CSCI 446 Introduction to Computer Networks

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Data Exchange: Message/Packet Switch (2)

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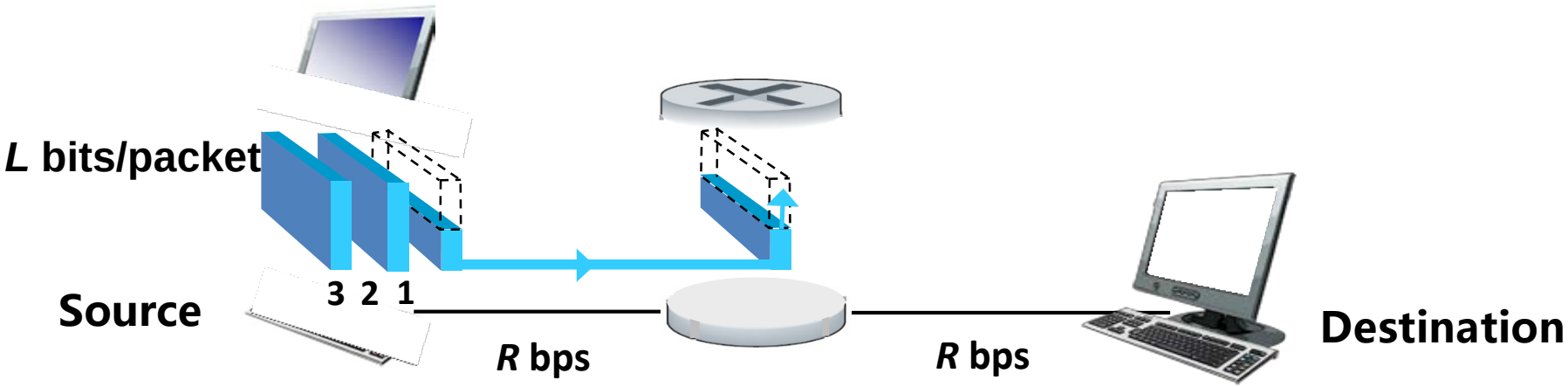
store-and-forward

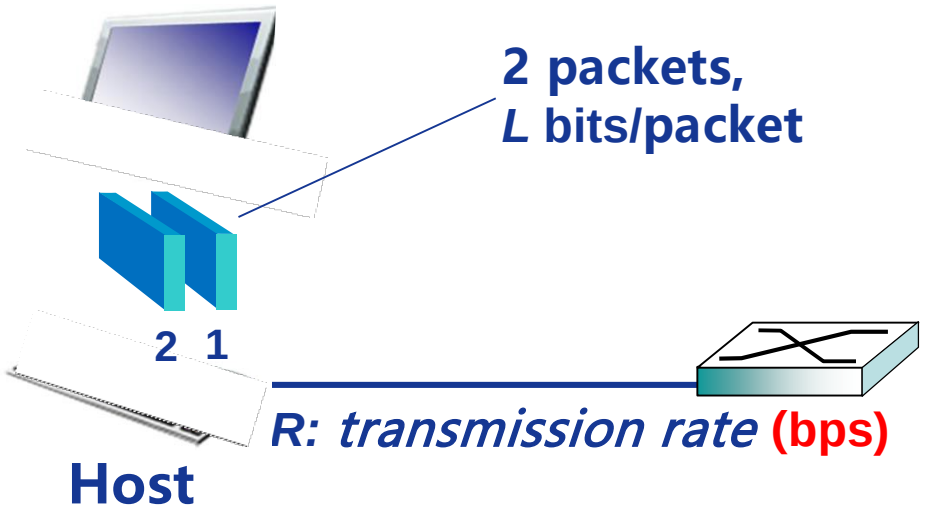


- Both message exchange and packet exchange use store-forward exchange.
- Difference:
  - Message exchange "store-forward" with full message
  - Packet switching "store-forward" in smaller groups
- Which exchange method is better?

Packet switching: Transfer delay.

