally, there could only be a small number of sites.

A solution to this issue would be to use the second value in the IP to designate a site, and the first value to designate a general area. Ignoring reserved address pools, this would allow for around 65536 sites without even accommodating NAT. This shows that the current implementation is flawed and should be refactored, even if it's functional.



Each site needs a firewall

Ideally I'd set each site up to have the local server in a DMZ, as well as having the servers mirror file hosting and web hosting on the first site. For simplicity, however, I didn't include any firewalls in this network design because I felt it would needlessly complicate what is effectively a mockup.



DNS and DHCP both work well

I generally agree with this, DNS works as it should with DHCP providing a DNS server address correctly. DHCP could be improved as described in the first feedback quote, however.



Connecting the sites with a switch is good for demonstration purposes

In the real world this connection would likely be replaced with a VPN for security and simplicity. This mockup benefits from having a simple implementation for demonstration, however.



The DNS and Office server isn't realistic as it wouldn't be on the company network

This is true, the Office server would be on the public internet, along with the DNS server. For demonstration, this setup implements these two services into a single server so that DNS could correctly be utilised.



There's no connection to the wider internet

This is an oversight, as I misinterpreted the way this system should be implemented. As with the commentary about the switch being good for demonstration purposes, it would be better suited to have the networks connect with both a VPN and a public internet connection in the current location of each router.



The routing works between each site

I configured the routing table correctly in each router, aided by the simple conversion that it utilises:

20.0.0.0/16 → 50.0.0.2/29

The first value of the target address is the last value of the 'next hop' address. This is possible thanks to the configuration in each router following the same rule.



I like how the access points are set up with security and names

This configuration was mostly implemented because Packet Tracer likes to connect all wireless devices to a single access point, regardless of distance. It does simulate signal strength, encryption, and SSIDs, so I implemented them to demonstrate how DHCP also works for access points on each network.