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CECS 327 – Assignment 1

Problems:

1. Efficiency, b/c packets can find their own paths to their destination without the need for a dedicated channel. That way there is no requirement to establish a channel and is available to all users throughout the network. Also, long messages are broken down into packets and sent individually, this eliminates packet loss.
2. Application – sends data over end systems via HTTP, SMTP, and FTP
   transport – transfers content between two endpoints via TCP
   network – moves packets between hosts via IP
   data link – moves packets from one node to next node using P2P
   physical – transfers individual bits from one node to next using physical materials, e.g. ethernet cable, coaxial, etc.
3. Transmission delay = L/S = 8 bits/byte * 1500 bytes / 2,000,000 bps = .006 s
   Propagation delay = D / S = 2500 km / 2.5 * 10 ^5 km / s = .01 s
   Total time delay = .006 + 0.01 s = 0.016 s
   No, it does not depend on packet length nor transmission rate.
4.
   a. RTT = 2 * Propagation delay = 2 * (D / S) = 2 * (385000 km / 3 * 10^5 m / s) = 2.56 s
   b. RTT * bandwidth = 2.56 s * 1 Gbps = 2560000000 bits or 320 MB
   c. This means how much data can be sent over the network at any given time.
   d. Min time is request RTT + transfer TT = 2.56 + (2.56 / 2) = 3.84 s
5.
   a. Ping www.google.com

```
C:\Users\Matthew Zaldana>ping google.com

Pinging google.com [142.250.188.238] with 32 bytes of data:
Reply from 142.250.188.238: bytes=32 time=13ms TTL=118
Reply from 142.250.188.238: bytes=32 time=13ms TTL=118
Reply from 142.250.188.238: bytes=32 time=12ms TTL=118
Reply from 142.250.188.238: bytes=32 time=13ms TTL=118

Ping statistics for 142.250.188.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 13ms, Average = 12ms
```

Minimum: 12ms, maximum: 13 ms, Average: 12 ms

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b. Ping -n 2 www.google.com vs ping -n 7 www.google.com

```
C:\Users\Matthew Zaldana>ping -n 2 www.google.com

Pinging www.google.com [142.251.40.36] with 32 bytes of data:
Reply from 142.251.40.36: bytes=32 time=30ms TTL=118
Reply from 142.251.40.36: bytes=32 time=16ms TTL=118

Ping statistics for 142.251.40.36:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 16ms, Maximum = 30ms, Average = 23ms

C:\Users\Matthew Zaldana>ping -n 7 www.google.com

Pinging www.google.com [142.251.40.36] with 32 bytes of data:
Reply from 142.251.40.36: bytes=32 time=15ms TTL=118
Reply from 142.251.40.36: bytes=32 time=13ms TTL=118
Reply from 142.251.40.36: bytes=32 time=12ms TTL=118
Reply from 142.251.40.36: bytes=32 time=13ms TTL=118
Reply from 142.251.40.36: bytes=32 time=14ms TTL=118
Reply from 142.251.40.36: bytes=32 time=13ms TTL=118
Reply from 142.251.40.36: bytes=32 time=13ms TTL=118

Ping statistics for 142.251.40.36:
    Packets: Sent = 7, Received = 7, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 15ms, Average = 13ms
```

Difference is the count of ping requests sent out

c. Ping 10.0.0.50

```
C:\Users\Matthew Zaldana>ping 10.0.0.50

Pinging 10.0.0.50 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.50:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Request timed out 4 times, this probably happens due to the IP address being unreachable, firewall rules put in place that don't allow me to contact the IP, or the requested IP address is not available.

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d. Ping www.imperialequestriancenter.com

```
C:\Users\Matthew Zaldana>ping www.imperialequestriancenter.com

Pinging www.imperialequestriancenter.com [64.29.151.221] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 64.29.151.221:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

No I did not for the reasons described above. However, I did receive the IP address of the domain name

6.

a. Tracert www.google.com

```
C:\Users\Matthew Zaldana>tracert www.google.com

Tracing route to www.google.com [142.251.40.36]
over a maximum of 30 hops:

  1    14 ms    14 ms    13 ms  us-west-027.whiskergalaxy.com [212.103.49.66]
  2    14 ms    13 ms    14 ms  212.103.49.65
  3    65 ms    37 ms    35 ms  irb-0.agg2.lax1.us.m247.com [37.120.128.180]
  4    14 ms    14 ms    14 ms  te-3-1-0.bb1.lax1.us.m247.com [82.102.29.112]
  5    14 ms    13 ms    13 ms  72.14.204.180
  6    14 ms    14 ms    17 ms  108.170.238.54
  7    14 ms    17 ms    13 ms  142.251.233.235
  8    13 ms    15 ms    13 ms  lax17s55-in-f4.1e100.net [142.251.40.36]

Trace complete.

C:\Users\Matthew Zaldana>
```

