

Tasks:

1. Using command-line tools, get the following information regarding network settings of your computer:

1.1 IP address(es) and network interfaces.

We need command Ipconfig

```
C:\Users\irapa>ipconfig

Windows IP Configuration

Unknown adapter LAN-Verbindung:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::7785:843b:a5d:c9a1%9
    IPv4 Address. . . . . : 10.9.0.130
    Subnet Mask . . . . . : 255.255.255.252
    Default Gateway . . . . . : 

Ethernet adapter Ethernet:

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

Unknown adapter OpenVPN Connect DCO Adapter:

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

Wireless LAN adapter LAN-Verbindung* 1:

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

Wireless LAN adapter LAN-Verbindung* 2:

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

```
Wireless LAN adapter WLAN:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::bf1c:42dc:8fa5:bae2%8
    IPv4 Address. . . . . : 192.168.0.132
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.0.1

Ethernet adapter Bluetooth-Netzwerkverbindung:

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

We can see here ip addresses:

IP addresses Link-local IPv6 Address . . . . . : fe80::7785:843b:a5d:c9a1%9

IPv4 Address. . . . . : 10.9.0.130

Link-local IPv6 Address . . . . . : fe80::bf1c:42dc:8fa5:bae2%8

IPv4 Address. . . . . : 192.168.0.132

1.2 Netmask for every network interface. Also calculate the maximum number of hosts within this network.

With command ipconfig we can see subnet mask too

```
IPv4 Address. . . . . : 10.9.0.130
Subnet Mask . . . . . : 255.255.255.252
```

```
IPv4 Address. . . . . : 192.168.0.132
Subnet Mask . . . . . : 255.255.255.0
```

1.3 IP address of your default gateway.

With command ipconfig we can see default gateway too

```
Default Gateway . . . . . : 192.168.0.1
```

1.4 IP addresses of DNS servers.

We can use this command : ipconfig /all

```
DNS Servers . . . . . : 192.168.0.1
```

2. Make a network trace between your computer and yandex.ru, using tracert (on Windows) or traceroute -nl (on macOS and Linux). Highlight or explicitly specify your default gateway in this trace. Remember this IP address of yandex.ru.

tracert yandex.ru

```
C:\Users\irapa>tracert yandex.ru
```

```
Tracing route to yandex.ru [5.255.255.77]  
over a maximum of 30 hops:
```

|    |       |       |        |  |
|----|-------|-------|--------|--|
| 1  | 2 ms  | 2 ms  | 2 ms   | 192.168.0.1  |
| 2  | 3 ms  | 3 ms  | 3 ms   | fritz.box [192.168.178.1]                              |
| 3  | 15 ms | 13 ms | 14 ms  | 10.141.0.1   |
| 4  | *     | *     | *      | Request timed out.                                     |
| 5  | 22 ms | 15 ms | 260 ms | 85.232.25.90   |
| 6  | 19 ms | 18 ms | 17 ms  | SNLEJ-MS01.hlkomm.net [85.232.0.55]                    |
| 7  | 14 ms | 28 ms | 14 ms  | 109.104.58.45  |
| 8  | 28 ms | 21 ms | 25 ms  | HEFRA-MC01.hlkomm.net [109.104.58.196]                 |
| 9  | *     | 21 ms | 19 ms  | ipv4.de-cix.fra.de.as208722.yandex.com [80.81.192.251] |
| 10 | *     | *     | *      | Request timed out.                                     |
| 11 | 85 ms | 54 ms | 78 ms  | yandex.ru [5.255.255.77]                               |

```
Trace complete.
```

Default gateway stays at the first place

|   |      |      |      |             |
|---|------|------|------|-------------|
| 1 | 2 ms | 2 ms | 2 ms | 192.168.0.1 |
|---|------|------|------|-------------|

