– General Linux 2 –

Fundamentals of TCP/IP [4]

(Linux Professional Institute Certification)

a


```
   .~.
   /V\      by: geoffrey robertson
  // \\         geoffrey@zip.com.au
  @._.@
```


$Id: gl2.112.1.slides.tex,v 1.1 2003/09/10 01:40:47 geoffr Exp $

(2.2) Networking Fundamentals [14]

1.112.1 **Fundamentals of TCP/IP [4]**

1.112.3 TCP/IP configuration and troubleshooting [7]

1.112.4 Configure Linux as a PPP client [3]

Fundamentals of TCP/IP [4]

Objective

Candidates should demonstrate a proper understanding of network fundamentals.

This objective includes the understanding of IP-addresses, network masks and what they mean (i.e. determine a network and broadcast address for a host based on its subnet mask in ”dotted quad” or abbreviated notation or determine the network address, broadcast address and netmask when given an IP-address and number of bits).

It also covers the understanding of the network classes and classless subnets (CIDR) and the reserved addresses for private network use.

It includes the understanding of the function and application of a default route.

It also includes the understanding of basic internet protocols (IP, ICMP, TCP, UDP) and the more common TCP and UDP ports (20, 21, 23, 25, 53, 80, 110, 119, 139, 143, 161).

Fundamentals of TCP/IP [4]

Key files, terms, and utilities

```
/etc/services
ftp
telnet
host
ping
dig
traceroute
whois
```

Fundamentals of TCP/IP [4]

Resources of interest

TCP/IP Illustrated, Volume 1

The Protocols

by W. Richard Stevens

Addison Wesley

LPIC 1 Certification Bible

Angie Nash and Jason Nash

Hungry Minds

IP addressing

This objective includes the understanding of IP-addresses, network masks and what they mean (i.e. determine a network and broadcast address for a host based on its subnet mask in ”dotted quad” or abbreviated notation or determine the network address, broadcast address and netmask when given an IP-address and number of bits).

IP Address Classes (Classic)

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Class A - 255.0.0.0

0**0**0000000.00000000.00000000.00000000 - 0.0.0.0

0**1**1111111.11111111.11111111.11111111 - 127.255.255.255

IP Address Classes (Classic)

Class A - 255.0.0.0

0**0**0000000.00000000.00000000.00000000 - 0.0.0.0
0**1**1111111.11111111.11111111.11111111 - 127.255.255.255

Class B - 255.255.0.0

10**0**000000.00000000.00000000.00000000 - 128.0.0.0
10**1**111111.11111111.11111111.11111111 - 191.255.255.255

IP Address Classes (Classic)

Class A - 255.0.0.0

0xxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 0.0.0.0

0xxxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 127.255.255.255

Class B - 255.255.0.0

10xxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 128.0.0.0

10xxxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 191.255.255.255

Class C - 255.255.255.0

110xxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 192.0.0.0

110xxxxx.xxxxxxxx.xxxxxxxx.xxxxxxxx - 223.255.255.255

IP Address - Loopback

Reserved Space 127.0.0.0 — 127.255.255.255

127.0.0.1 localhost

IP Address - Private Networks

There are IP ranges set aside for privite address spaces. These should not be made visible on the internet.

Class A

`10.0.0.0 --- 10.255.255.255`

Class B

`172.16.0.0 --- 172.32.255.255`

Class C

`192.168.0.0 --- 192.168.255.255`

IP Address - Subneting

```
Network: 192.168.192.0
Subnet:  255.255.255.224
```

IP Address - Default Route

```
# route add default gw 192.168.1.1
```

DoD Layer Model

Application ftp, telnet, mail, http protocols

Transport TCP , UDP protocols

Network IP, ICMP, IGMP protocols

Link Ethernet, Token Ring, FDDI

Basic Internet Protocols

IP

ICMP

TCP

UDP

Ports and Port Numbers

Listing the Ports

```
$ less /etc/services
ftp                 21/tcp
ftp                 21/udp              fsp fspd
ssh                 22/tcp              # SSH Remote Login Protocol
ssh                 22/udp              # SSH Remote Login Protocol
telnet              23/tcp
telnet              23/udp
# 24 - private mail system
smtp                25/tcp              mail
smtp                25/udp              mail
time                37/tcp              timserver
```

Ports and Port Numbers

FTP 20, 21

Telnet 23

SSH 22

smtp 25

DNS 53

http 80

pop3 110

nntp 119

netbios 137, 138, 139

imap2 143

snmp 161

Port Number vRanges

1-255

Original reserved ports (till 1992) (256-1023 UNIX)

1-1023

Well Known or Famous Port Numbers - Reserved

1024-65535

Unprivileged

The End