$$T_p$$

collision
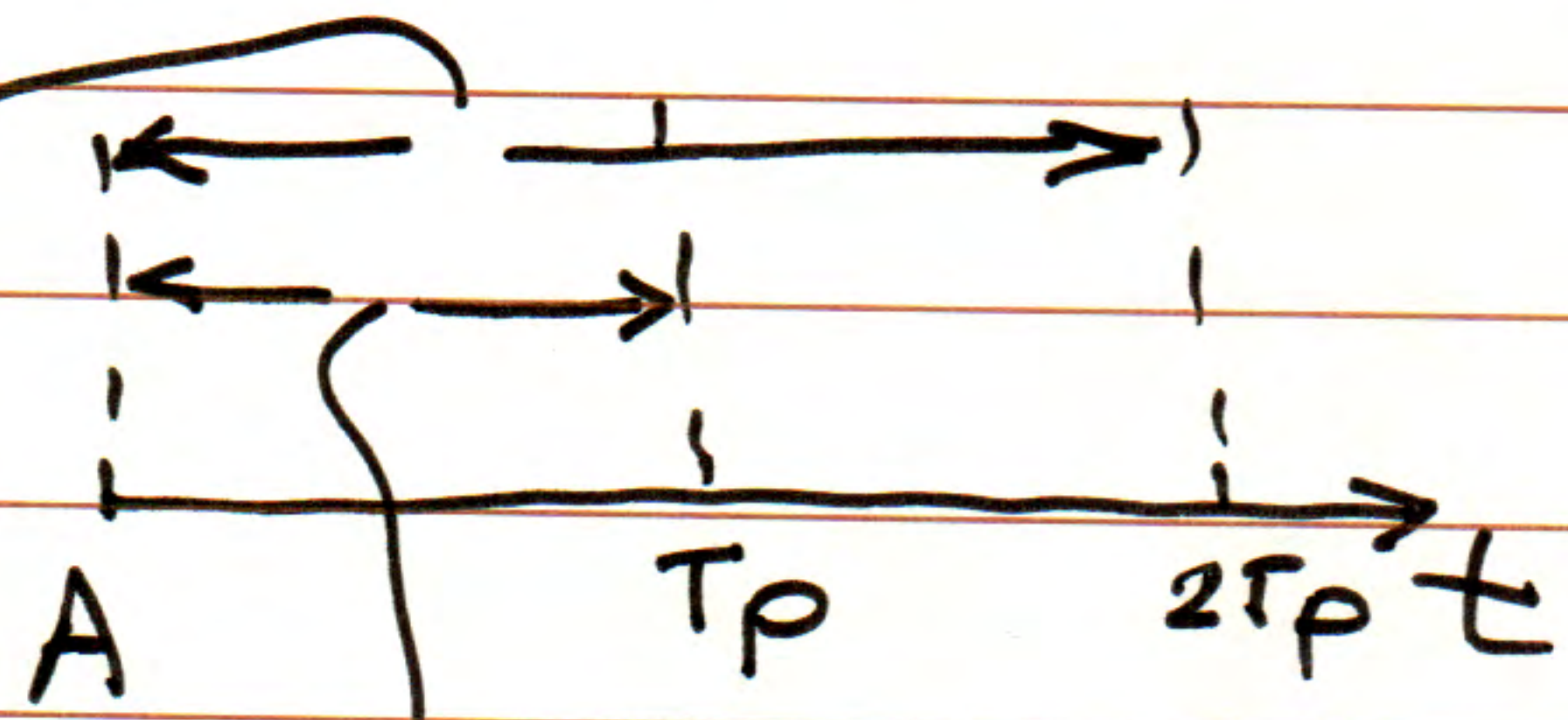

$$T_f = \frac{frame\ length}{R_b}$$

