1. (1) MR：because only MR can receive the report, each multicast member will reply the duplicate reports. Thus, the MR will have high traffic load of reply implosion.

(2) group address：In addition to MR, all multicast members can hear this report. Thus, only one report will be receive by the MR. those multicast members who hear this report will suppress their own report. The network, therefore, can reduce the overheads.

(3) 224.0.0.1：all hosts (no matter if a host belongs to the multicast group or not) will receive this report. Thus, there is no report isolation. (ie, non-member hosts will be involved) but, this way can avoid reply implosion. That is, only one report will be sent on the network. So it can have better performance than the first case !!

---

2. proxy ARP：a router can answer ARP requests on one of its networks for a host or another of its networks

point query：given an IP address, return the hostname correspond to that address

---

3. IP：224.0.64.32

Link-layer：01：00：5e：00：40：20

$\begin{pmatrix} 64_{(10)} = 40_{(16)} \\ 32_{(10)} = 20_{(16)} \end{pmatrix}$

---

4. IP：routing mechanism

RIP：routing policy

---

5. They are used for different purposes:

IP checksum is only for IP header. It is computed at the source and verified hop-by-hop at each intermediate route and the destination. IP checksum can guarantee all fields of IP header to be correct. Thus IP can do the right operation.

TCP checksum is for TCP header and data. It is computed at the source and verified only at destination. It can make sure the destination receives the correct data.

6.

(1) $2^9 < 1000 < 2^{10}$ → 140 . 117 . xxxxxxxx . xxxxxxxx

|----------|--------|

10 bits 6 bits

subnet ID host ID

→ mask: 255.255.255.192

$2^6 - 2 = 62$ hosts can be on each subnet

(2)

(i) 140.117.176. 00|xxxxxx

mask: 255.255.255.192

IP range: 140.117.176.0~63

Broadcast IP: 140.117.176.63

(ii) 140.117.176. 01|xxxxxx
mask: 255.255.255.192
IP range: 140.117.176.64~127
Broadcast IP: 140.117.176.127
(iii) 140.117.176. 10|xxxxxx
mask: 255.255.255.192
IP range: 140.117.176.128~191
Broadcast IP: 140.117.176.191
(iv) 140.117.176. 110|xxxxxx
mask: 255.255.255.224
IP range: 140.117.176.192~223
Broadcast IP: 140.117.176.223
(v) 140.117.176. 111|xxxxxx
mask: 255.255.255.224
IP range: 140.117.176.224~255
Broadcast IP: 140.117.176.255

---

7. (1) ifconfig
(2) netstat
(3) traceroute

---

8. ICMP (TCP can be also included)

---

9. (ref p.28)

---

10. (1) ff:ff:ff:ff:ff:ff
(2) IP layer address : 224.0.0.1
link layer address : 01:00:5e:00:00:01
Any host can send an IP datagram with the destination IP address and link layer address shown above. Then all host on the attached physical network can receive this packet

---

11.
(1) All fragment from a common datagram have the same ID field. Fragment offset records the offset of this fragment from beginning of the original datagram. The flags field uses one bit as the “more fragments” bit.