Networking Technologies and Applications

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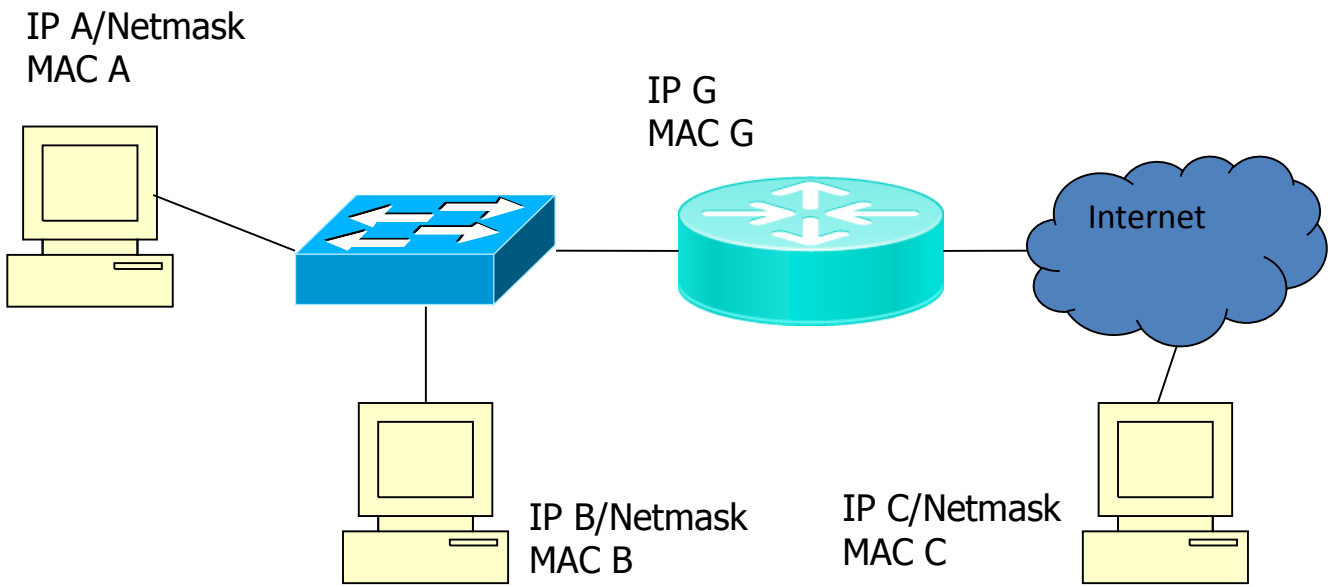
Routing table vs FDB

- What is the difference between
  - Routing table
  - Forwarding Table (FDB, FIB,…)
- When do we use the routing table?

