# KODLAMA SİSTEMLERİ

1. Onluk sistemler (Decimal systems (0,1,2,3,…….,,9) : İnsanlar için
2. Binary/ikili sistemler (0 ve 1) : Mkineler/Bilgisayarlar
3. Sekizli sistemler/Octal systems (0,1,2,3,….,7)
4. Onaltılık/Hexadecimal sistemler (0,1,2,3,…..,,15 veya 0,1,2,3,……,9 A B C D E F)
5. BCD (Binary Coded Decimal Systems)
6. EBCDIC systems (**E**xtended **B**inary **C**oded **D**ecimal **I**nterchange **C**ode)
7. ASC II systems (**A**merican **S**tandard **C**ode for **I**nformation **I**nterchange)
8. Gray systems (Frank Gray, The reflected binary code)


Fig.15 Computer Communications

## İKİLİ (BİNARY) SİSTEMLER

İkili sayı sistemi 0 ve 1 den oluşur.

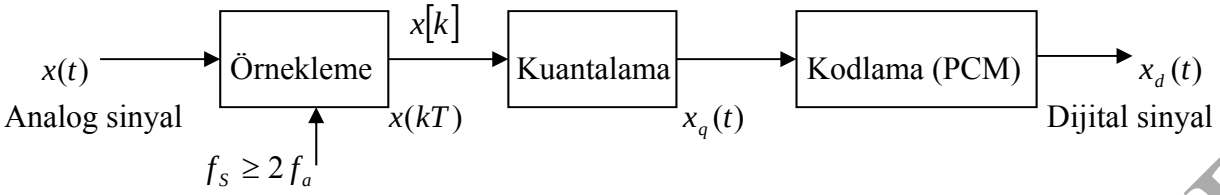
0 → bit
1 → bit

1 Nibble → 4 bits (half byte)

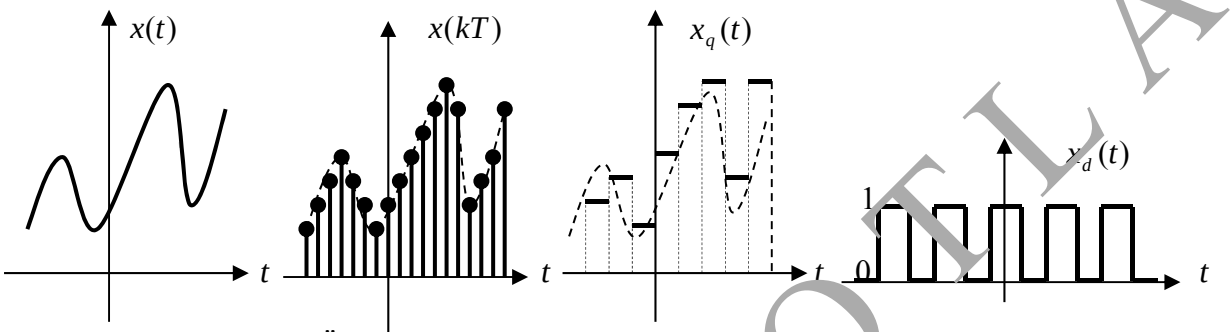
1 byte → 8 bits → $2^3$ bits
K kilo $2^{10}$ bit = $1024^1$ byte
M mega $2^{20}$ bit = $1024^2$ byte
G giga $2^{30}$ bit = $1024^3$ byte
T tera $2^{40}$ bit= $1024^4$ byte
P peta $2^{50}$ bit = $1024^5$ byte
E exa $2^{60}$ bit = $1024^6$ byte

| Name | Standart SI | Bit | Ad (Sembol) |
|---|---|---|---|
| kilobit (Kbit) | $10^3$ | $2^{10}$ | kibibit (Kibit) |
| **megabit** (Mbit) | $10^6$ | $2^{20}$ | mebibit (Mibit) |
| gigabit (Gbit) | $10^9$ | $2^{30}$ | gibibit (Gibit) |
| terabit (Tbit) | $10^{12}$ | $2^{40}$ | tebibit (Tibit) |
| petabit (Pbit) | $10^{15}$ | $2^{50}$ | pebibit (Pibit) |
| eksabit (Ebit) | $10^{18}$ | $2^{60}$ | eksbibit (Eibit) |
| zettabit (Zbit) | $10^{21}$ | $2^{70}$ | zebibit (Zibit) |
| yottabit (Ybit) | $10^{24}$ | $2^{80}$ | yobibit (Yibit) |

