Network Troubleshooting Tools

If you call technical support about problems with your network or Internet connection, they will most likely have you use some or all of these utilities. You should check all of the hardware connections as well. Refer to the Network Connections handout for a detailed description of networking connections.

Useful Connectivity Utilities

**ipconfig – (IP configuration)**

Use `ipconfig` to find the IP address and configuration of your own computer and network. By default, `ipconfig` only displays the IP address, subnet mask, and default gateway. For more in depth information, add the text `/all` after `ipconfig`. You will be able to view all of the IP configuration information for the computer.

**ping – (packet internet groper)**

A utility to determine whether a specific IP address is accessible. It works by sending a packet of data to the specified address and waiting for a reply. If you are having difficulty accessing the Internet, try using the `ping` command to connect to the different network nodes to narrow down where the problem could be coming from. For instance, if you are able to ping the network card, but not the router, the problem is most likely local. If you can ping everywhere except for a certain outside address, the problem is remote.

Syntax: `ping IP address or domain`

**tracert – (trace route)**

A utility that traces a packet from your computer to an Internet host, showing how many hops the packet requires to reach the host and how long each hop takes. If you're visiting a Web site and pages are appearing slowly, you can use trace route to figure out where the longest delays are occurring.

Syntax: `tracert IP address or domain`

**nslookup – (name server lookup)**

Nslookup is the name of a program that lets an Internet server administrator or user enter a host name (for example, `www.yahoo.com`) and find out the corresponding Internet address. It will also do reverse name lookup and find the host name for an IP address you specify. Nslookup sends a domain name query packet to a designated (or defaulted) Domain Name System (DNS) server. Depending on the system you are using, the default may be the local DNS name server at your service provider, some intermediate name server, or the root name server (at InterNIC) for the entire domain name system hierarchy.

Syntax: `nslookup IP address or domain`
Using Ipconfig:

1. Log on to the computer as a user with administrative rights.

2. Click Start and select Run (Windows Vista or Windows 7 → Click the “Start” button and type in the “Search for Programs and Files” text box).

3. Type cmd and press ENTER. The black Command Prompt window will appear.

4. Type ipconfig at the command prompt and press ENTER. The following screenshot gives an example of the information shown when using “ipconfig”:

5. Write down any configuration information you will need. At a minimum, it will be the IP address of your computer and the Default Gateway.

6. Sometimes you might need more information and you can add the “/all” to the above “ipconfig” command. This screenshot gives an example of the information shown when using “ipconfig /all”: 
Using Ping:

1. Log on to the computer as a user with administrative rights.
2. Click **Start** and select **Run** (Windows Vista or Windows 7 \(\rightarrow\) Click the “Start” button and type in the “Search for Programs and Files” text box).
3. Type **cmd** and press ENTER. The black Command Prompt window will appear.
4. Type **ping IP address or domain** and press ENTER. If you are unable to ping a destination, first check to see that there are no typing errors. If the address is correct, use the Troubleshooting Routing Errors table below to examine what the cause could be.

A successful ping looks similar to this:

```
C:\>ping 4.2.2.2
Pinging 4.2.2.2 with 32 bytes of data:
Reply from 4.2.2.2: bytes=32 time=80ms TTL=243
Reply from 4.2.2.2: bytes=32 time=70ms TTL=243
Reply from 4.2.2.2: bytes=32 time=70ms TTL=243
Reply from 4.2.2.2: bytes=32 time=70ms TTL=243
```

Use any or all of the following address options to determine where the connection is failing.

- **ping the Ethernet card (NIC) in your computer** — this will always be 127.0.0.1
- **ping your own computer** — use ipconfig to look up the IP address, if necessary.
- **ping the Default Gateway (router)** — you can find the Default Gateway on the computer in the same spot as the IP address.
- **ping an outside IP address** — for example the Level3 DNS Server 4.2.2.2.
- **ping a domain name to check DNS** — for example: ping www.google.com.

**Troubleshooting Ping Errors**

Once all of the hardware connections are checked and verified, any of the following could be the cause of your networking error(s).

