EP2120 Internetworking/Internetteknik
IK2218 Internets Protokoll och Principer

Homework Assignment 1
(Solutions due 17:00, Wednesday, 2014.Sept.10)
(Review due 17:00, Friday, 2014.Sept.12)

1. IPv4 Addressing (30/100)

a) What is the best fit netmask (i.e., resulting in as few host addresses as possible) for a network with 63 hosts in it? (5p)

b) What is the maximum number of hosts can you have in a /23 network? (5p)

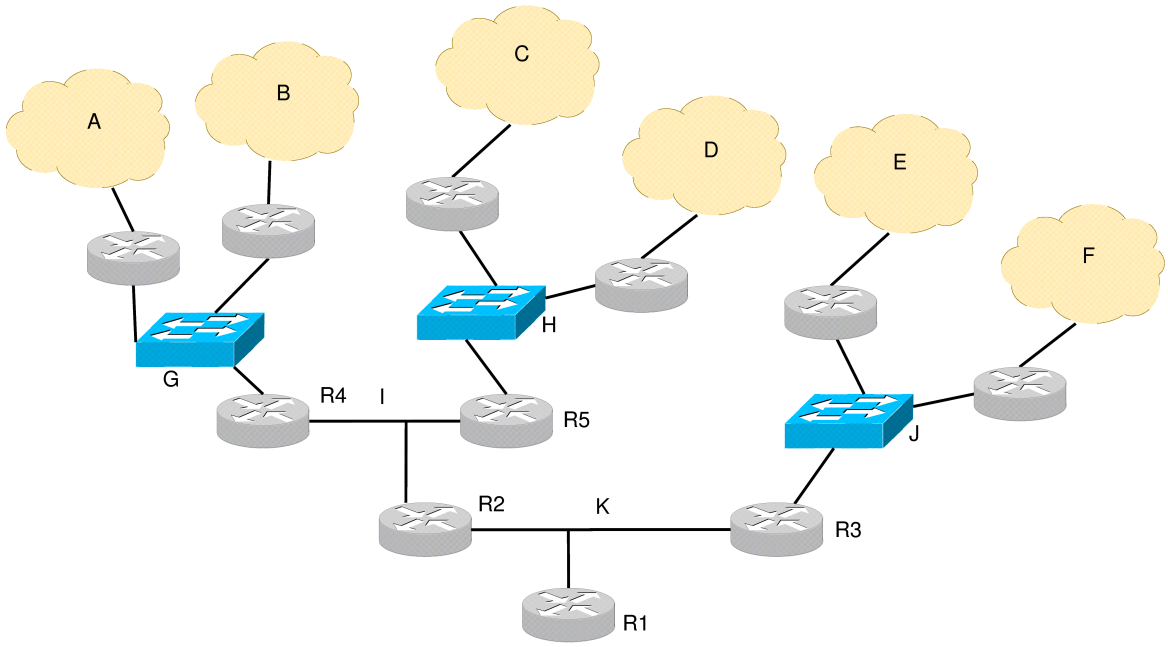
c) Split up the network 114.180.140.0/22 into four equally sized /24 networks! (5p)

d) What is the directed broadcast address of the network 82.211.96.0/21? (5p)

e) What is the limited broadcast address of the network 82.211.96.0/21? (5p)

f) Use the services of IANA and a regional registry to figure out to whom the IP network 130.243.128.0/17 belongs. Provide the name of the organization and the AS number. (5p)

2. Address allocation (30/100)



Consider the network above, a routed network in an organization's enterprise network. The organization built a core network connected to a central router R1 (network K), and connected their

edge/access routers with (long-haul) switched Ethernet (networks G, H, I, J). The access routers are connected to a set of local offices (networks A to F). All networks use Ethernet on the link layer.
The enterprise allocated prefix 190.124.200.0/21 for its internal addresses.
Make an *address allocation* using 190.124.200.0/21 in the network by assigning a sub-block to each network A-J in the following way:

1) The networks A – D require 200 hosts each, while networks E and F require 500 hosts each. Create a minimal block for each local office A through F. Start with the lowest address for network A.
2) There are no unnumbered point-to-point links: all Ethernet networks have IP sub-networks and all nodes (routers and hosts) have an IP address on all their network interfaces. All nodes need to be reachable from any other host.
3) The address allocation should be such that the sub-networks can be *aggregated*.

Based on your address allocation, provide the required entries of the forwarding tables of routers R1 and R2! Give a sketch of your reasoning to support your solution. (30p)

3. IPv4 forwarding (20/100)

A router has the forwarding table shown below. Determine the next-hop address and the outgoing interface for the packets arriving to the router with destination addresses as given in points (a)-(e).

Destination	Next hop	Flags	Interface
70.7.0.0/18	77.58.204.40	UG	m2
38.104.107.128/28	-	U	m0
65.200.82.128/25	-	U	m2
136.12.2.0/25	198.54.148.212	UG	m0
182.247.19.18/32	198.54.148.213	UG	m0
193.114.236.0/22	-	U	m1
162.168.31.232/30	77.58.204.41	UGH	m2
0.0.0.0	31.167.172.143	UG	m1

a) 193.114.240.84 (4p)
b) 182.247.19.18 (4p)
c) 162.168.31.234 (4p)
d) 70.7.23.140 (4p)
e) 87.176.148.61 (4p)

4. IPv4 and IPv6 transition strategies (20/100)

Since IPv6 is not backwards compatible with IPv4, certain strategies have been proposed in order to ensure that nodes in an internet, in which there are both IPv4 and IPv6 enabled hosts, are able to communicate with one another.

a) In your own words, describe the three proposed strategies of "dual stack", "tunneling", and "header translation". (5p)

b) Consider two hosts, H1 and H2, connected by an internetwork. H1 can only use IPv6 and H2 can only use IPv4. The network is compatible with both IPv4 and IPv6. What will happen if H1 tries to send a datagram to H2? What if it is H2 that wants to send a datagram to H1? (5p)

c) Consider two hosts, H1 and H2, connected by an internetwork. Both hosts can use IPv6 only. There is a region in the network that is using IPv4 only. How are IPv6 datagrams delivered between H1 and H2 so that they can reach their destinations? (5p)

d) Consider two hosts, H1 and H2, connected by an internetwork. Both hosts can use IPv4 only. There is a region in the network that is using IPv6 only. How are IPv4 datagrams delivered between H1 and H2 so that they can reach their destinations? (5p)