Source:

- Receive application messages
- Split into smaller packets with length L bits
- Transmission of packets on a link with a transmission rate of R



$$\text{Delay} = \frac{L\ (\text{bits})}{R\ (\text{bits/sec})}$$

Message switch vs Packet switch?

Message Exchange:

- The message length is M bits.
- The link bandwidth is R bps.
- Each transmission of the message requires M/R seconds.

Packet switching:

- Messages are split into packets.
- The packet length is L bits.
- The delay for each packet transfer is L/R seconds.
-

e.g.

- M=7.5 Mbits,

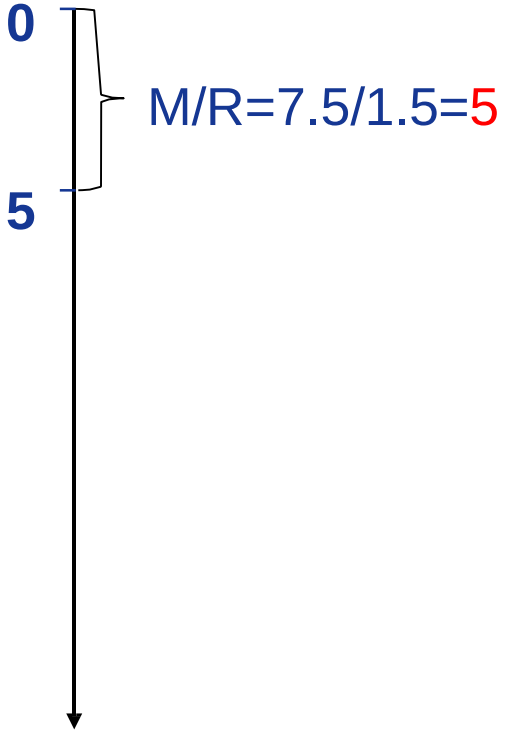
  L=1500bits

  - M=5000L
- R = 1.5 Mbps

- Message switch:
  - The delivery time of the message =? sec
- Packet switch:
  - The delivery time of the message =? sec

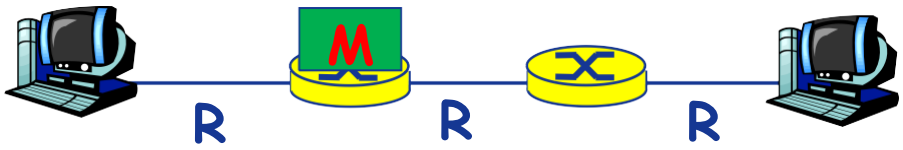
Message switch vs Packet switch?

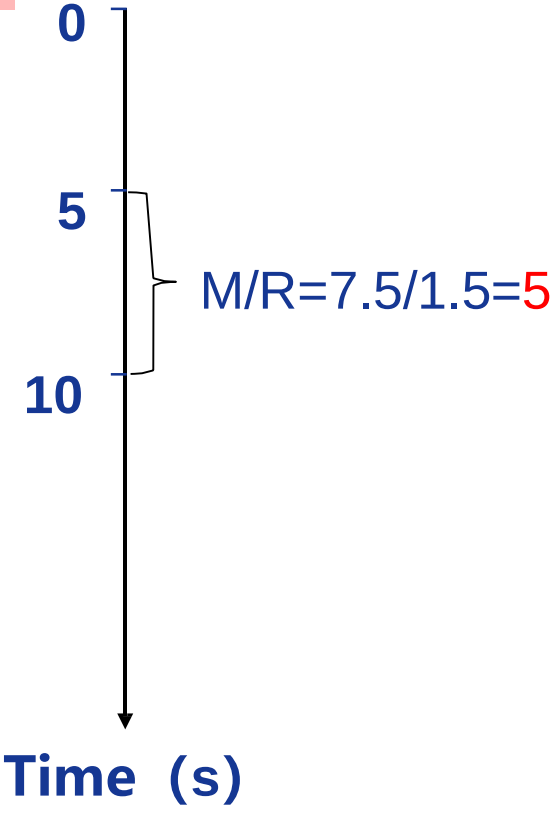
Message switch



Message switch vs Packet switch?