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to ping the NIC.</td>
<td>The NIC is disabled or faulty.</td>
</tr>
<tr>
<td>Unable to ping your own computer.</td>
<td>The IP address is incorrect.</td>
</tr>
<tr>
<td>Unable to ping the Default Gateway.</td>
<td>The computer is disconnected from the network.</td>
</tr>
<tr>
<td></td>
<td>The Default Gateway is down.</td>
</tr>
<tr>
<td></td>
<td>The gateway address used in ping is incorrect.</td>
</tr>
<tr>
<td></td>
<td>The gateway is not attached to the subnet.</td>
</tr>
<tr>
<td>Unable to ping an outside IP address.</td>
<td>The outside server is offline.</td>
</tr>
<tr>
<td></td>
<td>The IP address was typed incorrectly.</td>
</tr>
<tr>
<td></td>
<td>A packet is routed incorrectly between the source and destination networks.</td>
</tr>
<tr>
<td>Unable to ping a domain name.</td>
<td>The DNS server is not working.</td>
</tr>
<tr>
<td></td>
<td>The destination server is offline.</td>
</tr>
<tr>
<td>Internet connections are slow and or intermittent.</td>
<td>Internet traffic is heavy.</td>
</tr>
<tr>
<td></td>
<td>There are problems with the line. Contact the phone or cable company.</td>
</tr>
</tbody>
</table>
Using Tracert:

1. Log on to the computer as a user with administrative rights.
2. Click **Start** and select **Run** (Windows Vista or Windows 7 → Click the “Start” button and type in the “Search for Programs and Files” text box).
3. Type **cmd** and press ENTER. The black Command Prompt window will appear.
4. Type **tracert IP address or domain** and press ENTER.

The following screenshot shows an example using nslookup.

```
C:\>tracert 64.64.120.40
Tracing route to web01chi-pub.tgnt.net [64.64.120.40]
over a maximum of 30 hops:
1  <10 ms  <10 ms  <10 ms  6509-brouter [172.16.40.2]
2  <10 ms  <10 ms  <10 ms  bmgfinetrouter [64.64.60.2]
3  <10 ms  <10 ms  <10 ms  teligentnys [192.168.254.5]
4  * <10 ms  <10 ms  192.168.254.13
5  <10 ms  <10 ms  <10 ms  216.251.12.129
6  40 ms  50 ms  40 ms  atm1-916.chirtr01n0.tgnt.net [216.251.13.145]
7  50 ms  50 ms  40 ms  web01chi-pub.tgnt.net [64.64.120.40]
```

Tracert returns results in milliseconds (ms). Ideally, every hop should give an IP address and time. After requesting information from the DNS server, the first hop is to the default gateway. The hop to the default gateway should take 10-20 ms. After that, hops should take anywhere from 80-120ms. Errors indicated by * on the route can show where there is a lot of network traffic or possible line problems.

Using Nslookup:

1. Log on to the computer as a user with administrative rights.
2. Click **Start** and select **Run** (Windows Vista or Windows 7 → Click the “Start” button and type in the “Search for Programs and Files” text box).
3. Type **cmd** and press ENTER. The black Command Prompt window will appear.
4. Type **nslookup IP address or domain** and press ENTER.

The following screenshot shows two examples using nslookup. The first looks up an IP address (4.2.2.2) while the second looks up a domain name (www.yahoo.com).

```
C:\Users\steve>nslookup 4.2.2.2
Server: falcon.weatherford.local
Address: 10.1.1.20
Name: b.resolvers.level3.net
Address: 4.2.2.2

C:\Users\steve>nslookup www.google.com
Server: falcon.weatherford.local
Address: 10.1.1.20

Non-authoritative answer:
Name: www.google.com
Addresses: 2001:4860:4802::802::1010
173.194.33.112
173.194.33.115
173.194.33.114
173.194.33.116
173.194.33.113
```

- **Server:** the local DNS server used to look up the information.
- **Address:** the IP address of the local DNS server.
- **Name:** The domain name of the server hosting the remote domain or IP.
- **Address(s):** The IP address(s) of the remote server.
- **Aliases:** The common name(s) used to identify multiple IP addresses or domain names.