3. Repeat the task above for google.com. Find out and highlight the same hops seen in p.2 above.

tracert google.com

```
C:\Users\irapa>tracert google.com
```

```
Tracing route to google.com [142.251.209.142]  
over a maximum of 30 hops:
```

|    |        |       |        |   |
|----|--------|-------|--------|---|
| 1  | 2 ms   | 2 ms  | 2 ms   | 192.168.0.1                                 |
| 2  | 3 ms   | 3 ms  | 3 ms   | fritz.box [192.168.178.1]                   |
| 3  | 17 ms  | 19 ms | 17 ms  | 10.141.0.1                                  |
| 4  | *      | *     | *      | Request timed out.                          |
| 5  | 128 ms | 15 ms | 13 ms  | 85.232.25.90                                |
| 6  | 33 ms  | 15 ms | 17 ms  | SNLEJ-MS01.hlkomm.net [85.232.0.55]         |
| 7  | 20 ms  | 15 ms | 19 ms  | 109.104.58.37                               |
| 8  | 38 ms  | 28 ms | 23 ms  | HEFRA-MC01.hlkomm.net [109.104.58.196]      |
| 9  | 33 ms  | *     | 44 ms  | 74.125.32.62                                |
| 10 | 42 ms  | 20 ms | 24 ms  | 108.170.252.18                              |
| 11 | 41 ms  | 26 ms | 22 ms  | 192.178.73.111                              |
| 12 | 30 ms  | 29 ms | 46 ms  | 142.251.69.189                              |
| 13 | 36 ms  | 34 ms | 33 ms  | 142.251.66.23                               |
| 14 | 50 ms  | 35 ms | *      | 216.239.54.170                              |
| 15 | *      | 36 ms | 51 ms  | 108.170.253.65                              |
| 16 | 36 ms  | 36 ms | 130 ms | 142.251.244.105                             |
| 17 | 34 ms  | 47 ms | 155 ms | ham11s07-in-f14.1e100.net [142.251.209.142] |

the same hops seen in p.2 above are:

|   |        |       |       |  |
|---|--------|-------|-------|--|
| 1 | 2 ms   | 2 ms  | 2 ms  | 192.168.0.1                            |
| 2 | 3 ms   | 3 ms  | 3 ms  | fritz.box [192.168.178.1]              |
| 3 | 17 ms  | 19 ms | 17 ms | 10.141.0.1                             |
| 4 | *      | *     | *     | Request timed out.                     |
| 5 | 128 ms | 15 ms | 13 ms | 85.232.25.90                           |
| 6 | 33 ms  | 15 ms | 17 ms | SNLEJ-MS01.hlkomm.net [85.232.0.55]    |
| 7 | 20 ms  | 15 ms | 19 ms | 109.104.58.37                          |
| 8 | 38 ms  | 28 ms | 23 ms | HEFRA-MC01.hlkomm.net [109.104.58.196] |

4. Determine all IP addresses of yahoo.com.

```
C:\Users\irapa>nslookup yahoo.com
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:     yahoo.com
Addresses: 2001:4998:44:3507::8000
           2001:4998:24:120d::1:1
           2001:4998:24:120d::1:0
           2001:4998:124:1507::f001
           2001:4998:124:1507::f000
           2001:4998:44:3507::8001
           98.137.11.163
           74.6.231.20
           74.6.143.26
           74.6.143.25
           74.6.231.21
           98.137.11.164
```

5. Take any 3 of them and make a trace to each IP address. Which hops are the same for all chosen remote IP addresses?

```
C:\Users\irapa>tracert 98.137.11.163
```

```
Tracing route to media-router-fp74.prod.media.vip.gq1.yahoo.com [98.137.11.163]  
over a maximum of 30 hops:
```