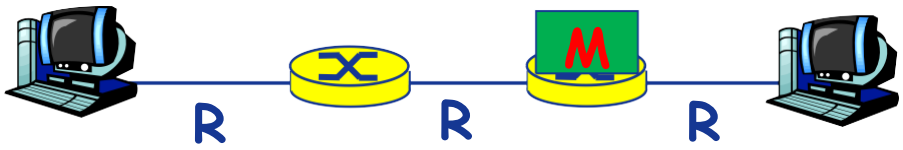
Message switch

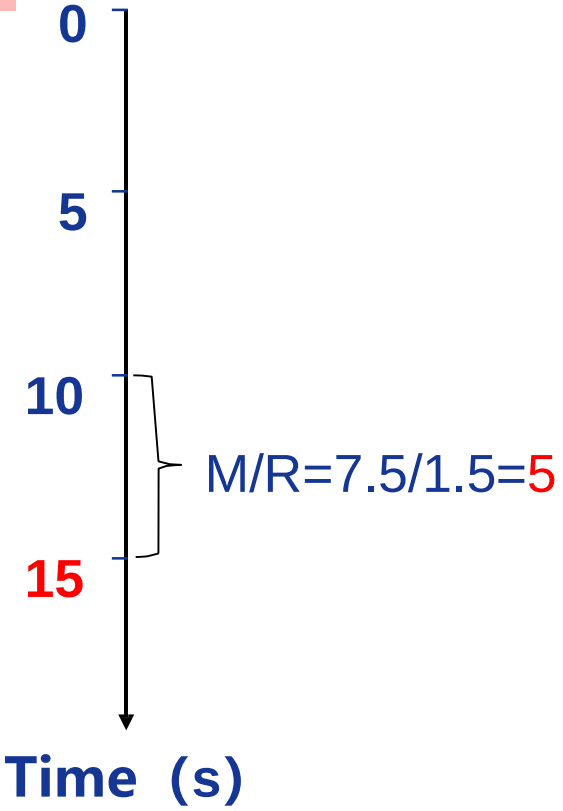




Message switch vs Packet switch?

Message switch





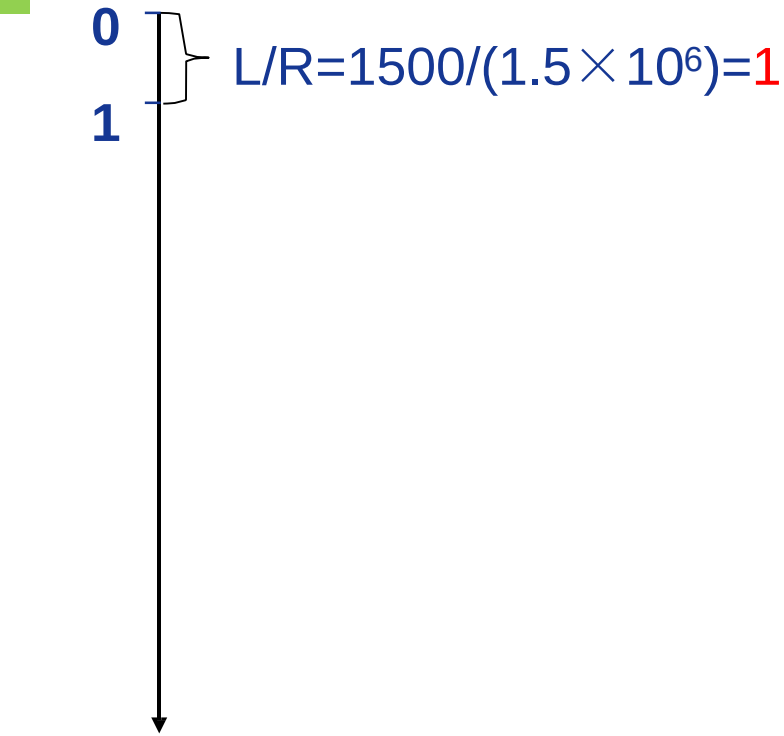
e.g.