$$T_f = Frame\ T/x\ time \geq 2T_p$$

worst case prop. delay

A   Tp   2Tp   t

Vulnerable interval where collision can occur.
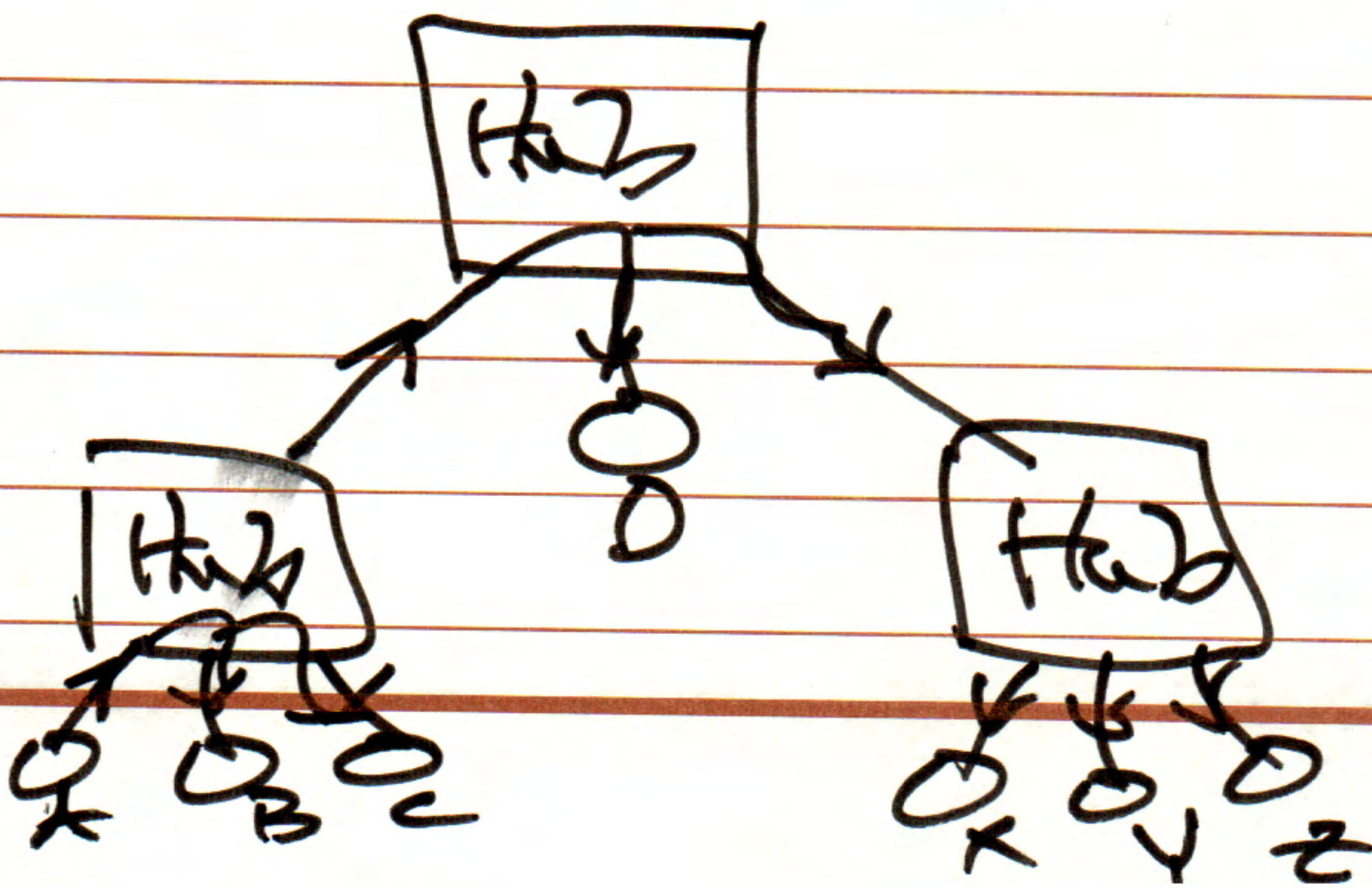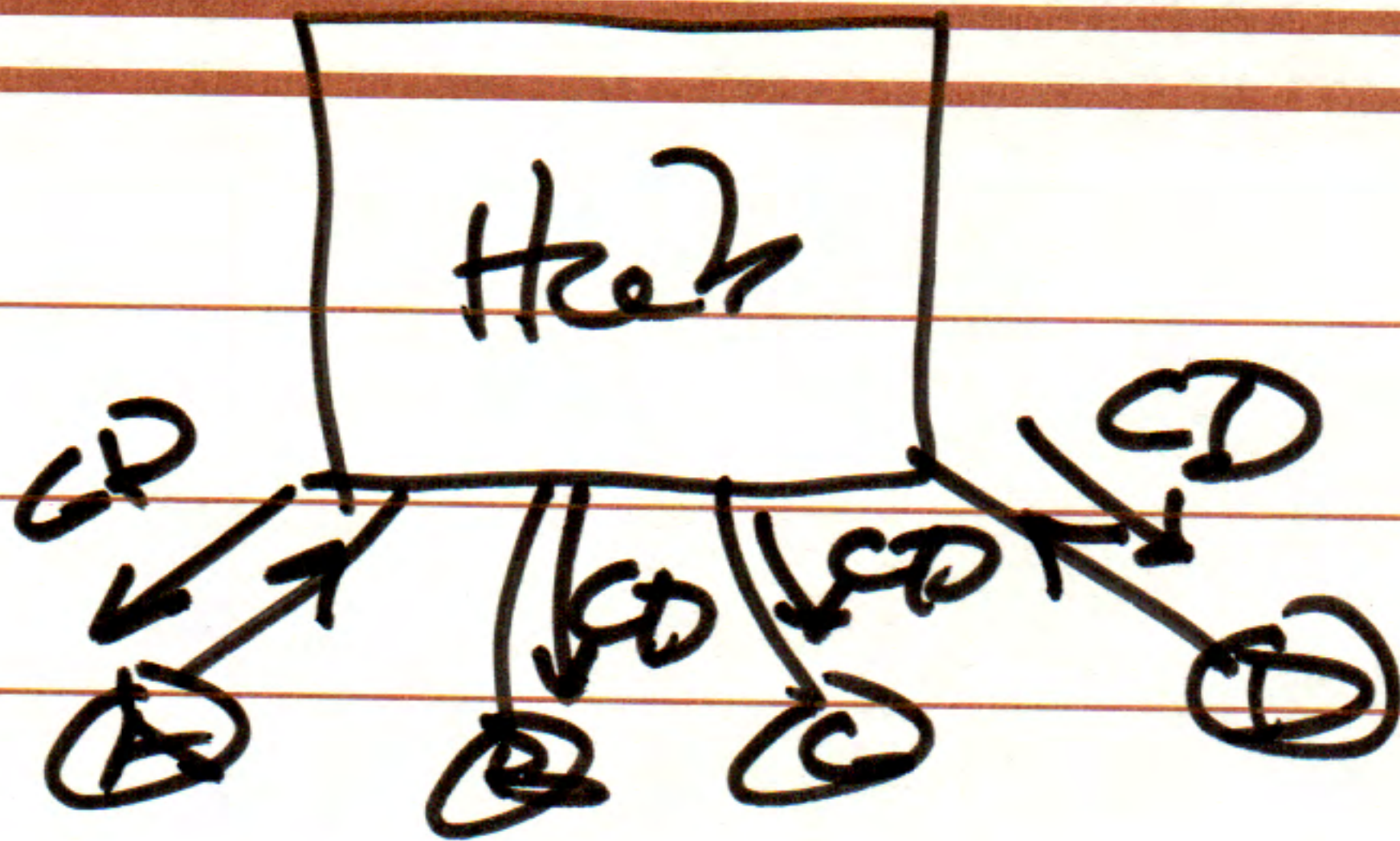