CS305 Lab1

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1. **Introduction**

   > Understand computer network commands and protocols, learn about your computer network connections, and test connectivity with other networks.

2. **Procedure**

   > 1. Practice on how to use the commands about network, including the options followed with them, and the use of them, such as testing ,troubleshooting and problem determination.
   > 2. Have a look at the network device and network protocols.
   > 3. Using `/?` to Understanding the meaning of each command and various parameters.
   > – ipconfig
   > – ping
   > – netstat
   > – Tracert
   > – arp
   > – net
   > – Nslookup

3. **Result**

   > 1. Open `cmd` first;
   > 2. Using some commands like `ipconfig /all` to get the information;
   > 3. Find the answers and reasons.

4. **Analysis(including answer of question)**

   1. Query the ip address and MAC address of host, the ip address of gateway and DHCP server, the subnet mask.
   Please determine whether the IP address of host is allocated statically or dynamically through DHCP. If the address is allocated dynamically, how long is the lease time of the current IP ?

   > IP address of host
   >
   > 
   >

```
Wireless LAN adapter WLAN:

   Connection-specific DNS Suffix  . : sustc.edu.cn
   Description . . . . . . . . . . . : Marvell AVASTAR Wireless-AC Network Controller
   Physical Address. . . . . . . . . : BC-83-85-EB-12-F8
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2001:da8:201d:1103:a282:a62c:5f48:2172(Preferred)
   Lease Obtained. . . . . . . . . . : 2019年9月3日 14:16:15
   Lease Expires . . . . . . . . . . : 2019年9月5日 14:16:15
   Link-local IPv6 Address . . . . . : fe80::547f:8f88:e8f0:99c6%8(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.21.6.171(Preferred)
```

MAC address of host

```
C:\Users\Eveneko>ipconfig /all
```

```
Wireless LAN adapter WLAN:

   Connection-specific DNS Suffix  . : sustc.edu.cn
   Description . . . . . . . . . . . : Marvell AVASTAR Wireless-AC Network Controller
   Physical Address. . . . . . . . . : BC-83-85-EB-12-F8
```

```
Wireless LAN adapter 本地连接* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : BE-83-85-EB-13-F9
```

```
Wireless LAN adapter 本地连接* 3:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
   Physical Address. . . . . . . . . : BE-83-85-EB-16-F9
```

```
Ethernet adapter 蓝牙网络连接:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : BC-83-85-EB-12-F9
```

The IP address of gateway

```
C:\Users\Eveneko>ipconfig /all
```

```
Default Gateway . . . . . . . . . : fe80::4271:83ff:feab:3002%8
                                    10.21.127.254
```

DHCP server

```
C:\Users\Eveneko>ipconfig /all
```

```
DHCP Server . . . . . . . . . . . : 172.18.1.135
```

The subnet mask

```
C:\Users\Eveneko>ipconfig /all
```

```
Subnet Mask . . . . . . . . . . . : 255.255.128.0
```

The IP address of host is allocated dynamically

```
C:\Users\Eveneko>ipconfig /all
```

```
DHCP Enabled. . . . . . . . . . . : Yes
```

```
Lease Obtained. . . . . . . . . . : 2019年9月3日 13:18:13
Lease Expires . . . . . . . . . . : 2019年9月5日 14:22:02
```

The lease time of the current IP is: 2019.9.5 14:22:02 - 2019.9.3 13:18:13 = 2 days, 1 hour, 3 mins and 49 seconds

2. DNS provides the corresponding relationship between domain name and IP address. Please query 1) IP address of host's DNS server 2) DNS information stored in host 3) IP address of www.sustech.edu.cn

1. IP address of host's DNS server

```
C:\Users\Eveneko>ipconfig /all
```

```
DNS Servers . . . . . . . . . . . : 172.18.1.92
                                    172.18.1.93
```

