PSIT
Kanpur

Computer Networks

(RCS-601)

UNIT 5

Application Layer

FILE TRANSFER PROTOCOL

FTP (File Transfer Protocol)

- **File Transfer Protocol (FTP)** is a standard network protocol for transmitting files between connected computers on the network over TCP/IP connections.

- FTP is a client-server protocol that relies on two communications channels between client and server: a command channel for controlling the conversation and a data channel for transmitting file content. Clients initiate conversations with servers by requesting to download a file.

- Using FTP, a client can upload, download, delete, rename, move and copy files on a server. A user typically needs to log on to the FTP server, although some servers make some or all of their content available without login, known as anonymous FTP.

FTP (File Transfer Protocol) - contd.

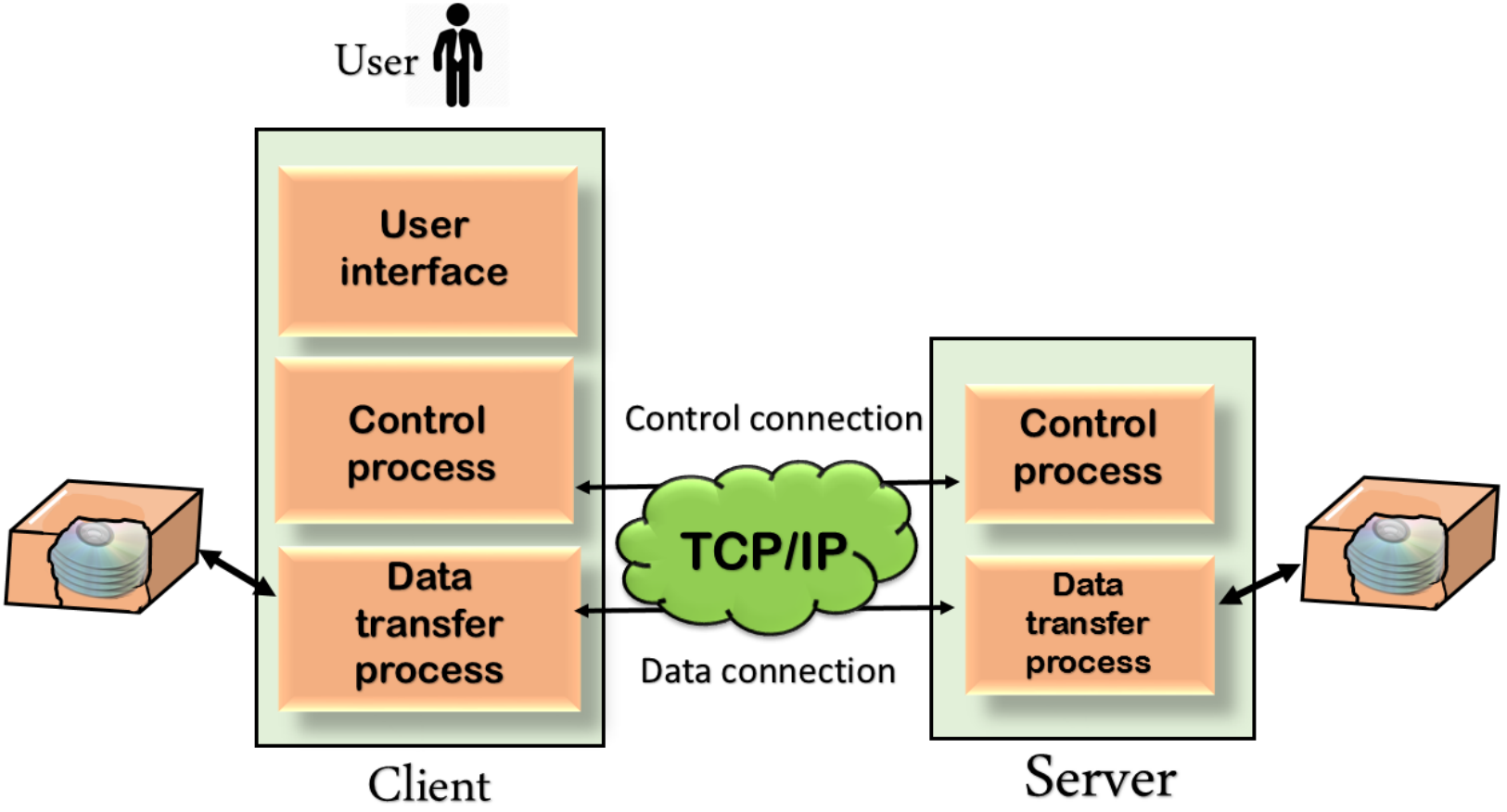
- Anonymous FTP is a type of FTP that allows users to access files and other data without needing an ID or password. Some websites will allow visitors to use a guest ID or password- anonymous FTP allows this.

