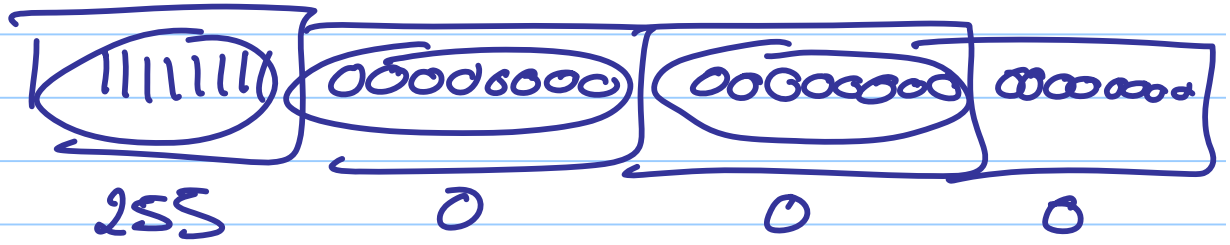
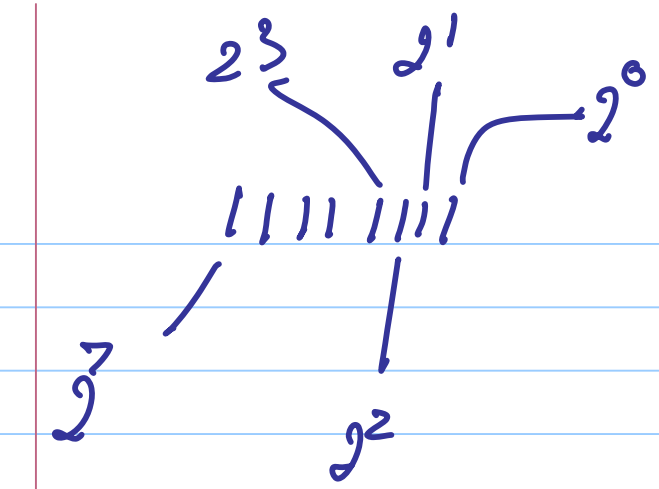
Lesson_6 IP, DNS, Home Nets