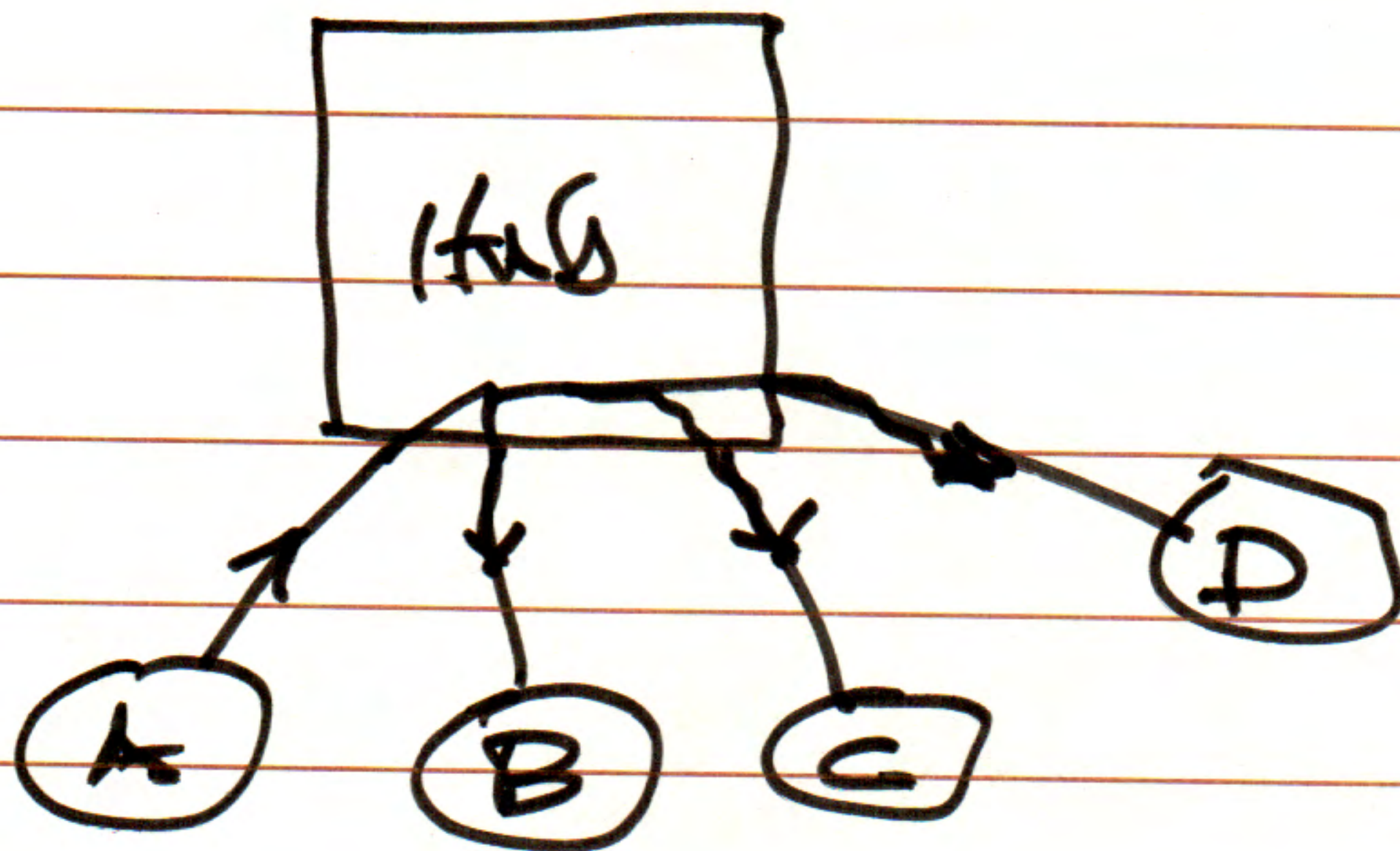
interval during which collision can be detected.