- M=7.5 Mbits，L=1500bits
  - M=5000L
- R = 1.5 Mbps
- Message switch:
  - The delivery time of the message **=15 s**

- **How much cache does the router need?**

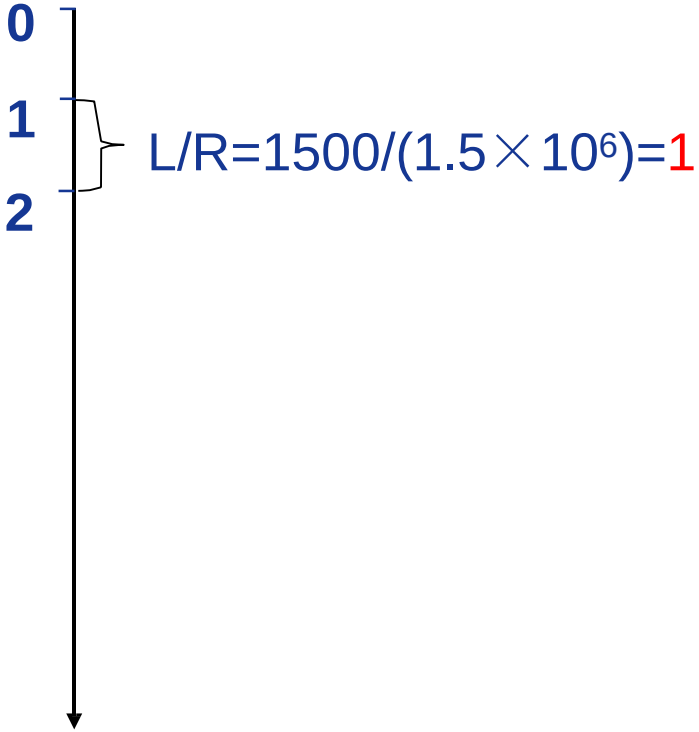
Message switch vs Packet switch?

Packet switch



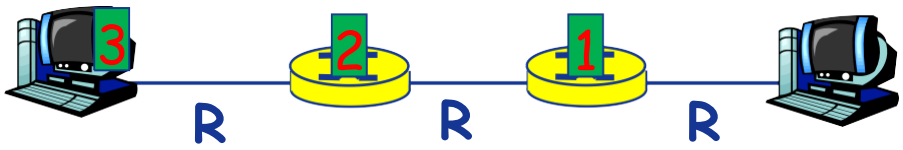
Message switch vs Packet switch?

