Chapter 15
TFTP: Trivial File Transfer Protocol

Introduction

- TFTP is the Trivial File Transfer Protocol.
- Be used when bootstrapping diskless system, normally workstations or X terminals.
- Be designed to use UDP, to make it simple and small.

Protocol

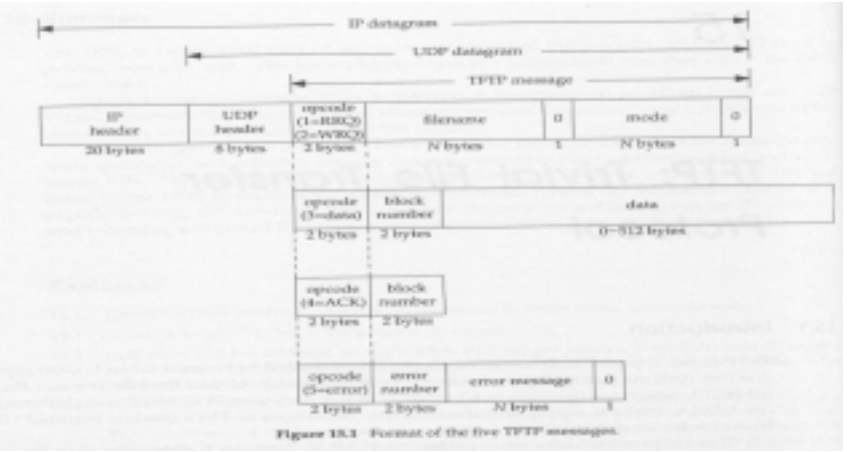

Figure 15.1 Format of the five TFTP messages.

Protocol (Cont.)

- **Format:**
  - *opcode*: 1=RRQ ; 2=WRQ ; 3=data ; 4=ACK ; 5=error
  - *filename*: the file on the server that the client wants to read from or write to.
  - *mode*:
  - *block number*: be used in an acknowledgment packet.
  - *error number* and *error message*: OS specific information. This is what the server responds with if a read request or write request can't be processed.
- **Stop-and-wait protocol**
- **Sorcerer's apprentice syndrome: both sides time out and retransmit (each data and ACK are transmitted twice).**

An Example

- **Scenario:**
  - We'll run the TFTP client on the host bsdi and fetch a text file from the host svr4.

```
bsdi% tftp svr4
tftp> get test1.c
Received 962 bytes in 0.3 seconds
tftp> quit
bsdi% ls -l test1.c
-rw-r--r--  1 rstevens  staff  914 Mar 20 11:41 test1.c
bsdi% wc -l test1.c
          48 test1.c
```


- Output of *tcpdump*

TFTP well-known port is 69

2 bytes for opcode+7 bytes filename+1 byte 0+8 byte netascii+1 byte 0

```
1  0.0                    bsdi.1106 > svr4.tftp: 19 RRQ "test1.c"

2  0.287080 (0.2871)      svr4.1077 > bsdi.1106: udp 516
3  0.291178 (0.0041)      bsdi.1106 > svr4.1077: udp 4

4  0.299446 (0.0083)      svr4.1077 > bsdi.1106: udp 454
5  0.312320 (0.0129)      bsdi.1106 > svr4.1077: udp 4
```

2 bytes for opcode+2 bytes for block number+512 bytes of data

Figure 15.2 Packet exchange for TFTP of a file.

Security

- There is no provision for a username or password.
- TFTP was designed for use during the bootstrap.
- Most TFTP servers nowadays provide an option whereby only files in a specific directory can be accessed.
- The TFTP server on a UNIX system normally sets its user ID and group ID to values that should not be assigned to any real user.

Summary

- TFTP is a simple protocol designed to fit into read-only memory and be used only during the bootstrap process of diskless systems.
- To allow multiple clients to bootstrap at the same time.
- The TFTP protocol provides no security feature.