a node should not finish transmitting the frame before it has a chance to detect a possible collision.

$\Rightarrow$ frame can't be too short
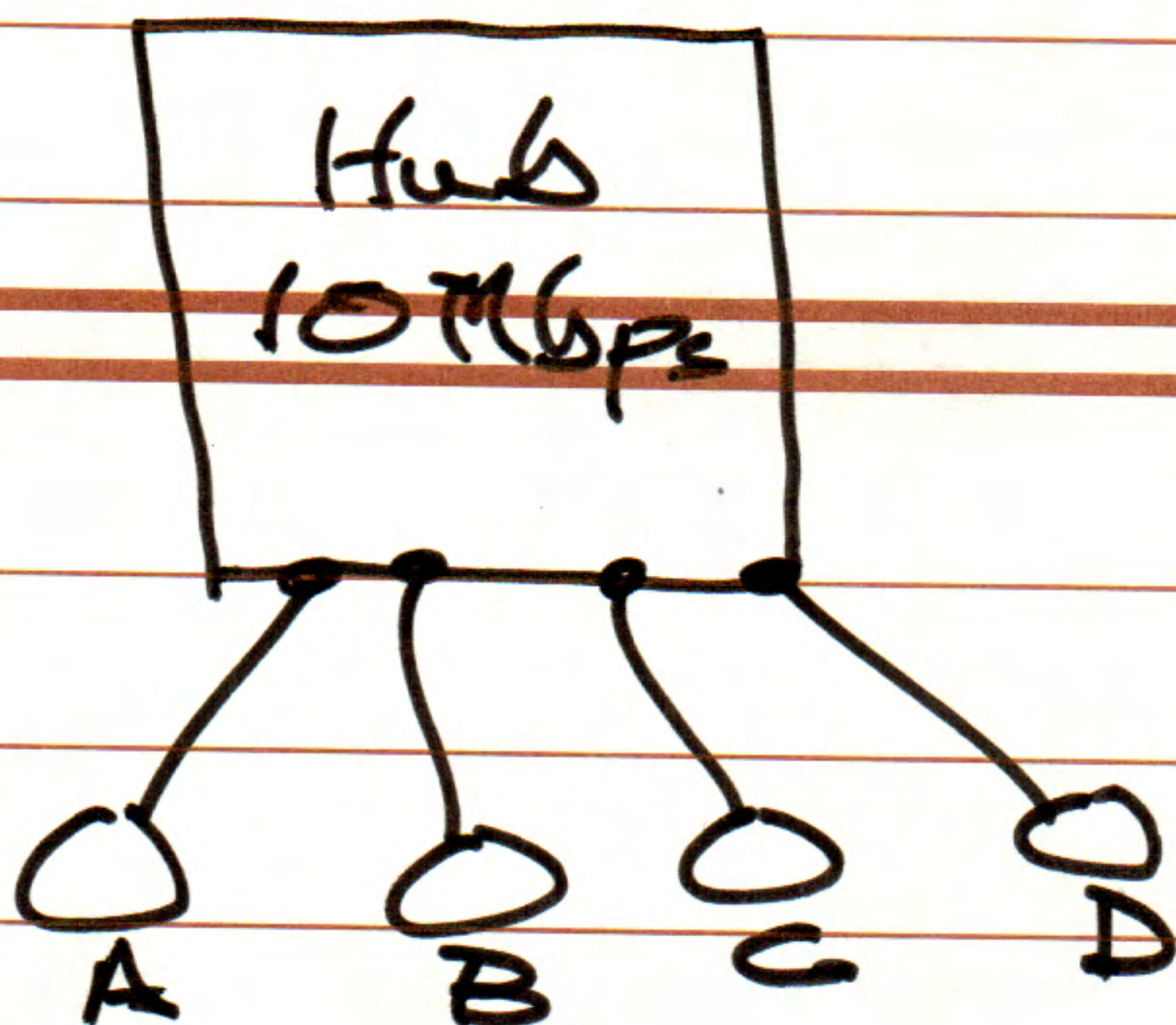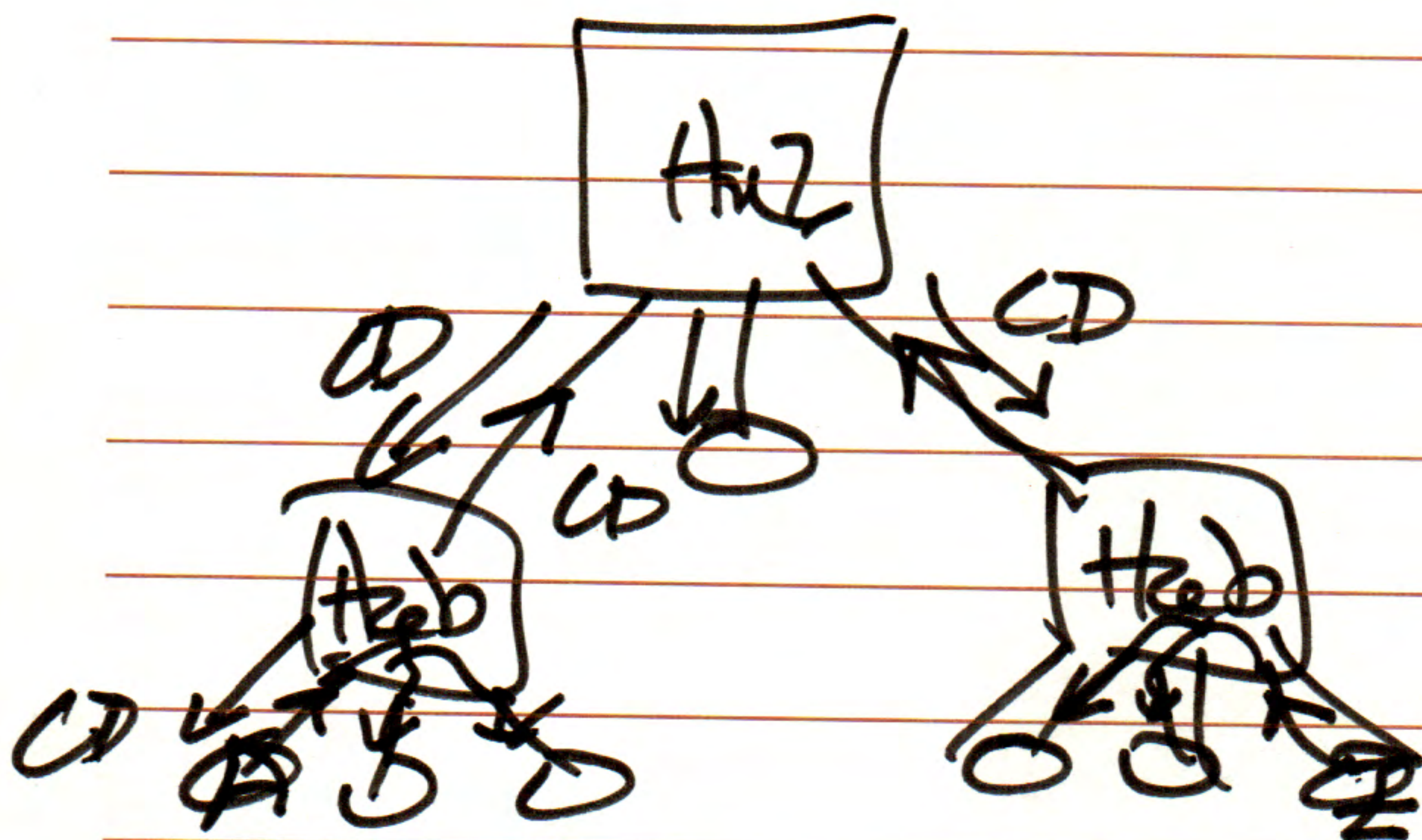
$\Rightarrow$ " " " " " long

