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When troubleshooting any network connectivity issue, there is a suite of diagnostic tools included with the Operating System and TCP/IP protocol. Listed below are the most common utilities and their usage.

Ping is the easiest and one of the most often used tools. Ping uses ICMP to send a data packet to a remote host, and then waits for it to bounce back. Ping then calculates the roundtrip time that the packet took to reach its destination and return. Ping works with all TCP/IP systems and helps to troubleshoot network connectivity problems. Ping can use the host name or IP address.

To ping a system, enter the following at the command prompt:

ping 10.10.10.1 (uses hostname of machine)
ping hostname (uses IP address of machine)

Netstat displays the connection status and statistics of your TCP/IP or UDP connections for current machine. The Netstat command shows the local name, remote name, and port of your active network connections and their current state.

To run the Netstat command, enter the following at the command prompt:

Netstat

Telnet lets you connect to a specific port on a remote system and find out whether a socket application is listening on that port.

To run Telnet, enter the following at the command prompt:

telnet hostname (uses hostname of machine)
telnet 10.10.10.1 (uses IP address of machine)

Route Print displays the machine's routing table. The Route Print command shows you the default routes used, and the routes to remote systems on the Routing Information Protocol (RIP).

To run Route Print, enter the following at the command prompt:

route print

Ipconfig displays your system's TCP/IP configuration settings. This is especially useful for finding out MAC addresses, WINS servers, and whether or not the machine is set to DHCP.

To display all TCP/IP settings, enter the following at the command prompt:

```
ipconfig /all
```

Tracert is a utility to trace each hop of a packet between your system and a remote system.

To trace the route to a system with the name appserver, enter the following at the command prompt:

```
tracert appserver
```

Nbtstat displays statistics and connections about systems that are using NetBIOS over TCP/IP.

To display all NetBIOS over TCP/IP sessions on the system, enter the following at the command prompt:

```
nbtstat –s
```

Arp resolves TCP/IP to media access control (MAC) addresses. All network protocols must use the MAC hardware address to connect to a remote system.

To display the Ethernet address of a TCP/IP system with the IP address of 10.10.10.1, enter the following at the command prompt:

```
arp -a 10.10.10.1
```

Nslookup is a diagnostic tool that displays information from Domain Name System (DNS) name servers. You can use the tool to troubleshoot DNS setup problems.

To start Nslookup, enter the following at the command prompt:

```
nslookup
```
