Lab 1: Network Fundamentals and

Cloud Service Measurement

**1. Objectives**

- Master the network measurement tool: WireShark ([Get Wireshark)](https://www.wireshark.org/download.html)

- Understand Internet traffic characteristics

- Understand the operations of a typical cloud-based storage service: Dropbox

- Compare [Dropbox a](https://www.dropbox.com/install)nd [Google Drive](https://tools.google.com/dlpage/drive)

**2. Equipment Needs**

- Computers

- Internet access

**3. Experiments**

**3.1 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.

2) Go to NYU-Poly cafeteria to capture packets in the wireless environment. Repeat the measurement in

the morning, noon, and afternoon. For each time, capture the packets continuously for 10 minutes.

3) Analyze each measurement result and provide the following statistics.

**Table 1 Campus Network Traffic Measurement**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Morning | Noon | Afternoon |
| Total number of  packets captured | 14559 | 12666 | 100356 |
| Total number of  bytes captured | 12067057 | 9523284 | 97960642 |
| Percentage of  broadcast packets in packet numbers | 0.2% | 0.4% | 0.01% |
| Percentage of broadcast packets in  bytes | 3.4% | 0.2% | 0.001% |
| Percentage of |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| packets with  transmission errors in packet numbers | - | 0 | 0 |

**3.2 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, 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 |
| SoftLayer Technologies Inc.  -reverse.com | 158.85.224.180 | Computer application data |
| 1e100.net  Google servers | 74.125.226.8 | TCP |
| Dropbox | 45.58.74.161 | Dropbox authentication |
| Dropbox | 108.160.169.49 | Dropbox ip address |

**3.3 Comparison between Dropbox and Google drive**

1) Place a computer A to a subnet, run Dropbox, then operate a computer B a different subnet. (You can use campus WiFi and Lab’s Ethernet ports as two different subnets, make sure that each computer is only connected to one subnet.)

2) Create a file on B, upload it to the Dropbox cloud, and mark the time as T1. Then wait for the file to be

automatically downloaded to computer A, and mark the time as T2.

3) Try different files with different sizes with Dropbox and repeat the same for Google drive, and fill out the following table.

**Table 3 Comparison 1: Dropbox and GDrive**

|  |  |  |
| --- | --- | --- |
| Partner’s name and ID | Time Consumed | |
| Files | Using Dropbox | Using Google drive |
| File-a: 1 MB | T1 = 24s T2= 24.4s | T1= 57s T2 = 60s |
| File-b: 10 MB | T1 = 38s T2 = 40s | T1= 90s T2 = 88s |
| File-c: 100 MB | T1 = 55s T2= 32s | T1=430s T2= 454s |
| Question: How do you measure  T1 and T2 to reach high accuracy? | Answer: We measured the start and end time of application data packets in Wireshark. | |

4) Now copy a file, File-C, 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 | 28341 |
| # of bytes uploaded to Google drive | 151150127 |
| Why there is a difference between  the above two numbers? | Answer: Google drive creates the replica of file. Dropbox only copies the changes in two versions of the file. It compares both  Versions of files. This is called binary difference. |

**4. Reports**

Please include your name, student ID, Tables 1-4.

**We have zero tolerance to forged or fabricated data!!** A single piece of forged/fabricated data would bring the total score down to zero. For Table 3, two partners are allowed to share the same set of data.