Table of Contents

Name: Anand Prakash Tiwary UBIT Name: anandpra

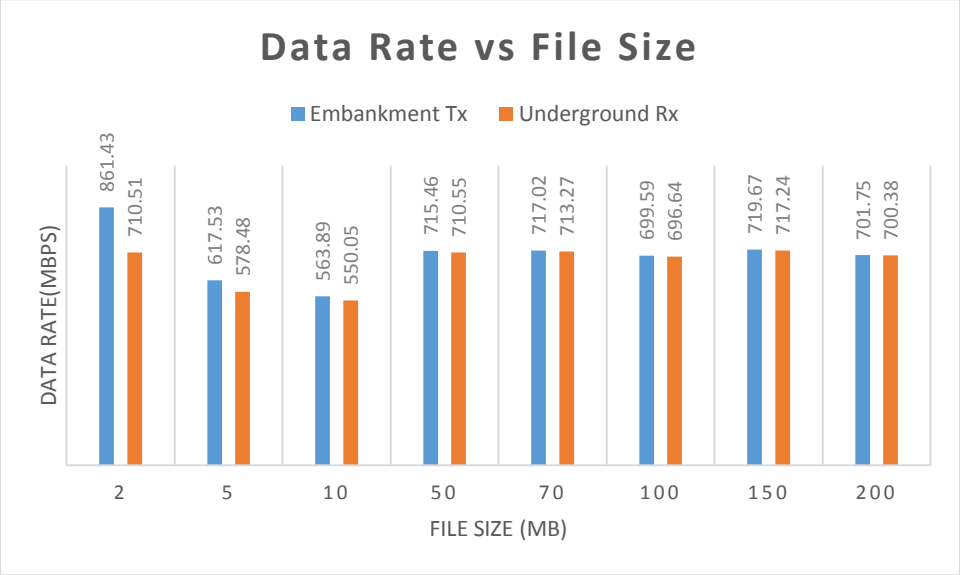
INTRODUCTION

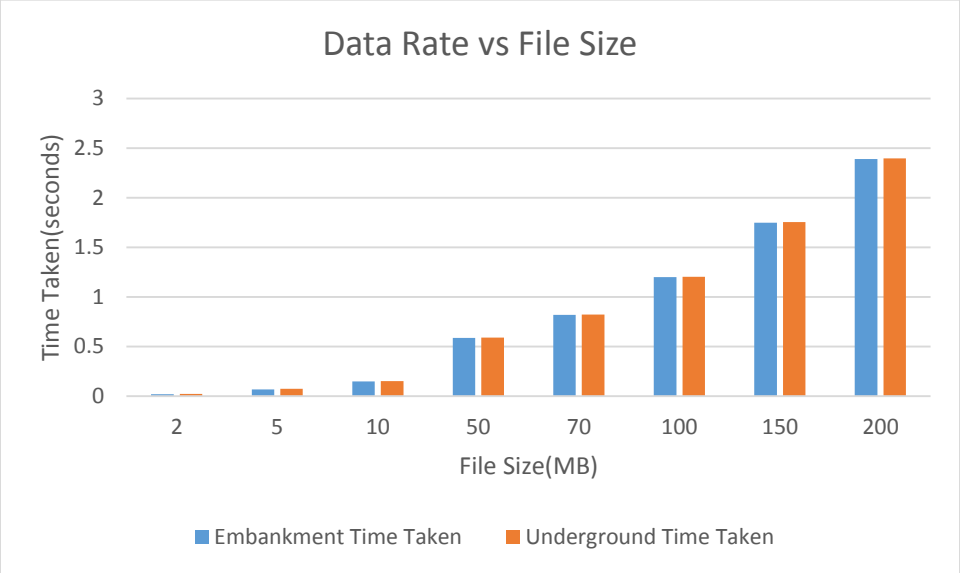
This document provides the insights into the performance of Remote File sharing application over the UB CSE network. It measures the effect of factors like File Size, Packet Size and network load on the overall data rate and also lists down the possible causes for it.

