# HW I – CS 6390 , Spring 2012 , Answers

# Question 1

The Ident ﬁeld is 16 bits, so we can send 576×2^16 bytes per 60 seconds, or about 5Mbps. If

we send more than this, then fragments of one packet could conceivably have the same Ident

value as fragments of another packet, which would cause packets to be incorrectly reassembled at the destination.

# Question 2

(a) A would broadcast an ARP request “where is C?”

B would answer it; it would supply its own Ethernet address (i.e. masquerading as C).

A would send C’s packet to B’s Ethernet address (thinking that “B” is actually “C”)

B would forward the packet to C.

(b) For the above to work, B must know to forward the packet without using subnet address-

ing; this is typically accomplished by having B’s routing table contain a “host-speciﬁc route”:

net/host interface

C/32 direct link

200.0.0/24 Ethernet link

# Question 3 (Inter-domain routing)

* 1. Have R1 and R2 inject a default route (0.0.0.0/0) into the local intradomain routing protocol (e.g. OSPF or RIP)
  2. Those routers closest to R1 (in terms of the local routing metric) will have the traffic end up going to R1, while those closest to R2 (in terms of the local routing metric) will have the traffic end up going to R2 (assuming the intradomain routing protocol uses minimum cost routing)

1. The routers in X and Y that are border routers should inject into their local intradomain routing protocols the fact that they are “directly” attached to 110.128.0.0/20 (although in reality they are multiple hops away)
2. If Y is not aware of X, it has two choices, (i) make one BGP advertisement for 110.128.0.0/16 and another for 110.128.0.0/20, or (ii) make a SINGLE advertisement for 110.128.0.0/16. Y would choose (ii) since in this way it adds only one entry to the routing tables in the core of the Internet (i.e. 110.128.0.0/16) as opposed to adding two entries (i.e. 110.128.0.0/16 and 110.128.0.0/20)
3. Assuming Y uses a single advertisement (ii in c), then, if X advertises both 107.255.0.0/16 and 110.1128.0.0/20 (i.e. two advertisements), then, due to longest prefix match, all Internet traffic to the client will go via X instead of via Y.

# Question 4

There might be several solutions, but this is what I came up with from the top of my head.

Assume two providers: Q and P. Assume P has an address block Bp. Assume that a customer of P moves to Q, and that customer (call it X), has block Bx (which is a sub-block of Bp). Thus Q advertises Bx. So far so good. However, assume X has itself clients, one of which is A, with block Ba, where Ba is a subset of Bx (and hence also of Bp). A returns to P. P advertises only Bp (allowed by the rules of the question) and Q advertises Bx (even though Ba is missing, again allowed by the rules of the question)

Where will a packet addressed to A go? To Q (even though A is in P), since Q advertises Bx which is more specific than Bp advertised by P.

Hopefully this makes sense.

# Question 5

From the transmission edges, we know that 1, 2, and 3 are neighbors of 0, and 3 is also a neighbor of 4 and 1, also that 2 is a neighbor of 1 and 5. The transmission edges also tell us the paths allowed at each node. So, we have the following graph:

So far, we don’t know the order of the ranking at each node. Hopefully the conflict edges help us here.

We have only two conflict edges: (1 3 0) 🡪 (2 1 0), and (2 1 0) 🡪 (4 2 0)

(1 3 0) 🡪 (2 1 0) (here, “2” is “u” and “1” is “v”) tells us that 1 3 0 is ranked higher than 1 0 at node 1 (otherwise no conflict)

(2 1 0) 🡪 (4 2 0) tells us that (2 1 0) is ranked higher than (2 0) at node 2.

**You are UNABLE to determine the relative order of (4 2 0) and (4 3 0) at node 4.**

# Question 6

See attached PDF scanned file (handwritten notes)

# Question 7

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1 2 0  
1 0

2 3 0  
2 0

3 1 0  
3 0