

You have 10 minutes to complete this quiz.

Name: _____

RIT Username: _____

Problem	Possible	Score
1	10	
2	10	
Total	20	

1. State **two** reasons why broadcast Ethernet, where all hosts on the network share one single wire and CSMA/CD (carrier sense multiple access/collision detect) is used to arbitrate media access among the hosts, cannot support (1) a large number of hosts, or (2) hosts spread across a large geographic area. (10 pts)

With broadcast Ethernet, a large number of hosts cannot be supported as it is a single collision domain (i.e., only a single host can broadcast at once). A large geographic area cannot be supported, as the Ethernet would have to have a very large minimum frame size.

2. Calculate the maximum cable length in 10 Mbps Ethernet environment. (assume that the light speed is 3.0×10^8 m/s) (10 pts)

$$(64 \times 8) \text{ bit} \times (3 \times 10^8 \text{ m/sec}) / (2 \times 10^7 \text{ bit/sec}) = 7680 \text{ m};$$

There is another approach to solve this; If we let T_{eth} be the interval between two packets sending from Ethernet, it becomes $(64 \times 8 \text{ bit}) / (10^7 \text{ bit/sec})$. During T_{eth} , the receiver receives the first packet and the sender must be able to listen the jamming signal that is sent from the receiver right after the reception of the first packet. Thus, if we let X be the distance between the sender and receiver, the total distance the packet has to travel is $2 \times X$, and the time for light in a cable to travel $2 \times X$ meters is $(2 \times X \text{ m} / (3 \times 10^8 \text{ m/sec}))$, which has to be faster than T_{eth} . Hence, $(64 \times 8) \text{ bit} / (10^7 \text{ bit/sec}) \geq 2 \times X / (3 \times 10^8 \text{ m/sec})$, which is $7,680 \text{ m} \geq X$.