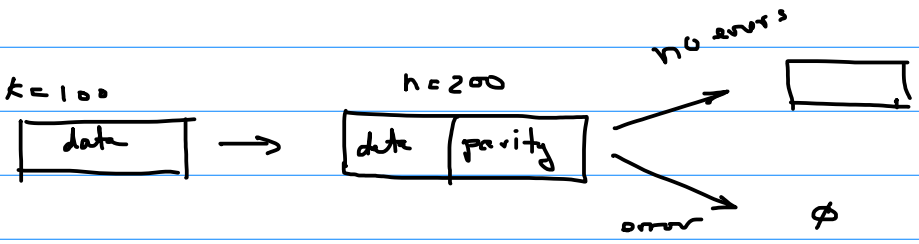
Lec. 13

Ex. 1



e.g. 20% of frames have errors:

w/o FEC: throughput = $\frac{80\% \times 100}{100}$ ← time to transmit $= 0.8$

w/ FEC: $= \frac{100\% \times 100}{200} = 0.5$

if correct 50% of frames: w/o FEC 0.5
w/ FEC 0.5

Ex. 2 (rate $\frac{1}{2}$ code)

	w/o FEC	w/ FEC
channel bit rate	1 Mb/s	2 Mb/s
information rate	1 Mb/s	1 Mb/s
Power	1 W	0.5 W
information bit period	1 μs	1 μs
Eb	1×10^{-6} J	0.5×10^{-6} J

In both cases the error rate is 10^{-3}
but w/ FEC the Eb is 3dB lower. ⇒ coding gain is 3dB

$$\text{Power} = \frac{\text{Energy}}{\text{Time}} \qquad \frac{1 \text{ Joule}}{\text{second}} = 1 \text{ Watt}$$

$$E = P \cdot T$$

Ex. 3

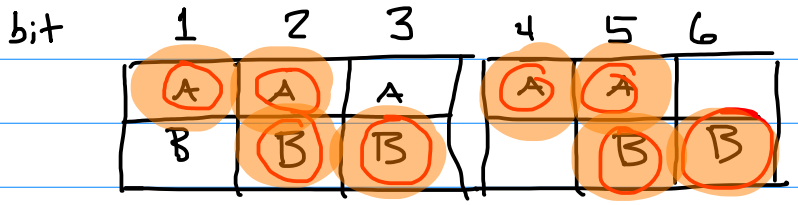
$n = 2$

$k = 1$

$k = 7$

$rate = \frac{1}{2}$

Ex. 4



$$rate = \frac{\text{input bits}}{\text{output bits}} = \frac{3}{4}$$