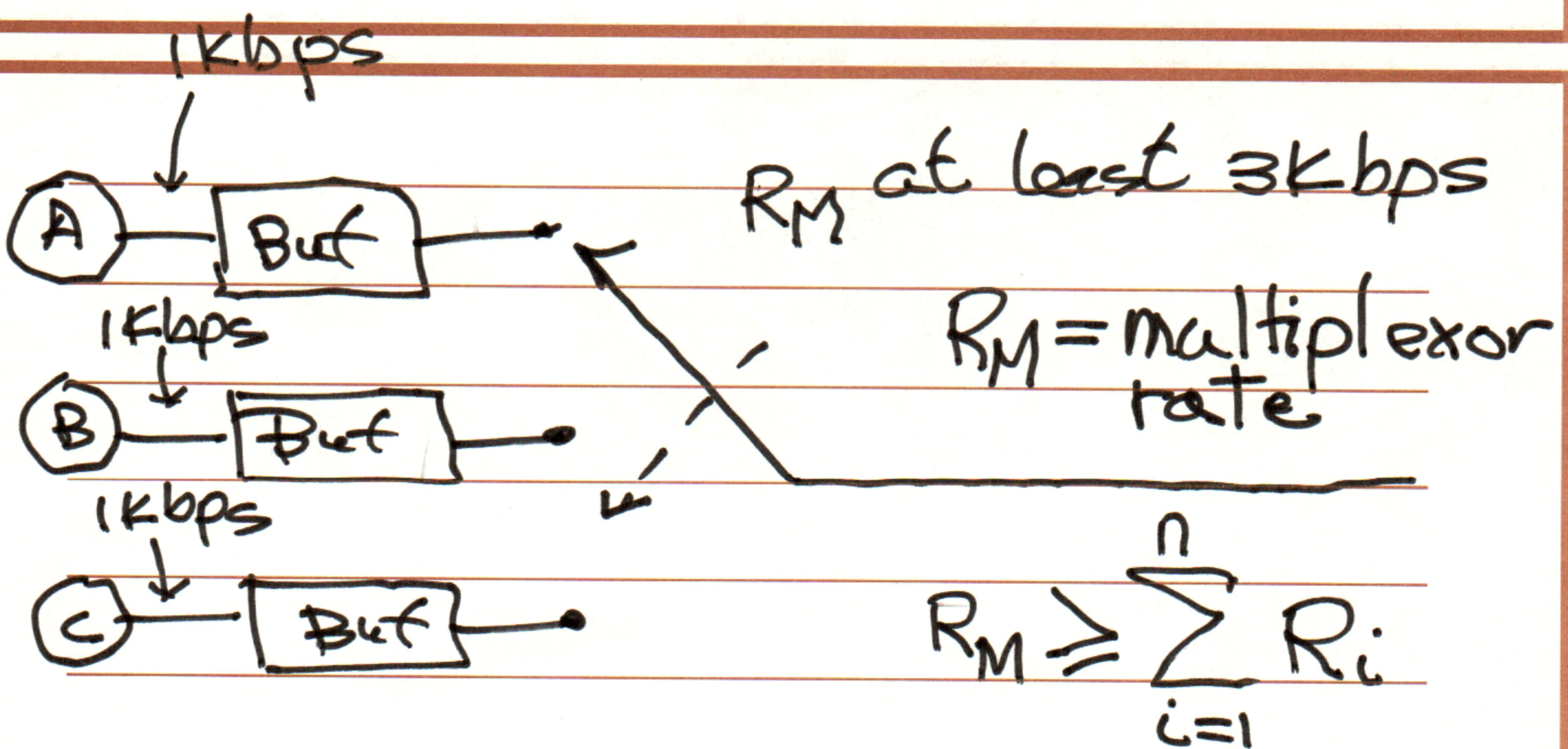
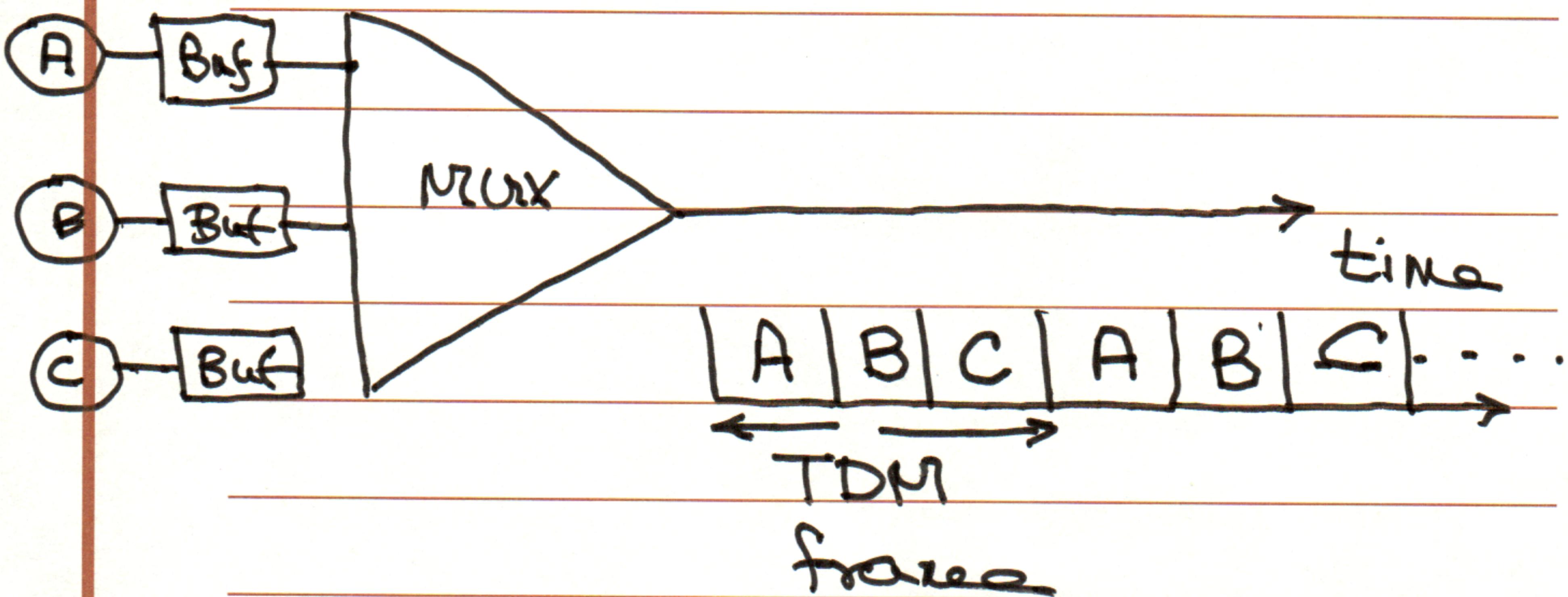


