Electrical, Computer, and Systems Engineering
ECSE-6600: Internet Protocols
Spring 2002

Problem Set 4- Due Thursday, April 11th, 2002
[Tape-delayed students ONLY: Due April 17th, 2002]

NOTE:

1. BE BRIEF.
2. SUBMIT THIS HOMEWORK USING WEBCT DROP BOX ONLINE!
3. All paper readings are available from the backup course web page:

http://www.ecse.rpi.edu/Homepages/shivkuma/teaching/sp2002/index.html#readings

I. Reading assignments:

- Chapters 17, 20, 23, 30, 33 in Comer's book
- **Reading:** Deering et al An Architecture for Wide-Area Multicast Routing
- **Reading:** C. Diot et al: "Deployment issues with IP multicast"
- **Reading:** Holbrook and Cheriton: "IP Multicast Channels: EXPRESS Support for Large-scale Single-source Applications"
- **Reading:** Byers et al: "A Digital Fountain Approach to Reliable Distribution of Bulk Data"
- **Reading:** Hinden, IP Next Generation Overview
- **Reading:** RFC 3056, Connection of IPv6 Domains via IPv4 Clouds

Questions based upon reading assignments:

a) (10 pts) Describe the ways in which the PIM protocol described in Deering et al differs from DVMRP and MOSPF.

b) (20 pts) Discuss the key deployment issues with the original IP multicast model (see Diot et al) and explain how the architecture proposed by Holbrook and Cheriton fixes many of the problems and enables a relatively simple upgrade of IP multicast protocols.

c) (15 pts) Describe how the Digital Fountain's reliability model is different from TCP's model. Explain how one can gain efficiencies in reliable multicast of both video and data transmission with the protocol. What applications could effectively use the approach?

d) (15 pts) Though IPv6 is based upon the IPv4 model (see Hinden's paper), develop a list of reasons why it is difficult transition IPv4 to IPv6. Explain how the new strategy proposed in RFC 3056 might be superior to earlier transition approaches.

II. IPv4, IPv6, Other Network Layer Protocols, OAM Functions:

a) [20 pts] Develop a short list of differences between IPv4, IPv6, IPX, Decnet, Appletalk and CLNP. Explain why you think IP won over the competition? What was so special about the list of choices IP made which helped it become the dominant network layer protocol ?

b) [20 pts] Describe how subnet masking, CIDR, NAT and DHCP together help deal with the address shortage problem. Why does IPv6 still have dynamic address allocation and a leased model of addressing (eg: address lifetimes, DHCP etc) when it no longer has an address shortage issue ? Explain the key elements of IPv6 auto-configuration, and how does it compare to IPX, CLNP, Appletalk's mechanisms.