2. DNS information stored in host

```
C:\Users\Eveneko>ipconfig /displaydns

Windows IP Configuration

    vasapi.wps.cn
    ----------------------------------------
    Record Name . . . . . : vasapi.wps.cn
    Record Type . . . . . : 5
    Time To Live  . . . . : 52
    Data Length . . . . . : 8
    Section . . . . . : Answer
    CNAME Record  . . . . : vasapi.wpsdns.com

    Record Name . . . . . : vasapi.wpsdns.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 52
    Data Length . . . . . : 4
    Section . . . . . : Answer
    A (Host) Record . . . : 120.92.119.74

    Record Name . . . . . : ns4.dnsv5.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 52
    Data Length . . . . . : 4
    Section . . . . . : Additional
    A (Host) Record . . . : 182.254.20.44

    Record Name . . . . . : ns4.dnsv5.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 52
    Data Length . . . . . : 4
    Section . . . . . : Additional
    A (Host) Record . . . : 223.166.151.126

    Record Name . . . . . : ns4.dnsv5.com
```

```
    Record Type . . . . . : 1
    Time To Live  . . . . : 52
    Data Length . . . . . : 4
    Section . . . . . . . : Additional
    A (Host) Record . . . : 14.215.150.13
```

3. IP address of www.sustech.edu.cn

```
C:\Users\Eveneko>ping www.sustech.edu.cn

Pinging www.sustech.edu.cn [172.18.1.3] with 32 bytes of data:
Reply from 172.18.1.3: bytes=32 time=1ms TTL=63
Reply from 172.18.1.3: bytes=32 time=1ms TTL=63
Reply from 172.18.1.3: bytes=32 time=2ms TTL=63
Reply from 172.18.1.3: bytes=32 time=1ms TTL=63

Ping statistics for 172.18.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

IP: 172.18.1.3

3. Statistical analysis on the traffic of different network communication protocols, please list which protocols are counted by this command, and what are the differences in the names of statistical objects in different protocol statistics?

IPv4, IPv6, ICMPv4, ICMPv6, TCP for IPv4, TCP for IPv6, UDP for IPv4, UDP for IPv6 are counted by `netstat -s`

the differences in the names of statistical objects in different protocol statistics:

IPv4	IPv6	ICMPv4	ICMPv6	TCP for IPv4	TCP for IPv6	UDP for IPv4	UDP for IPv6
Packets	Packets	Messages	Messages	Segments	Segments	Datagrams	Datagrams

```
C:\Users\Eveneko>netstat -s

IPv4 Statistics

  Packets Received                   = 211396
  Received Header Errors             = 0
  Received Address Errors            = 1068
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 0
  Received Packets Discarded         = 73731
  Received Packets Delivered         = 218366
  Output Requests                    = 48179
  Routing Discards                   = 0
  Discarded Output Packets           = 754
  Output Packet No Route             = 8
  Reassembly Required                = 26
  Reassembly Successful              = 13
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 0
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 0

IPv6 Statistics

  Packets Received                   = 166112
  Received Header Errors             = 0
  Received Address Errors            = 34135
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 789
  Received Packets Discarded         = 29399
  Received Packets Delivered         = 129501
  Output Requests                    = 1296
  Routing Discards                   = 0
  Discarded Output Packets           = 0
  Output Packet No Route             = 0
  Reassembly Required                = 4
  Reassembly Successful              = 2
```

```
Reassembly Failures                    = 0
Datagrams Successfully Fragmented      = 0
Datagrams Failing Fragmentation        = 0
Fragments Created                      = 0
```

```
ICMPv4 Statistics

                            Received    Sent
  Messages                  309         320
  Errors                    0           0
  Destination Unreachable   302         316
  Time Exceeded             0           0
  Parameter Problems        0           0
  Source Quenches           0           0
  Redirects                 0           0
  Echo Replies              4           0
  Echos                     3           4
  Timestamps                0           0
  Timestamp Replies         0           0
  Address Masks             0           0
  Address Mask Replies      0           0
  Router Solicitations      0           0
  Router Advertisements     0           0