Note Title 4/17/2008

15/8 ⟹ 15.0.0.0/8 CIDR



192.168.16.0/24 255.255.255.0

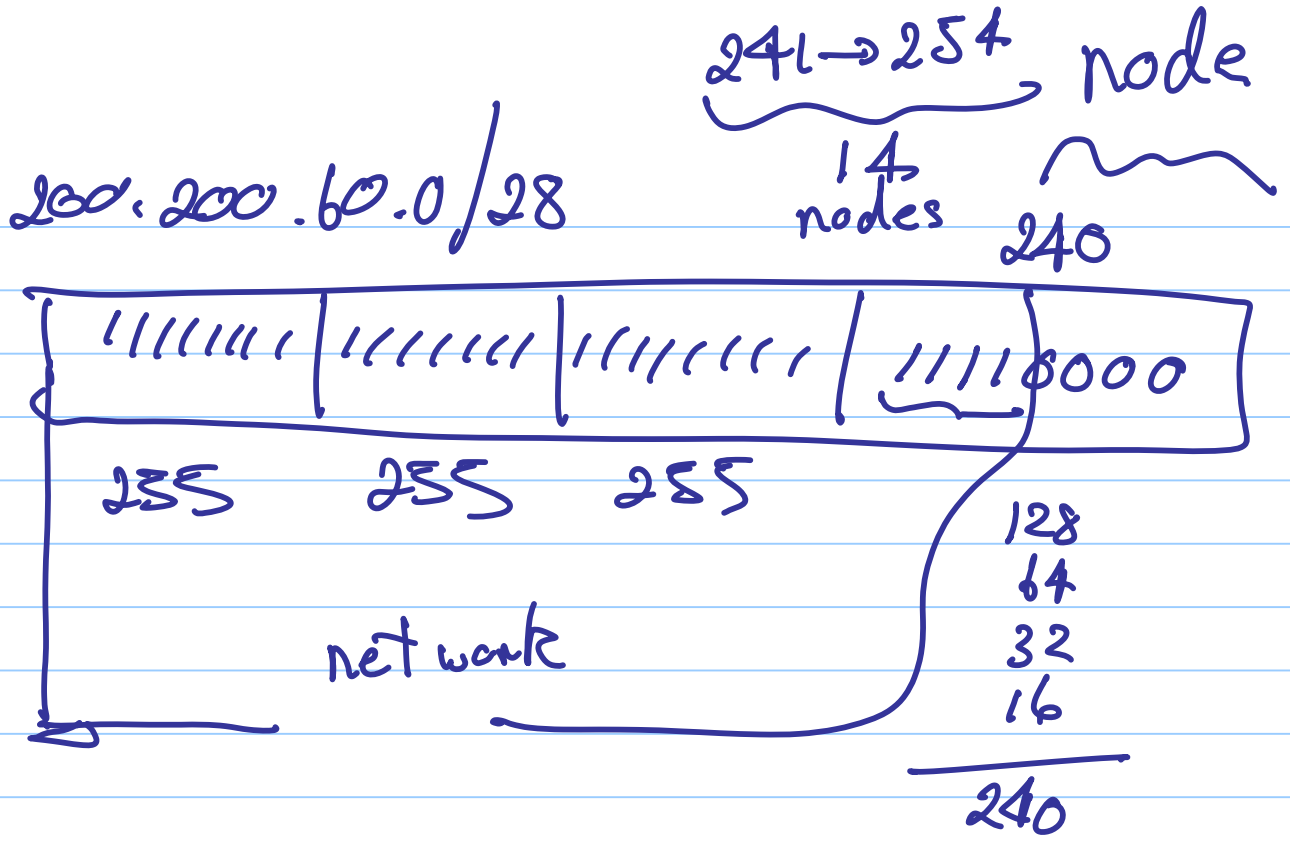


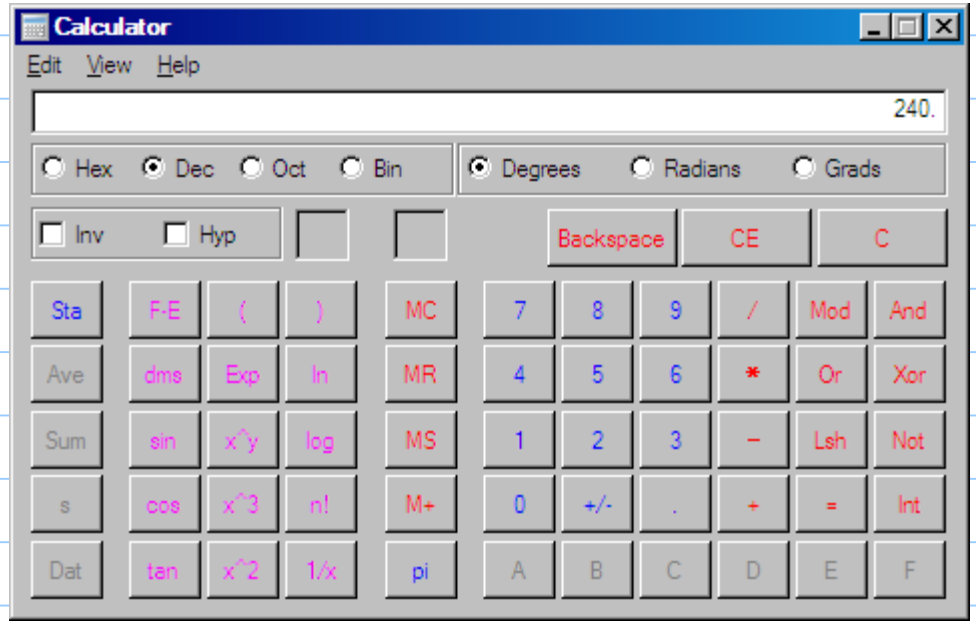
200.200.60.0/28

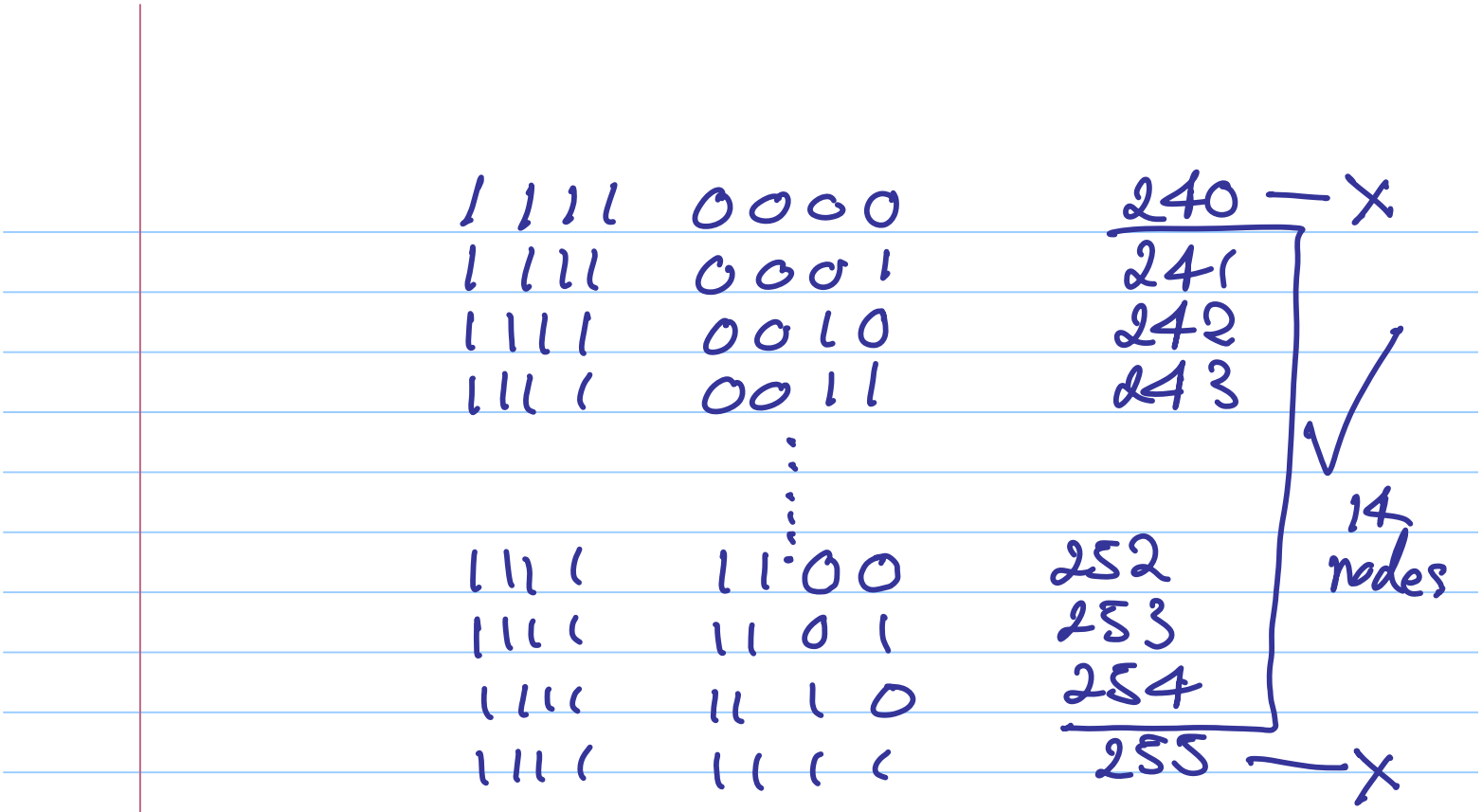
binary notation

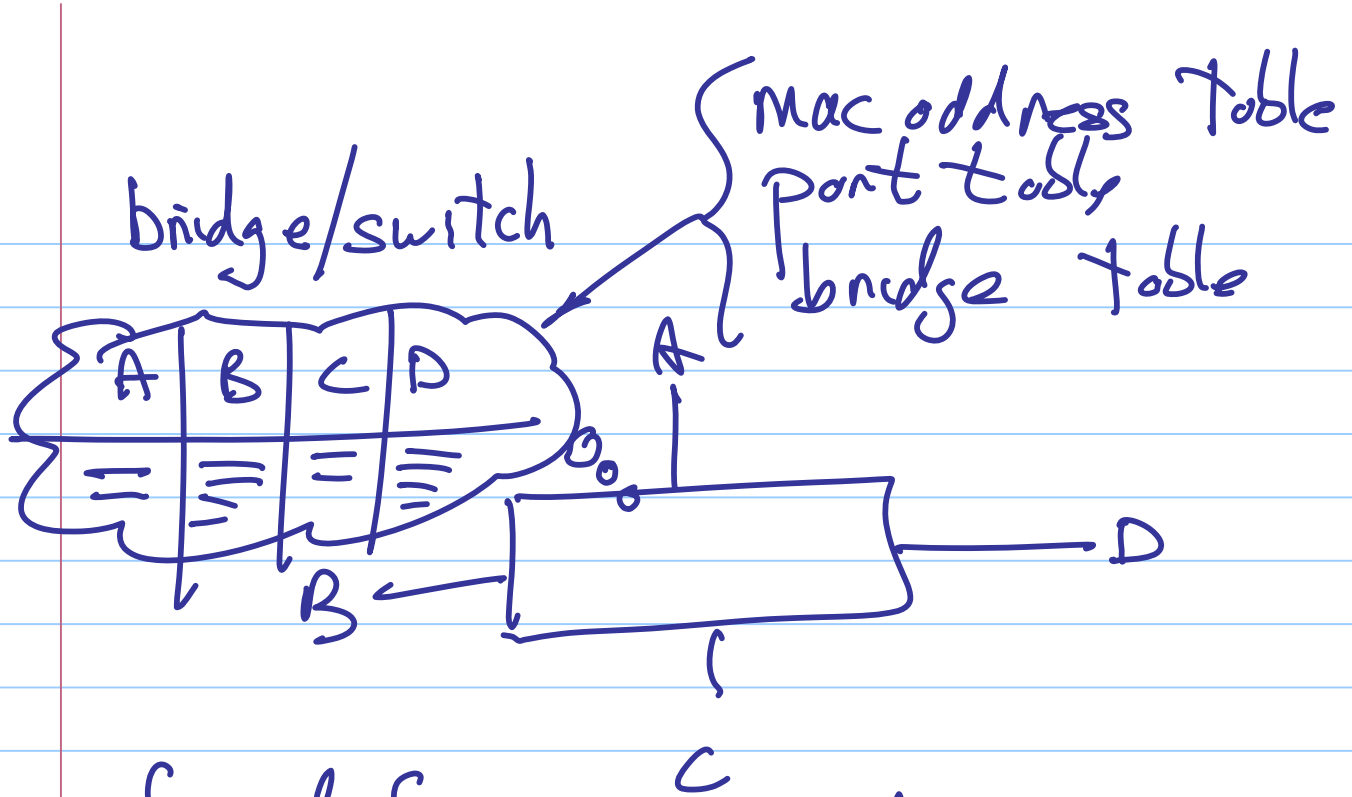
2^7	128
2^6	64
2^5	32
2^4	16
2^3	8
2^2	4
2^1	2
2^0	1

255


241 → 254
node
14
nodes
200.200.60.0/28
240
11111111 11111111 11111111 11110000
255 255 255
128
64
32
16
240
network