Name: Anand Prakash Tiwary UBIT Name: anandpra

Data Rate vs File Size

In this observation, we kept the packet size constant to 1000 Bytes. We then performed file transfer operation for different file sizes, with Embankment server as the transmitting end and Underground as the receiving end. The following are the statistics for this observation.





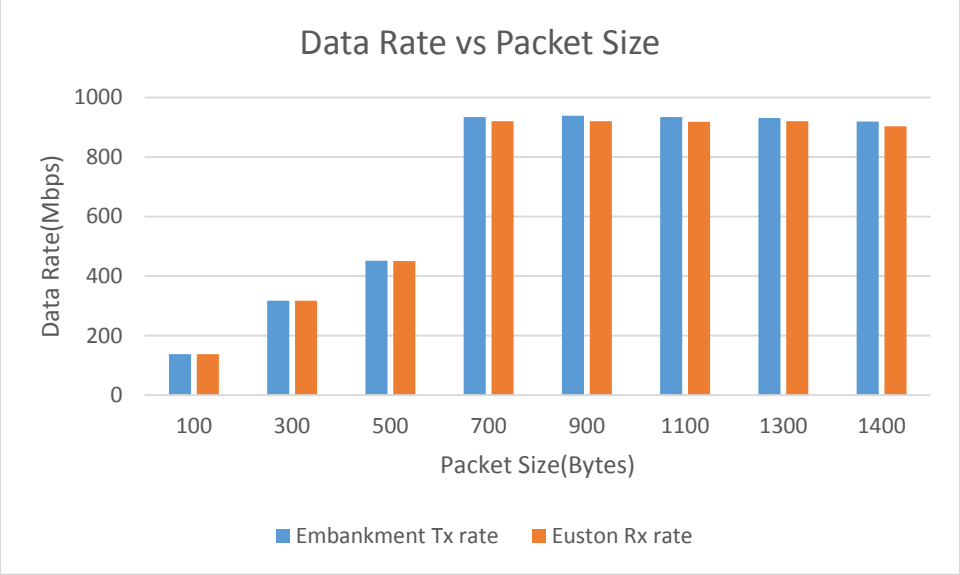
Observation:

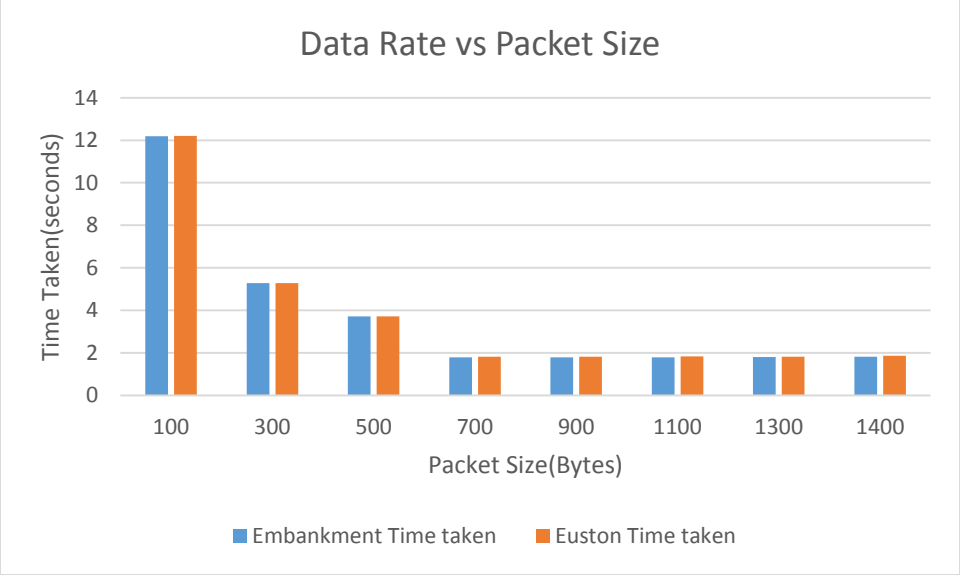
1. Transmission Rate is always greater than receive rate. Queuing delay could be a factor for this.
2. Both Transmission rate and Receive rate data rate started with >700 Mbps but while transferring the 10 MB file, it decreased to around 550Mbps. For later file transfers, it increases and stayed in the range for 690-720 Mbps. The network congestion from external factors at the time of 5 MB and 10 MB file transfer could account for a decrease in the data rate.

