

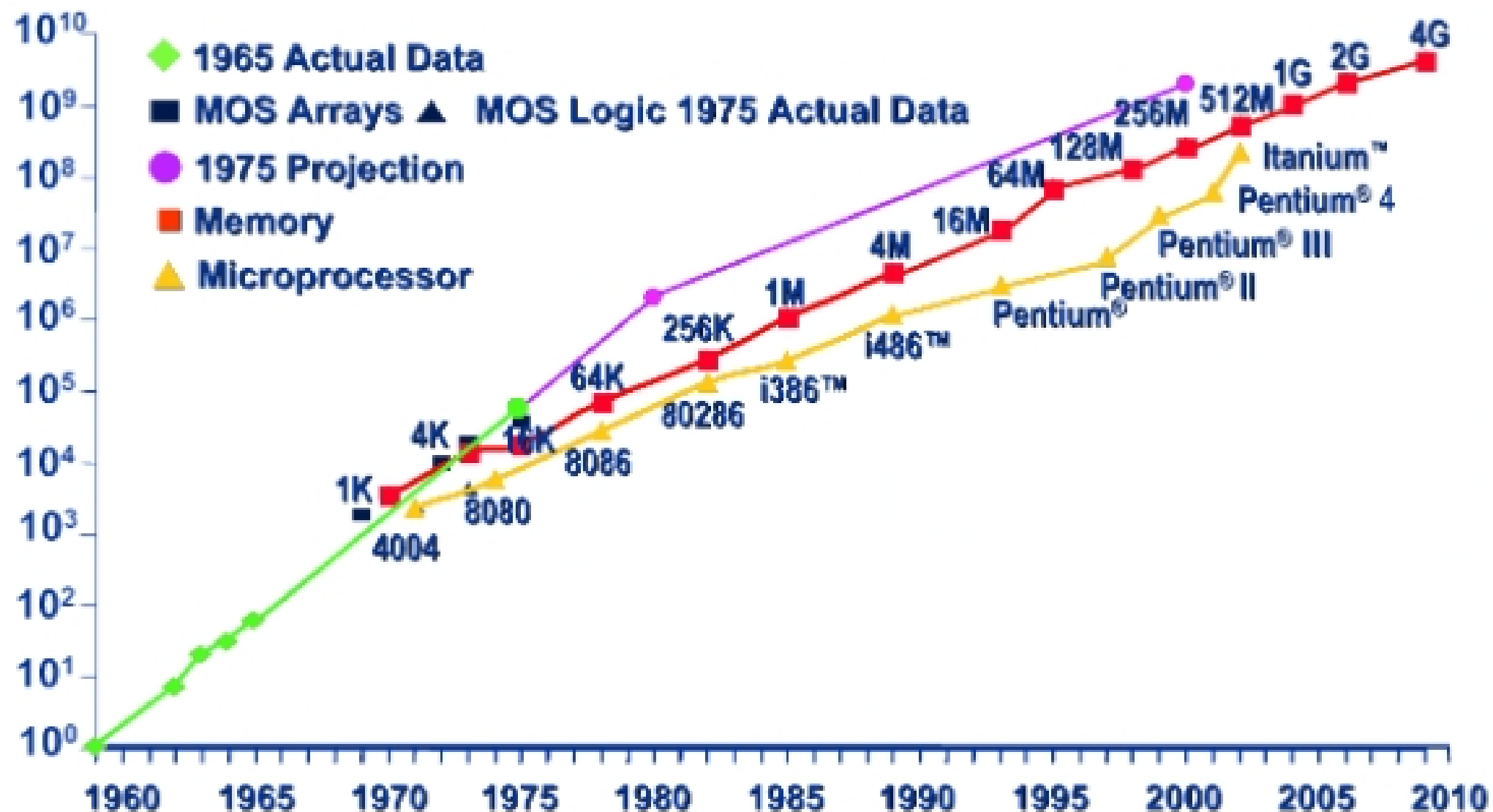
# **Si-based On-chip Optical Interconnects**

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ECE423

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# Transistors Per Die



# Disadvantages of Electrical Interconnects

## Scaling Problem — "Aspect Ratio" Limit

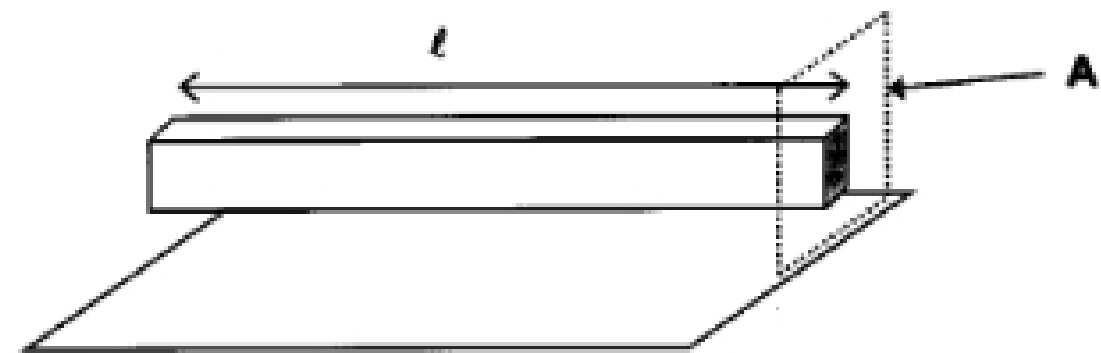
Total RC time constant:  $R_1 C_1 l^2$

Now scaling with s factor:

$R_1 \diamond R_1/s^2, l \diamond sl, C_1 \diamond C_1$

Now Total RC time constant:

$R_1 C_1 l^2 \diamond (R_1/s^2) C_1 (sl)^2 = R_1 C_1 l^2$  **The same!!!**



$$R \diamond \frac{1}{A}, l \diamond B \quad 1/RC \quad A/l^2$$

**However, optical interconnects do not have such problem!**