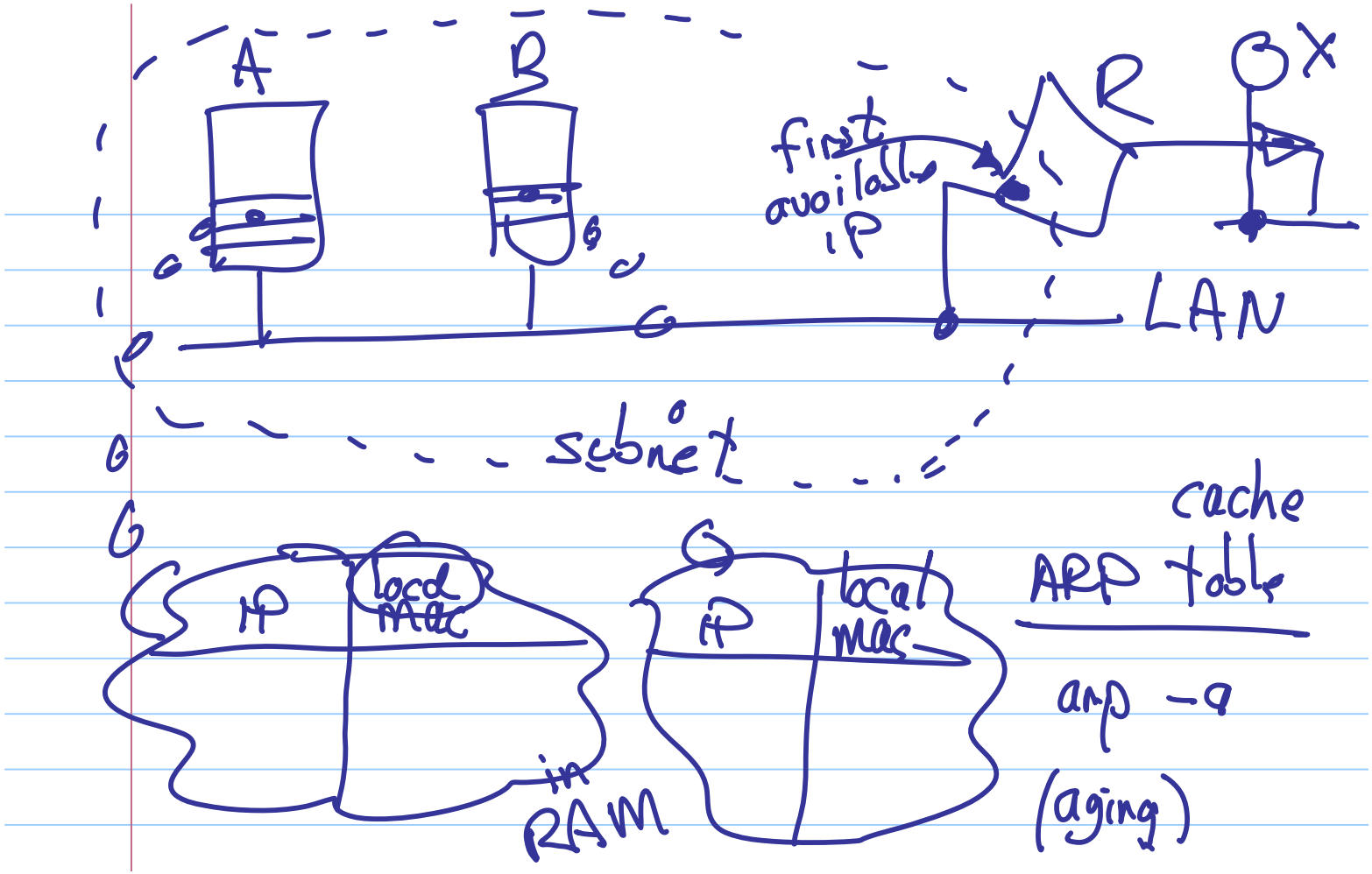

Calculator
Edit View Help
240.
Hex Dec Oct Bin
Degrees Radians Grads
Inv Hyp
Backspace CE C
Sta F-E ( ) MC 7 8 9 / Mod And
Ave dms Exp ln MR 4 5 6 * Or Xor
Sum sin x^y log MS 1 2 3 - Lsh Not
s cos x^3 n! M+ 0 +/- . + = Int
Dat tan x^2 1/x pi A B C D E F

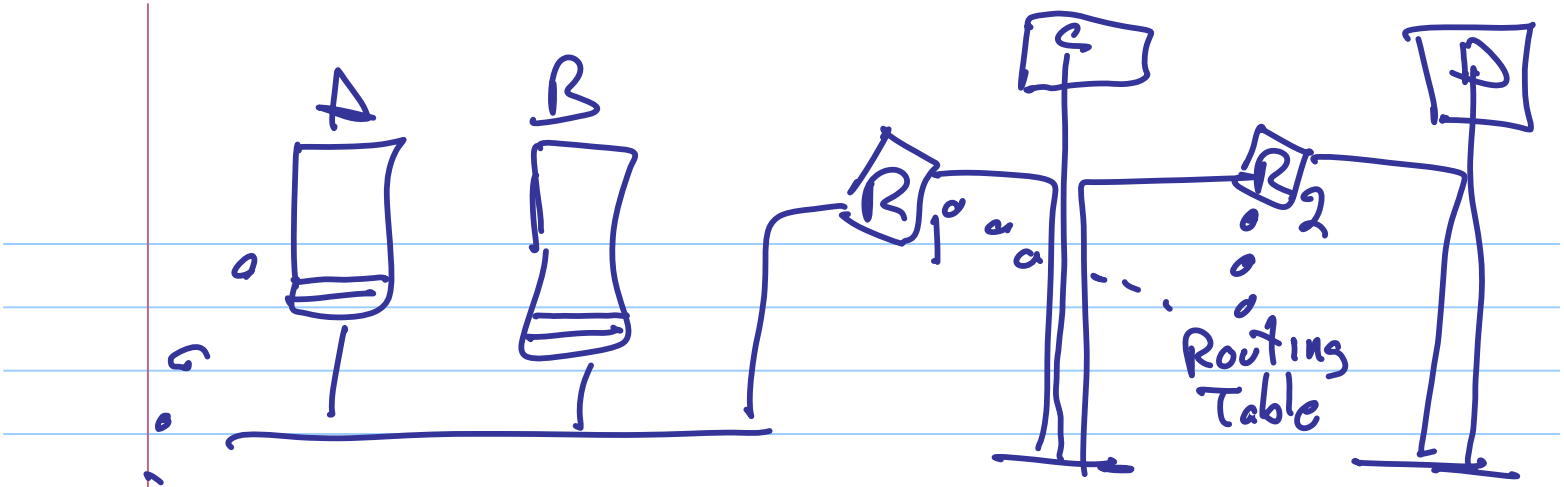

1111 0000
1111 0001
1111 0010
1111 0011
1111 1100
1111 1101
1111 1110
1111 1111
240 — X
241
242
243
252
253
254
255 — X
14 nodes



forward frames

subnet agnostic


A
B
R
X
first available IP
LAN
subnet
IP
local MAC
IP
local MAC
IP
RAM
cache
ARP table
arp -a
(aging)



