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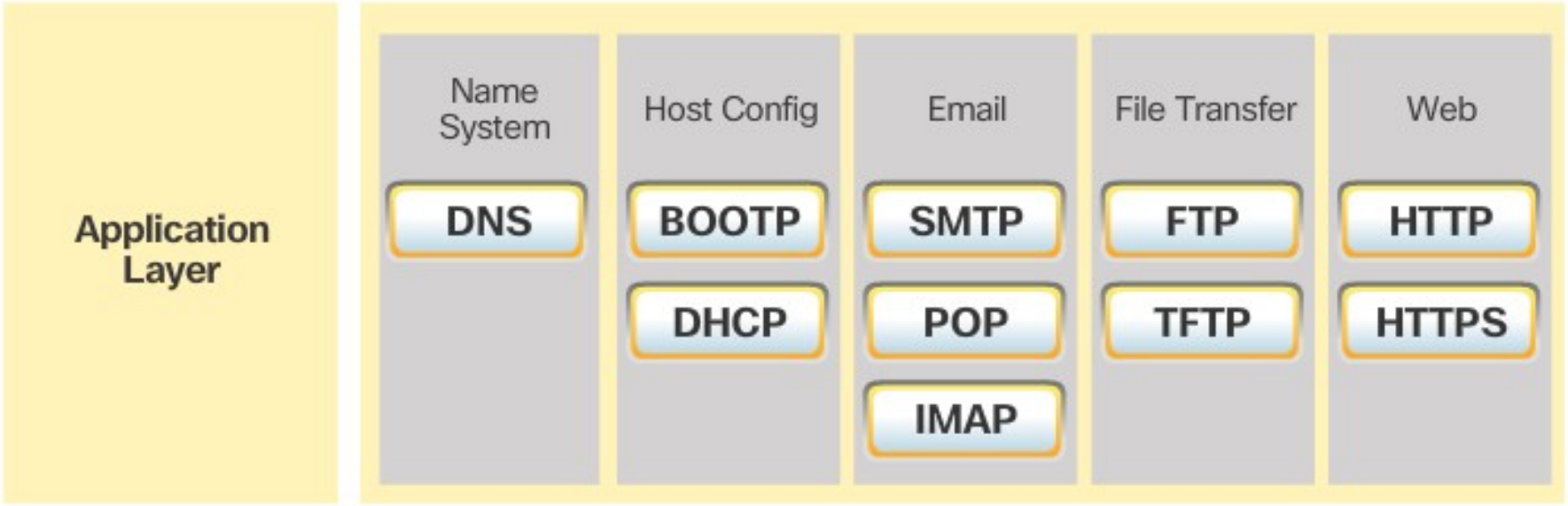
# Chapter 10: Application Layer

Introduction to Networks v5.1

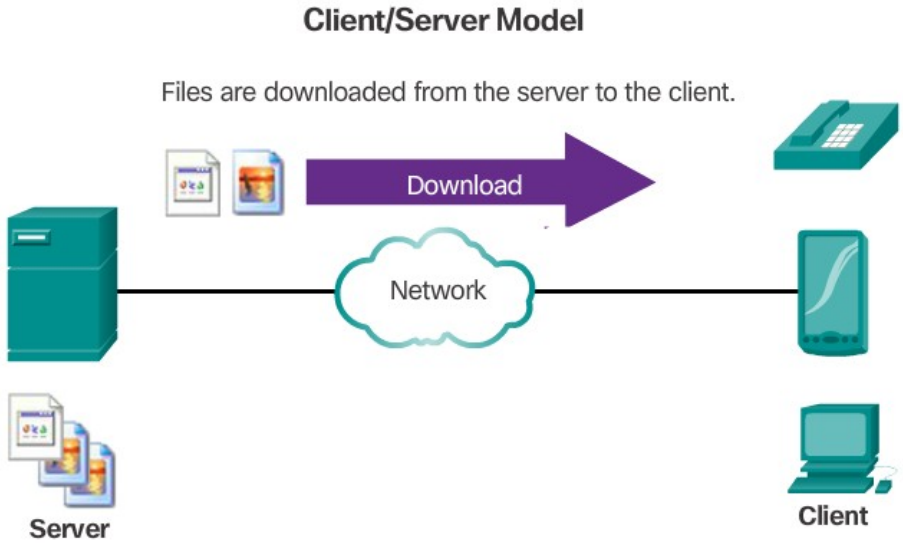
# TCP/IP Application Layer Protocols

- TCP/IP application protocols specify the format and control information necessary for common Internet functions.
- Application layer protocols must be implemented in both the source and destination devices.
- Application layer protocols implemented on the source and destination host must be compatible to allow communication.