8 hops

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b. Tracert www.ieee.org

```
C:\Users\Matthew Zaldana>tracert www.ieee.org

Tracing route to e1630.c.akamaiedge.net [72.247.12.100]
over a maximum of 30 hops:

  1    12 ms    19 ms    12 ms  us-west-027.whiskergalaxy.com [212.103.49.66]
  2    17 ms    12 ms    12 ms  212.103.49.65
  3    25 ms    25 ms    97 ms  irb-0.agg2.lax1.us.m247.com [37.120.128.180]
  4    12 ms    12 ms    13 ms  37.120.220.198
  5    49 ms    30 ms    32 ms  te-4-3-0.bb1.lax1.us.m247.com [82.102.29.110]
  6    15 ms    24 ms    35 ms  hu0-7-0-2.ccr41.lax05.atlas.cogentco.com [38.104.85.169]
  7    14 ms    13 ms    13 ms  be3359.ccr42.lax01.atlas.cogentco.com [154.54.3.69]
  8    37 ms    13 ms    13 ms  be3360.ccr41.lax04.atlas.cogentco.com [154.54.25.150]
  9    16 ms    15 ms    15 ms  ntt.lax04.atlas.cogentco.com [154.54.9.30]
 10    14 ms    13 ms    17 ms  ae-6.r25.lsanca07.us.bb.gin.ntt.net [129.250.3.237]
 11    13 ms    23 ms    14 ms  ae-1.a03.lsanca20.us.bb.gin.ntt.net [129.250.3.178]
 12    51 ms    16 ms    17 ms  ae-2.akamai.lsanca20.us.bb.gin.ntt.net [129.250.204.158]
 13    13 ms    13 ms    14 ms  a72-247-12-100.deploy.static.akamaitechnologies.com [72.247.12
.100]

Trace complete.
```

Same ones are the first, second, third hops

c. Tracert www.ubc.ca

Tracert -d www.ubc.ca

```
Command Prompt
 16     *        *        *     Request timed out.
 17  ^C
C:\Users\Matthew Zaldana>tracert www.ubc.ca

Tracing route to ubc.ca [206.87.224.15]
over a maximum of 30 hops:

  1    16 ms    12 ms    15 ms  us-west-027.whiskergalaxy.com [212.103.49.66]
  2    14 ms    13 ms    13 ms  212.103.49.65
  3    22 ms    79 ms    28 ms  irb-0.agg2.lax1.us.m247.com [37.120.128.180]
  4    14 ms    14 ms    13 ms  xe-2-3-0-0.bb2.lax1.us.m247.com [193.9.115.198]
  5    13 ms    13 ms    13 ms  hurricane-electric.as6939.any2ix.coresite.com [206.72.210.122]
  6    37 ms    36 ms    35 ms  100ge15-2.core1.pdx1.he.net [184.104.193.142]
  7    47 ms    54 ms    77 ms  port-channel2.core2.sea1.he.net [184.105.64.137]
  8    56 ms    63 ms    65 ms  port-channel2.core2.yvr1.he.net [184.104.196.222]
  9     *        *        *     Request timed out.
 10    41 ms    41 ms    43 ms  345-ix-ubcab-cr1.vncv1.bc.net [134.87.0.57]
 11    43 ms    43 ms    42 ms  137.82.88.122
 12    43 ms    44 ms    62 ms  a22-a0.net.ubc.ca [137.82.123.113]
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.

C:\Users\Matthew Zaldana>\
```

```
Command Prompt

C:\Users\Matthew Zaldana>tracert -d www.ubc.ca

Tracing route to ubc.ca [206.87.224.15]
over a maximum of 30 hops:

  1    53 ms    23 ms    22 ms  212.103.49.66
  2    13 ms    15 ms    29 ms  212.103.49.65
  3    31 ms    36 ms    24 ms  37.120.128.180
  4    14 ms    25 ms    14 ms  193.9.115.198
  5    13 ms    13 ms    13 ms  206.72.210.122
  6    46 ms    34 ms    35 ms  184.104.193.142
  7    39 ms    40 ms    39 ms  184.105.64.137
  8    42 ms    49 ms    44 ms  184.104.196.222
  9     *        *        *     Request timed out.
 10    41 ms    41 ms    45 ms  134.87.0.57
 11    42 ms    50 ms    50 ms  137.82.88.122
 12    48 ms    43 ms    43 ms  137.82.123.113
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.

C:\Users\Matthew Zaldana>
```

The difference is that it doesn't display the domain name when using the -d flag option.
It ialso went by a lot faster.