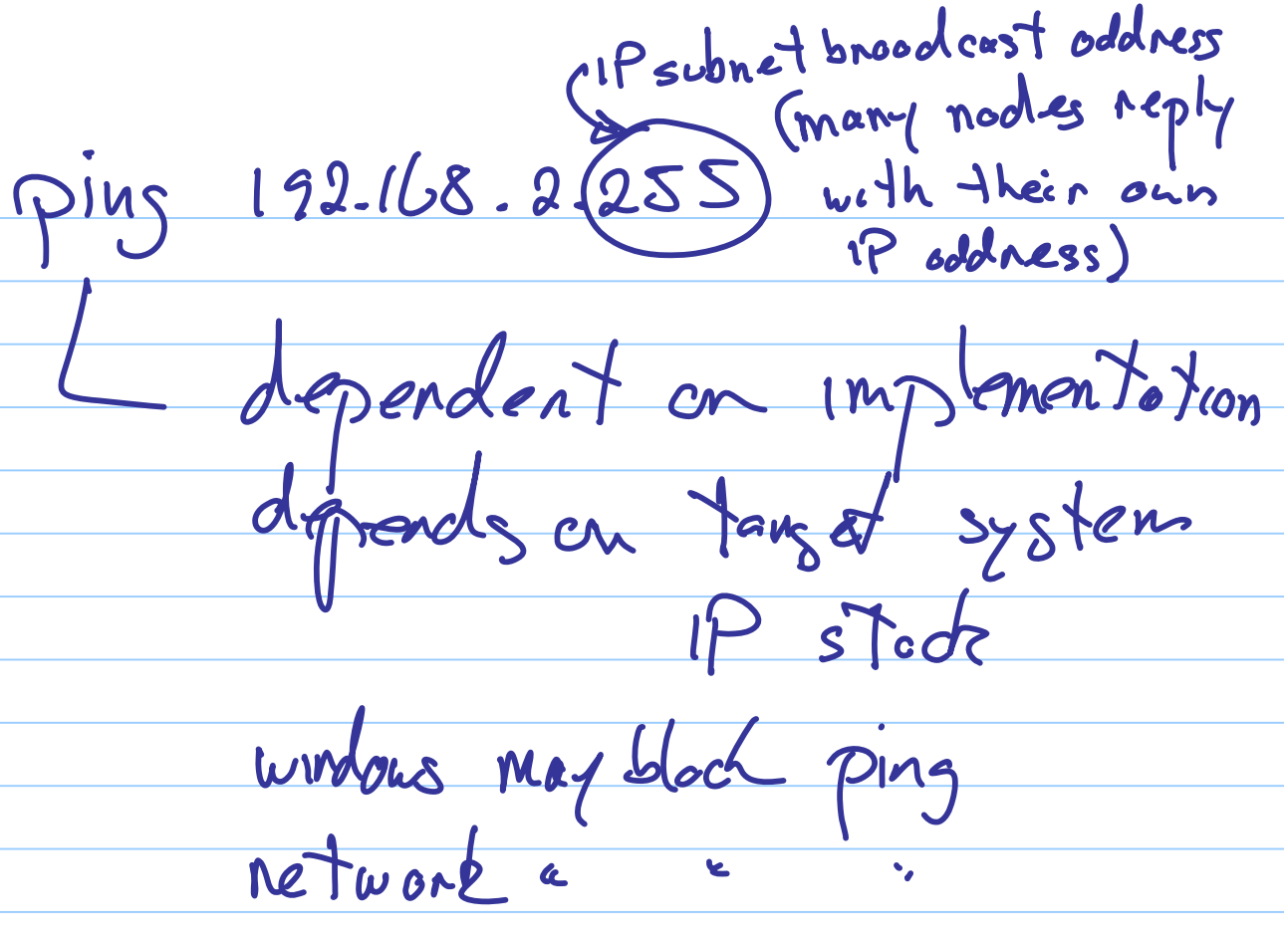
Ping B

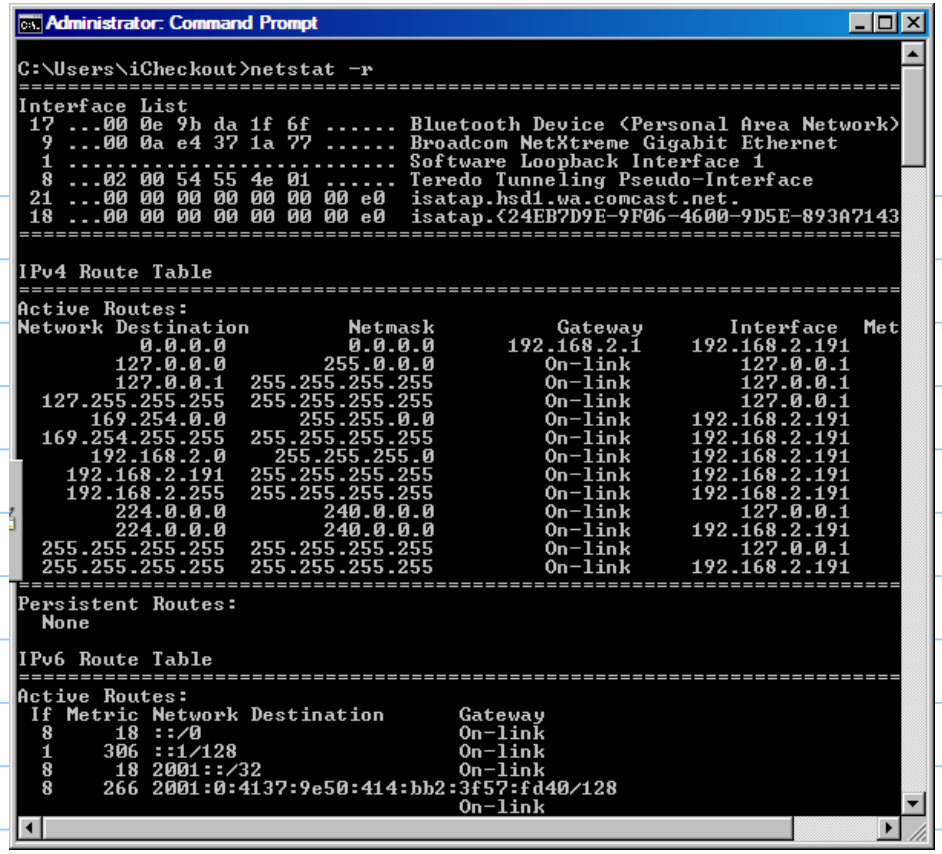
ARP for 'B' (broadcast)

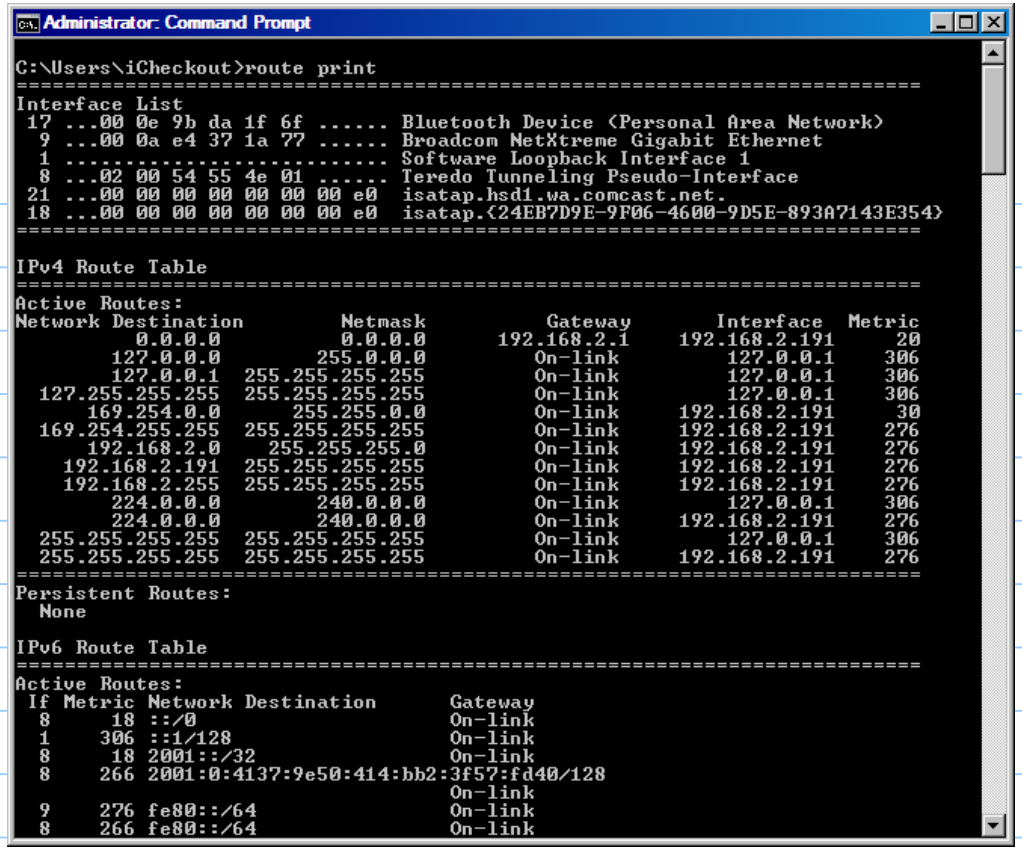
B replies with its MAC address

A ⟶ ping ⟶ B

A ⟵ reply ⟵ B

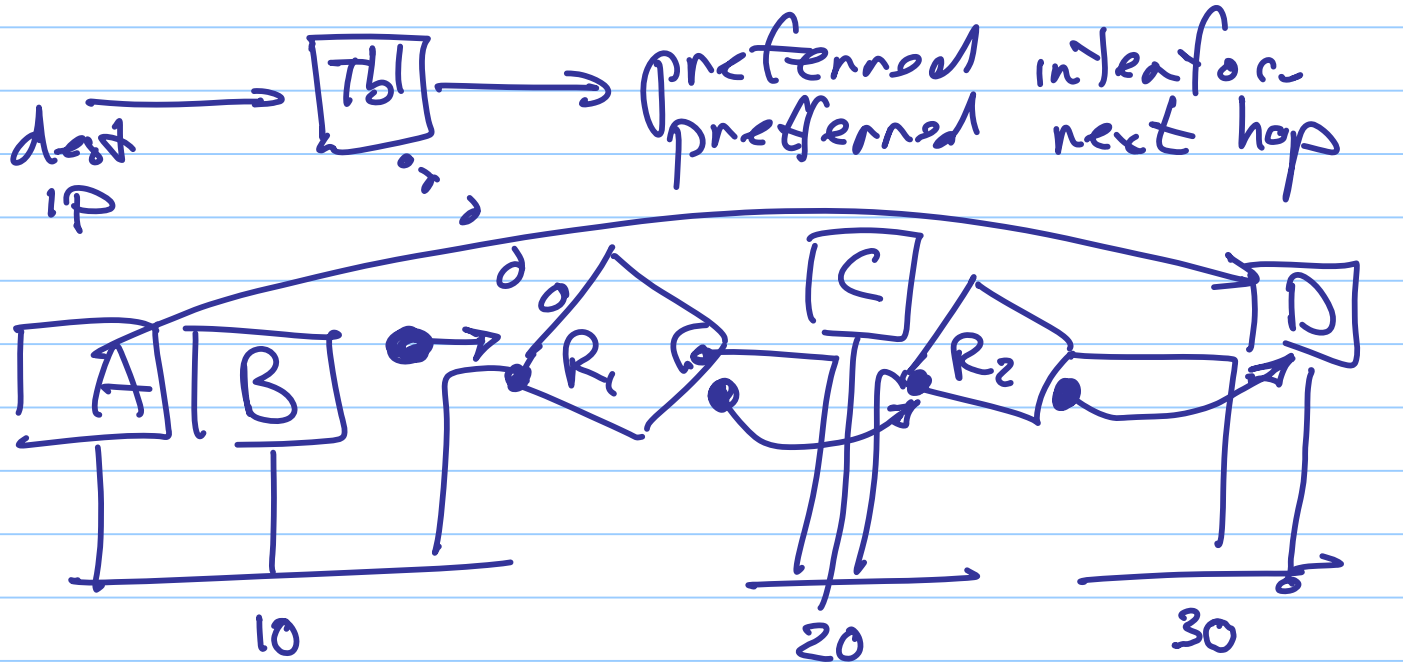

IP subnet broadcast address
(many nodes reply with their own IP address)
ping 192.168.2.255
dependent on implementation
depends on target system IP stack
windows may block ping
network " "


