LCT2-08F
Peer to Peer Streaming Applications

Supervisor:
Professor Chin Tau, LEA

Group Members:
Li Phillip
Leung Ming Fai
Wong Pui Yin

Introduction
Nowadays, many teenagers like watching broadcast TV or video through internet, such as, live matches, movie clips or music videos. It is popular in Hong Kong and is very convenience that we can watch TV anytime at anywhere. However, these kinds of broadcast video services have some disadvantages: poor quality of online video, sequence problems and long waiting time before playing. To improve these media streaming problems, we have designed and developed a new video streaming application by using some new technologies, such as Peer-to-Peer and Network Coding.

Aim and Objectives
The aim of our project is to produce a video streaming application that can share and watch online videos, and also make some improvement to encounter media streaming problems. Therefore, our project is designed to use Peer-to-Peer (P2P) architecture, which is good and efficiently for media streaming, and also to use Network Coding technology to enhance our project.

Our video streaming application provides the following functions:
1. Videos sharing
2. Videos playing
3. Great quality of service
4. User-friendly interface

Methodology
In details, our project focus on two major parts
1. Peer-to-Peer part
2. Network Coding part

Peer-to-Peer
For the part of P2P, a concept of P2P file sharing is used for our project. As you can see in the figure, all shared videos will be distributed in different computers. Once a peer requests a video file, other peers which hold the same video file will be separated into several small segments. When the first segment is delivered to the requested peer, system will trigger the play function. Besides, at the same time, system will keep downloading another part of video segments. Therefore, the waiting time will become short as the segments of video become small.

Network Coding
In the upper illustration, there is an example of network coding. The image shows a video file (video 1) is splitting into a number of small blocks by using coding method. To recover back to the video, we only collect a fixed number of blocks randomly without any sequence.

Advantages by using Network Coding:
- Improve the throughput of the network
- Improve P2P network performance

Result and Discussion
As a result, we developed two applications:
- Redirect Server application
- Video Application

By our experiment, our applications are fully functional and can share and view the online videos successfully. Here are some advantages.

Advantages of our applications:
- Users access increase, total capacity of system increase
- System will not slowed down the speed of data transfer when adding more peers
- In case of video or link failures, system able to replace and recover data over multiple peers

Although we tested our application within a small network (<10) and the results of performance are similar with or without coding, it may clear to see the difference within a large network (>100). In theory, by the help of network coding, the system performance should be increased in a large network. Also, when the size of a video block becomes smaller and smaller, the waiting time will also become smaller too.