**CSC 435 Computer Networks**
**Instructor: Dr. Natarajan Meghanathan**
**Quiz 6: DOS Networking Commands**
**Due: April 17th, 2019 – 4 PM.** **Submit hardcopy in class.**

The DOS commands we will be studying are: **ping, tracert, arp, ipconfig, nslookup, route, netstat and finger**. To get an idea of the commands, refer to the documentation included after the questions.

**Submission:** In addition to presenting the results, show how you tried to answer each of the questions by capturing the DOS screen using the PrintScreen key in your keyboard and then pasting it in the Paint Brush application in your PC. Save the picture as a jpeg file and include in your submission report.

**Questions**

1. (15 pts) Use an efficient algorithm and any one of the above command tools to find the maximum data size that can be handled by the physical network to which your computer is attached. Show all the iterations of your algorithm and screenshots of the outputs.
2. (10 pts) Use the ping command to determine how long it takes for a request packet with data size 50 bytes to reach a website operated from India: www.sify.com. Try sending another request packet of data size 1200 bytes to the same website and observe the delay it takes this time. Compare the delays you observed in the two cases. Are they significantly different? If so, why? If not, why there is no significant difference?
3. (10 pts) Find the number of hops and the corresponding delay it takes to reach www.abc.com and https://www.uq.edu.au/. What is the percentage increase in the number of hops and delay to reach the site in Australia compared to reaching www.abc.com, a website in California? If you observe that the increase in the delay is not proportional to the increase in the number of hops, comment?
4. (6 pts) Find the IP addresses of the first "five" intermediate routers that are on the path to a web server www.sify.com.
5. (6 pts) Show the routing table of your host.
6. (6 pts) Find the number of unicast Ethernet frames sent and received by each of the network interfaces of your PC?
7. (6 pts) What is the physical address of the Ethernet adapter of the PC in which you are working?
8. (8 pts) Find the IP address and MAC address of the hosts that are in the same network as your PC?
9. (5 pts) Find whether port number 4123 is part of an active connection?
10. (6 pts) What is the IP address and physical address of the default router to which your machine forwards a packet for which it has no other next-hop forwarding router information in its local routing table?
11. (6 pts) Find out the date/time the IP address for your PC was leased from the DHCP server as well as the date/time the lease expires.
12. (16 pts) Find out the IP addresses of the following servers related to Jackson state university.

    (i) Web server
    (ii) File server
    (iii) PAWS
    (iv) Canvas

**Help Module on DOS Network Tools and Commands**

To go to the DOS prompt, click on the Windows icon in the bottom left corner -> Type cmd and Press enter. Type cd\ on the DOS window, it will take you to the root directory, commonly the C:\

To get and idea of the commands, we will now see the primary utilities of each them.

**Ping:** Used to check the availability of systems by using the ICMP Echo Request / Response messages.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
            [-r count] [-s count] [[-j host-list] | [-k host-list]]
            [-w timeout] [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -t             Ping the specified host until stopped.
                   To see statistics and continue - type Control-Break;
                   To stop - type Control-C.
    -a             Resolve addresses to hostnames.
    -n count       Number of echo requests to send.
    -l size        Send buffer size.
    -f             Set Don't Fragment flag in packet (IPv4-only).
    -i TTL         Time To Live.
    -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                   and has no effect on the type of service field in the IP Head
er).
    -r count       Record route for count hops (IPv4-only).
    -s count       Timestamp for count hops (IPv4-only).
    -j host-list   Loose source route along host-list (IPv4-only).
    -k host-list   Strict source route along host-list (IPv4-only).
    -w timeout     Timeout in milliseconds to wait for each reply.
    -R             Use routing header to test reverse route also (IPv6-only).
    -S srcaddr     Source address to use.
    -4             Force using IPv4.
    -6             Force using IPv6.
```

**Tracert:** The traceroute command is used to find the sequence of hops (i.e., the name of the intermediate hops/routers) from the source to a remote destination host.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                 Do not resolve addresses to hostnames.
    -h maximum_hops    Maximum number of hops to search for target.
    -j host-list       Loose source route along host-list (IPv4-only).
    -w timeout         Wait timeout milliseconds for each reply.
    -R                 Trace round-trip path (IPv6-only).
    -S srcaddr         Source address to use (IPv6-only).
    -4                 Force using IPv4.
    -6                 Force using IPv6.
```

**Route:** The route command is used to display and modify the entries in the local routing table.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>route

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
                  [MASK netmask]  [gateway] [METRIC metric]  [IF interface]

  -f            Clears the routing tables of all gateway entries.  If this is
                used in conjunction with one of the commands, the tables are
                cleared prior to running the command.

  -p            When used with the ADD command, makes a route persistent across
                boots of the system. By default, routes are not preserved
                when the system is restarted. Ignored for all other commands,
                which always affect the appropriate persistent routes. This
                option is not supported in Windows 95.