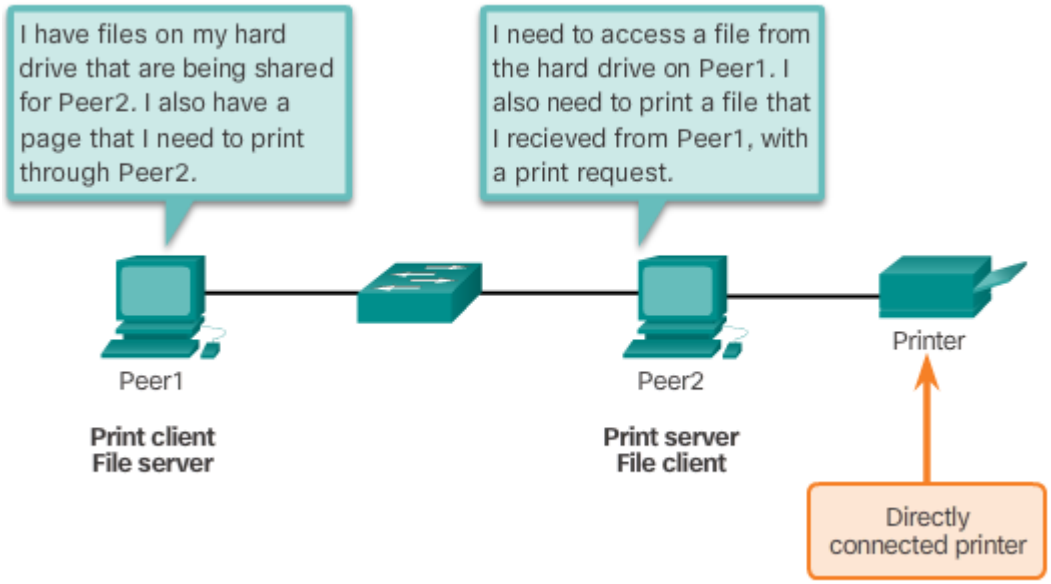
# Client-Server Model

- The device requesting the information is called a client.
- The device responding to the request is called a server.
- Client and server processes are considered to be in the application layer.
- The client initiates the exchange by requesting data from the server.
- The server responds by sending one or more streams of data to the client.
- Application layer protocols describe the format of the requests and responses between clients and servers.
- The contents of the data exchange will depend of the application in use.
- Email is an example of a Client-Server interaction.



# Peer-to-Peer Networks

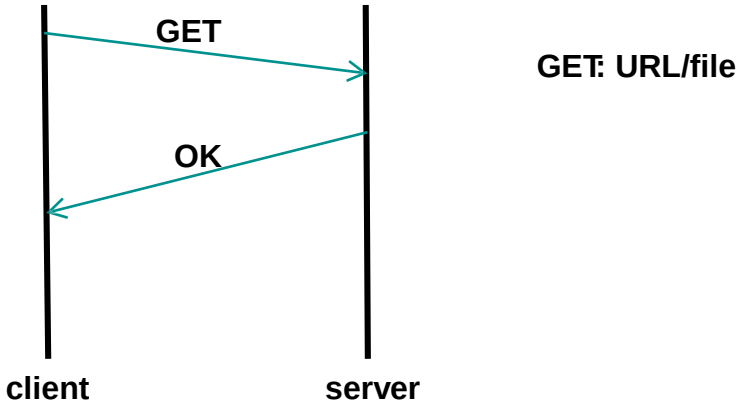
- In the peer-to-peer (P2P) networking model, the data is accessed without the use of a dedicated server.
- Two or more computers can be connected to a P2P network to share resources.
- Every connected end device (a peer) can function as both a server and a client.
- The roles of client and server are set on a per request basis.