3. As the file size increased, we can observe a slight decrease in the data rate. This will increase the number of packets, leading to more queuing delay and possible packet loss, eventually lowering the overall data rate.

Data Rate vs Packet Size

In this observation, we performed file transfer operation from Embankment to Euston. We kept the file size constant at 200MB. However, we varied the packet size from 100 Bytes to 1400 Bytes at an interval of 200Bytes. The following are the statistics of this observation.





Observation:

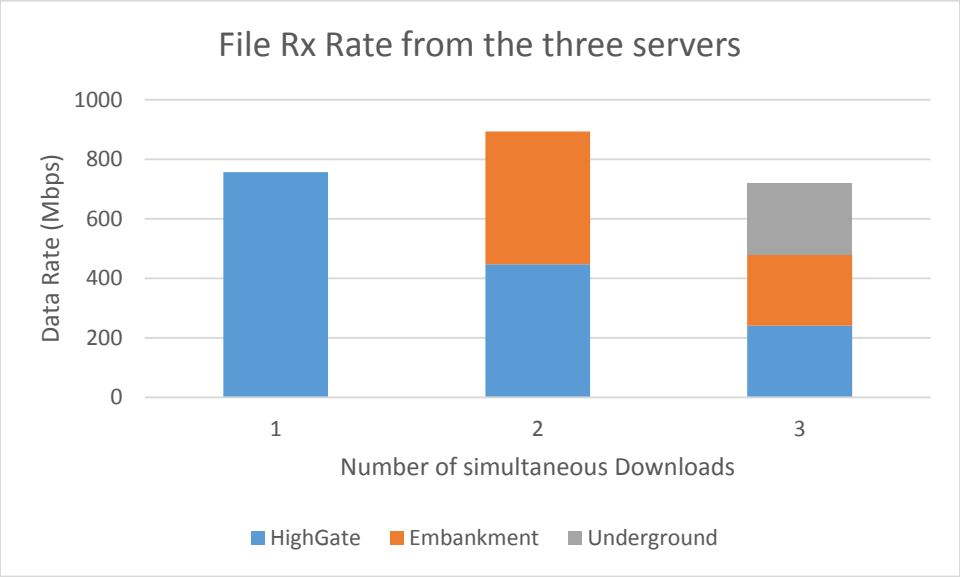
1. As we can observe that there is a huge difference between data rate at packet size= 100Bytes and data rate at packet size >700 Bytes. In my view, as the packet size decreases, the number of

packets for a 70MB file increases. More number of packets will lead to more queuing delay and packet drop and hence, the data rate is too low for lower packet sizes.

2. Since header information is added to every packet, with a lower packet size, we will be wasting bandwidth in sending a lot of packet header data to the receive end. With a large packet size, we send more file data in every packet and so this improves the data rate.
3. The data rate is almost constant for packet size >700 bytes. The underlying TCP must be sending full packets for this, thereby improving the data rate.
4. The data rate at the receiver side is slightly lower. This is due to the packet queuing delay.

Data Rate vs Load Variation

In this observation, we performed file download operation with increasing number of simultaneous downloads. We chose Euston as the receiving end and Highgate, Embankment and Underground as the transmitting end. The following are the statistics of this observation.