Synchronous TDM

(Technology used
in Telephone
Network)

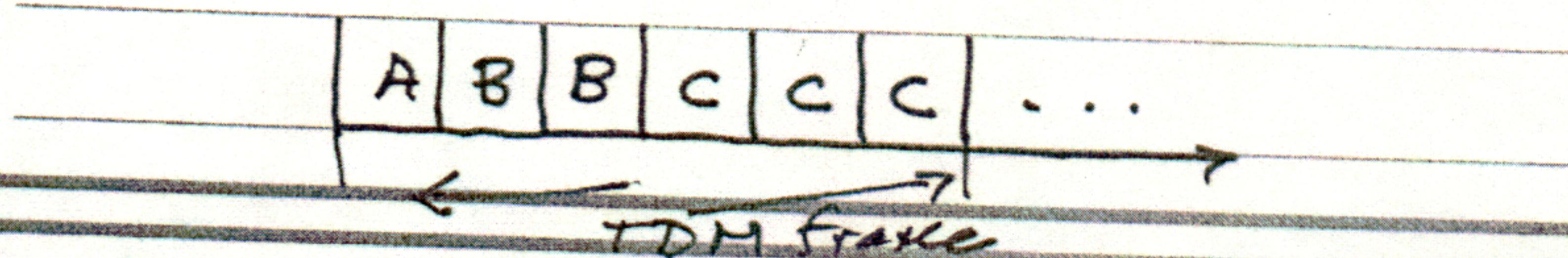


Let R_i be the bit rate generated by channel i . (in our example we have 3 channels)

Three sources 2K, 4K & 6Kbps are to be multiplexed using TDM.

What is the minimum # of time slots (per frame) allocated to each device?

Ans: $1T_S, 2T_S, 3T_S = 6T_S$ per TDM frame



Multiplexor Data Rate $\geq 12 \text{ Kbps}$

If every slot can support 1 bit,

$$\# \text{ of bits/frame} = 6 \quad \text{frame rate (frames/sec)}$$

$$\# \text{ of frames/sec (frames Rate)} = \frac{12 \text{ Kbps}}{6 \text{ bits/frame}} = 2 \text{ K frames/sec.}$$

$$\text{Frame duration} = \frac{1}{2 \text{ K}} = 0.5 \text{ msec.}$$

$$\text{slot duration} = 0.5/6 \approx 0.083 \text{ msec.}$$

$$\frac{\text{bits}}{\text{sec}} \cdot \frac{\text{bits}}{\text{frame}}$$

$$\frac{\cancel{\text{bits}}}{\text{sec}} \times \frac{\text{frame}}{\cancel{\text{bits}}} = \frac{\text{frame}}{\text{sec}}$$

$$1 \text{ sec} \quad 2000 \text{ fr}$$

?