- Although a lot of file transfer is now handled using HTTP, FTP is still commonly used to transfer files "behind the scenes" for other applications -- e.g., hidden behind the user interfaces of banking, a service that helps build a website, such as Wix or SquareSpace, or other services. It is also used, via Web browsers, to download new applications.

FTP Client

- **An FTP client is a *software* which uses the FTP protocol to transfer files to and from a remote computer.**
- It allows a user to connect to a remote host and upload or download the files.
- It has a set of commands that we can use to connect to a host, transfer the files between you and your host and close the connection.
- The FTP program is also ***available as a built-in component in a Web browser***. This GUI based FTP client makes the file transfer very easy and also does not require to remember the FTP commands.

Basic model of FTP

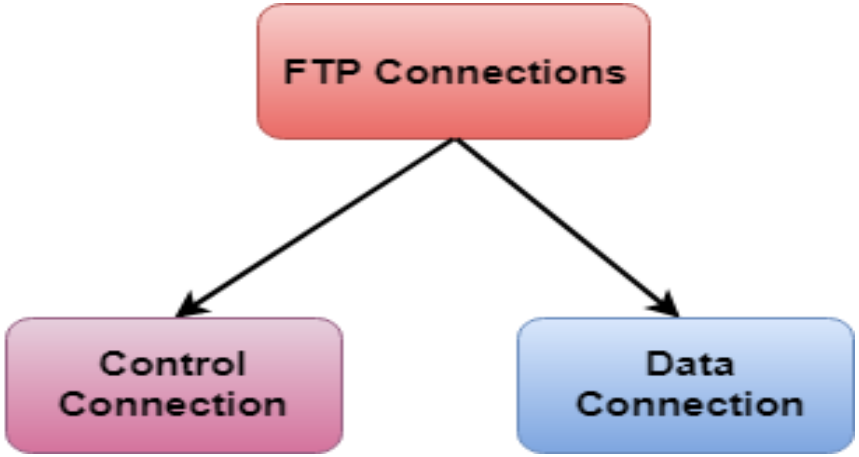


- The FTP client has three components:
  User interface, control process, and data transfer process

- The server has two components:
  Server control process and the server data transfer process

FTP: connections

FTP protocol establishes two types of connections between hosts-



- **Control Connection:** The control connection uses very simple rules for communication. Through control connection, we can transfer a line of command or line of response at a time. The control connection is made between the control processes. The control connection remains connected during the entire interactive FTP session.

- **Data Connection:** The Data Connection uses very complex rules as data types may vary. The data connection is made between data transfer processes. The data connection opens when a command comes for transferring the files and closes when the file is transferred.

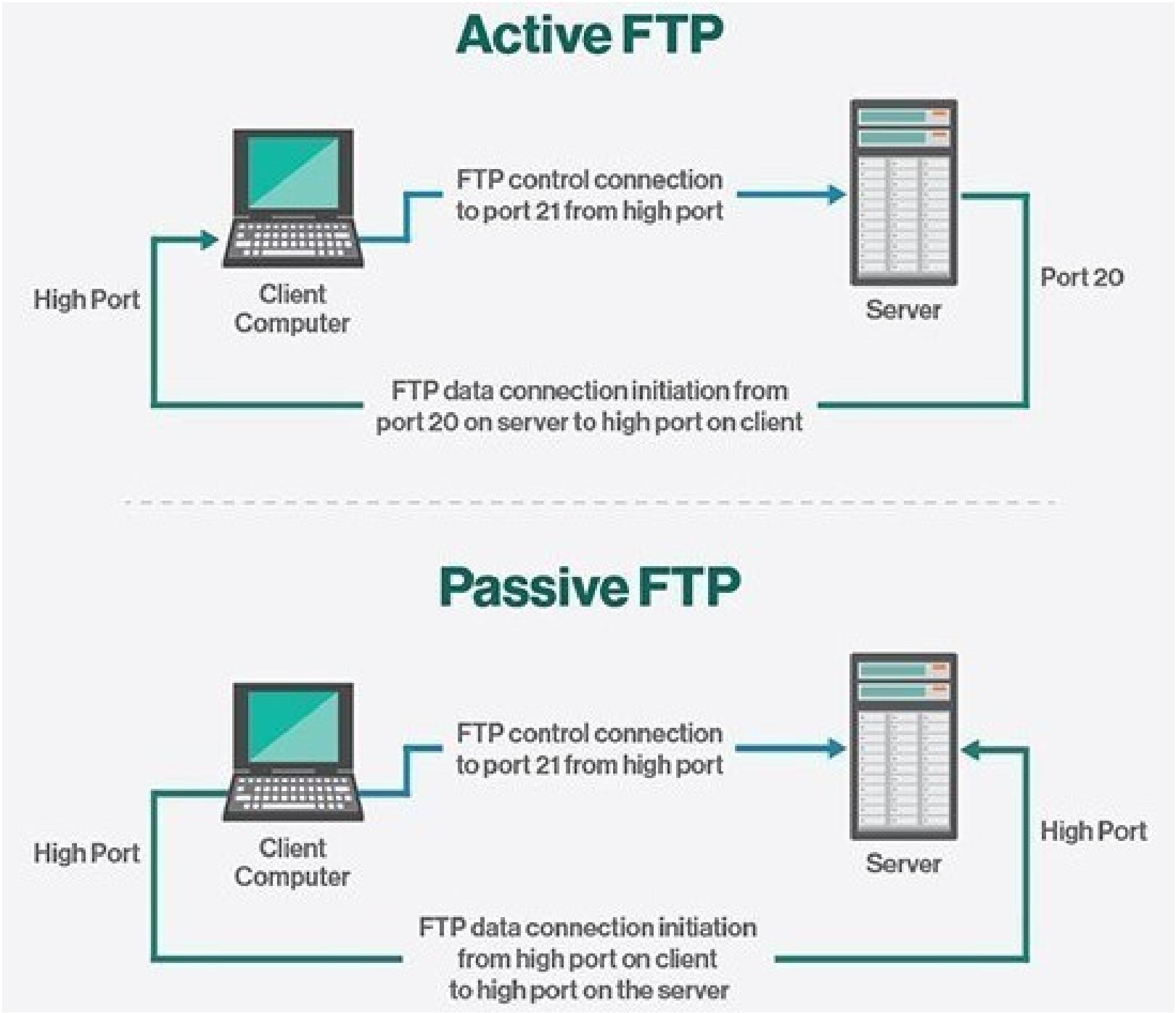
- FTP utilizes two ports, a **'data' port** and a **'command' port** (also known as the control port).

