

# ***Lesson 9: Configuring Basic Networking***

# ***Objectives covered***

- ***109.1 Fundamentals of internet protocols (weight: 4)***
- ***109.2 Persistent network configuration (weight: 4)***
- ***109.4 Configure client side DNS (weight: 2)***
- ***109.3 Basic network troubleshooting (weight: 4)***

# *Basic network troubleshooting*

# *Sending test packets and tracing route*

```
$ ping 10.0.2.2
```

```
PING 10.0.2.2 (10.0.2.2) 56(84) bytes of data.  
64 bytes from 10.0.2.2: icmp_seq=1 ttl=63 time=14.6 ms  
64 bytes from 10.0.2.2: icmp_seq=2 ttl=63 time=3.82 ms  
64 bytes from 10.0.2.2: icmp_seq=3 ttl=63 time=2.05 ms  
64 bytes from 10.0.2.2: icmp_seq=4 ttl=63 time=0.088 ms  
64 bytes from 10.0.2.2: icmp_seq=5 ttl=63 time=3.54 ms  
64 bytes from 10.0.2.2: icmp_seq=6 ttl=63 time=3.97 ms  
64 bytes from 10.0.2.2: icmp_seq=7 ttl=63 time=0.040 ms  
^C  
--- 10.0.2.2 ping statistics ---  
7 packets transmitted, 7 received, 0% packet loss, time 6020ms  
rtt min/avg/max/mdev = 0.040/4.030/14.696/4.620 ms
```

```
$ ping6 -c 4 fe80::c418:2ed0:aead:cbce%enp0s3
```

```
PING fe80::c418:2ed0:aead:cbce%enp0s3(fe80::c418:2ed0:aead:cbce) 56 data  
bytes  
64 bytes from fe80::c418:2ed0:aead:cbce: icmp_seq=1 ttl=128 time=1.47 ms  
64 bytes from fe80::c418:2ed0:aead:cbce: icmp_seq=2 ttl=128 time=0.478 ms  
64 bytes from fe80::c418:2ed0:aead:cbce: icmp_seq=3 ttl=128 time=0.777 ms  
64 bytes from fe80::c418:2ed0:aead:cbce: icmp_seq=4 ttl=128 time=0.659 ms  
  
--- fe80::c418:2ed0:aead:cbce%enp0s3 ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3003ms  
rtt min/avg/max/mdev = 0.478/0.847/1.475/0.378 ms
```

```
$ tracepath 192.168.1.254
```

```
1?: [LOCALHOST] pmtu 1500  
1: _gateway 6.218ms reached  
1: homeportal 4.366ms reached  
Resume: pmtu 1500 hops 1 back 1
```

# Look up DNS information

```
$ host www.google.com
```

```
www.google.com has address 74.125.138.104
www.google.com has address 74.125.138.105
www.google.com has address 74.125.138.147
www.google.com has address 74.125.138.99
www.google.com has address 74.125.138.103
www.google.com has address 74.125.138.106
www.google.com has IPv6 address 2607:f8b0:4002:c0c::67
```

```
$ nslookup
```

```
> www.google.com
```

```
Server:          192.168.1.254
Address:         192.168.1.254#53
```

```
Non-authoritative answer:
```

```
Name:   www.google.com
Address: 172.217.2.228
```

```
> www.wikipedia.org
```

```
Server:          192.168.1.254
Address:         192.168.1.254#53
```

```
Non-authoritative answer:
```

```
Name:   www.wikipedia.org
Address: 208.80.153.224
```

```
> exit
```

```
$ dig www.linux.org
```

```
; <<>> DiG 9.9.4-RedHat-9.9.4-18.el7_1.5 <<>> www.linux.org
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 45314
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1
```

```
;; OPT PSEUDOSECTION:
```

```
; EDNS: version: 0, flags;; udp: 4096
```

```
;; QUESTION SECTION:
```

```
;www.linux.org.                IN      A
```

```
;; ANSWER SECTION:
```

```
www.linux.org.        14400   IN      CNAME   linux.org.
linux.org.            3600    IN      A        107.170.40.56
```

```
;; Query time: 75 msec
```

```
;; SERVER: 192.168.1.254#53(192.168.1.254)
```

```
;; WHEN: Sat Feb 06 17:44:29 EST 2016
```

```
;; MSG SIZE rcvd: 72
```

