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Preguntas de la presentación: 1_Redes_de_computadoras

1. Imagine that you have trained your St. Bernard, Bernie, to carry a box of three 8-mm tapes instead of a flask of brandy. (When your disk fills up, you consider that an emergency.) These tapes each contain 7 gigabytes. The dog can travel to your side, wherever you may be, at 18 km/hour. For what range of distances does Bernie have a higher data rate than a transmission line whose data rate (excluding overhead) is 150 Mbps? How does your answer change if (i) Bernie's speed is doubled; (ii) each tape capacity is doubled; (iii) the data rate of the transmission line is doubled.

18km/h = 0.005km/s – Velocidad
21Gb x 8Gigabits = 168Gigabits x 1024 = 172032 Megabits / 150Megabits/s = 1146.88 s
Distancia que Bernie es mas rapido = 1146.88s x 0.005km/s = 5.73Km

i. Velocidad de Bernie se Dupica = 11.46km
ii. Se duplica la capacidad de cada cinta = 11.46km
iii. Se duplica la velocidad de los datos de transmision = 2.91km

3. The performance of a client-server system is strongly influenced by two major network characteristics: the bandwidth of the network (that is, how many bits/sec it can transport) and the latency (that is, how many seconds it takes for the first bit to get from the client to the server). Give an example of a network that exhibits high bandwidth but also high latency. Then give an example of one that has both low bandwidth and low latency.

Internet tiene un alto ancho de banda y una latencia muy alta ya que son conexiones de miles de kilometros de distancia.

Bluetooth tiene un bajo ancho de banda y una latencia muy baja ya que la distancia de conexión es muy pequeña, te alcanza hasta 10 metros.

10. What are two reasons for using layered protocols? What is one possible disadvantage of using layered protocols?

Ventajas
- Los protocolos que operan en una capa específica tienen información definida sobre la cual actuar y una interfaz definida para las capas superior e inferior.
- Fomenta la competencia, ya que los productos de distintos proveedores pueden trabajar en conjunto.

Desventaja
- Las capas contienen demasiadas actividades redundantes, por ejemplo, el control de errores se integra en casi todas las capas siendo que tener un único control en la capa de aplicación o presentación sería suficiente.

16. A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

Con n capas y h bytes agregadas por capa, el numero total de bytes de encabezamientos por el mensaje es hn, el tamaño del mensaje total es M + nh, dando que la fraccion de ancho de banda en encabezamientos sea hn / (M + hn).

22. How long was a bit in the original 802.3 standard in meters? Use a transmission speed of 10 Mbps and assume the propagation speed in coax is 2/3 the speed of light in vacuum.

La velocidad de la luz en 2/3coaxial = 200.000 km/seg, lo que equivale a 200 metros/µseg. A 10 Mbps, tarda 0,1 µs en transmitir un bit.

Así, el bit dura 0,1 µseg en el tiempo, durante el cual se propaga 20 metros. Por lo tanto, un bit tiene 20 metros.

23. An image is 1600 × 1200 pixels with 3 bytes/pixel. Assume the image is uncompressed. How long does it take to transmit it over a 56-kbps modem channel? Over a 1-Mbps cable modem? Over a 10-Mbps Ethernet? Over 100-Mbps Ethernet? Over gigabit Ethernet?

Imagen 1600 x 1200 x 3 bytes = 5 760 000 Bytes = 46 080 000 bits.

- 46080000bits / 56000bits/s = 822.85s
- 46080000bits / 1000000bits/s = 46.08s
- 46080000bits / 10000000bits/s = 4.608s
- 46080000bits / 100000000bits/s = 0.4608s
- 46080000bits / 1000000000bits/s = 0.04608s

33. The *ping* program allows you to send a test packet to a given location and see how long it takes to get there and back. Try using *ping* to see how long it takes to get from your location to several known locations. From these data, plot the one-way transit time over the Internet as a function of distance. It is best to use universities since the location of their servers is known very accurately. For example, *berkeley.edu* is in Berkeley, California; *mit.edu* is in Cambridge, Massachusetts; *vu.nl* is in Amsterdam; The Netherlands; *www.usyd.edu.au* is in Sydney, Australia; and *www.uct.ac.za* is in Cape Town, South Africa.

```
MacBook-Pro:~ albertocon$ ping berkeley.edu
PING berkeley.edu (35.163.72.93): 56 data bytes
64 bytes from 35.163.72.93: icmp_seq=0 ttl=48 time=103.717 ms
64 bytes from 35.163.72.93: icmp_seq=1 ttl=48 time=83.914 ms
64 bytes from 35.163.72.93: icmp_seq=2 ttl=48 time=88.289 ms
64 bytes from 35.163.72.93: icmp_seq=3 ttl=48 time=105.631 ms
64 bytes from 35.163.72.93: icmp_seq=4 ttl=48 time=95.122 ms
64 bytes from 35.163.72.93: icmp_seq=5 ttl=48 time=83.718 ms
64 bytes from 35.163.72.93: icmp_seq=6 ttl=48 time=84.261 ms
64 bytes from 35.163.72.93: icmp_seq=7 ttl=48 time=91.035 ms
64 bytes from 35.163.72.93: icmp_seq=8 ttl=48 time=82.723 ms
^C
--- berkeley.edu ping statistics ---
9 packets transmitted, 9 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 82.723/90.934/105.631/8.282 ms
MacBook-Pro:~ albertocon$
```

```
MacBook-Pro:~ albertocon$ ping mit.edu
PING mit.edu (23.14.168.237): 56 data bytes
64 bytes from 23.14.168.237: icmp_seq=0 ttl=54 time=102.055 ms
64 bytes from 23.14.168.237: icmp_seq=1 ttl=54 time=98.873 ms
64 bytes from 23.14.168.237: icmp_seq=2 ttl=54 time=98.889 ms
64 bytes from 23.14.168.237: icmp_seq=3 ttl=54 time=115.924 ms
64 bytes from 23.14.168.237: icmp_seq=4 ttl=54 time=110.166 ms
64 bytes from 23.14.168.237: icmp_seq=5 ttl=54 time=99.303 ms
^C
--- mit.edu ping statistics ---
6 packets transmitted, 6 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 98.873/104.202/115.924/6.560 ms
MacBook-Pro:~ albertocon$
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```
MacBook-Pro:~ albertocon$ ping vu.nl
PING vu.nl (52.232.69.102): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
^C
--- vu.nl ping statistics ---
7 packets transmitted, 0 packets received, 100.0% packet loss
MacBook-Pro:~ albertocon$
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```
MacBook-Pro:~ albertocon$ ping www.usyd.edu.au
PING rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.com (54.79.145.225): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
Request timeout for icmp_seq 6
^C
--- rpxy-loadb-1thwdg5gwm0fm-2097141603.ap-southeast-2.elb.amazonaws.com ping statistics ---
8 packets transmitted, 0 packets received, 100.0% packet loss
MacBook-Pro:~ albertocon$
```

```
MacBook-Pro:~ albertocon$ ping www.uct.ac.za
PING ecm-vip-prd.uct.ac.za (137.158.154.230): 56 data bytes
Request timeout for icmp_seq 0
Request timeout for icmp_seq 1
Request timeout for icmp_seq 2
Request timeout for icmp_seq 3
Request timeout for icmp_seq 4
Request timeout for icmp_seq 5
Request timeout for icmp_seq 6
Request timeout for icmp_seq 7
^C
--- ecm-vip-prd.uct.ac.za ping statistics ---
9 packets transmitted, 0 packets received, 100.0% packet loss
```