Lab 1: Network Fundamentals and

Cloud Service Measurement

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Objectives

* Master the network measurement tool: WireShark ([Get Wireshark](https://www.wireshark.org/#download))
* Understand Internet traffic characteristics
* Understand the operations of a typical cloud-based storage service: Dropbox & Google Drive
* Compare [Dropbox](https://www.dropbox.com/install) and [Google Drive](https://tools.google.com/dlpage/drive)

# Equipment Needs

* Computers
* Internet access

# Experiments

## Campus network traffic measurement

1. Download WireShark and study how to use it to capture packets, in particular, how to set filters to capture certain traffic or use built-in functions to display certain packets.
2. Go to NYU-Tandon cafeteria to capture packets in a wireless environment. Repeat the measurement in the morning, noon, and afternoon. For each time, capture the packets continuously for 10 minutes. (If you cannot make it to the NYU-Tandon campus, you can choose other public places with wifi access and decent amount of wifi users)
3. Analyze each measurement result and provide the following statistics.

Table 1 Campus Network Traffic Measurement

|  |  |  |  |
| --- | --- | --- | --- |
|  | Morning | Noon | Afternoon |
| Total number of packets captured |  |  |  |
| Total number of bytes captured |  |  |  |
| Percentage of broadcast packets in packet numbers |  |  |  |
| Percentage of broadcast packets in bytes |  |  |  |
| Percentage of packets with transmission errors in packet numbers |  |  |  |
| Question 1: How do you count the number of broadcast packets? | | | |
| Answer 1: | | | |
| Question 2: How do you decide if a packet belongs to a transmission error? | | | |
| Answer 2: | | | |

## Dropbox traffic measurement

1. Create a Dropbox account, and install the client software
2. Use Wireshark to capture the packets between the Dropbox client software and the cloud during the synchronization process (i.e., sync a file to dropbox), and understand the steps that the Dropbox client software takes to exchange data with the cloud.
3. Based on your measurement, fill out the following table to list ALL the servers the Dropbox client software interacted with. The order must be the same as what you observed.

Table 2 Dropbox-Cloud Interactions

|  |  |  |  |
| --- | --- | --- | --- |
| Server domain name | Server IP address | Server’s function | Amount of Traffic Exchanged |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Questions 1: How do you make sure the above servers/IPs are used for Dropbox but not other applications on your computer? | | | |
| Answer 1: | | | |
| Questions 2: How do you decide the function of each server contacted? | | | |
| Answer 2: | | | |

## Comparison between Dropbox and Google drive

1. Place a computer A in one subnet and place computer B in a different subnet, both computers should have the DropBox client software.
2. Create a shared Dropbox folder between computer A and computer B
3. Create a file in the shared folder on computer A, Dropbox should upload it to the Dropbox cloud, and mark the time to start upload as T1. Then wait for the file to be automatically downloaded to computer B, and mark the time the download is complete as T2. The time consumed for this process is then (T2-T1)
4. Try different files with different sizes with Dropbox and repeat the same for Google drive, and fill out the following table. (Highly recommended to use text files)

Table 3 Comparison 1: Dropbox and GDrive

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Using Dropbox | | Using Google drive | |
| Files | Time Consumed | Bytes Uploaded | Time Consumed | Bytes Uploaded |
| File-a: 1 MB |  |  |  |  |
| File-b: 10 MB |  |  |  |  |
| File-c: 100 MB |  |  |  |  |
| Question: How do you measure T1 and T2 to reach high accuracy? | Answer: | | | |
| Question: Is there any difference between number of bytes uploaded for Dropbox and Google Drive? If so, why? | Answer: | | | |

1. Now copy a file, File-C in the above table, to create a duplicate file. It will be uploaded to dropbox. Repeat the operation and let it be uploaded to Google drive. Measure the number of bytes being uploaded in each operation. Fill out the following table.

Table 4 Comparison 2: Dropbox and GDrive

|  |  |
| --- | --- |
| # of bytes uploaded to Dropbox |  |
| # of bytes uploaded to Google drive |  |
| Is there any difference in number of uploaded bytes between DropBox and GoogleDrive? Is so, why is there a difference between the above two numbers? | Answer: |

# Reports

Please include your name, student ID, and the followings,

* Completed Tables 1-4.
* Wireshark capture files from each table.

**We have zero tolerance to forged or fabricated data!!** A single piece of forged/fabricated data would bring the total score down to zero.