# Data Communication and Computer Networks (CS536)

## Lab 6

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## Problem 1

### My Experiments:

**1. Experiments within same lab (POD Machines) :**

T= Client wait time before sending a packet
D= Server wait time before sending a response
N = Number of Packets, the client is sending

**Initial Calculation of RTT with two machines.**
Client : 128.10.25.225, Server: 128.10.25.221 (No Hops).

Calculated RTT value:

- **T=0, D=0, N=3 :**  0.449ms , 0.228ms , 0.204ms (Avg - 0.293ms)

- **T=5, D=3, N=3 :**  3000.667969ms , 3000.605957ms, 3000.587891ms (Avg - 3000.62158ms)

- **T=3, D=5, N=3 :**  5000.553223ms , 7000.74517ms , 10000.590820ms (Avg - 7333.96307ms)

**With Two Intermediate Hops:**

Client Machine: 128.10.25.225
Two Hops : 128.10.25.224, 128.10.25.222
Server Machine: 128.10.25.221

- **T=0, D=0, N=3 :**  0.650ms , 0.455ms , 0.462ms (Avg - 0.522ms)

- **T=5, D=3, N=3 :**  3001.5498ms , 3001.7334ms, 3001.5743ms (Avg - 3001.61916ms)

- **T=3, D=5, N=3 :**  5002.764ms , 7001.347ms , 10001.622ms (Avg - 7335.23833ms)

**With Four Intermediate Hops:**

Client Machine: 128.10.25.225
Two Hops : 128.10.25.224, 128.10.25.220, 128.10.25.219, 128.10.25.217
Server Machine: 128.10.25.221

- **T=0, D=0, N=3 :**  0.796ms , 0.587ms , 0.565ms (Avg - 0.64933ms)

- **T=5, D=3, N=3 :**  3003.627ms , 3003.533ms, 3002.895ms (Avg - 3003.35166ms)

- **T=3, D=5, N=3 :**  5003.743ms , 7003.126ms , 10002.8633ms (Avg - 7336.57743ms)

**Interpretation:**
As we can see, increasing the number of hops increases the RTT value for same parameters(N,T,D,S). This happens because the number of internal communication increases between machines, and the machine takes some time to transfer the message to other computer.

**2. Experiments across lab (POD Machines & Amber Machines) :**

**Initial Calculation of RTT with two machines.**
Client : 128.10.25.225, Server: 128.10.112.148 (No Hops).

Calculated RTT value:

- **T=0, D=0, N=3 :**  0.414ms , 0.369ms , 0.373ms (Avg - 0.385ms)

- **T=5, D=3, N=3 :**  3001.000977ms , 3000.927002ms , 3000.897949ms (Avg - 3000.94197ms)

- **T=3, D=5, N=3 :**  5000.958008ms ,7001.061113ms , 10000.458008ms (Avg - 7334.15904ms)

**With Two Intermediate Hops:**

Client Machine: 128.10.25.225
Two Hops : 128.10.112.148, 128.10.112.147
Server Machine: 128.10.25.221

- **T=0, D=0, N=3 :**  0.673ms , 0.572ms , 0.558ms (Avg - 0.589ms)

- **T=5, D=3, N=3 :**  3003.6822ms , 3003.452ms, 3003.6339ms (Avg - 3003.58936ms)

- **T=3, D=5, N=3 :**  5004.3722ms , 7003.126ms , 10003.3275ms (Avg - 7336.9419ms)

**With Four Intermediate Hops:**

Client Machine: 128.10.25.225
Two Hops : 128.10.25.223, 128.10.112.143, 128.10.25.224, 128.10.112.144
Server Machine: 128.10.25.221

- **T=0, D=0, N=3 :**   0.895ms , 0.796ms , 0.788ms (Avg - 0.82633ms)

- **T=5, D=3, N=3 :**   3004.772ms , 3004.897ms, 3003.956ms (Avg - 3004.54166ms)

- **T=3, D=5, N=3 :**   5005.7855ms , 7004.998ms , 10004.373ms (Avg - 7338.3855ms)

**Interpretation:**
Because of the higher RTT for the communication between two different lab machines, the RTT increases for each of the case compared to same experiments with similar lab machines. But the observation is similar as when the number of hops increases, RTT also increases.