CS 408 – Computer Networks Spring 2024 Homework 1

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Question 1:

1. metin, ekran görüntüsü, yazı tipi içeren bir resim

   Açıklama otomatik olarak oluşturuldumetin, ekran görüntüsü, yazı tipi içeren bir resim

   Açıklama otomatik olarak oluşturulduInvocation of “ping” command on different hours

ping command invoked at 03:34 ping command invoked at 15:34

There is a very, very small difference between the two invocations. No matter what I tried, there is little to none difference between the two invocations.

1. metin, ekran görüntüsü, yazı tipi içeren bir resim

   Açıklama otomatik olarak oluşturuldumetin, ekran görüntüsü, yazı tipi içeren bir resim

   Açıklama otomatik olarak oluşturulduInvocation of “tracert” (traceroute on UNIX) on different hours

tracert command invoked at 03:34 tracert command invoked at 15:34

Tracert command invoked at 15:34 took 196 miliseconds, which is understandable since the local time at Stanford would be 06:34 and there is not a reason for an increased traffic for that time of the day there.

1. There is an equal number of hops in both of the hours. However, the paths changed in between the two hours. In the invocation that took place in 3 AM, we arrived to a router which is inside a datacenter in California. This could have happened for the following reason: 03:34 is 18:34 in California and that is a time where there could be a lot of network traffic there. In order to accommodate for the increased network traffic, the router inside the datacenter started to serve the internet. That is why we arrived there before arriving to Stanford.

NOTE: These commands were invoked in my own house, at Istanbul, Küçükyalı, with an internet bandwidth of 200Mbits/s.

Question 2:

1. Stanford University is 10.818km. away from my location. If this were the fiber optic distance between my location and Stanford, d\_prop would be 54ms.
2. The approximate fiber optic cable distance from Istanbul to Stanford if packets follow the given path, would be equal to a + b + c + d where:
   1. Istanbul – Marmaris land distance, which is 468.83km.
   2. Marmaris – GoonHilly Downs, UK via SeaMeWe-3 Submarine Cable, which is 6181.76km.
   3. UK – Bellport, NY, USA Yellow Cable which is 7001km.
   4. NY to San Francisco Distance, which is 4134.69km.

This amounts to 17.786,28km. in total. d\_prop then equals to 88ms. RTT then would be equal to 176ms.

1. The average RTT value that was calculated in Q1-a was equal to 198ms. The RTT is theoretically equal to 176ms. This was due to the fact that there was congestions that was occurring that led to queuing of my packets. The difference between the theoretical value could be attributed to d\_queue and d\_proc.

Question 3:

metin, ekran görüntüsü, yazı tipi, harita içeren bir resim

Açıklama otomatik olarak oluşturuldu The topology of the STARLINK satellite array at Mediterranean sea at 02:54:



There exists a overhead created by one satellite uplink operation and one satellite downlink operation, which are the same value since the bandwidth is symmetric. d\_trans is equal to a delay of 160ms, which equals to a 320ms of total d\_trans. This value is found by dividing 8 by 50.

The total distance propagated by the packets is 801.02km, which creates a d\_prop equal to 4ms.

The total delay is then equal to 324ms.