# The netstat Command

```
# netstat -s
```

```
Ip:
```

```
240762 total packets received
0 forwarded
0 incoming packets discarded
240747 incoming packets delivered
206940 requests sent out
32 dropped because of missing route
```

```
Icmp:
```

```
57 ICMP messages received
0 input ICMP message failed.
ICMP input histogram:
    destination unreachable: 12
    timeout in transit: 38
    echo replies: 7
7 ICMP messages sent
0 ICMP messages failed
ICMP output histogram:
    echo request: 7
```

```
IcmpMsg:
```

```
InType0: 7
InType3: 12
InType11: 38
OutType8: 7
```

```
Tcp:
```

```
286 active connections openings
0 passive connection openings
0 failed connection attempts
0 connection resets received
0 connections established
239933 segments received
206091 segments send out
0 segments retransmitted
0 bad segments received.
0 resets sent
```

```
# netstat
```

```
Active Internet connections (w/o servers)
```

```
Proto Recv-Q Send-Q Local Address           Foreign Address          State
```

```
Active UNIX domain sockets (w/o servers)
```

Proto	RefCnt	Flags	Type	State	I-Node	Path
unix	2	[ ]	DGRAM		10825	@/org/freedesktop/systemd1/notify
unix	2	[ ]	DGRAM		10933	/run/systemd/shutdown
unix	6	[ ]	DGRAM		6609	/run/systemd/journal/socket
unix	25	[ ]	DGRAM		6611	/dev/log
unix	3	[ ]	STREAM	CONNECTED	25693	
unix	3	[ ]	STREAM	CONNECTED	20770	/var/run/dbus/system_bus_socket
unix	3	[ ]	STREAM	CONNECTED	19556	
unix	3	[ ]	STREAM	CONNECTED	19511	
unix	2	[ ]	DGRAM		24125	
unix	3	[ ]	STREAM	CONNECTED	19535	
unix	3	[ ]	STREAM	CONNECTED	18067	/var/run/dbus/system_bus_socket
unix	3	[ ]	STREAM	CONNECTED	32358	
unix	3	[ ]	STREAM	CONNECTED	24818	/var/run/dbus/system_bus_socket
...						

```
$ netstat -t
```

```
Active Internet connections (w/o servers)
```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State
tcp	1	0	10.0.2.15:58630	productsearch.ubu:https	CLOSE_WAIT
tcp6	1	0	ip6-localhost:57782	ip6-localhost:ipp	CLOSE_WAIT

```
$ netstat -l
```

```
Active Internet connections (only servers)
```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State
tcp	0	0	ubuntu02:domain	*:*	LISTEN
tcp	0	0	localhost:ipp	*:*	LISTEN
tcp6	0	0	ip6-localhost:ipp	[::]:*	LISTEN
udp	0	0	*:ipp	*:*	
udp	0	0	*:mdns	*:*	
udp	0	0	*:36355	*:*	
udp	0	0	ubuntu02:domain	*:*	
udp	0	0	*:bootpc	*:*	
udp	0	0	*:12461	*:*	
udp6	0	0	[::]:64294	[::]:*	
udp6	0	0	[::]:60259	[::]:*	
udp6	0	0	[::]:mdns	[::]:*	
...					

# Examining sockets

```
$ ss -anpt
```

State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port
LISTEN	0	100	127.0.0.1:25	*:*
LISTEN	0	128	*:111	*:*
LISTEN	0	5	192.168.122.1:53	*:*
LISTEN	0	128	*:22	*:*
LISTEN	0	128	127.0.0.1:631	*:*
LISTEN	0	100	:::1:25	:::*
LISTEN	0	128	:::1:111	:::*
LISTEN	0	128	:::22	:::*
LISTEN	0	128	:::1:631	:::*
ESTAB	0	0	:::1:22	:::1:40490
ESTAB	0	0	:::1:40490	:::1:22

```
users:(("ssh",pid=15176,fd=3))
```

# *Netcat utility*

```
# nc -l 2000
```

This is a test message from client

**Server**

**IP ADD: 192.168.1.10**

```
# nc 192.168.1.10 2000
```

This is a test message from client

**Client**

**IP Addr: 192.168.1.23**



*Question...* ■