Observation:

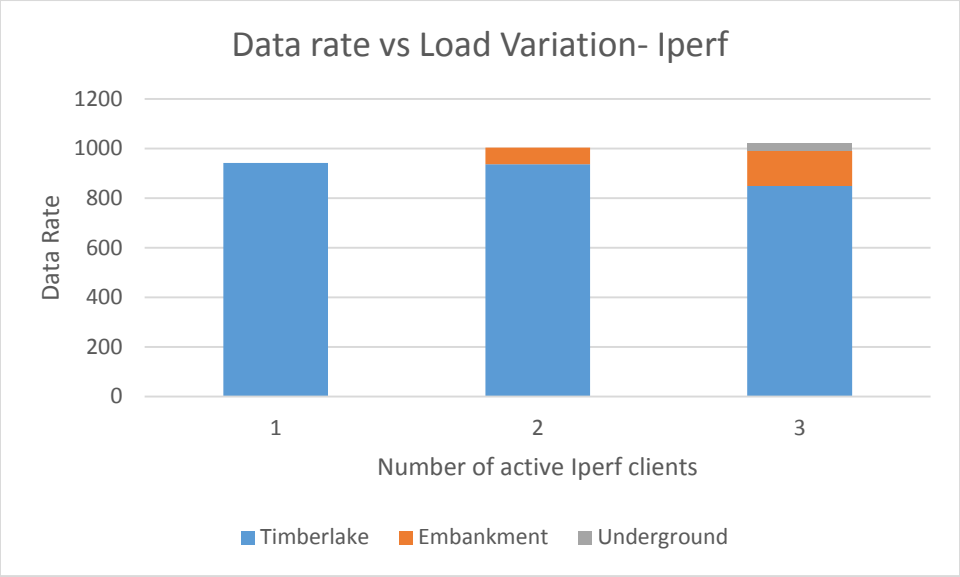
1. The overall data receive rate at Euston (receiving end) has slightly varied. This could be due to network congestion from external factors. But it remains roughly in the same range.
2. The data receive rate from Highgate, Embankment and Underground servers (transmitting servers) decreased as the number of simultaneous downloads increased. This is because of the congestion at Euston. These three servers can transmit at full rate, but since Euston has to

receive data from them simultaneously, the rate at which it can accept data from each connection decreased as the number of download increases.

3. Similarly, the data transmission rate at each of the transmitting server also decreased with the number of downloads. This is solely because of the simultaneous download congestion at the receiver end (Euston).

Measure Network Bandwidth using Iperf

For this observation, we started the Iperf server on Euston and Iperf clients on Timberlake, Embankment and Underground. The following chart shows the measure of network bandwidth from the server (Euston) end.



Observation:

1. Data receive rate increased significantly.
2. Most of the data received is from Timberlake, while contributions from other two servers are very less. This means that Timberlake is very fast sender as compared to others. Factors like congestion at Embankment and Underground end can also be a possible reason for low data rate from their side.
3. There was a slight manual delay in starting the 2nd and 3rd client, which can also be a factor here.
4. A low data rate for Embankment and Underground does not mean that they are very slow senders. Since, Timberlake is sending at a higher rate, the packets from these two servers were expecting higher queuing delay and possible packet loss, which would have decreased their data rate.
5. Network congestion from external factors may have decreased the data rate for the first and second download operation.

Difference in Performance of Iperf and my File sharing application:

1. Iperf had a high data rate as compared to my application. This was expected as my application certainly transmitted more number of partially filled packets, which increases processing time, queuing delay and possible packet loss.
2. In my application, download operation at all the three clients started at roughly the same time. This is why the data rate from each of the clients were almost same (although I did not use Timberlake as one of the clients). While with Iperf, due to manual delay the 2nd and 3rd clients started slightly later than the first one and so the client at Timberlake got more time to transmit.

Reference

1. http://beej.us/guide/bgnet/output/print/bgnet_USLetter.pdf
2. http://www.cplusplus.com/