第七次作业：（英文版教材第五章 20，21，29，30，31，34，35，38，39，补充题）

20. (IP Fragmentation) Suppose that host A is connected to a router R 1, R 1 is connected to another router, R 2, and R 2 is connected to host B. Suppose that a TCP message that contains 900 bytes of data and 20 bytes of TCP header is passed to the IP code at host A for delivery to B. Show the Total length, Identification, DF, MF, and Fragment offset fields of the IP header in each packet transmitted over the three links. Assume that link A-R1 can support a maximum frame size of 1024 bytes including a 14-byte frame header, link R1-R2 can support a maximum frame size of 512 bytes, including an 8-byte frame header, and link R2-B can support a maximum frame size of 512 bytes including a 12-byte frame header.

21. (DatagramID cycling) A router is blasting out IP packets whose total length (data plus header) is 1024 bytes. Assuming that packets live for 10 sec, what is the maximum line speed the router can operate at without danger of cycling through the IP datagram ID number space?

29. (Address Aggregation) The set of IP addresses from 29.18.0.0 to 29.18.127.255 has been aggregated to 29.18.0.0/17. However, there is a gap of 1024 unassigned addresses from 29.18.60.0 to 29.18.63.255 that are now suddenly assigned to a host using a different outgoing line. Is it now necessary to split up the aggregate address into its constituent blocks, add the new block to the table, and then see if any reaggregation is possible? If not, what can be done instead?

30. (CIDR Routing) A router has the following (CIDR) entries in its routing table:

Network address	Next hop/Interface
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
0.0.0.0/0 (default)	Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?

(a) 135.46.63.10
(b) 135.46.57.14
(c) 135.46.52.2
(d) 192.53.40.7
(e) 192.53.56.7

31. (NAT) Many companies have a policy of having two (or more) routers connecting the company to the Internet to provide some redundancy in case one of them goes down. Is this policy still possible with NAT? Explain your answer.

34. (IP Fragmentation) Most IP datagram reassembly algorithms have a timer to avoid having a lost fragment tie up reassembly buffers forever. Suppose that a datagram is fragmented into four fragments. The first three fragments arrive, but the last one is delayed. Eventually, the timer goes off and the three fragments in the receiver's memory are discarded. A little later, the last fragment stumbles in. What should be done with it?

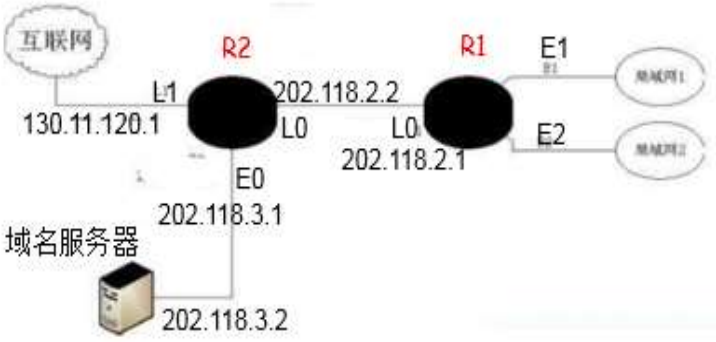
35. (Header checksum) In IP, the checksum covers only the header and not the data. Why do you suppose this design was chosen?

38. (IPv4 vs. IPv6) The *Protocol* field used in the IPv4 header is not present in the fixed IPv6 header. Why not?

39. (ARP) When the IPv6 protocol is introduced, does the ARP protocol have to be changed? If so, are the changes conceptual or technical?

补充题：

某公司网络拓扑图如下图所示，路由器 R1 通过接口 E1，E2 分别连接局域网 1，局域网 2，通过接口 L0 连接路由器 R2，并通过路由器 R2 连接域名服务器与互联网。



R1 和 R2 的路由表结构为：

目的网络 IP 地址	子网掩码	下一跳 IP 地址	接口

1) 将 IP 地址空间 202.118.1.0/24 划分为两个子网，分配给局域网 1，局域网 2，每个局域网分配的地址数不少于 120 个，请给出子网划分结果。说明理由或给出必要的计算过程。

2) 请给出 R1 的路由表，使其明确包括到局域网 1 的路由，局域网 2 的路由，域名服务器的主机路由和互联网的路由。 请采用路由聚合技术，给出 R2 到局域网 1 和局域网 2 的路由。