Administrator: Command Prompt
C:\Users\iCheckout>netstat -r
Interface List
17 ...00 0e 9b da 1f 6f ...... Bluetooth Device (Personal Area Network)
9 ...00 0a e4 37 1a 77 ...... Broadcom NetXtreme Gigabit Ethernet
1 .... Software Loopback Interface 1
8 ...02 00 54 55 4e 01 ...... Teredo Tunneling Pseudo-Interface
21 ...00 00 00 00 00 00 00 e0 isatap.hsd1.wa.comcast.net.
18 ...00 00 00 00 00 00 00 e0 isatap.{24EB7D9E-9F06-4600-9D5E-893A7143
IPv4 Route Table
Active Routes:
Network Destination Netmask Gateway Interface Met
0.0.0.0 0.0.0.0 192.168.2.1 192.168.2.191
127.0.0.0 255.0.0.0 On-link 127.0.0.1
127.0.0.1 255.255.255.255 On-link 127.0.0.1
127.255.255.255 255.255.255.255 On-link 127.0.0.1
169.254.0.0 255.255.0.0 On-link 192.168.2.191
169.254.255.255 255.255.255.255 On-link 192.168.2.191
192.168.2.0 255.255.255.0 On-link 192.168.2.191
192.168.2.191 255.255.255.255 On-link 192.168.2.191
192.168.2.255 255.255.255.255 On-link 192.168.2.191
224.0.0.0 240.0.0.0 On-link 127.0.0.1
224.0.0.0 240.0.0.0 On-link 192.168.2.191
255.255.255.255 255.255.255.255 On-link 127.0.0.1
255.255.255.255 255.255.255.255 On-link 192.168.2.191
Persistent Routes:
None
IPv6 Route Table
Active Routes:
If Metric Network Destination Gateway
8 18 ::/0 On-link
1 306 ::1/128 On-link
8 18 2001::/32 On-link
8 266 2001:0:4137:9e50:414:bb2:3f57:fd40/128
On-link


Administrator: Command Prompt
C:\Users\iCheckout>route print
===
Interface List
 17 ...00 0e 9b da 1f 6f ...... Bluetooth Device (Personal Area Network)
  9 ...00 0a e4 37 1a 77 ...... Broadcom NetXtreme Gigabit Ethernet
  1 .... Software Loopback Interface 1
  8 ...02 00 54 55 4e 01 ...... Teredo Tunneling Pseudo-Interface
 21 ...00 00 00 00 00 00 00 e0 isatap.hsd1.wa.comcast.net.
 18 ...00 00 00 00 00 00 00 e0 isatap.{24EB7D9E-9F06-4600-9D5E-893A7143E354}
===
IPv4 Route Table
===
Active Routes:
Network Destination   Netmask   Gateway   Interface Metric
          0.0.0.0   0.0.0.0   192.168.2.1   192.168.2.191   20
        127.0.0.0   255.0.0.0   On-link   127.0.0.1   306
        127.0.0.1 255.255.255.255   On-link   127.0.0.1   306
  127.255.255.255 255.255.255.255   On-link   127.0.0.1   306
      169.254.0.0   255.255.0.0   On-link   192.168.2.191   30
  169.254.255.255 255.255.255.255   On-link   192.168.2.191   276
      192.168.2.0   255.255.255.0   On-link   192.168.2.191   276
    192.168.2.191 255.255.255.255   On-link   192.168.2.191   276
    192.168.2.255 255.255.255.255   On-link   192.168.2.191   276
        224.0.0.0   240.0.0.0   On-link   127.0.0.1   306
        224.0.0.0   240.0.0.0   On-link   192.168.2.191   276
  255.255.255.255 255.255.255.255   On-link   127.0.0.1   306
  255.255.255.255 255.255.255.255   On-link   192.168.2.191   276
===
Persistent Routes:
  None
IPv6 Route Table
===
Active Routes:
 If Metric Network Destination   Gateway
  8   18 ::/0   On-link
  1   306 ::1/128   On-link
  8   18 2001::/32   On-link
  8   266 2001:0:4137:9e50:414:bb2:3f57:fd40/128
                                    On-link
  9   276 fe80::/64   On-link
  8   266 fe80::/64   On-link

Routing Table

(routeprint)
(netstat -r)



