– LPI 102 –

TCP/IP Configuration and Troubleshooting

(Linux Professional Institute Certification)

`$Id: gl2.112.3.slides.tex,v 1.1 2003/10/25 04:33:06 anguslees Exp $`

TCP/IP Configuration and Troubleshooting

Objective

Candidates should be able to view, change and verify configuration settings and operational status for various network interfaces. This objective includes manual and automatic configuration of interfaces and routing tables. This especially means to add, start, stop, restart, delete or reconfigure network interfaces. It also means to change, view or configure the routing table and to correct an improperly set default route manually. Candidates should be able to configure Linux as a DHCP client and a TCP/IP host and to debug problems associated with the network configuration.

Weight: 7

TCP/IP Configuration and Troubleshooting

Key files, terms, and utilities

```
/etc/HOSTNAME or /etc/hostname
/etc/hosts
/etc/networks
/etc/host.conf
/etc/resolv.conf
/etc/nsswitch.conf
traceroute
dhcpcd, dhcpclient, pump
hostname (domainname, dnsdomainname)
```

```
ifconfig
route
netstat
host
ping
tcpdump
```

the network scripts run during system initialisation

TCP/IP Configuration and Troubleshooting

Resources of Interest

Linux Networking HOWTO by Joshua Drake :

`http://www.linuxdoc.org/HOWTO/Net-HOWTO/index.html`

Linux Ethernet-Howto by Paul Gortmaker :

`http://www.linuxdoc.org/HOWTO/Ethernet-HOWTO.html`

ifconfig – Low level network config

Network interface configuration

```
ifconfig eth0 192.168.7.26
    netmask 255.255.255.0
    broadcast 192.168.7.255

ifconfig eth0 down
```

route – Low level network config

```
route add -net 192.168.7.0
    netmask 255.255.255.0
    dev eth0

route add default gw 192.168.7.1
```

View routing table:

```
route -n
```

netstat – See network stuff

Ports in use	netstat -a -u -t
Routing table	netstat -r
Interfaces	netstat -i
Multicast groups	netstat -g
Masqueraded connections	netstat -M
Statistics	netstat -s

Network debugging

ping Try to bounce an ICMP packet off a host

Good for reachability, round trip delay, packet loss

traceroute Show the network path to a particular host

Good for testing routing problems, “which ISP screwed up”

tcpdump Dump raw network traffic

Exceptional for diagnosing network problems involving a particular host

tcpdump again

tcpdump is your friend, learn to use it

```
# tcpdump -i ppp0 not port ssh
tcpdump: listening on ppp0
21:54:32.913475 10.0.128.107.1024 > 10.0.128.97.domain:  20147+ A? fatso.urnet.com.au
21:54:33.102745 10.0.128.97.domain > 10.0.128.107.1024:  20147* 1/3/3 (178) (DF)
21:54:33.103766 10.0.128.107 > 203.26.250.2: icmp: echo request (DF)
21:54:33.352745 203.26.250.2 > 10.0.128.107: icmp: echo reply
21:54:34.102912 10.0.128.107 > 203.26.250.2: icmp: echo request (DF)
21:54:34.302745 203.26.250.2 > 10.0.128.107: icmp: echo reply
21:56:09.908636 10.0.128.107.1068 > 203.26.250.2.www: S 1245080954:1245080954(0) win
21:56:10.052743 203.26.250.2.www > 10.0.128.107.1068: S 3633684004:3633684004(0) ack
21:56:10.052869 10.0.128.107.1068 > 203.26.250.2.www: . ack 1 win 5840 <nop,nop,times
21:56:12.977510 10.0.128.107.1068 > 203.26.250.2.www: P 1:2(1) ack 1 win 5840 <nop,no
```

`/etc/HOSTNAME` or `/etc/hostname`

System scripts set the hostname from one of these files during boot, using the **hostname** command.

dnsdomainname, **ypdomainname**, **nisdomainname** and **domainname** are variations on **hostname**

domainname gives the NIS domainname, **NOT the DNS domain**

/etc/nsswitch.conf

“Name Service Switch” configuration

```
passwd:         compat
group:          compat
shadow:         compat

hosts:          files dns
networks:       files

protocols:      db files
services:       db files
ethers:         db files
rpc:            db files

netgroup:       nis
```

`/etc/networks`

Labels for network addresses

Only supports class A, B or C addresses (not CIDR)

Rarely used or kept up to date

```
localnet 192.168.1.0
```

/etc/hosts

Hostname to IP address mapping, mostly superseded by DNS

```
127.0.0.1       localhost
192.168.1.1     cat.pasture.com.au      cat

# The following lines are desirable for IPv6 capable hosts

::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts
```

`/etc/host.conf` – Resolver configuration

Various keywords to tweak non-DNS-specific resolver behaviour

Rarely modified; most options no longer relevant

```
order hosts,bind
multi on
```

`/etc/resolv.conf` – DNS configuration

DNS configuration for resolver

Nameserver defaults to `127.0.0.1`, search suffix defaults to DNS domain name

```
search pasture.com.au
nameserver 10.0.128.97
```

Debugging DNS

host performs various DNS queries

`host [options] hostname [server]`

Common options:

-v verbose

-l list all hosts in a domain (using AXFR)

-t query type (“-t any” is useful)

DHCP

“Dynamic Host Control Protocol” configures networking details, DNS, etc automatically by querying a “DHCP server”

Various DHCP clients:

dhcpclient Comes with ISC DHCP server, highly configurable

dhcpcd

pump Simple DHCP client written by RedHat

udhcpc Very small DHCP client