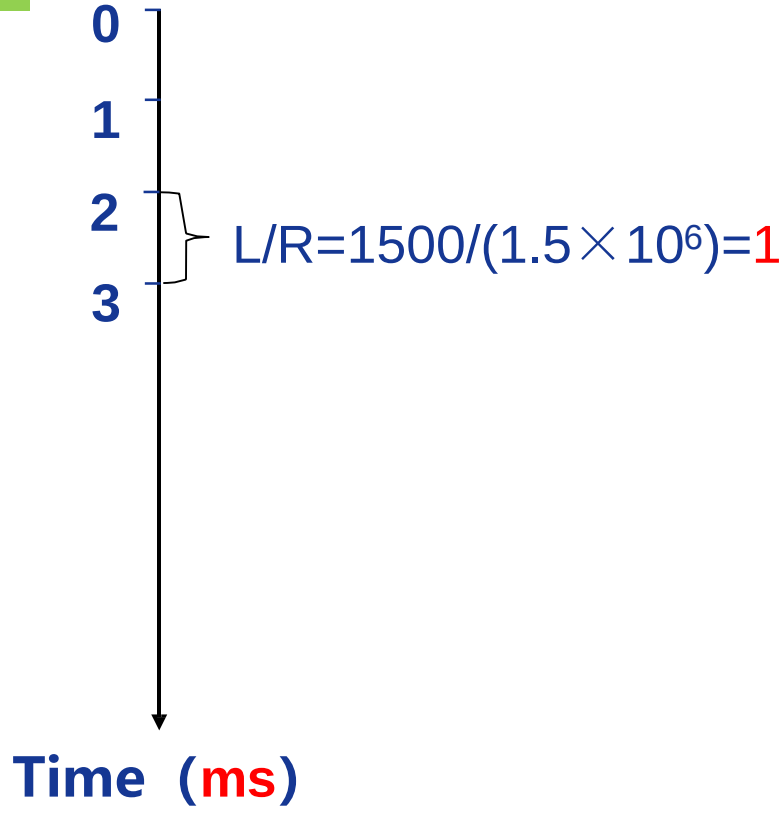
Packet switch



Message switch vs Packet switch?