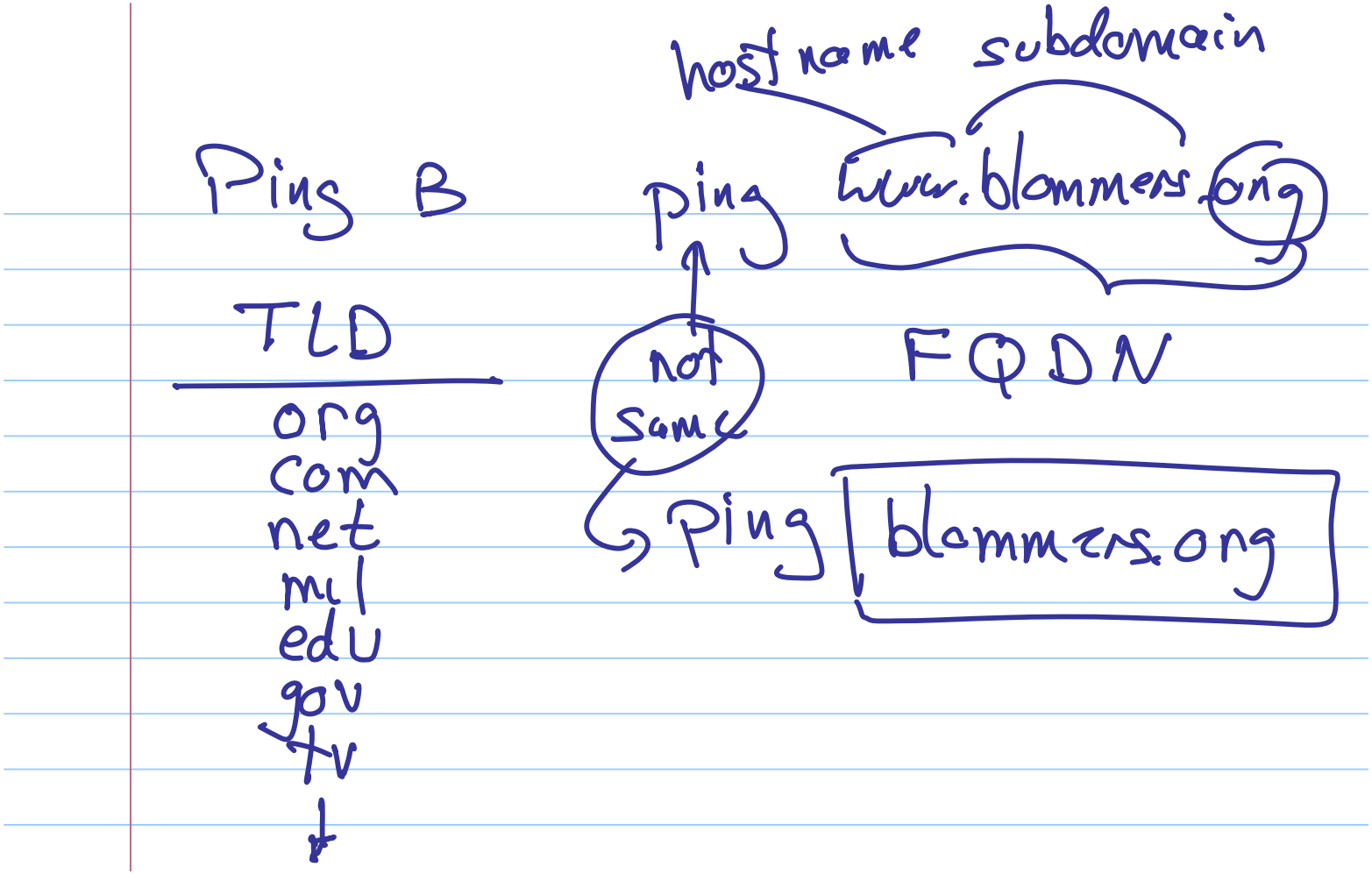
Routing table

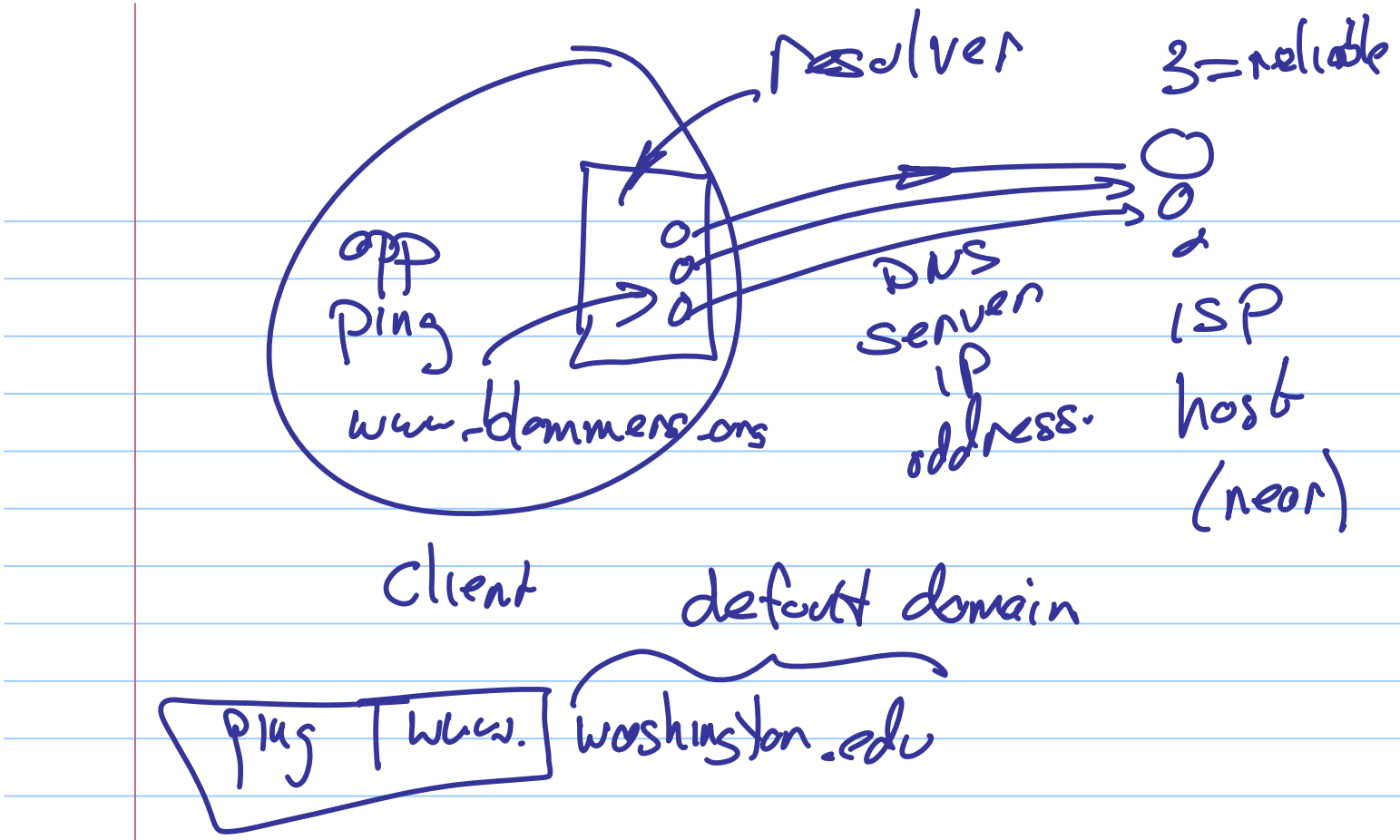
① statically
② DHCP

} end nodes

used by routers {

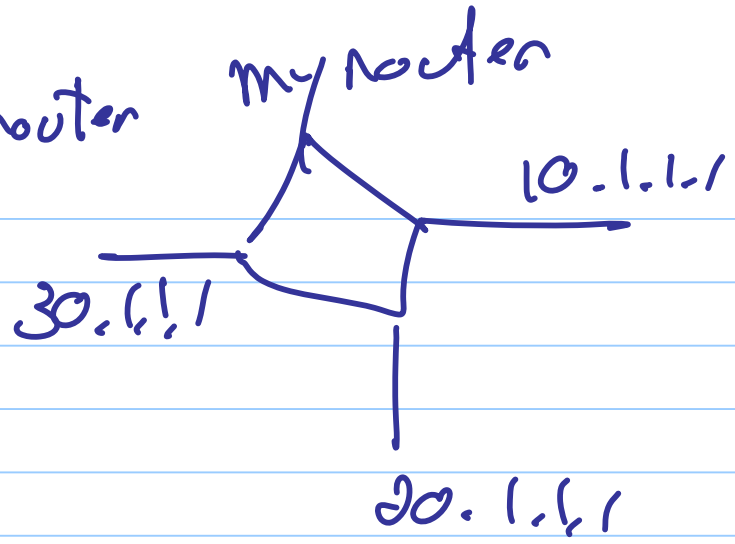
③ routing discovery protocol
- RIP (16 hops)
- OSPF N/A
- BGP (1 hop)


Ping B
TLD
org
com
net
mil
edu
gov
tv
hostname subdomain
ping
www.blammers.org
FQDN
not same
Ping
blammers.org


resolver
3=reliable
app
ping
www.hammers.org
DNS
server
IP
address.
ISP
host
(near)
client
default domain
ping | www.
washington.edu

