CS 168 Introduction to the Internet
Fall 2017 Scott Shenker

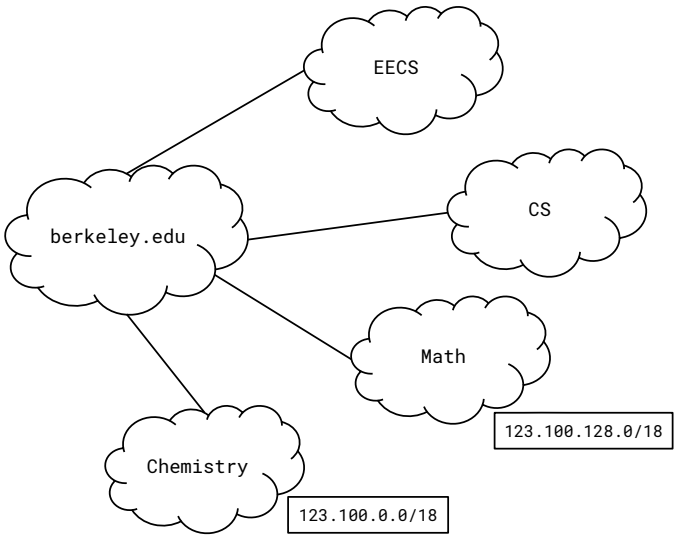
Discussion 6: IP and Forwarding

1 Warm Up

Find the binary representation, subnet mask, and address range of `192.168.0.0/13`.

2 IP Addressing

berkeley.edu is the Provider AS for EECS, CS, Math, and Chemistry. Assume that the CIDR (Classless InterDomain Routing) addressing scheme is used.



(1) What range of addresses does Math hold? How many addresses are in this range?

(2) `123.100.192.0/18` is reserved for EECS and CS. Assign equal halves of this address space to the two departments.

(3) What is the longest prefix for berkeley.edu that encompasses all of Chemistry, Math, EECS and CS?

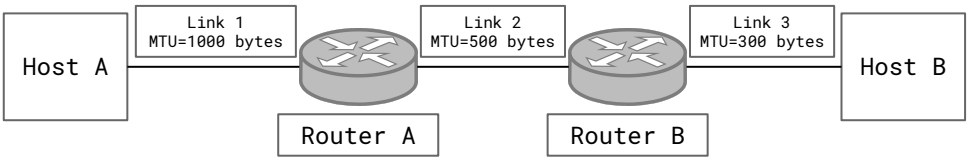
(4) You want to start a new department Floriology, but you foresee that no more than 50 people will enroll. Assuming one address per person, what prefix would you assign to it?

(5) Your friend came up with the brilliant idea of starting yet another (slightly redundant) department, Mathematical Floriology (`123.100.64.0/29`), which is multi-homed from the existing Math and Floriology departments. Why might it be a good idea for Mathematical Floriology to be multi-homed, instead of directly attached to only Math or Floriology?

(6) How does this affect Berkeley.edu?

3 IP Fragmentation

Maximum Transmission Unit (MTU) is the size of the largest packet that a link can carry. Host A sends an **600 byte** IP packet (including header) to Host B, which is fragmented along the way. Assume the typical IP header length of 20 bytes.



(1) The packet fits within the MTU of Link 1 and arrives at Router A. What are the resulting fragments that traverse Link 2? For each fragment, identify the total length (including header), flags, and offset.

(2) The fragments arrive at Router B. What are the resulting fragments that traverse Link 3?

(3) Why is the MF flag needed?

(4) Why cant we just number our fragments instead of keeping track of fragmentation offsets?

4 Longest Prefix Matching

Your routing table contains the following entries:

Address	Port
01*	Port 1
000	Port 2
001	Port 1
1**	Port 2
101	Port 1

Mark the entries on the following tree. Then, find a more concise representation of the table.