Example network



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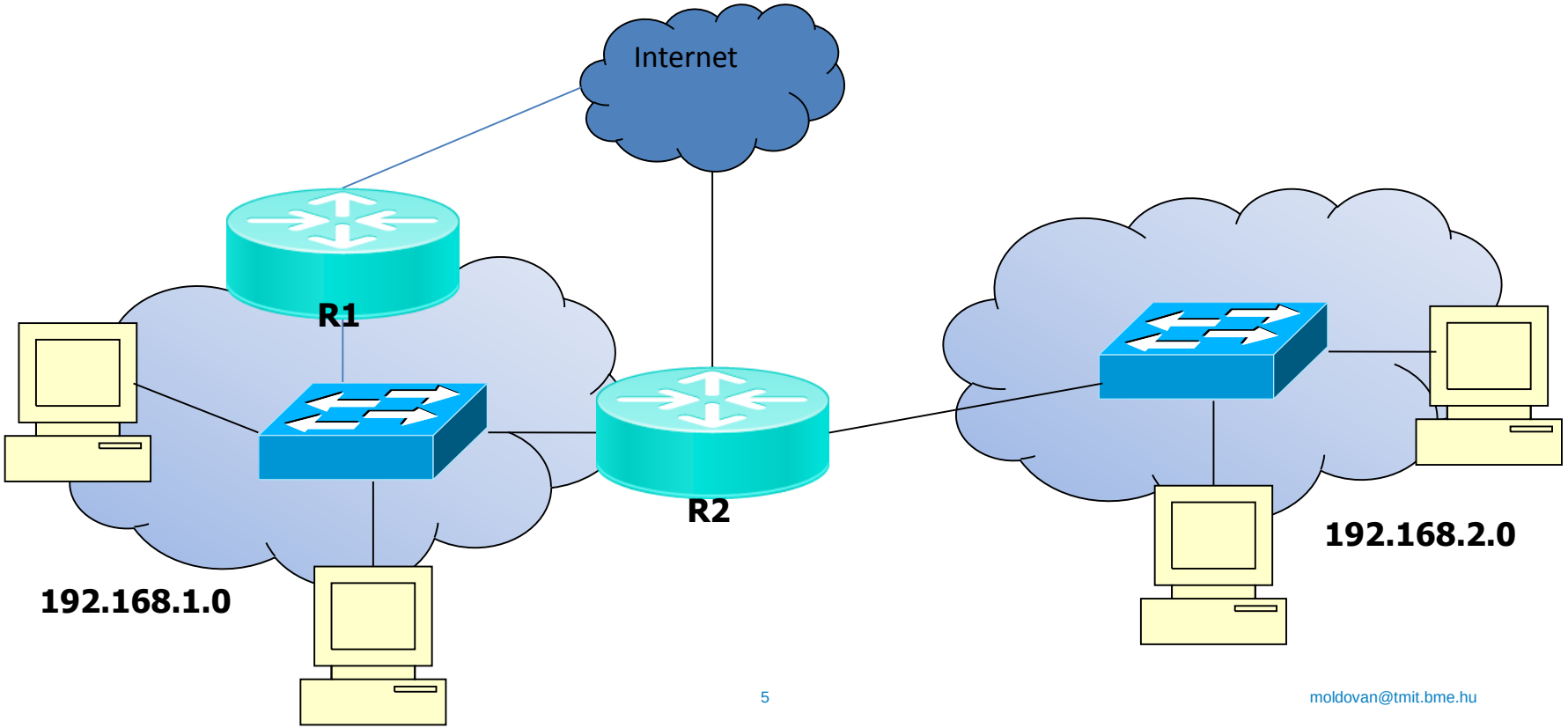
Questions:

- How many default gateways can have a subnet?
- How many default gateways can have a host?
- How many gateways can have a host?