# Section 10.2: Well-Known Application Layer Protocols and Services

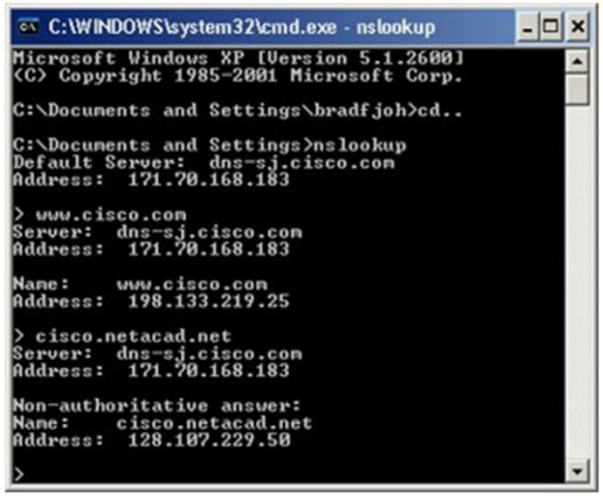
# HTTP(S) – Hypertext Transfer Protocol

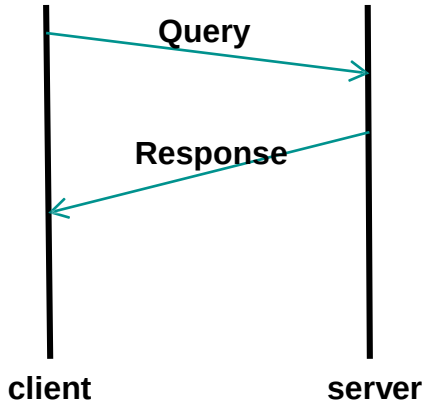
- Purpose: Transfer a file (resource). Resources include HTML files, audio, video, etc.
- Model: client / server
- Transport Layer: TCP
- Well Known Port Number: 80 (unencrypted); 443 (secured with TLS)
- Example Message Sequence:



# DNS – Domain Name Service

- Purpose: Translate a host name (eg. www.algonquincollege.com/index) into a numerical IP address.
- Model: client / server
- Transport Layer: UDP
- Well Known Port Number: 53
- Tools: nslookup URL
- Example Message Sequence:

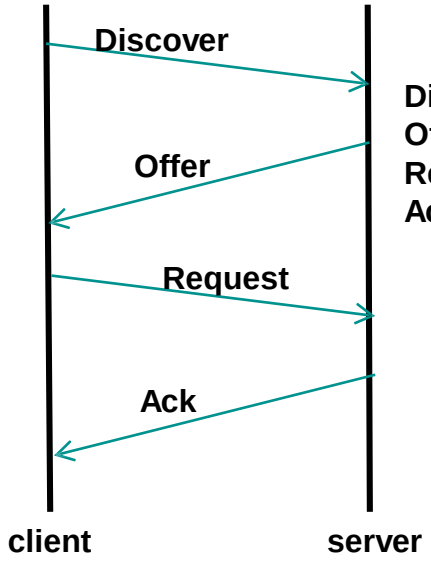



**DNS Query: www.algonquincollege.com**
**DNS Response: 54.86.119.60**

# DHCP – Dynamic Host Configuration Protocol

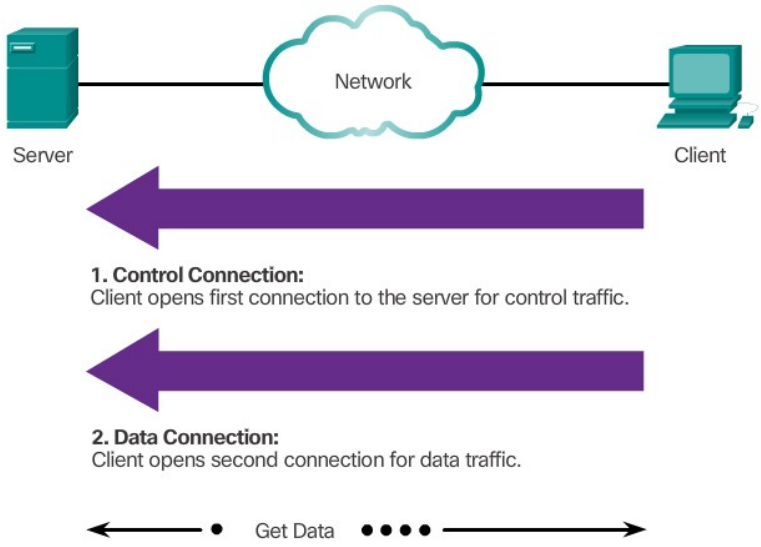
- Purpose: Request host configuration information (IP address, mask, gateway, other options)
- Model:  client / server
- Transport Layer: UDP
- Well Known Port Number: 67
- Example Message Sequence:




**Discover:  Broadcast**
**Offer: DHCP sends IP Address and other config info**
**Request:  Client selects from among offers**
**Ack:  DHCP server confirms request**

# File Transfer Protocol

- FTP was developed to allow the transfer of files over the network.
- Model: Client Server.
- Transport Layer: TCP
- FTP requires two connections between the client and the server: one connection for commands and replies and another connection for the actual file transfer.
- The client initiates and establishes the first connection to the server for control traffic on TCP port 21.
- The client then establishes the second connection to the server for the actual data transfer on TCP port 20.
- The client can download (pull) data from the server or upload (push) data to the server.



# Thank you.

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