(for fairness)

legacy Ethernet   10Mbps

Max. Throughput per node = 10 Mbps

Avg Throughput per node = 2.5 Mb/s

Throughput of hub = 10 Mbps

100 Mbps Ethernet (Fast Ethernet)

1 Gbps ethernet   1 Gb Ethernet

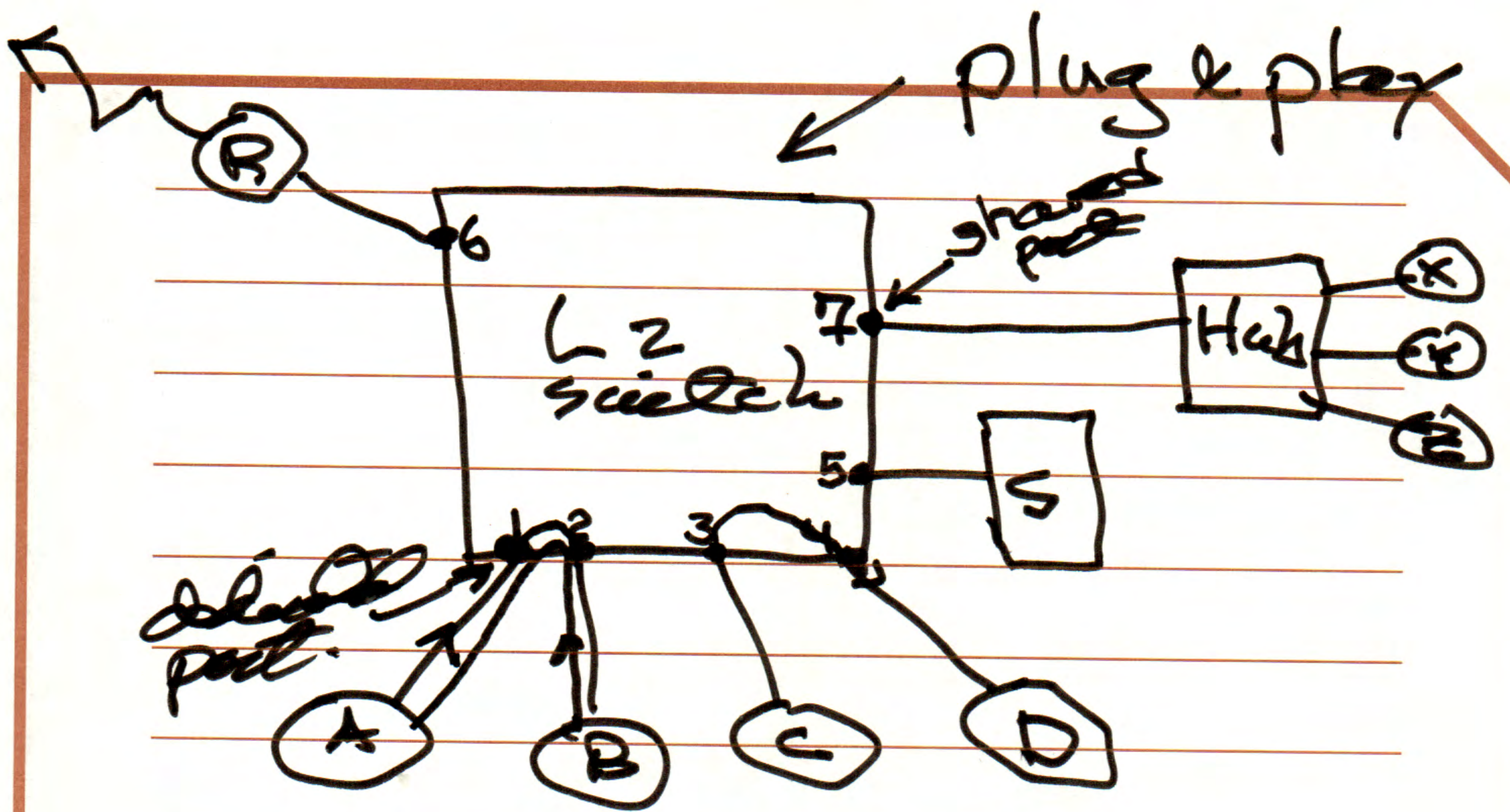10 Gbps   ~~1 GBE~~

100 Gbps

1000 Gbps 10^{12}

Switched Ethernet

replace the hubs by a L2 switch
(recognizes MAC addresses NOT
IP addresses).

plug & play

R

6

L 2
switch

7 shared
port

Hub — X
Hub — Y
Hub — Z

5

S

dead
port

1 2 3 4

A B C D

Inside the switch we have
a forwarding Database

A → B

Port #	MAC addr.
1	A
2	B
3	C
4	D
5	S
6	R
7	X
7	Y
7	Z

Switches are <u>Transparent</u>
to the nodes ⇒

Nodes have no idea
that a switch exists.