

# – LPI 102 –

## 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 \$

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# 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

00000000.00000000.00000000.00000000 - 0.0.0.0

01111111.11111111.11111111.11111111 - 127.255.255.255



# IP Address Classes (Classic)

## Class A - 255.0.0.0

00000000.00000000.00000000.00000000 - 0.0.0.0  
01111111.11111111.11111111.11111111 - 127.255.255.255

## Class B - 255.255.0.0

10000000.00000000.00000000.00000000 - 128.0.0.0  
10111111.11111111.11111111.11111111 - 191.255.255.255

# IP Address Classes (Classic)

## Class A - 255.0.0.0

00000000.00000000.00000000.00000000 - 0.0.0.0  
01111111.11111111.11111111.11111111 - 127.255.255.255

## Class B - 255.255.0.0

10000000.00000000.00000000.00000000 - 128.0.0.0  
10111111.11111111.11111111.11111111 - 191.255.255.255

## Class C - 255.255.255.0

11000000.00000000.00000000.00000000 - 192.0.0.0  
11011111.11111111.11111111.11111111 - 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 private 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 - Subnetting

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
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

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