Single-bit error correction

To correct an error, the receiver reverses the value of the altered bit. To do so, it must know which bit is in error.

Number of redundancy bits needed

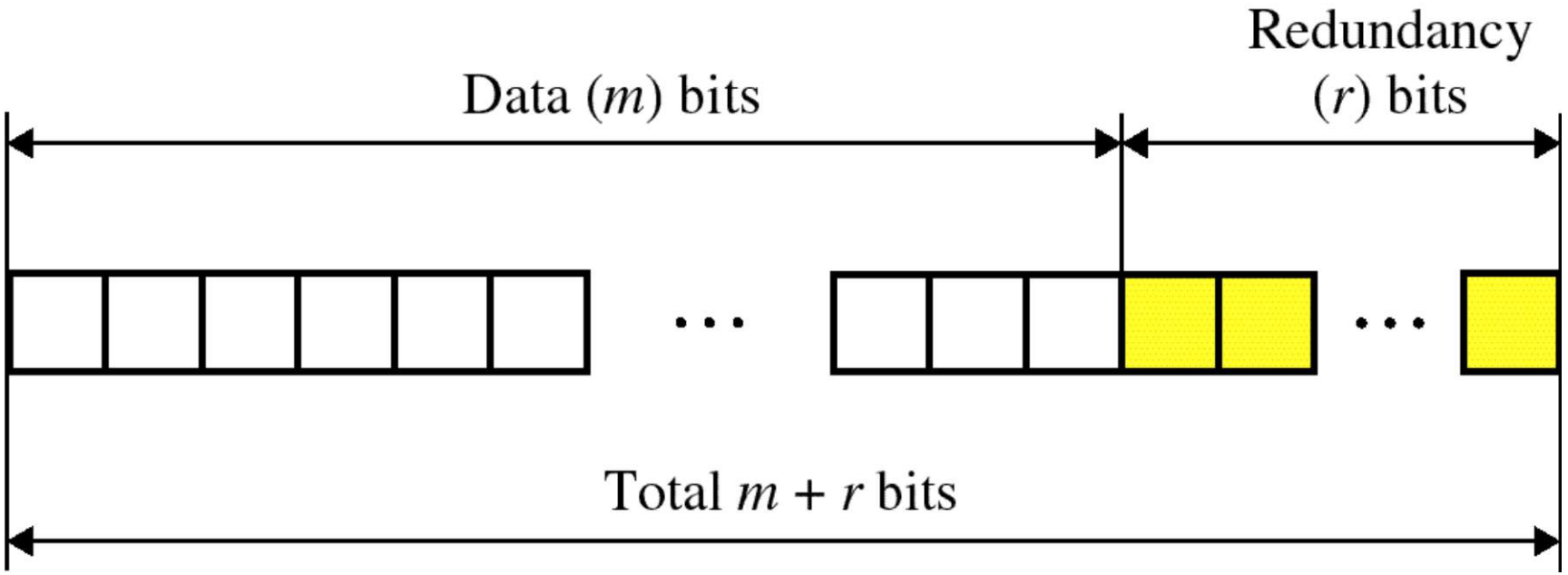
- Let data bits = *m*
- Redundancy bits = *r*