ICMPv6 Statistics

                            Received    Sent
  Messages                  9784        225
  Errors                    0           0
  Destination Unreachable   0           0
  Packet Too Big            0           0
  Time Exceeded             69          0
  Parameter Problems        0           0
  Echos                     20          84
  Echo Replies              3           0
  MLD Queries               1           0
  MLD Reports               2893        0
  MLD Dones                 789         0
  Router Solicitations      0           15
  Router Advertisements     4447        0
  Neighbor Solicitations    33          87
  Neighbor Advertisements   1529        39
```

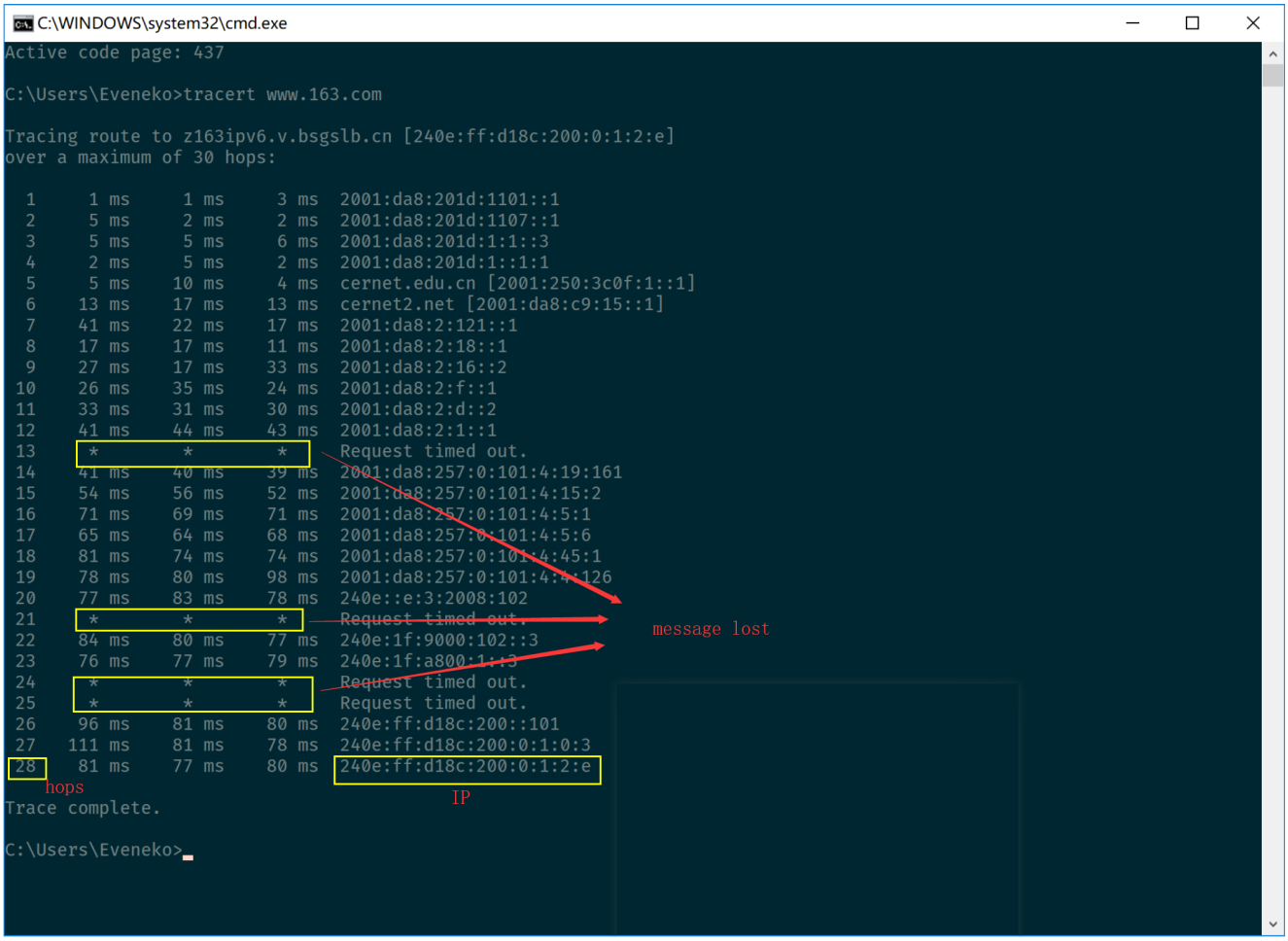
```
  Redirects                     0                     0
  Router Renumberings           0                     0
```