|    |        |        |        |  |
|----|--------|--------|--------|--|
| 1  | 2 ms   | 2 ms   | 2 ms   | 192.168.0.1  |
| 2  | 3 ms   | 3 ms   | 3 ms   | fritz.box [192.168.178.1]                                      |
| 3  | 25 ms  | 23 ms  | 17 ms  | 10.141.0.1   |
| 4  | *      | *      | *      | Request timed out.   |
| 5  | 31 ms  | 18 ms  | 13 ms  | 85.232.25.90   |
| 6  | 18 ms  | 23 ms  | 156 ms | SNLEJ-MS01.hlkomm.net [85.232.0.55]                            |
| 7  | 35 ms  | *      | 22 ms  | 109.104.58.41  |
| 8  | 38 ms  | 24 ms  | 29 ms  | 85.232.3.243   |
| 9  | 52 ms  | 37 ms  | 38 ms  | oath.bcix.de [193.178.185.110]                                 |
| 10 | 45 ms  | 32 ms  | *      | ae-0.pat2.dez.yahoo.com [209.191.112.7]                        |
| 11 | 37 ms  | 37 ms  | 50 ms  | ae-3.pat2.frz.yahoo.com [209.191.112.25]                       |
| 12 | 114 ms | 119 ms | 119 ms | ae-11.pat1.dce.yahoo.com [209.191.64.24]                       |
| 13 | 132 ms | 128 ms | 130 ms | ae-14.pat2.che.yahoo.com [209.191.64.39]                       |
| 14 | 151 ms | 156 ms | 156 ms | ae-12.pat1.dnx.yahoo.com [209.191.68.1]                        |
| 15 | 176 ms | 182 ms | 177 ms | ae-19.pat2.gqb.yahoo.com [209.191.65.103]                      |
| 16 | 186 ms | 173 ms | 170 ms | et-1-0-0.msr2.gq2.yahoo.com [66.196.67.125]                    |
| 17 | 178 ms | 180 ms | 206 ms | et-18-1-0.clr2-a-gdc.gq2.yahoo.com [98.136.158.211]            |
| 18 | 181 ms | 171 ms | 169 ms | lo0.fab8-1-gdc.gq2.yahoo.com [98.136.159.240]                  |
| 19 | 171 ms | 178 ms | 172 ms | usw2-1-lbc.gq2.yahoo.com [98.136.158.193]                      |
| 20 | 191 ms | 211 ms | 169 ms | media-router-fp74.prod.media.vip.gq1.yahoo.com [98.137.11.163] |

```
C:\Users\irapa>tracert 74.6.231.20
```

```
Tracing route to media-router-fp73.prod.media.vip.ne1.yahoo.com [74.6.231.20]  
over a maximum of 30 hops:
```

|    |        |        |        |  |
|----|--------|--------|--------|--|
| 1  | 2 ms   | 6 ms   | 2 ms   | 192.168.0.1  |
| 2  | 4 ms   | 4 ms   | 4 ms   | fritz.box [192.168.178.1]                                    |
| 3  | 35 ms  | 17 ms  | 30 ms  | 10.141.0.1   |
| 4  | *      | *      | *      | Request timed out.   |
| 5  | 18 ms  | 19 ms  | 223 ms | 85.232.25.90   |
| 6  | 23 ms  | 21 ms  | 15 ms  | SNLEJ-MS01.hlkomm.net [85.232.0.55]                          |
| 7  | 35 ms  | 16 ms  | 17 ms  | 109.104.58.43  |
| 8  | 21 ms  | 21 ms  | 22 ms  | 109.104.60.32  |
| 9  | 34 ms  | 38 ms  | 217 ms | oath.bcix.de [193.178.185.110]                               |
| 10 | 44 ms  | *      | 36 ms  | ae-3.pat1.frz.yahoo.com [209.191.112.17]                     |
| 11 | 43 ms  | 50 ms  | 49 ms  | ae-0.pat2.frz.yahoo.com [209.191.112.49]                     |
| 12 | 114 ms | 113 ms | *      | ae-11.pat1.dce.yahoo.com [209.191.64.24]                     |
| 13 | 149 ms | 126 ms | 130 ms | ae-14.pat2.che.yahoo.com [209.191.64.39]                     |
| 14 | 150 ms | 149 ms | 155 ms | ae-7.pat2.nez.yahoo.com [209.191.64.214]                     |
| 15 | 148 ms | 140 ms | 141 ms | et-10-1-1.msr1.ne1.yahoo.com [216.115.105.31]                |
| 16 | 156 ms | 164 ms | 157 ms | et-18-0-0.clr1-a-gdc.ne1.yahoo.com [98.138.97.23]            |
| 17 | 139 ms | 149 ms | 139 ms | lo0.fab6-2-gdc.ne1.yahoo.com [98.138.51.5]                   |
| 18 | 141 ms | 143 ms | 162 ms | usw2-1-lbd.ne1.yahoo.com [98.138.97.157]                     |
| 19 | 262 ms | 147 ms | 138 ms | media-router-fp73.prod.media.vip.ne1.yahoo.com [74.6.231.20] |

```
C:\Users\irapa>tracert 74.6.143.26
```

```
Tracing route to media-router-fp74.prod.media.vip.bf1.yahoo.com [74.6.143.26]  
over a maximum of 30 hops:
```

