**Worksheet 5**

1. Compare client-server and P2P architectures. List four P2P applications
2. BitTorrent
3. KanKan
4. Skype

* P2P: peers are intermittently connected and change IP address. Peers can be client and server.

1. In BitTorrent, Alice provides chunks to Bob throughout a 30-second interval. Will Bob necessarily return the favor and provide chunks to Alice in this same interval? Why or why not?

* No. There is a Top 4 hierarchy. If either of them was not in the other’s top 4. They would receive a slower download speed.

1. Consider a new peer Alice just joins BitTorrent. Without any chunks, she cannot become a top-four uploader for any of the other peers since she has nothing to upload. How then will Alice get her first chunk?

* Tit-for-tat:
  + Every 30 seconds. A peer is randomly selected by another peer and starts sending chunks.

1. CDNs typically adopt one of two different server placement philosophies. Name and briefly describe them.

* Enter Deep: push CDN servers deep into many access networks
  + Close to users
  + Smaller numbers, but more powerful
* Bring home: small number (10’s) of larger clusters in POPs near (but not within) access networks
  + Can be in an access network
  + Near access network, but not in

1. Besides network-related considerations such as delay, loss, and bandwidth performance, there are other important factors that go into designing a CDN server selection strategy. What are they?

* Location
  + Population density
  + Popularity of content in a region
* Security
* Load balancing
* ISP cost. Different ISPs charge different rates.
* Limited bandwidth availability