System Administration and IP Services

Contents

1 TCP/IP Networking Exercises

- Commands preceded with "$" imply that you should execute the command as a general user - not as root.
- Commands preceded with "#" imply that you should be working as root.
- Commands with more specific command lines (e.g. "rtrX>" or "mysql>") imply that you are executing commands on remote equipment, or within another program.

2 Practice: ping, netstat, tcpdump, traceroute, arp, route

2.1 Check your network configuration

Check it with:

```
$ sudo ifconfig eth0
```

Do you see an IP address on your network card? It should look like this:

```
eth0      Link encap:Ethernet  HWaddr 52:54:8e:12:66:49
          inet addr:10.0.0.xx  Bcast:10.0.0.255  Mask:255.255.255.0
```

This is your machine's IP address.

If you wanted to manually configure the IP address of eth0 (your computer's network card) to give it an IP address (10.0.0.xx), then you would write:

```
$ sudo ifconfig eth0 10.0.0.xx/24
$ sudo route add default gw 10.0.0.254
```

Note: Don't do this now! As we are logged in using SSH, don't do this or you may end up breaking your network connection to your machine.

2.2 netstat

Look at your routing table:

```
$ netstat -rn
```

- What do you notice?
- Is the default gateway configured?
- How do you know?

Review the presentation if you are not sure.

- What is your default gateway?
- On what network interface is your default gateway reachable ?

Here's another way to look at your routing table:

```
$ ip route
```

2.3 ping

Let's ping the default gateway:

```
$ ping 10.0.0.254
```

(Stop it with CTRL+C)

Let's ping something outside, on the Internet. For example, nsrc.org

```
$ ping nsrc.org
```

Do you get an answer ?

If not, check:

- That you have a gateway configured
- That in the file /etc/resolv.conf there is an entry for "nameserver"
- Do you notice anything about the response time? How far away is nsrc.org?

Verify 10.0.0.254 is configured as your default gateway:

```
$ netstat -rn
```

Now, remove your default gateway:

```
$ sudo route delete default
```

Check that it's gone

```
$ netstat -rn
```

How can you be sure that the default gateway is no longer configured? Now, try to ping the local NOC machine.

```
$ ping 10.0.0.250
```

Now let's ping a machine outside our network (nsrc.org):

```
$ ping nsrc.org
```

The ip address of nsrc.org is `128.223.157.19`

```
$ ping 128.223.157.19
```

What do you observe? What is the consequence of removing the default gateway?

Re-establish the default gateway:

```
$ sudo route add default gw 10.0.0.254
```

Check that the default gateway is enabled again by pinging nsrc.org:

```
$ ping nsrc.org
```

2.4 traceroute

Traceroute to nsrc.org

```
$ traceroute nsrc.org
```

Try again, this time with the -n option:

```
$ traceroute -n nsrc.org
```

Observe the difference with and without the '-n' option. Do you know what it is?

Try this again with the command "mtr":

```
$ mtr nsrc.org
```

You can stop mtr with CTRL-C.

2.5 tcpdump

Run tcpdump on your system:

```
$ sudo tcpdump -n -i eth0 icmp
```

(Note the use of the icmp keyword to limit viewing ICMP traffic)

Ask the instructor(s) or your neighbor to ping your machine, and look at your screen.

Now delete the default route on your system:

```
$ sudo route delete default
```

Repeat the ping (ask the instructor or neighbor)

Does it make a difference ?

2.6 arp table

Run the command:

```
$ arp -a
```

And

```
$ arp -an
```

Now, try and ping another host on the network (10.0.0.1 - .98)

Run `arp -an` again.

What do you notice ?

Now try:

```
$ ping -c 2 nsrc.org
$ arp -an
```

- What do you notice ?
- When is ARP used,
- When is it not used ?

2.7 Reaching another network

- Try to ping: 10.10.1.1
- Try to traceroute (or mtr) to 10.10.1.1

Now, remove the default route:

```
$ sudo route delete default
```

Now, try to ping 10.10.1.1 again.

- What happened ?

For your knowledge, 10.10.1.1 is a PC on network 10.10.1.0/24.

This network is reachable via the router 10.0.0.221.

- What route do you need to add to reach 10.10.1.1 (not a default route ?)
- What route do you need to add to reach 10.10.1.2 (another PC on the same network) ?

You can solve both questions with one answer!

2.8 IPv6

Do this:

```
$ sudo /sbin/ifconfig eth0 inet6 add fdba:dc55:48c7::00:XX/64
```

... replace XX with the number of your VM ! (01, 02, ... , 23, ...)

Now, try to ping6 each other:

```
$ ping6 fdba:dc55:48c7::00:YY
```

Where YY is the IP of another VM in the class.