

Assignment #1

CSc 4220/6220 - Computer Networks

September 5, 2017

→ *For CSc4220, students must answer the question until 5. (c) (inclusive).*

→ *For CSc6220, students must answer all question.*

1. List the available residential access technologies in your city. For each type of access, provide the advertised downstream rate, upstream rate, and monthly price.
2. How long does it take a packet of length 1,000 bytes to propagate over a link of distance 2,500 km, propagation speed $2.5 * 10^8$ m/s, and transmission rate 2 Mbps? More generally, how long does it take a packet of length L to propagate over a link of distance d , propagation speeds, and transmission rate R bps? Does this delay depend on packet length? Does this delay depend on transmission rate?
3. What is the difference between a **virus** and a **worm**?
4. Review the car-caravan analogy in **Section 1.4**. Assume a propagation speed of 100 km/hour.
 - (a) Suppose the caravan travels 150 km, beginning in front of one tollbooth, passing through a second tollbooth, and finishing just after a third tollbooth. What is the end-to-end delay?
 - (b) Repeat (a), now assuming that there are **eight** cars in the caravan instead of ten.
5. Suppose two hosts, **A** and **B**, are separated by 20,000 kilometers and are connected by a direct link of $R = 2$ Mbps. Suppose the propagation speed over the link is $2.5 * 10^8$ meters/sec.
 - (a) Calculate the bandwidth-delay product, $R * d_{prop}$.
 - (b) Consider sending a file of 800,000 bits from Host **A** to Host **B**. Suppose the file is sent continuously as one large message. What is the maximum number of bits that will be in the link at any given time?
 - (c) Provide an interpretation of the bandwidth-delay product.
 - (d) What is the width (in meters) of a bit in the link? Is it longer than a football field?
 - (e) Derive a general expression for the width of a bit in terms of the propagation speed s , the transmission rate R , and the length of the link m .