∴ Total message sent = *m+r*

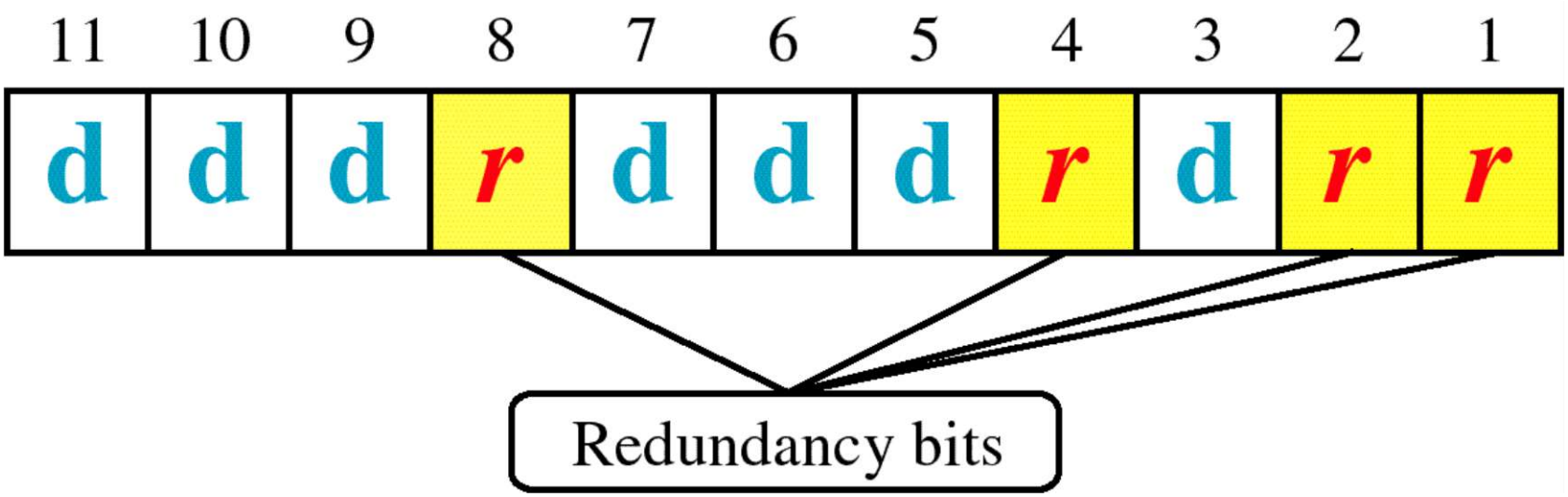
The value of r must satisfy the following relation:

$$2^r \geq m+r+1$$

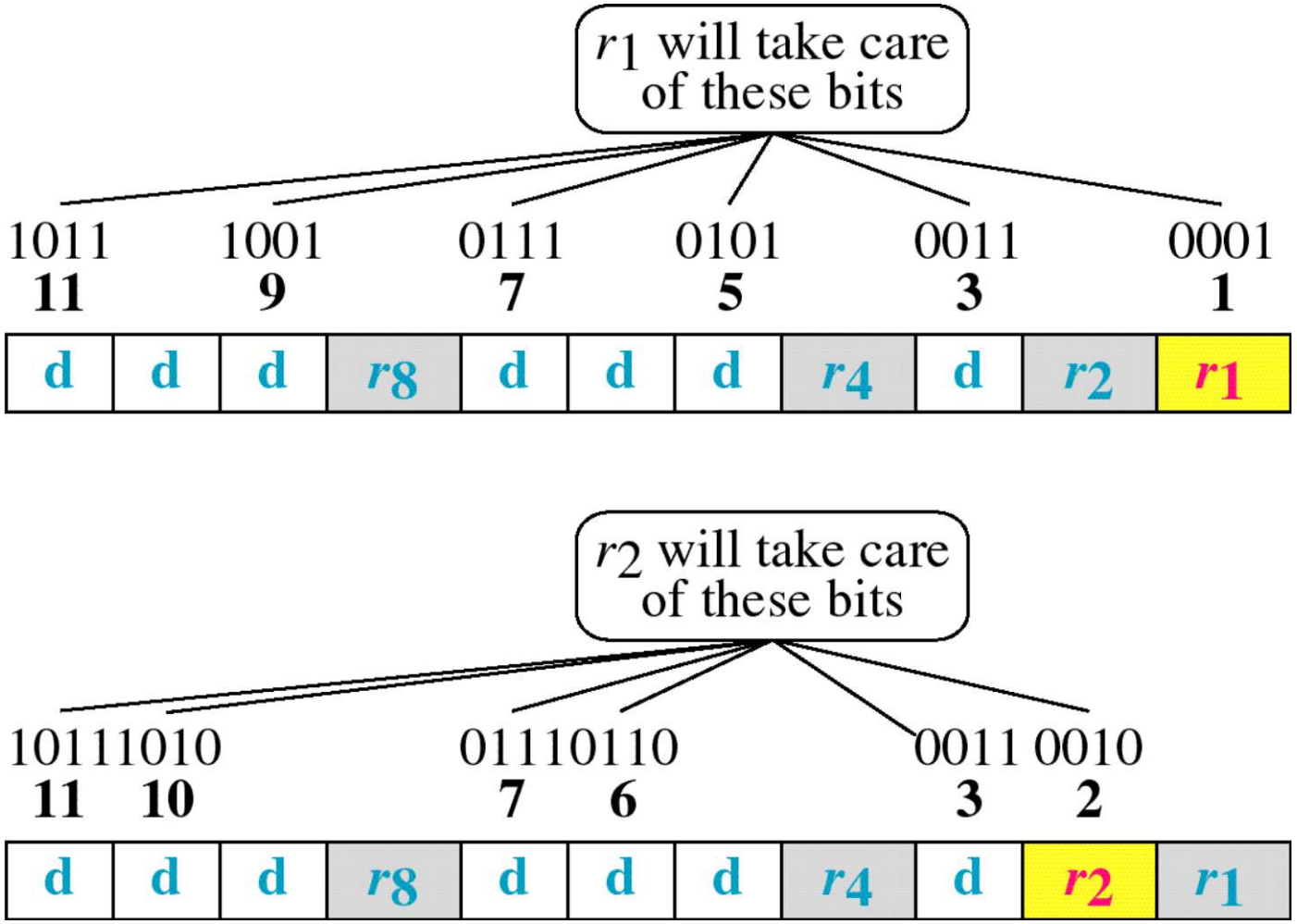
Error Correction



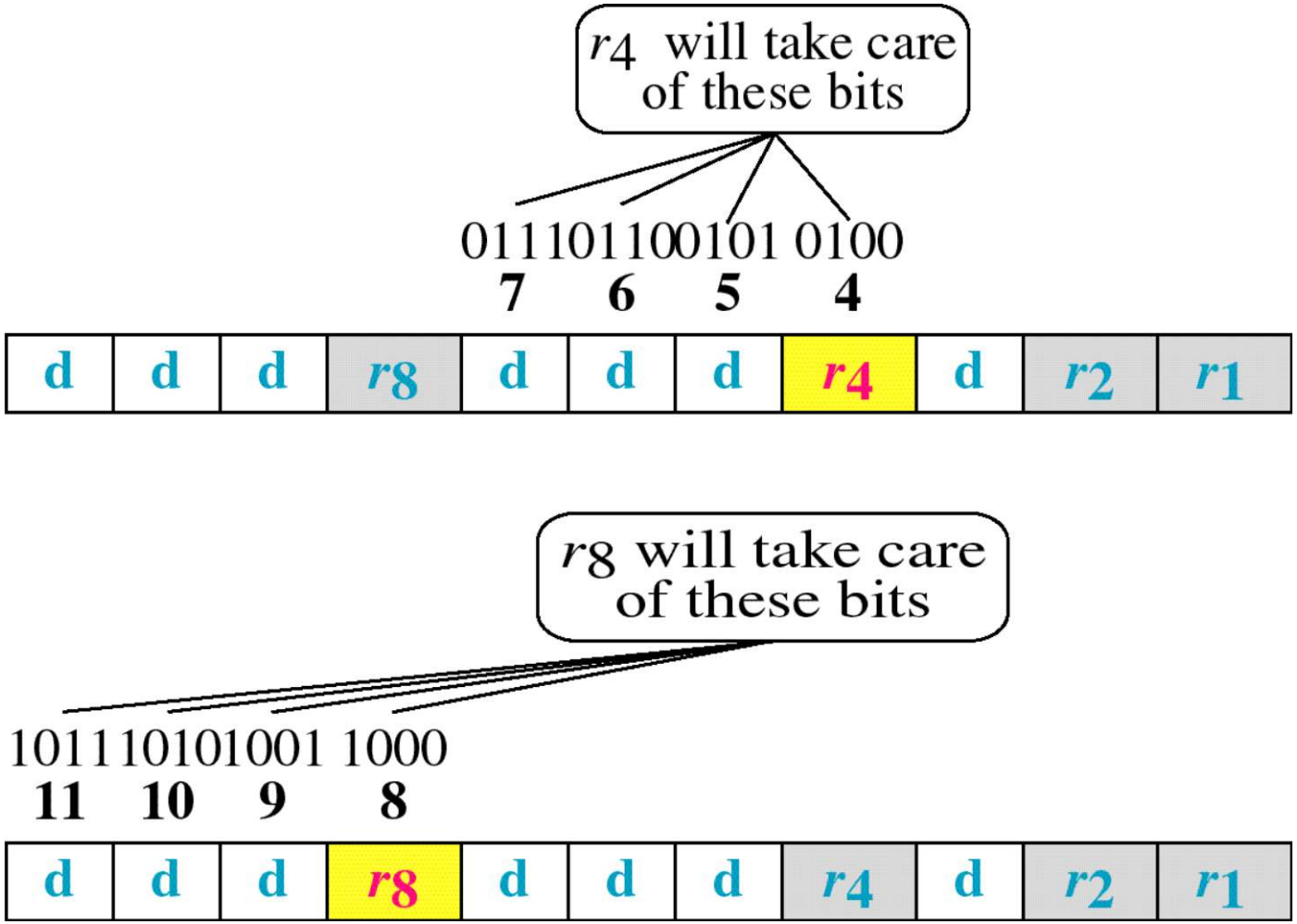
Hamming Code



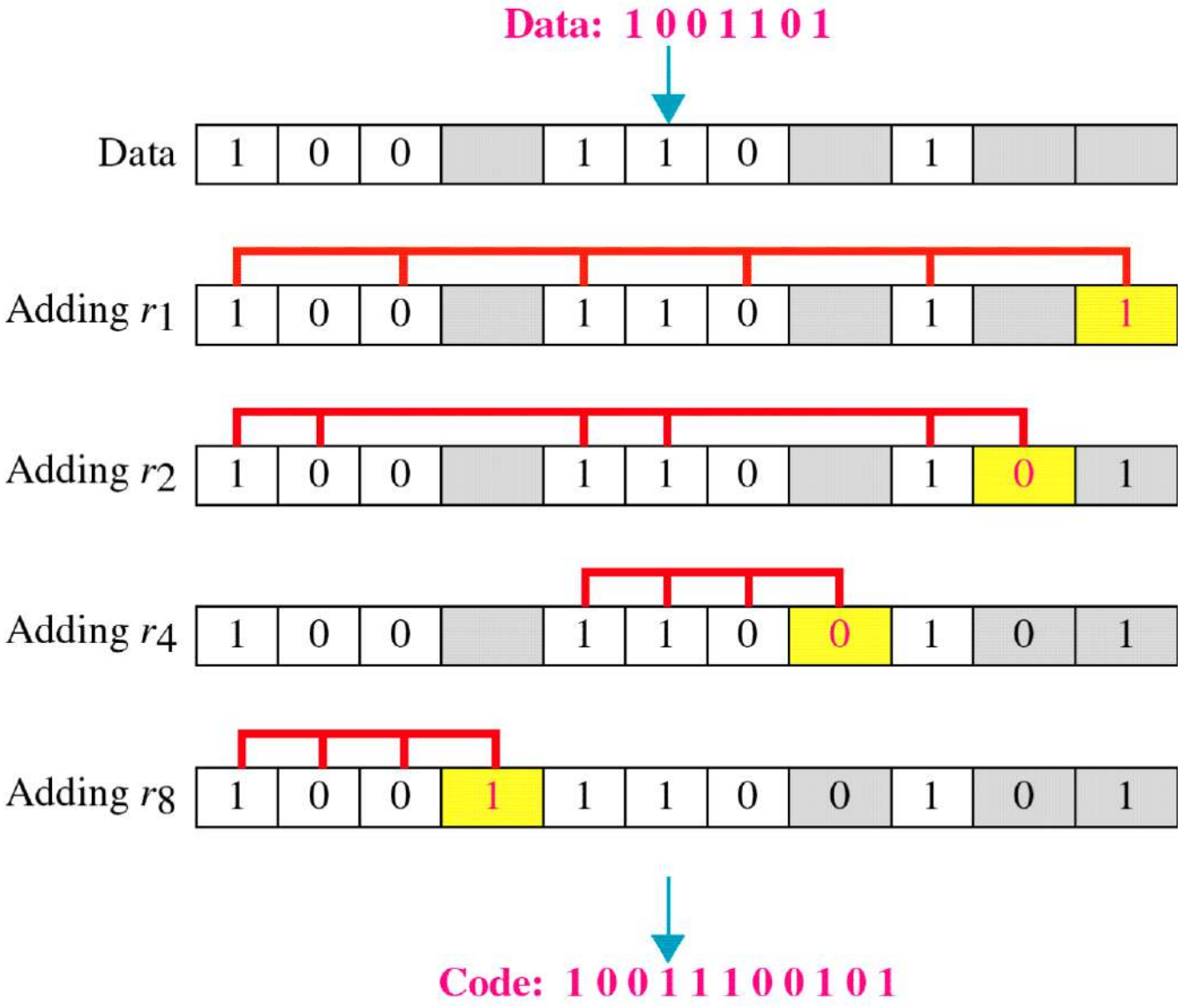
Hamming Code



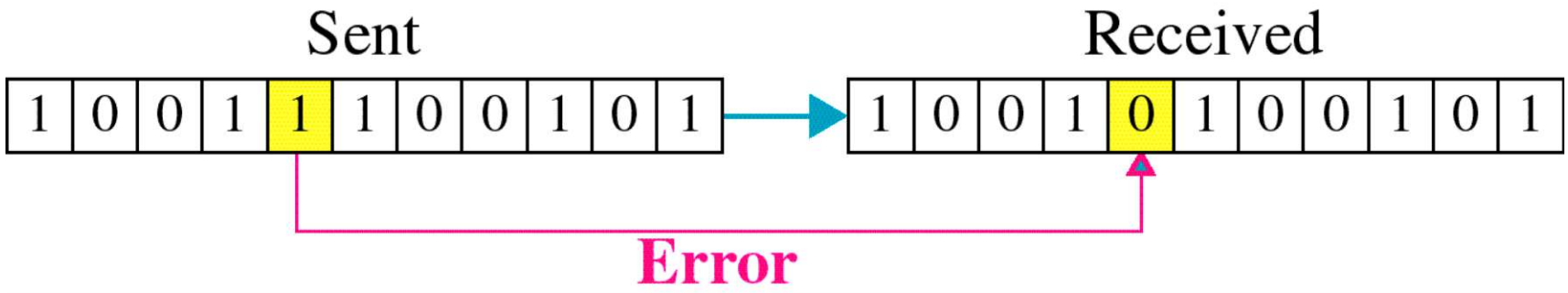
Hamming Code