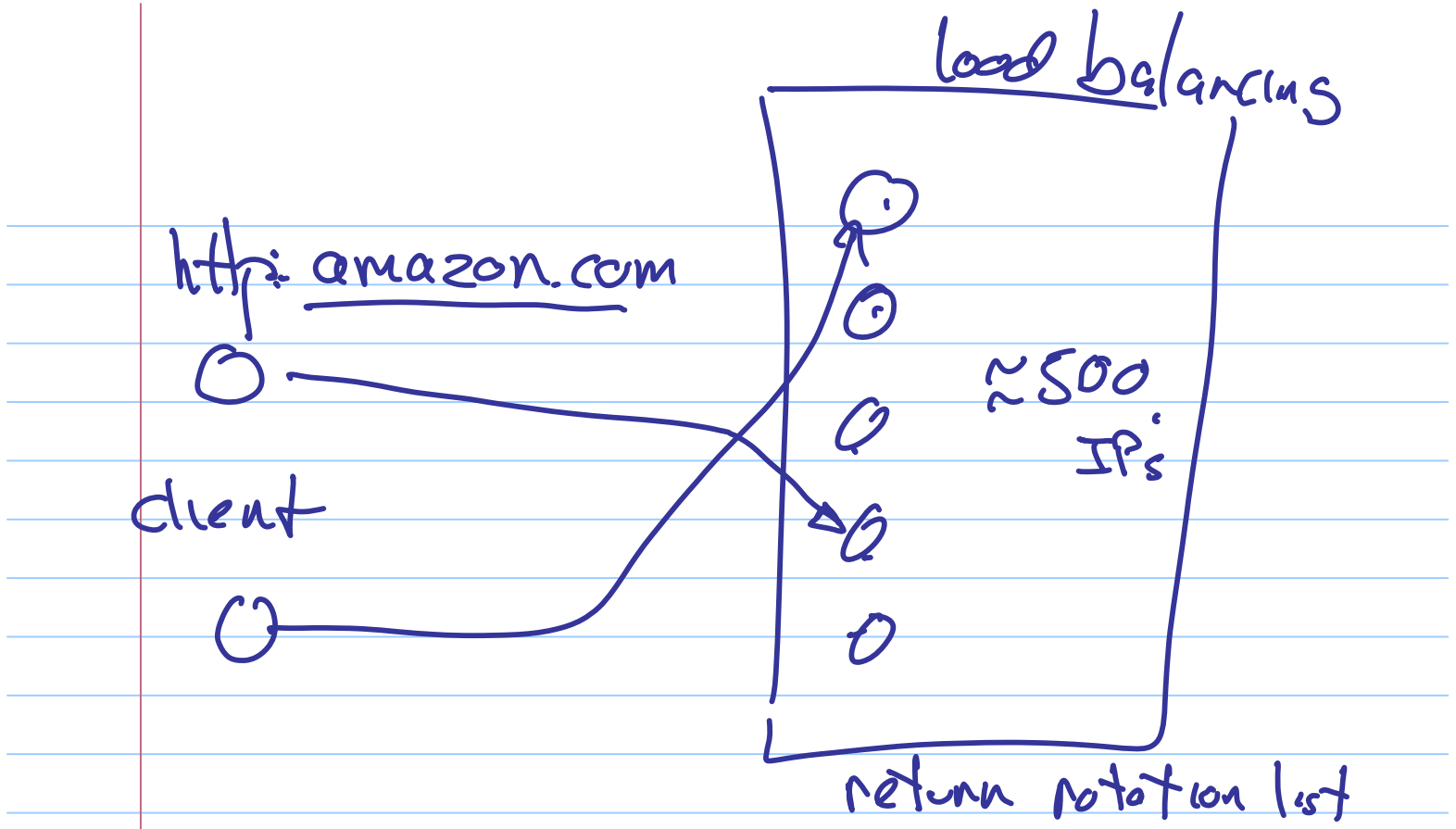
telnet myrouter

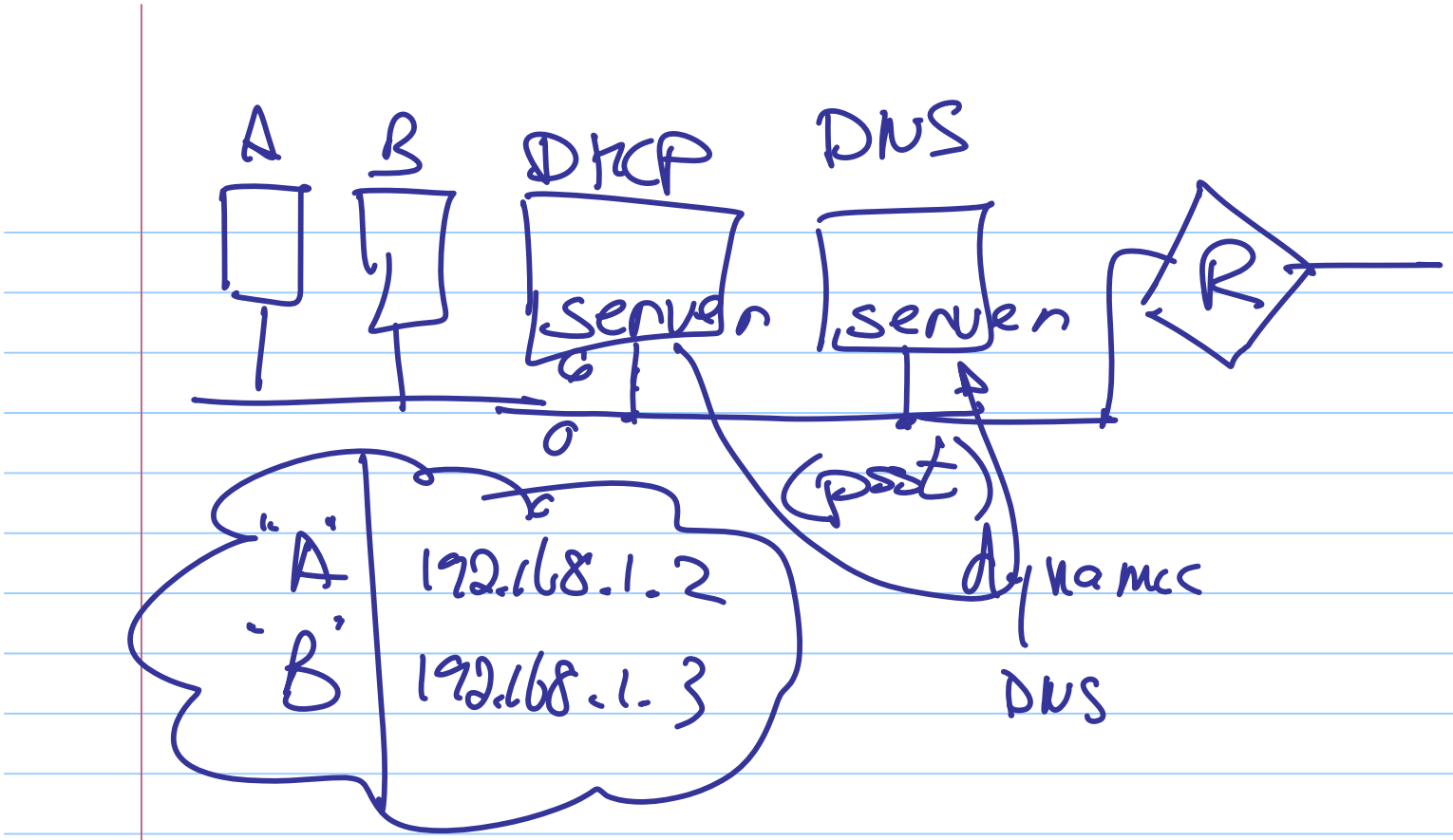
ftp

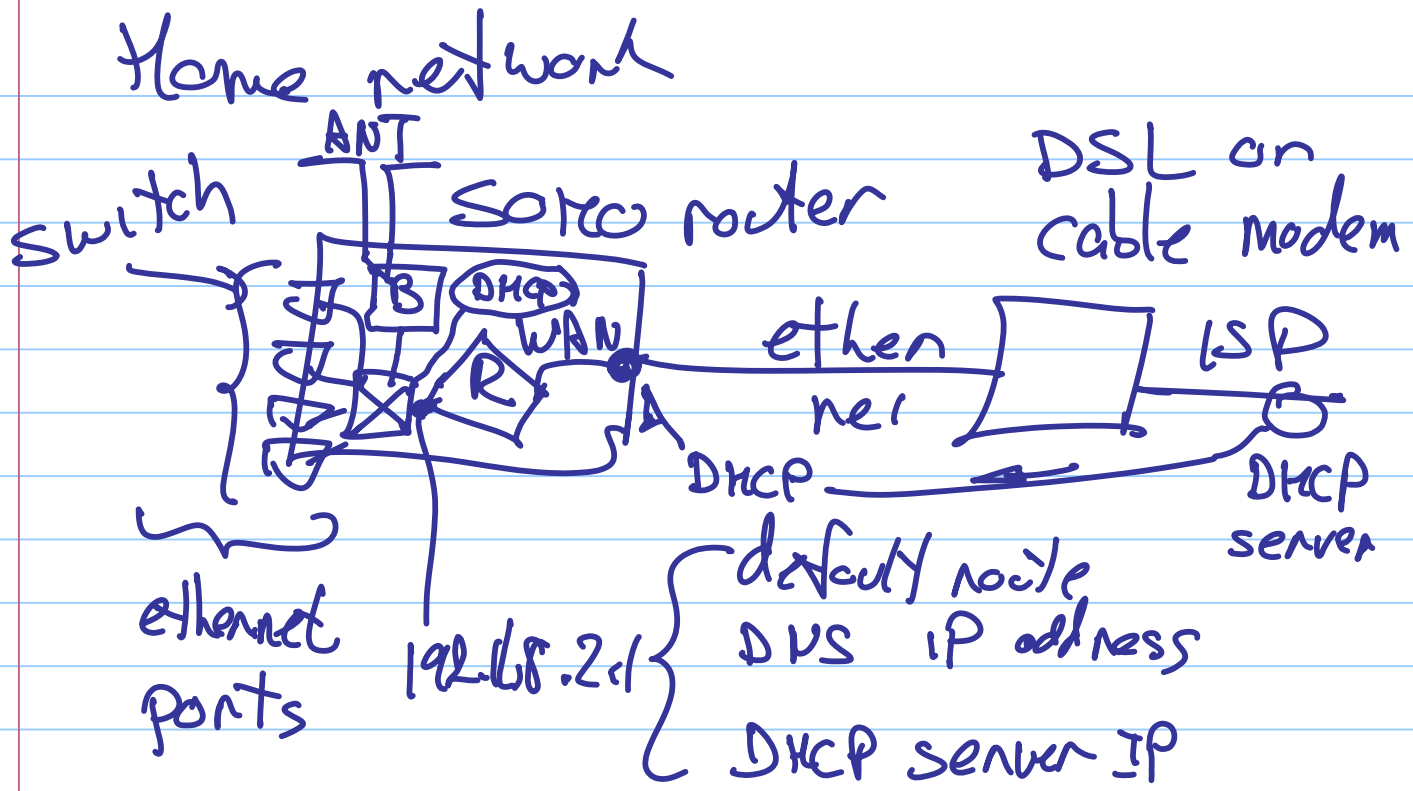


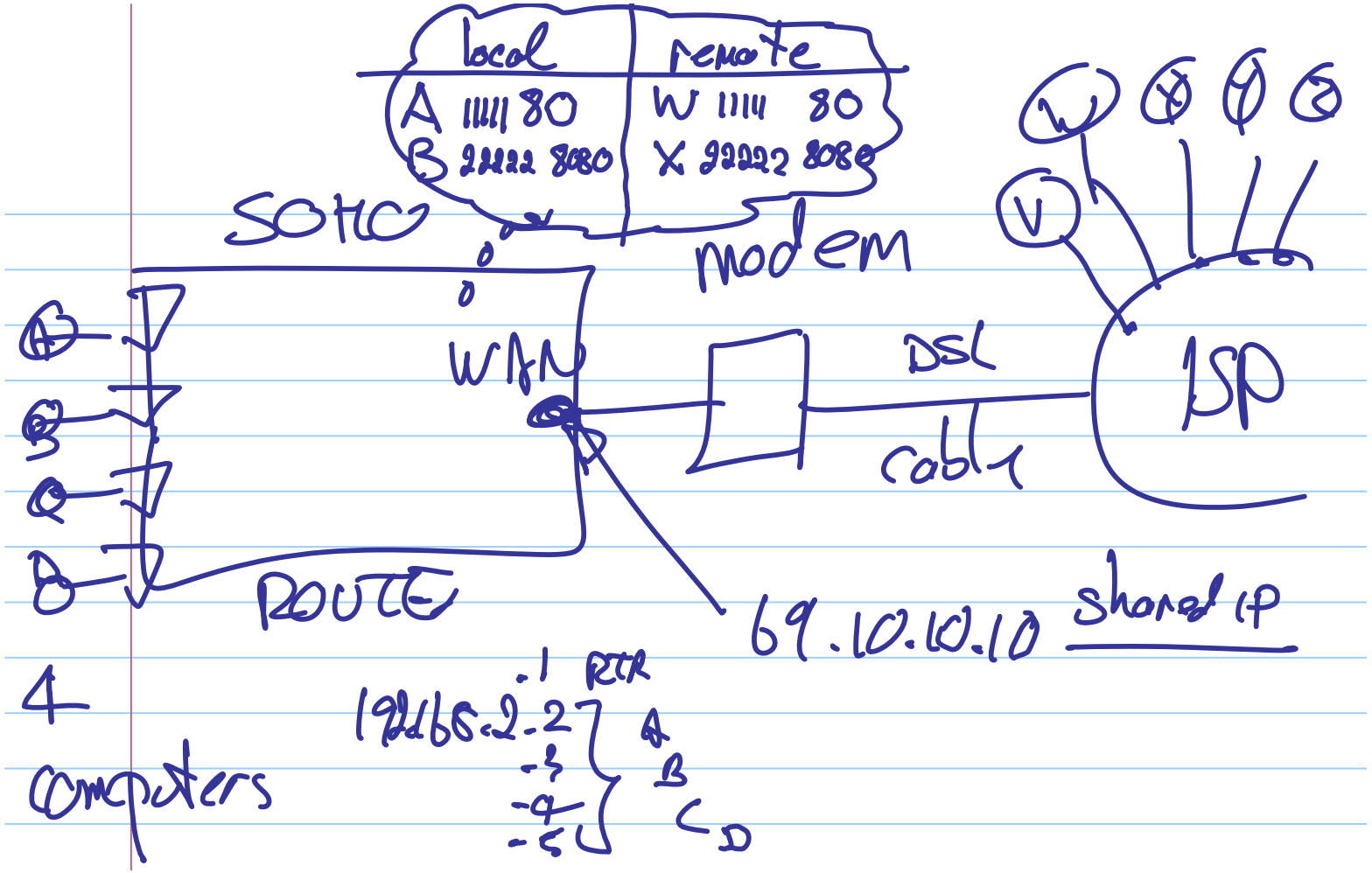
ping myrouter

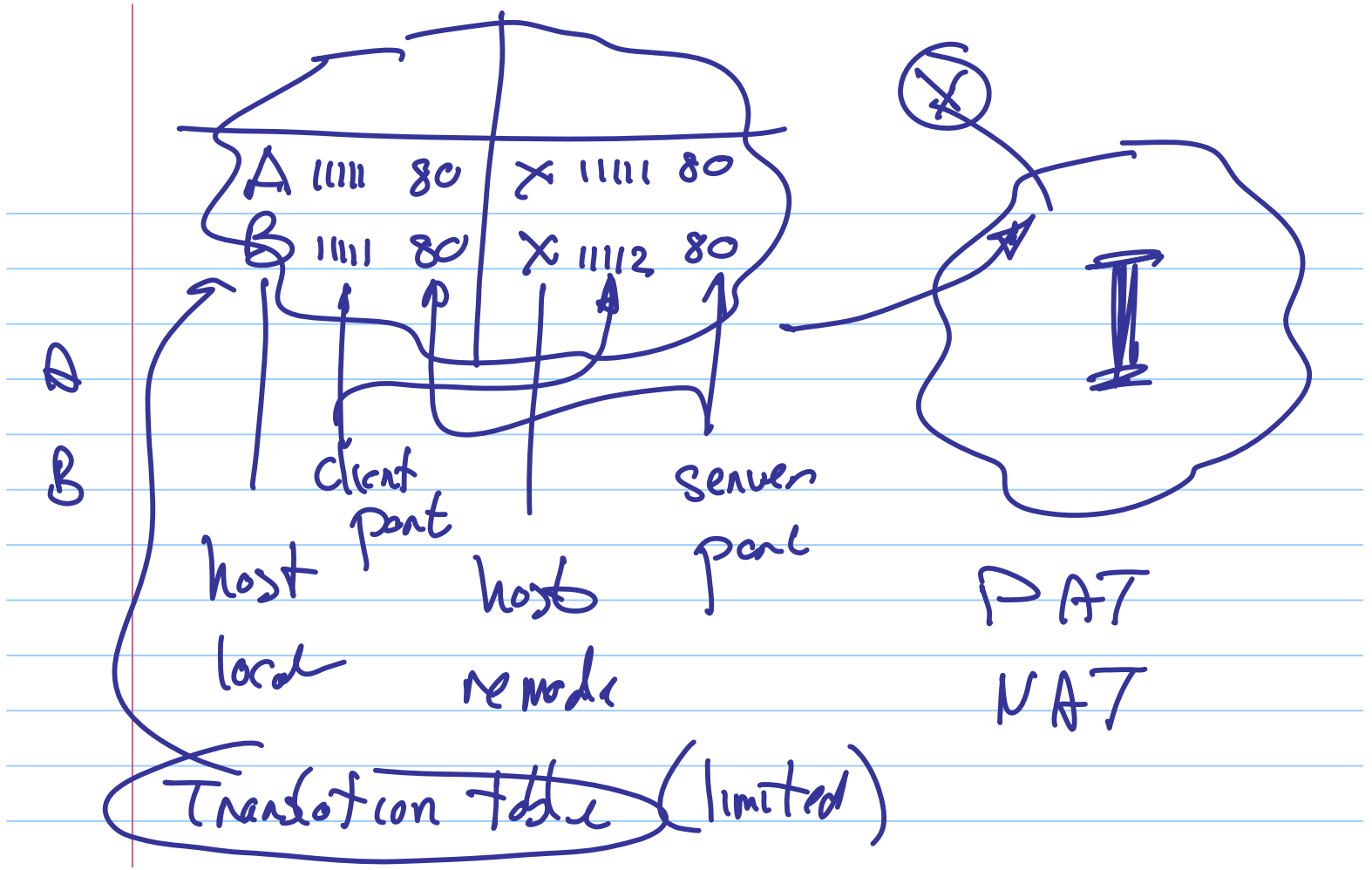
nslookup myrouter


load balancing
http: amazon.com
client
≈500 IPs
return rotation list


A
B
DHCP
DNS
server
server
R
(post)
"A" 192.168.1.2
"B" 192.168.1.3
dynamic
DNS


Home network
ANT
switch
soho router
B
DHCP
WAN
R
ethernet
DSL or
cable modem
ISP
DHCP
DHCP
server
ethernet
ports
192.168.2.1
default route
DNS IP address
DHCP server IP


local
remote
A 11111 80
B 22222 8080
W 1111 80
X 22222 8080
SOHO
modem
WAN
DSL
cable
ISP
ROUTE
69.10.10.10 shared IP
4
computers
.1 RTR
192.168.2.2
A
B
C
D


A 11111 80 X 11111 80
B 11111 80 X 11112 80
A
B
client port
server port
host local
host remote
PAT
NAT
Translation Table (limited)