  -4            Force using IPv4.

  -6            Force using IPv6.

  command       One of these:
                  PRINT     Prints  a route
                  ADD       Adds    a route
                  DELETE    Deletes a route
                  CHANGE    Modifies an existing route
  destination   Specifies the host.
  MASK          Specifies that the next parameter is the 'netmask' value.
  netmask       Specifies a subnet mask value for this route entry.
                If not specified, it defaults to 255.255.255.255.
  gateway       Specifies gateway.
  interface     the interface number for the specified route.
  METRIC        specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.
```

**Finger:** The finger command is used to display information about users running in a specific host.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>finger

Displays information about a user on a specified system running the
Finger service. Output varies based on the remote system.

FINGER [-l] [user]@host [...]

  -l        Displays information in long list format.
  user      Specifies the user you want information about. Omit the user
            parameter to display information about all users on the
            specifed host.
  @host     Specifies the server on the remote system whose users you
            want information about.
```

**Arp:** The arp command is used to display and modify the address resolution cache, which stores the mapping between the IP address of systems and their resolved physical addresses.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

  -a              Displays current ARP entries by interrogating the current
                  protocol data.  If inet_addr is specified, the IP and Physical
                  addresses for only the specified computer are displayed.  If
                  more than one network interface uses ARP, entries for each ARP
                  table are displayed.
  -g              Same as -a.
  -v              Displays current ARP entries in verbose mode.  All invalid
                  entries and entries on the loop-back interface will be shown.
  inet_addr       Specifies an internet address.
  -N if_addr      Displays the ARP entries for the network interface specified
                  by if_addr.
  -d              Deletes the host specified by inet_addr. inet_addr may be
                  wildcarded with * to delete all hosts.
  -s              Adds the host and associates the Internet address inet_addr
                  with the Physical address eth_addr.  The Physical address is
                  given as 6 hexadecimal bytes separated by hyphens. The entry
                  is permanent.
  eth_addr        Specifies a physical address.
  if_addr         If present, this specifies the Internet address of the
                  interface whose address translation table should be modified.
                  If not present, the first applicable interface will be used.
Example:
  > arp -s 157.55.85.212   00-aa-00-62-c6-09  .... Adds a static entry.
  > arp -a                                    .... Displays the arp table.
```

**IPconfig**: The ipconfig command is used to display the current TCP/IP network configurations. Also, try **IPconfig /all** to display full configuration information

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>ipconfig

Windows IP Configuration


Wireless LAN adapter Wireless Network Connection:

   Connection-specific DNS Suffix  . : attlocal.net
   IPv6 Address. . . . . . . . . . . : 2600:1700:a2d0:9110:5ca6:5bf1:11cd:7c73
   Temporary IPv6 Address. . . . . . : 2600:1700:a2d0:9110:850c:9a3d:7d70:cf60
   Link-local IPv6 Address . . . . . : fe80::5ca6:5bf1:11cd:7c73%12
   IPv4 Address. . . . . . . . . . . : 192.168.1.68
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::d6b2:7aff:fe6a:70d1%12
                                       192.168.1.254

Ethernet adapter Local Area Connection:

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

Ethernet adapter Local Area Connection 2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::8f:315f:1a7:13ca%16
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
```

**Netstat:** When used without parameters, ***netstat*** displays active TCP connections.
Use netstat -e option to learn about the statistics of the Ethernet.

netstat –a option to learn about the active TCP connections and also the ports on which the computer is waiting for incoming TCP/UDP messages.

netstat –n option to learn about the numerical values of the IP addresses and ports used for active TCP connections.

netstat –p <protocol> to learn about the statistics for a specific protocol. The valid values for <protocol> include tcp, udp, ip, icmp.

**nslookup:** The nslookup command is used to study the DNS infrastructure.

```
C:\Big3-Laptop-August2015\3300-laptop\0-res\NetworkSci-Research\Sensors\CompLigh
tSharedNeighborhood>nslookup
Default Server:  homeportal
Address:  192.168.1.254

> www.cnn.com
Server:  homeportal
Address:  192.168.1.254

Non-authoritative answer:
Name:    turner-tls.map.fastly.net
Addresses:  2a04:4e42:400::323
          2a04:4e42:200::323
          2a04:4e42::323
          2a04:4e42:600::323
          151.101.205.67
Aliases:  www.cnn.com

> www.jsums.edu
Server:  homeportal
Address:  192.168.1.254

Non-authoritative answer:
Name:    www.jsums.edu
Address:  143.132.8.208

> compbio.jsums.edu
Server:  homeportal
Address:  192.168.1.254

Non-authoritative answer:
Name:    compbio.jsums.edu
Address:  143.132.224.66
```