IP routing – host és router



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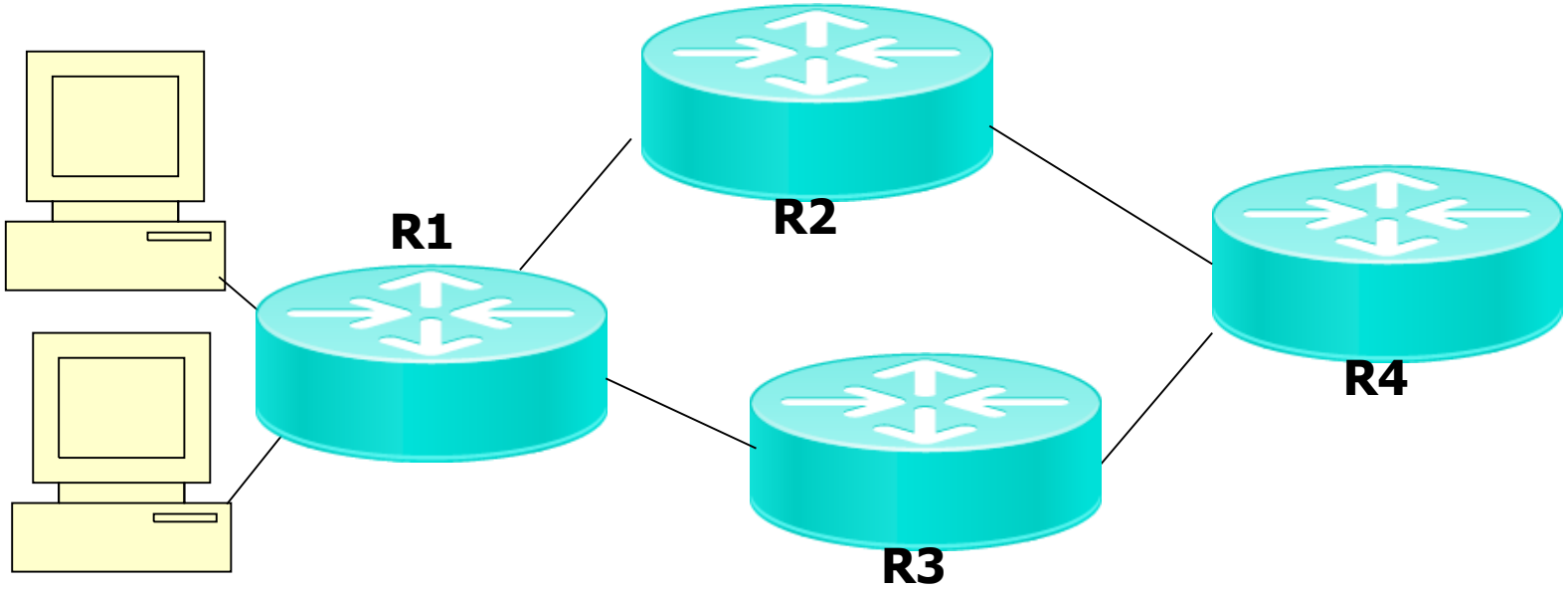
Routing table

C:\route print

IPv4 Route Table

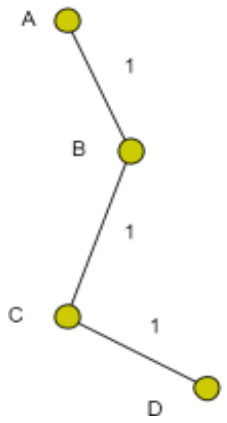
```
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0      192.168.1.1    192.168.1.114     20
      192.168.1.0    255.255.255.0         On-link     192.168.1.114    276
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    306
===========================================================================
```

How are the routing tables filled?



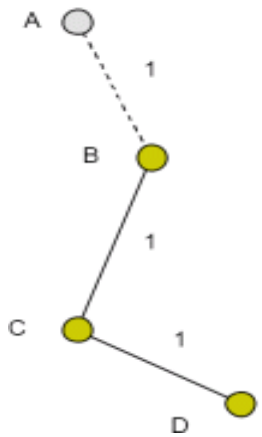
RIP - issues

- Count to infinity
  - After a link failure, routers count incrementing the cost



B	C	D
1	2	3

Distance to A

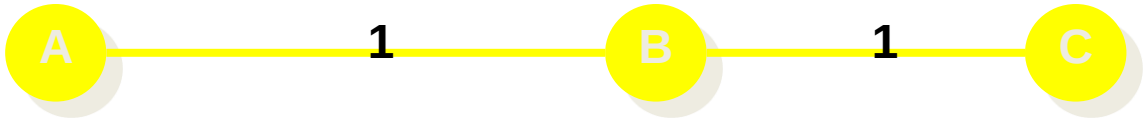


B	C	D
3	2	3

B	C	D
3	4	3

B	C	D
5	4	5

„Count-to-Infinity”



A's Routing Table

to	via (next hop)	cost
C	B	2

B's Routing Table

to	via (next hop)	cost
C	C	1

now link B-C goes down

C	B	2

C	2

→

←

C	oo

C	-	oo

C	oo

→

←

C	3

C	A	3

C	B	4

C	4

→

←

C	oo

C	-	oo

CIDR

How can we compact the following routing table using CIDR?