|    |        |        |        |  |
|----|--------|--------|--------|--|
| 1  | 2 ms   | 2 ms   | 3 ms   | 192.168.0.1  |
| 2  | 2 ms   | 3 ms   | 2 ms   | fritz.box [192.168.178.1]                                    |
| 3  | 12 ms  | 17 ms  | 16 ms  | 10.141.0.1   |
| 4  | *      | *      | *      | Request timed out.   |
| 5  | 23 ms  | 15 ms  | 17 ms  | 85.232.25.90   |
| 6  | *      | 32 ms  | 18 ms  | SNLEJ-MS01.hlkomm.net [85.232.0.55]                          |
| 7  | 17 ms  | 16 ms  | 22 ms  | 109.104.58.41  |
| 8  | 22 ms  | 16 ms  | 20 ms  | 109.104.60.32  |
| 9  | 50 ms  | 38 ms  | 33 ms  | oath.bcix.de [193.178.185.110]                               |
| 10 | 137 ms | 41 ms  | 36 ms  | ae-3.pat1.frz.yahoo.com [209.191.112.17]                     |
| 11 | 42 ms  | *      | 41 ms  | ae-1.pat2.frz.yahoo.com [209.191.112.51]                     |
| 12 | 121 ms | 118 ms | 120 ms | ae-11.pat1.dce.yahoo.com [209.191.64.24]                     |
| 13 | 123 ms | 119 ms | 120 ms | ae-14.pat2.nyc.yahoo.com [209.191.64.23]                     |
| 14 | 146 ms | 128 ms | 141 ms | ae-1.pat2.bfw.yahoo.com [209.191.64.165]                     |
| 15 | 122 ms | 125 ms | 125 ms | et-0-1-1.msr1.bf2.yahoo.com [74.6.227.67]                    |
| 16 | 129 ms | 122 ms | *      | et-1-1-0.clr1-a-gdc.bf2.yahoo.com [74.6.122.53]              |
| 17 | 125 ms | 129 ms | 119 ms | lo0.fab7-1-gdc.bf2.yahoo.com [74.6.123.238]                  |
| 18 | 188 ms | 122 ms | 122 ms | usw2-1-lbb.bf2.yahoo.com [74.6.98.139]                       |
| 19 | 139 ms | 119 ms | 118 ms | media-router-fp74.prod.media.vip.bf1.yahoo.com [74.6.143.26] |

These hops are the same for all chosen remote IP addresses:

|   |       |       |        |                                     |
|---|-------|-------|--------|-------------------------------------|
| 1 | 2 ms  | 2 ms  | 2 ms   | 192.168.0.1                         |
| 2 | 3 ms  | 3 ms  | 3 ms   | fritz.box [192.168.178.1]           |
| 3 | 25 ms | 23 ms | 17 ms  | 10.141.0.1                          |
| 4 | *     | *     | *      | Request timed out.                  |
| 5 | 31 ms | 18 ms | 13 ms  | 85.232.25.90                        |
| 6 | 18 ms | 23 ms | 156 ms | SNLEJ-MS01.hlkomm.net [85.232.0.55] |