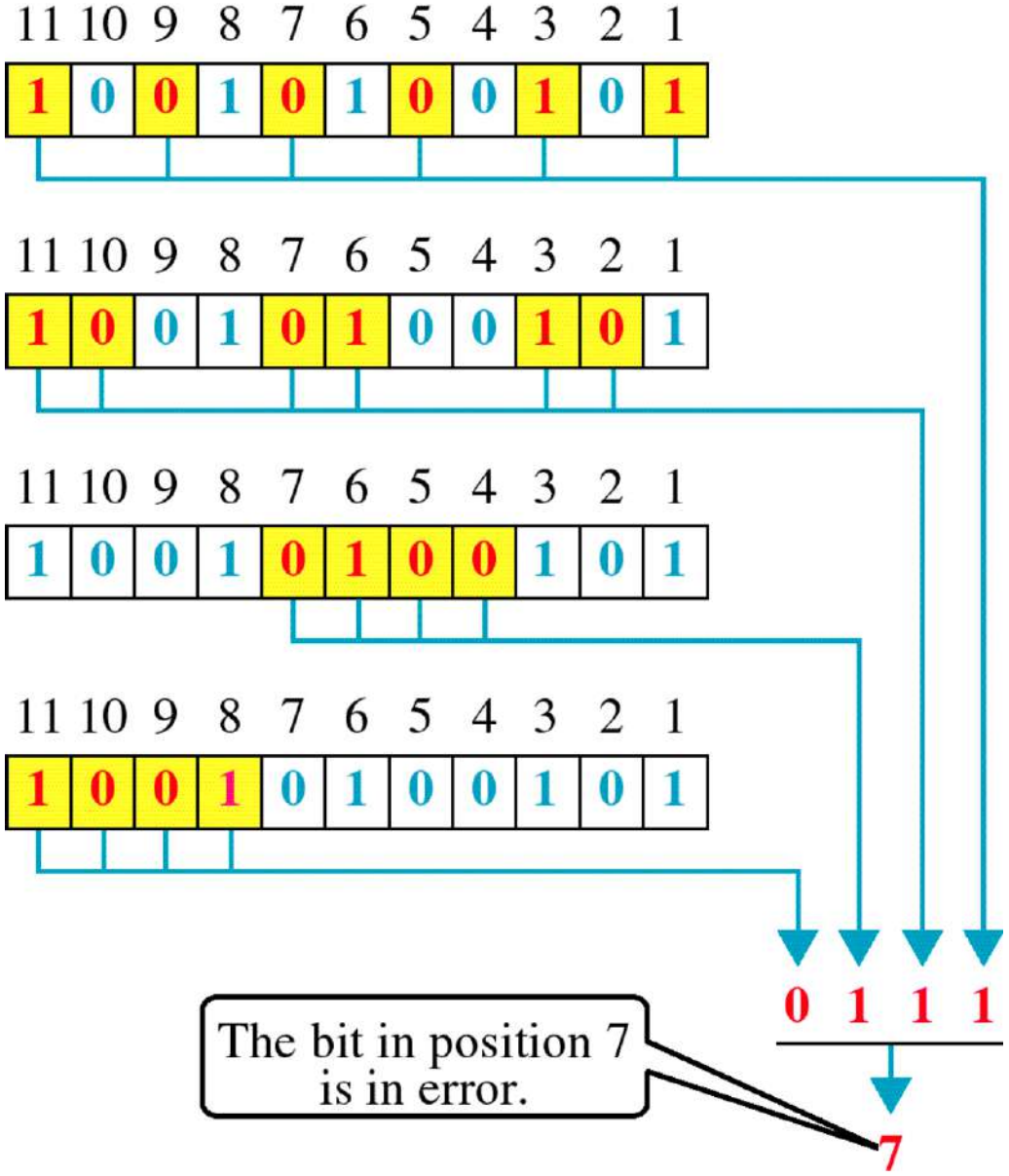
Example of Hamming Code



Single-bit error



Error Detection



Problem

- A bit word 1011 is to be transmitted. Construct the even parity seven-bit hamming code for this data.

1	**0**	**1**	**0**	**1**	**0**	**1**
D7	D6	D5	R4	D3	R2	R1

Problem 2

- A seven bit hamming code is received as 1110101. What is the correct code. Assume the parity to be even.

1	**1**	**1**	**0**	**1**	**0**	**1**
D7	D6	D5	R4	D3	R2	R1

- R4 R2 R1
- 1 1 0 = 6

Problem 3

- A bit word 111011001 is to be transmitted. Construct the even parity seven-bit hamming code for this data.

1	**1**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**1**	**1**
D 13	D 12	D 11	D 10	d9	r8	d7	d6	d5	r4	d3	r2	r1

THANK YOU…