1

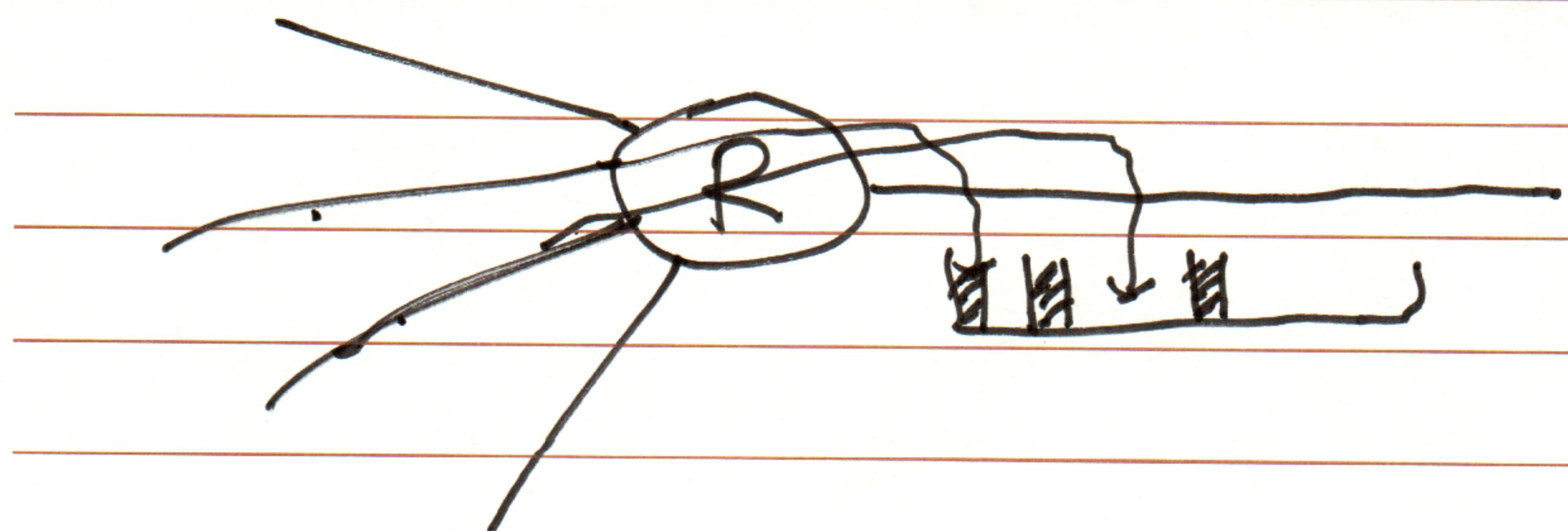
$$\underline{1} \\ 2000$$

In Synchronous TDM

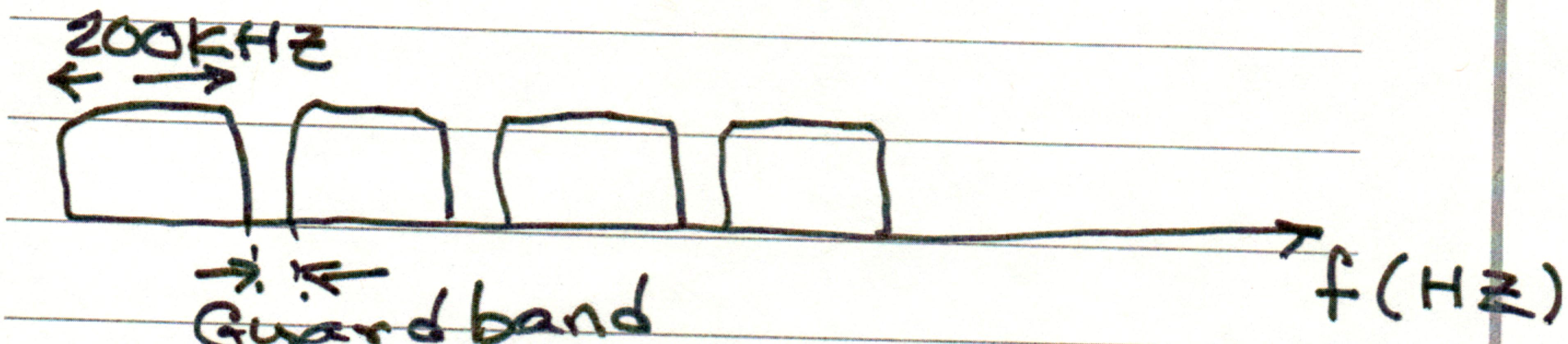
$$R_M \geq \sum_{i=1}^n R_i$$

In STDM,

$$R_M \leq \sum_{i=1}^n R_i$$



FDM: Ex: FM radio



resource is the BW (measured in Hz)

FM $88.1 \text{ MHz} - 108.1 \text{ MHz}$
(allocated by FCC)

Bandwidth

Federal
Communication
Commission

$$108.1 - 88.1 = 20 \text{ MHz}$$

$$\frac{20M}{200K} = 100 \text{ channels.}$$