6. Find all your network "neighbors" by using the "arp" tool.

```
C:\Users\irapa>arp -a
```

```
Interface: 192.168.0.132 --- 0x8
```

| Internet Address | Physical Address  | Type    |
|------------------|-------------------|---------|
| 192.168.0.1      | 48-22-54-29-a0-0c | dynamic |
| 192.168.0.75     | 10-6f-d9-cc-5d-70 | dynamic |
| 192.168.0.255    | ff-ff-ff-ff-ff-ff | static  |
| 224.0.0.2        | 01-00-5e-00-00-02 | static  |
| 224.0.0.22       | 01-00-5e-00-00-16 | static  |
| 224.0.0.113      | 01-00-5e-00-00-71 | static  |
| 224.0.0.251      | 01-00-5e-00-00-fb | static  |
| 224.0.0.252      | 01-00-5e-00-00-fc | static  |
| 224.0.1.60       | 01-00-5e-00-01-3c | static  |
| 239.255.255.250  | 01-00-5e-7f-ff-fa | static  |
| 255.255.255.255  | ff-ff-ff-ff-ff-ff | static  |

```
Interface: 10.9.0.130 --- 0x9
```

| Internet Address | Physical Address  | Type    |
|------------------|-------------------|---------|
| 10.9.0.129       | 00-ff-43-a1-4f-08 | dynamic |
| 10.9.0.131       | ff-ff-ff-ff-ff-ff | static  |
| 224.0.0.2        | 01-00-5e-00-00-02 | static  |
| 224.0.0.22       | 01-00-5e-00-00-16 | static  |
| 224.0.0.251      | 01-00-5e-00-00-fb | static  |
| 224.0.0.252      | 01-00-5e-00-00-fc | static  |
| 224.0.1.60       | 01-00-5e-00-01-3c | static  |
| 239.255.255.250  | 01-00-5e-7f-ff-fa | static  |

my network "neighbors" are:

| Internet Address | Physical Address  | Type    |
|------------------|-------------------|---------|
| 192.168.0.1      | 48-22-54-29-a0-0c | dynamic |
| 192.168.0.75     | 10-6f-d9-cc-5d-70 | dynamic |

|            |                   |         |
|------------|-------------------|---------|
| 10.9.0.129 | 00-ff-43-a1-4f-08 | dynamic |
|------------|-------------------|---------|

7 Connect to Internet in a different way compared to p.1, e.g.: another WiFi access point, via smartphone acting like a router, etc. Repeat p.1 above. Highlight or explicitly specify all changes compared to p.1 above.

I use my smartphone as another WiFi access point

```
C:\Users\irapa>ipconfig
```

## Windows IP Configuration

### Unknown adapter LAN-Verbindung:

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

### Ethernet adapter Ethernet:

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

### Unknown adapter OpenVPN Connect DC0 Adapter:

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

### Wireless LAN adapter LAN-Verbindung\* 1:

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

### Wireless LAN adapter LAN-Verbindung\* 2:

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

### Wireless LAN adapter WLAN:

```
Connection-specific DNS Suffix  . :
Link-local IPv6 Address . . . . . : fe80::bf1c:42dc:8fa5:bae2%8
IPv4 Address. . . . . : 192.168.171.242
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.171.185
```

```
C:\Users\irapa>ipconfig
```

## Windows IP Configuration

### Unknown adapter LAN-Verbindung:

With smartphone as another WiFi access point, we can see that we have another ip address and default gateway:



IPv4 Address . . . . . : 192.168.171.242

Subnet Mask . . . . . : 255.255.255.0

Default Gateway . . . . . : 192.168.171.185

As it was at p1:

IPv4 Address . . . . . : 192.168.0.132

Subnet Mask . . . . . : 255.255.255.0

Default Gateway . . . . . : 192.168.0.1

When open vpn is on we can see

Unknown adapter LAN-Verbindung:

Connection-specific DNS Suffix . :

Link-local IPv6 Address . . . . : fe80::7785:843b:a5d:c9a1%9

IPv4 Address . . . . . : 10.9.0.130

Subnet Mask . . . . . : 255.255.255.252

Default Gateway . . . . . :

When open vpn is off, we can not see this information:

```
C:\Users\irapa>ipconfig

Windows IP Configuration

Unknown adapter LAN-Verbindung:

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

8 Having the same internet connection as in p.7, repeat p.2 above with the same IP address of yandex.ru. Highlight or explicitly specify common hops in these two traces.

When we use smartphone: we can see that the first step is different

1 2 ms 1 ms 1 ms 192.168.183.178 . It is because we use smartphone

Then they are the same

2 15 ms 11 ms 7 ms 192.168.0.1

3 42 ms 6 ms 7 ms fritz.box [192.168.178.1]

4 24 ms 20 ms 16 ms 10.141.0.1

```
5  *      *      *      Request timed out.

6  21 ms   18 ms   21 ms  85.232.25.90

7  18 ms   22 ms   215 ms SNLEJ-MS01.hlkomm.net [85.232.0.55]

8  37 ms   19 ms   17 ms  109.104.58.37

9  27 ms   25 ms   22 ms  HEFRA-MC01.hlkomm.net [109.104.60.64]

10 25 ms   83 ms   24 ms  ipv4.de-cix.fra.de.as208722.yandex.com [80.81.192.251]

11 *      *      *      Request timed out.

12 63 ms   59 ms   339 ms yandex.ru [5.255.255.70]
```

```
C:\Users\irapa>tracert yandex.ru

Tracing route to yandex.ru [5.255.255.70]
over a maximum of 30 hops:

  1    39 ms     2 ms     4 ms  192.168.0.1
  2     8 ms     3 ms     5 ms  fritz.box [192.168.178.1]
  3    17 ms    16 ms    13 ms  10.141.0.1
  4     *        *        *    Request timed out.
  5    11 ms    17 ms    15 ms  85.232.25.90
  6    17 ms    14 ms   172 ms  SNLEJ-MS01.hlkomm.net [85.232.0.55]
  7    19 ms    15 ms    20 ms  109.104.58.37
  8    24 ms    22 ms    21 ms  HEFRA-MC01.hlkomm.net [109.104.60.64]
  9    26 ms    21 ms    24 ms  ipv4.de-cix.fra.de.as208722.yandex.com [80.81.192.251]
 10     *        *        *    Request timed out.
 11    61 ms    58 ms    57 ms  yandex.ru [5.255.255.70]
```

```
C:\Users\irapa>tracert yandex.ru

Tracing route to yandex.ru [5.255.255.70]
over a maximum of 30 hops:

  1     2 ms     1 ms     1 ms  192.168.183.178
  2    15 ms    11 ms     7 ms  192.168.0.1
  3    42 ms     6 ms     7 ms  fritz.box [192.168.178.1]
  4    24 ms    20 ms    16 ms  10.141.0.1
  5     *        *        *    Request timed out.
  6    21 ms    18 ms    21 ms  85.232.25.90
  7    18 ms    22 ms   215 ms  SNLEJ-MS01.hlkomm.net [85.232.0.55]
  8    37 ms    19 ms    17 ms  109.104.58.37
  9    27 ms    25 ms    22 ms  HEFRA-MC01.hlkomm.net [109.104.60.64]
 10    25 ms    83 ms    24 ms  ipv4.de-cix.fra.de.as208722.yandex.com [80.81.192.251]
 11     *        *        *    Request timed out.
 12    63 ms    59 ms   339 ms  yandex.ru [5.255.255.70]
```