  Traditionally these are **port 21 for the command port** and **port 20 for the data port.**

FTP sessions work in passive or active modes-

- **In active mode,** after a client initiates a session via a command channel request, the server initiates a data connection back to the client and begins transferring data.
  In the active mode, the client initially specifies which client-side port it has opened up for the data channel, and **the server initiates the connection**.

- **In passive mode,** the server instead uses the command channel to send the client the information it needs to open a data channel. Because passive mode has the client initiating all connections, it works well across firewalls and Network Address Translation (NAT) gateways.
  In the passive mode, the server specifies which server-side port the client should connect to and **the client initiates the connection**.


Active FTP
FTP control connection
to port 21 from high port
High Port
Client
Computer
Server
Port 20
FTP data connection initiation from
port 20 on server to high port on client
Passive FTP
FTP control connection
to port 21 from high port
High Port
Client
Computer
Server
High Port
FTP data connection initiation
from high port on client
to high port on the server

Trivial File Transfer Protocol (TFTP)

Trivial File Transfer Protocol (TFTP) is a ***simple light weight file transfer protocol***, used for transferring files over the network. This protocol is similar to FTP but supports much lesser features and hence comes with a smaller foot print.

TFTP provides faster file transfer, as it uses UDP as the transport layer protocol

- Lesser Code size or foot print
- Ascii and binary modes of file transfer
- What TFTP does not provide
- does not provide authentication
- does not support a rich set of user interface commands

Use of *Trivial File Transfer Protocol (TFTP)*

- **TFTP** is mainly used during device bootstrap process for downloading device OS/firmware and configuration files. It is typically used for copying bootstrap and configuration files between nodes belonging to the same LAN.

- **TFTP** is used in situations where all the features of a full file transfer protocol like FTP are not needed.

- **It is used along with boot protocols** (like BOOTP and DHCP etc.) **to initialize devices.** Whenever an IP enabled node boots up, it gets its IP address and other device and network related parameters through BOOTP or DHCP. As part of these parameters, the client also receives the TFTP server address, bootstrap file and configuration file details (file name and directory location). The client then uses the TFTP protocol to download the bootstrap image and configuration files from the TFTP server.

Remote Login: Telnet

- TELNET is a general-purpose client-server application program.

- TELNET enables the establishment of a connection to a remote system in such a way that the local terminal appears to be a terminal at the remote system.

Working of TELNET:

Telnet uses software, installed on your computer, to create a connection with the remote host. The Telnet client (software), at your command, will send a request to the Telnet server (remote host). The server will reply asking for a user name and password. If accepted, the Telnet client will establish a connection to the host, thus making your computer a virtual terminal and allowing you complete access to the host's computer.

Telnet requires the use of a user name and password, which means you need to have previously set up an account on the remote computer. In some cases, however, computers with Telnet will allow guests to log on with restricted access.

Remote Login: Telnet