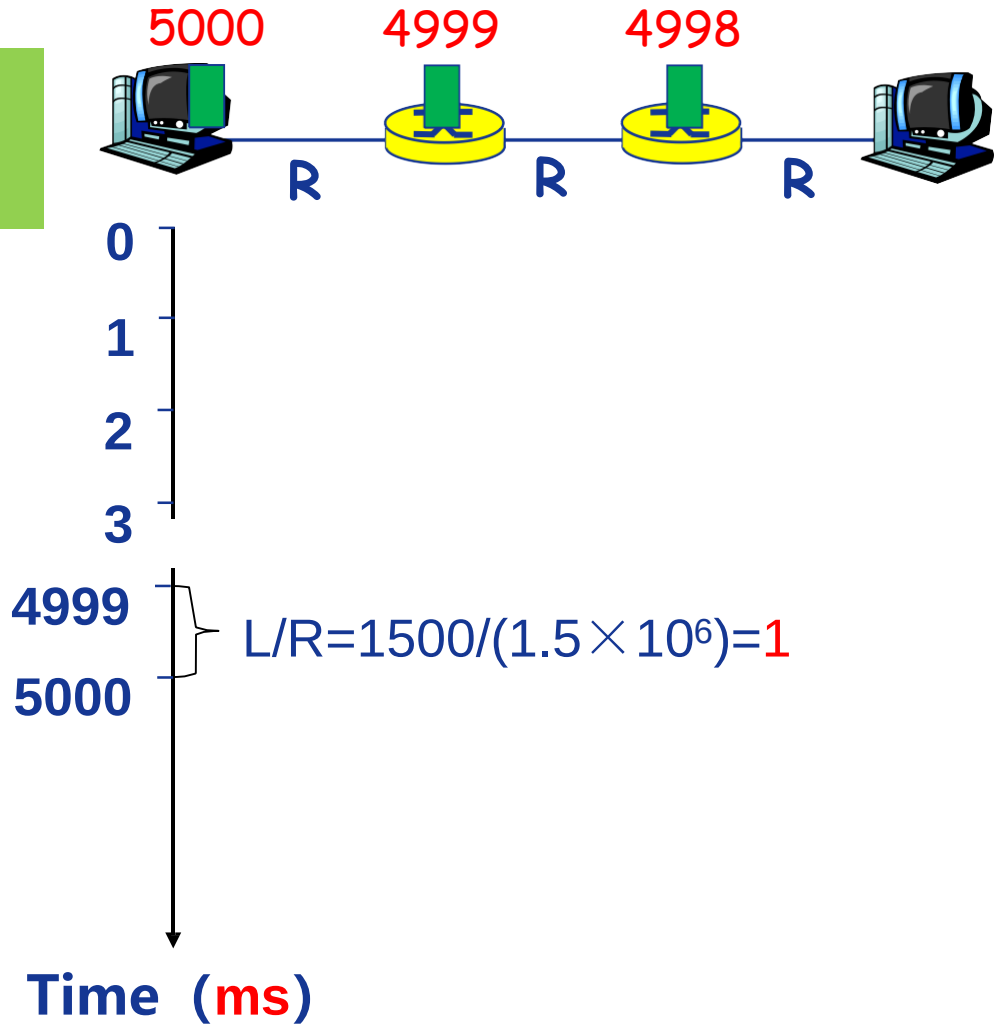
Packet switch





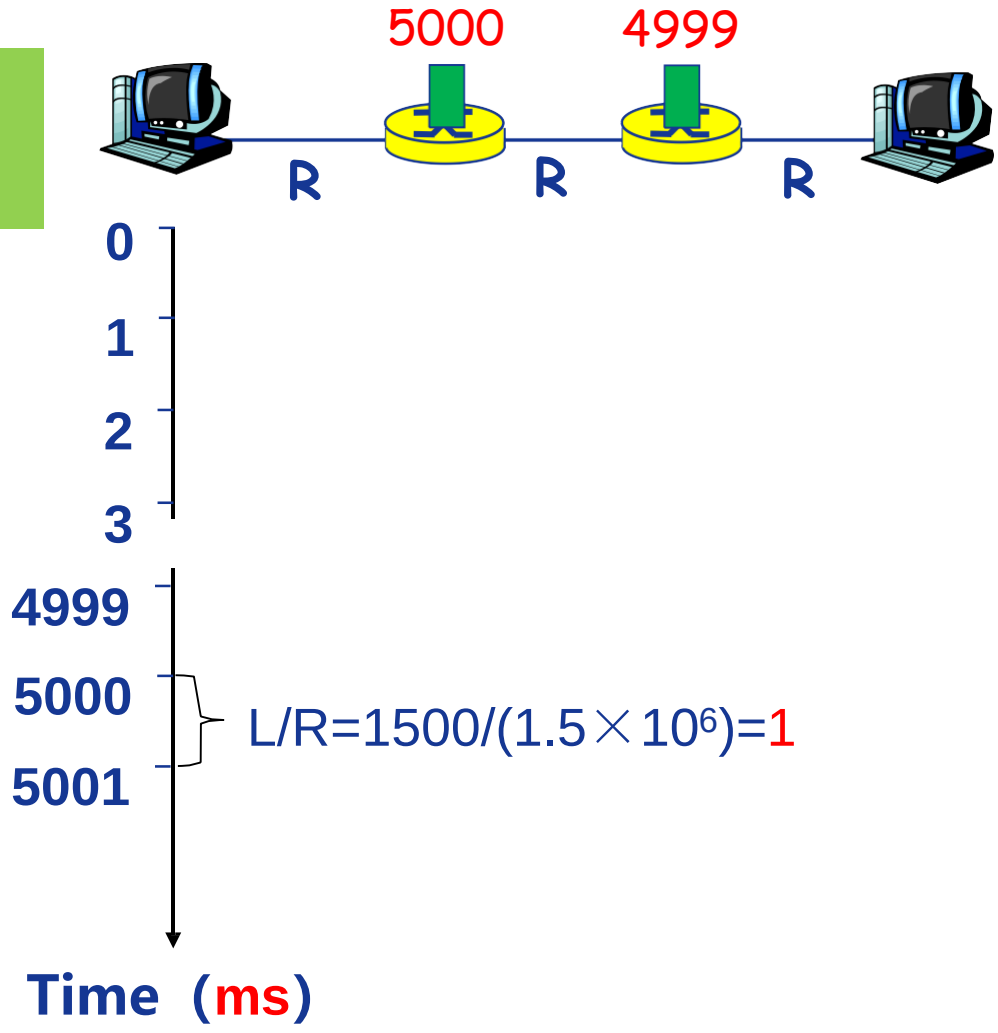
Message switch vs Packet switch?