```
TCP Statistics for IPv4

  Active Opens                                = 7081
  Passive Opens                               = 12
  Failed Connection Attempts                  = 7470
  Reset Connections                           = 52
  Current Connections                         = 29
  Segments Received                           = 58458
  Segments Sent                               = 40926
  Segments Retransmitted                      = 14468

TCP Statistics for IPv6

  Active Opens                                = 20
  Passive Opens                               = 1
  Failed Connection Attempts                  = 7
  Reset Connections                           = 2
  Current Connections                         = 1
  Segments Received                           = 854
  Segments Sent                               = 835
  Segments Retransmitted                      = 19
```

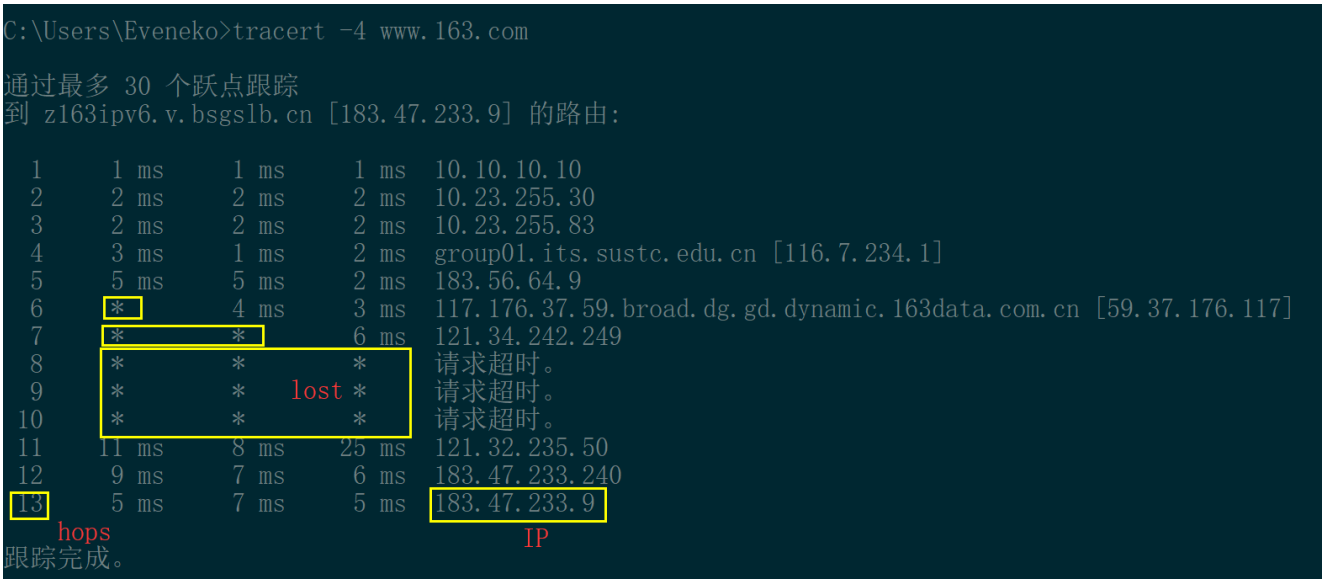
```
UDP Statistics for IPv4

  Datagrams Received    = 261833
  No Ports              = 10937
  Receive Errors        = 62793
  Datagrams Sent        = 11637

UDP Statistics for IPv6

  Datagrams Received    = 137401
  No Ports              = 1810
  Receive Errors        = 27553
  Datagrams Sent        = 189
```

4. Use the 'tracert' to access 'www.163.com', find out the total number of hops from the local host to the target. Are there any ICMP messages lost during the tracert process? What is the IP address of the server on which www.163.com is located?

> There are 28 hops from the local host to the target.
>
> And there are messages lost during the tracert process.
>
> The IP address of the server on which www.163.com is located at 240e:ff:d18c:200:0:1:2:e(IPv6)



> The IP address of the server on which www.163.com is located at 183.47.233.9(IPv6)



5. **Conclusion and Experience:**

    1. If we don't know some commands and their parameters, we can use `/?` to get the usage.
    2. When we reconnect the network or do this homework over 2 days, some information like **IP address** maybe changed due to the lease time is over.
    3. For different network environment and computer, the results are different.