Discover Network Gateway and Routing Details

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Assignment Instructions

For this assignment you'll be delving into the intricacies of network configurations using Command Line Interface (CLI) tools. Your tasks involve discovering your network's gateway and routing details directly from the CLI. The purpose of this exercise is threefold: firstly, to identify key network configurations through specific CLI commands; secondly, to interpret the significance of these network configurations; and lastly, to analyze and elucidate the output provided by these CLI commands.

Your assignment submission should include screenshots demonstrating how you identified your default gateway and default route using the CLI. Accompany these screenshots with a written explanation where you'll describe in your own words the commands you used and their functionality. This narrative should not only cover the steps you took but also your interpretation of what the CLI output signifies in the context of network configurations. This exercise is designed to enhance your understanding of network diagnostics and management through practical, hands-on experience with CLI tools.

Exercise

Using the `ipconfig` command will output the information for all the network interfaces on a machine in Windows. Identify the machines network interface below should be the IP address, netmask and default gateway. Shown below it is easy to identify that the default gateway is `192.168.1.1`. Note that using the option `ipconfig /all` will display more information about each network interface to include DHCP IP, DNS IP, IP lease dates and

MAC addresses.

```
PS C:\Users\tyler> ipconfig.exe

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::a3f3:1c91:8e2f:dd3f%23
   IPv4 Address. . . . . . . . . . . : 192.168.1.190
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1

Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 3:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::3331:91b:3901:c1a3%19
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Unknown adapter Local Area Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

Using the command `route print` will display a list of network interfaces and the local IP routing table. Generally speaking, the local IP routing table tells the interface where to send data packets. The IP routing table can be used top confirm the route to the default gateway of the network. At the top of the routing table is the default route to the network gateway. A majority of the routes that follow are broadcast, loopback and multi-cast addresses. Notice that `192.168.1.1` is the network gateway for the interface

`192.168.1.190`, witch is the IP of NIC for the machine.

```
PS C:\Users\tyler> route print
===========================================================================
Interface List
 23...00 d8 61 e6 d0 79 ......Realtek PCIe GbE Family Controller
 15...00 ff a7 32 26 3d ......TAP-NordVPN Windows Adapter V9
 19...0a 00 27 00 00 13 ......VirtualBox Host-Only Ethernet Adapter
 25...00 ff fb 5e 3a f0 ......TAP-Windows Adapter V9
 21...40 ec 99 c7 67 86 ......Microsoft Wi-Fi Direct Virtual Adapter
  8...42 ec 99 c7 67 85 ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 50 56 c0 00 01 ......VMware Virtual Ethernet Adapter for VMnet1
 17...00 50 56 c0 00 08 ......VMware Virtual Ethernet Adapter for VMnet8
 20...40 ec 99 c7 67 85 ......Intel(R) Wi-Fi 6 AX201 160MHz
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0      192.168.1.1    192.168.1.190     25
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
      192.168.1.0    255.255.255.0         On-link     192.168.1.190    281
    192.168.1.190  255.255.255.255         On-link     192.168.1.190    281
    192.168.1.255  255.255.255.255         On-link     192.168.1.190    281
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
     192.168.72.0    255.255.255.0         On-link      192.168.72.1    291
     192.168.72.1  255.255.255.255         On-link      192.168.72.1    291
   192.168.72.255  255.255.255.255         On-link      192.168.72.1    291
    192.168.181.0    255.255.255.0         On-link     192.168.181.1    291
    192.168.181.1  255.255.255.255         On-link     192.168.181.1    291
  192.168.181.255  255.255.255.255         On-link     192.168.181.1    291
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link     192.168.1.190    281
        224.0.0.0        240.0.0.0         On-link     192.168.181.1    291
        224.0.0.0        240.0.0.0         On-link      192.168.72.1    291
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link     192.168.1.190    281
  255.255.255.255  255.255.255.255         On-link     192.168.181.1    291
  255.255.255.255  255.255.255.255         On-link      192.168.72.1    291
===========================================================================
Persistent Routes:
  None
```

The `tracert` command will report the route taken to a specified destination; either and IP address or a URL. The first column is the hop count to the destination in sequence. The center columns display the round trip time in milliseconds and represents network latency. The far right column is the address of each device a packet passes through to reach it's destination. So by tracing the route to `google.com` it's observed that:

1. the first hop is the network gateway. Following that the packet traverses the internet service providers nodes eventually moving outside of that network. This example machine is using TDS as it's service provider.

2. Finally the packet reaches it's destination at `google.com`.
3. The command `nslookup` queries the DNS record to resolve IP addresses and hostnames. In this example `nslookup google.com` is used to verify the destination address of the previous `tracert google.com` command.