Packet switch



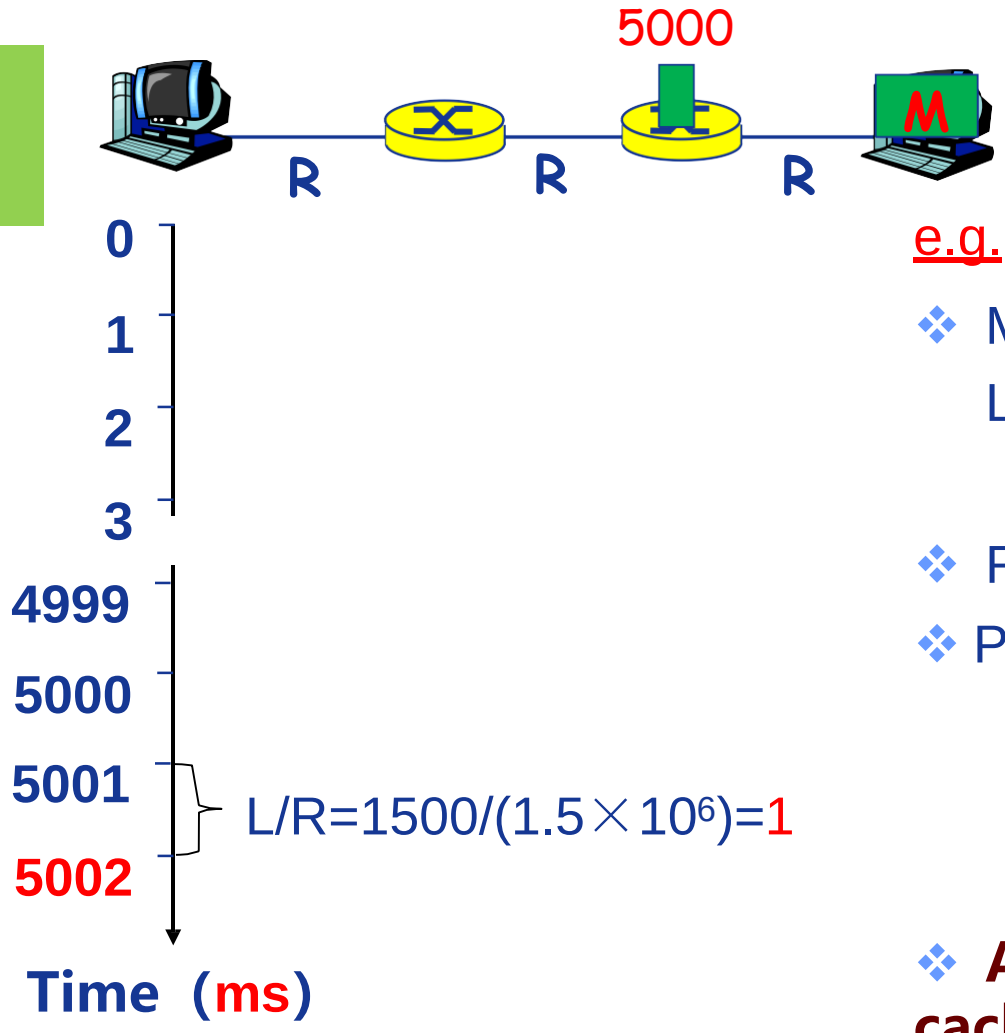
Message switch vs Packet switch?

Packet switch



Message switch vs Packet switch?

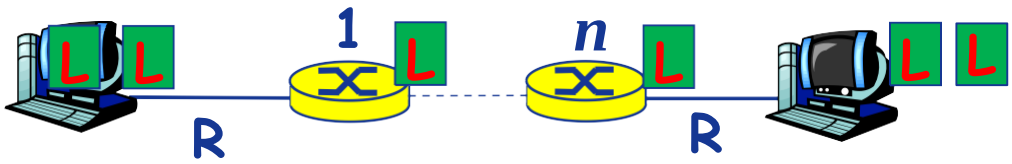
Packet switch



e.g.

- M=7.5 Mbits，L=1500bits
  - M=5000L
- R = 1.5 Mbps
- Packet switch:
  - The delivery time of the message =5002ms =5.002 sec
- **At least how much cache does the router need?**

The delivery time of the message for the packet exchange



- Message: M bits
- Link bandwidth (data transfer rate): R bps
- Packet length(size): L bits
- #hops: *h*
- #routers: *n*

$$T=M/R+(h-1)L/R$$

$$=M/R+nL/R$$

Thank you!