DestNet	NetMask	Interface
194.100.0.0	255.255.255.0	I1
194.100.1.0	255.255.255.0	I1
194.100.2.0	255.255.254.0	I1
194.100.4.0	255.255.252.0	I1
194.100.8.0	255.255.248.0	I1
194.100.48.0	255.255.240.0	I1
194.100.64.0	255.255.240.0	I1

CIDR – solution 1

DestNet	NetMask	IF
194.100.0.0	255.255.255.0	I1
194.100.1.0	255.255.255.0	I1
194.100.2.0	255.255.254.0	I1
194.100.4.0	255.255.252.0	I1
194.100.8.0	255.255.248.0	I1
194.100.48.0	255.255.240.0	I1
194.100.64.0	255.255.240.0	I1

- 194.100.0.0/24 -> 194.100.0.0 to 194.100.0.255 (256 addr.)
- 194.100.1.0/24 -> 194.100.1.0 to 194.100.1.255 (256 addr.)
- 194.100.2.0/23 -> 194.100.2.0 to 194.100.3.255 (512 addr.)
- 194.100.4.0/22 -> 194.100.4.0 to 194.100.7.255 (1024 addr.)
- 194.100.8.0/21 -> 194.100.8.0 to 194.100.15.255 (2048 addr.)
- Continuous addresses, 20 bit, 4096 addr.
  - CIDR: 194.100.0.0/20

- 194.100.48.0/20 -> 194.100.48.0-tól 194.100.63.255-ig (4096 addr.)
- 194.100.64.0/20 -> 194.100.64.0-tól 194.100.79.255-ig (4096 addr.)
- Continuous, but 48 -> 00110000, 64 -> 01000000, the first 19 bit does not match, can not be aggregated into a /19

CIDR - solution 2

DestNet	NetMask	IF
194.100.0.0	255.255.255.0	I1
194.100.1.0	255.255.255.0	I1
194.100.2.0	255.255.254.0	I1
194.100.4.0	255.255.252.0	I1
194.100.8.0	255.255.248.0	I1
194.100.48.0	255.255.240.0	I1
194.100.64.0	255.255.240.0	I1

- The aggregated CIDR routing table

DestNet	IF
194.100.0.0/20	I1
194.100.48.0/20	I1
194.100.64.0/20	I1

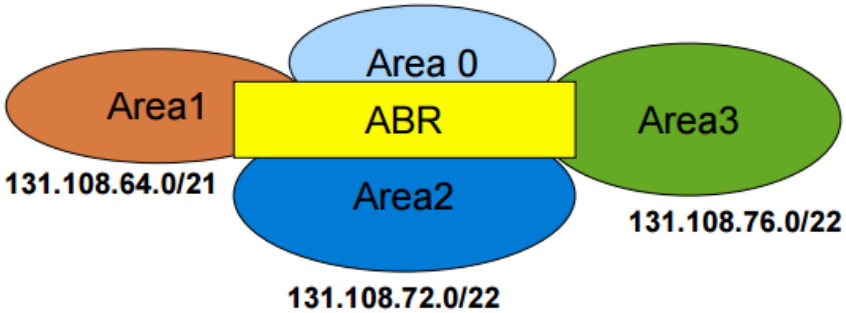
OSPF

- A company X cégnek has the following address range 131.108.64/20
- The range must be distributed to the 3 branches:
  - branch A requires max. 2000 addresses
  - branches B and C need max 1000-1000 addresses

- Suggest a network topology, suposing that OSPF will be used as IGP protokol
- How to distribute the address space?

OSPF - solution

- Address range: 4096 addresses-> OK
- 3 OSPF aread(+ area 0), per-branch
- Address ranges:
  - A: 2048 addr. -> /21 -> 131.108.64.0/21 (131.108.64.0 to 131.108.71.255), area1
  - B: 1024 addr. -> /22 -> 131.108.72.0/22, (131.108.72.0 to 131.108.75.255), area2
  - C: 1024 addr. -> /22 -> 131.108.76.0/22 , (131.108.76.0 to 131.108.79.255), area3



Questions?