DATA COMPRESSION IN Communication Channels by Error Correcting Codes

Binary case $q=2$

We assume that the user can tolerate ℓ errors and there are no errors in the communication channel

Consider a binary message

$x=(x_1,\dots,x_n) \quad x_i \in F_2$

Let V is a $(n,2^k,2\ell+1)$-code

Let $v \in V$ and $d(x,v) \leq \ell$

then instead of transmitting x we can transmit

k info bits of v and at the receiving end reconstruct v. the user will interprete v as x

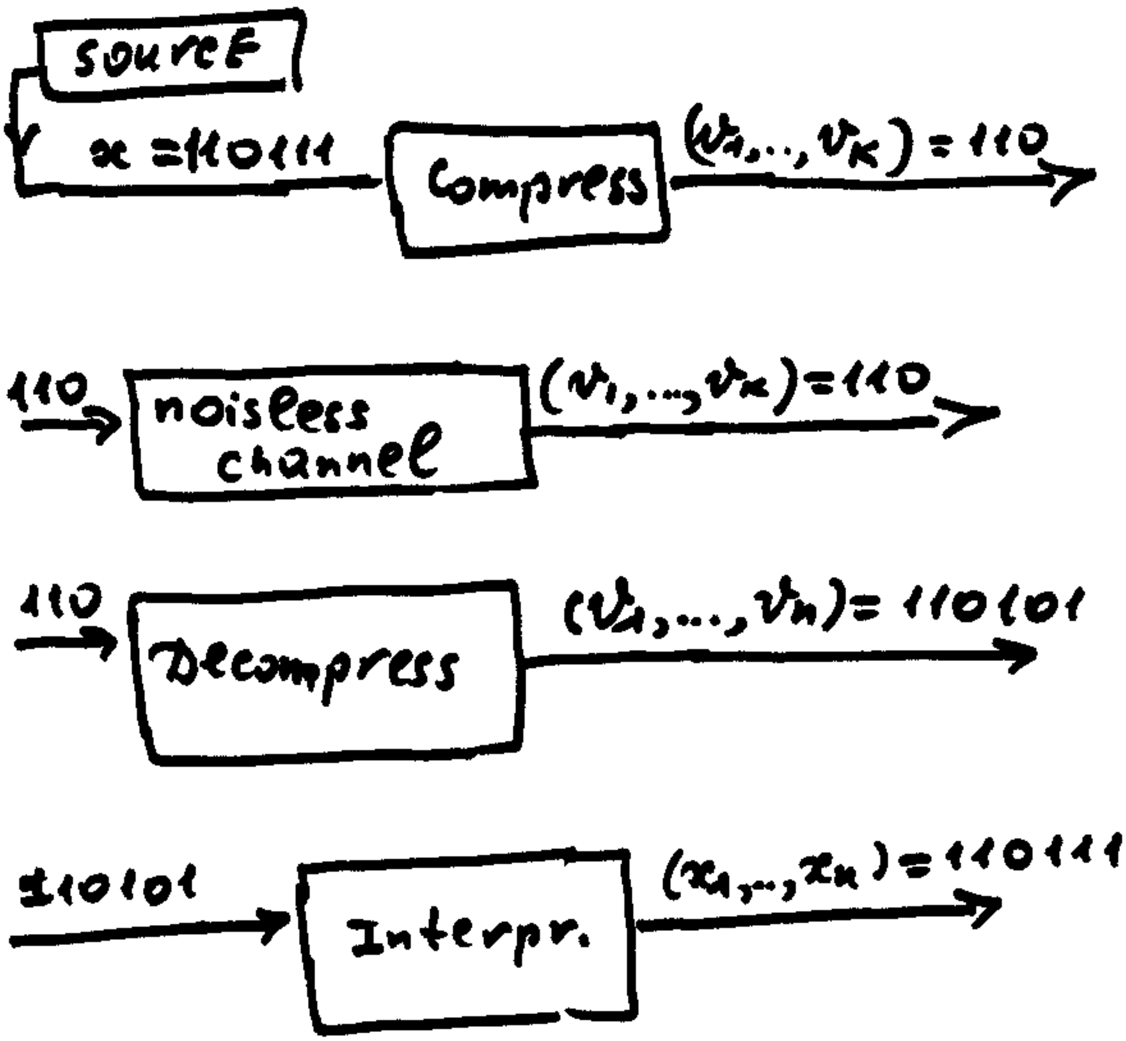
<u>Example</u> V $(6,3,3)$ code (shortened Hamming code)

$$G = \begin{bmatrix} 100 & 110 \\ 010 & 011 \\ 001 & 101 \end{bmatrix}$$

Let $x = (110\,111)$ is a message we have to transmit

Since $v = (110\,101) \in V$ and $d(v, x) = 1$ we can transmit only (110) - 3 information digits of v and reconstruct $v = (110\,101)$ at the receiving end.

Compression Ratio $\frac{n}{k} = 6/3 = 2$



- In code V is perfect than all n-bit messages can be compressed into k bits.

- Compression ratio is growing if the receiver can tolerate more errors

- Good codes generate efficient data compressing schemes.