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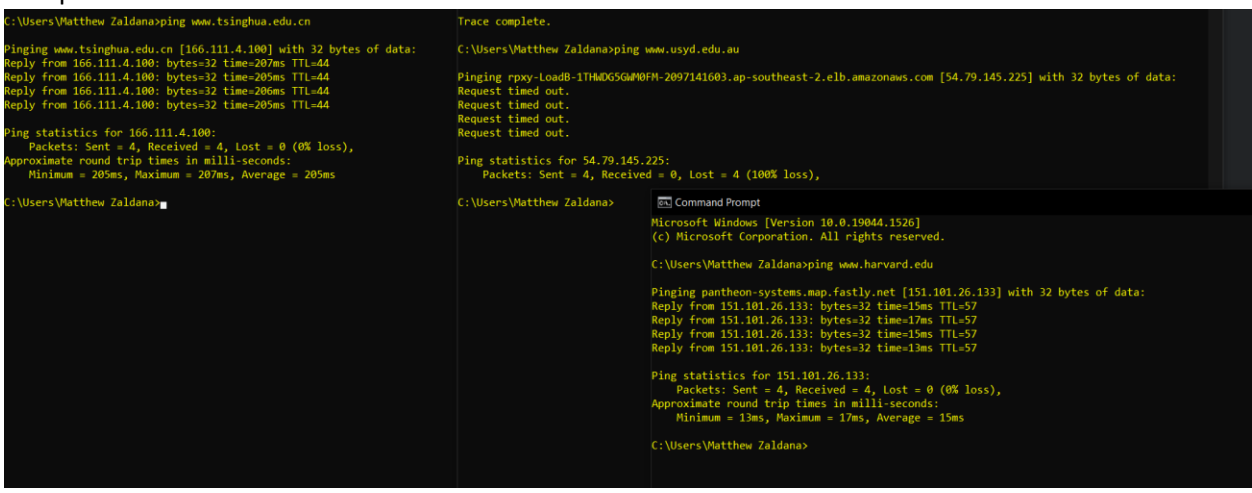
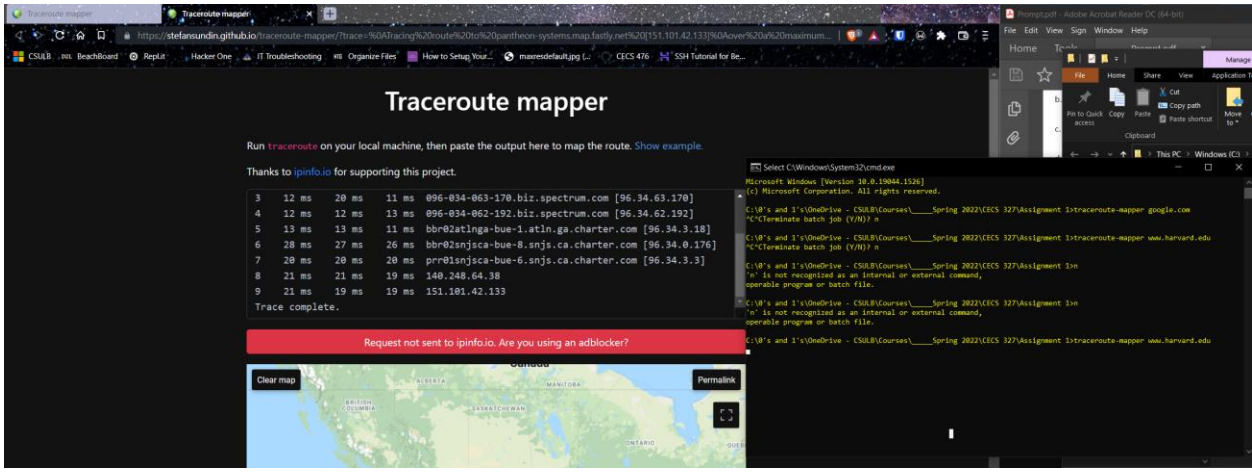
d. Compare different hosts



I notice that those that are closer to me are faster to respond and have a smaller average of round times than those that are farther. Also, those domains such as usyd.edu.au may be behind a firewall and don't allow me to get a reply back b/c inbound communication port may be disabled.

e. Use traceroute mapper

For Harvard.edu:



Sorry professor, the website does not work for me for any host trace route mapping, I followed the example to see how formatting should work, however, not even the example maps out the route of the trace.

However, I can conclude that the route for the first couple of hops is the same because the trace is navigating throughout my wifi-provider's network. From there, the shorter the distance to the host, the shorter the trace route is as well.