## BINARY SİSTEM – DIJITAL SİNYALLER




Şekil.16. Analog sinyal – Dijital sinyal dönüşümü : Pulse Code Modulation (PCM)




Şekil. 17. Analog – Dijital Dönüşüm

### Sayı Sistemlerinin Dönüşümü

**Örnekler**

**1.** Onluk/Desimal sistemdeki $(2784)_{10}$ sayısını hesaplayın.

| $(\mathbf{2784})_{10}$ | $\mathbf{2}\times10^{3}$ | $\mathbf{7}\times10^{2}$ | $\mathbf{8}\times10^{1}$ | $\mathbf{4}\times10^{0}$ | **Sonuç** |
|---|---|---|---|---|---|
| | 2000 | 700 | 80 | 4 | **2784** |

$$(2784)_{10} = \mathbf{2}\times10^{3} + \mathbf{7}\times10^{2} + \mathbf{8}\times10^{1} + \mathbf{4}\times10^{0}$$
$$= \mathbf{2}\times1000 + \mathbf{7}\times100 + \mathbf{8}\times10 + \mathbf{4}\times1 = 2000 + 700 + 80 + 4 = 2784$$

**2.** $(325.67)_{10}$

| $(\mathbf{325.67})_{10}$ | $\mathbf{3}\times10^{2}$ | $\mathbf{2}\times10^{1}$ | $\mathbf{5}\times10^{0}$ | ● | $\mathbf{6}\times10^{-1}$ | $\mathbf{7}\times10^{-2}$ | **Sonuç** |
|---|---|---|---|---|---|---|---|
| | 300 | 20 | 5 | ● | **0.6** | **0.07** | **325.67** |

$$(\mathbf{325.67})_{10} = \mathbf{3}\times10^{2} + \mathbf{2}\times10^{1} + \mathbf{5}\times10^{0} + \mathbf{6}\times10^{-1} + \mathbf{7}\times10^{-2}$$
$$= \mathbf{3}\times100 + \mathbf{2}\times10 + \mathbf{5}\times1 + \mathbf{6}\times\frac{1}{10} + \mathbf{7}\times\frac{1}{100} = 300 + 20 + 5 + 0.6 + 0.07 = 325.67$$

**3.** $(1010)_2$ Sayısını onlu sisteme çevirin.

| $(\mathbf{1010})_2$ | $\mathbf{1}\times 2^3$ | $\mathbf{0}\times 2^2$ | $\mathbf{1}\times 2^1$ | $\mathbf{0}\times 2^0$ | **Sonuç** |
|---|---|---|---|---|---|
| | 8 | 0 | 2 | 0 | $(\mathbf{10})_{10}=\mathbf{10}$ |

$$(1010)_2 = \mathbf{1}\times 2^3 + \mathbf{0}\times 2^2 + \mathbf{1}\times 2^1 + \mathbf{0}\times 2^0$$
$$= 1\times 8 + 0\times 4 + 1\times 2 + 0\times 1 = 8+0+2+0 = 10$$
$$(1010)_2 = (10)_{10}$$

**4.** $(11001)_2$ Sayısını onlu sisteme çevirin.

| $(\mathbf{11001})_2$ | $\mathbf{1}\times 2^4$ | $\mathbf{1}\times 2^3$ | $\mathbf{0}\times 2^2$ | $\mathbf{0}\times 2^1$ | $\mathbf{1}\times 2^0$ | **Sonuç** |
|---|---|---|---|---|---|---|
| | 16 | 8 | 0 | 0 | 1 | $(\mathbf{25})_{10}=\mathbf{25}$ |

$$(11001)_2 = \mathbf{1}\times 2^4 + \mathbf{1}\times 2^3 + \mathbf{0}\times 2^2 + \mathbf{0}\times 2^1 + \mathbf{1}\times 2^0$$
$$= 1\times 16 + 1\times 8 + 0\times 4 + 0\times 2 + 1\times 1 = 16+8+0+0+1 = 25$$
$$(11001)_2 = (25)_{10}$$

**5.** $(111.101)_2$ Sayısını onlu sisteme çevirin.

| $(\mathbf{111.101})_2$ | $\mathbf{1}\times 2^2$ | $\mathbf{1}\times 2^1$ | $\mathbf{1}\times 2^0$ | ● | $\mathbf{1}\times 2^{-1}$ | $\mathbf{0}\times 2^{-2}$ | $\mathbf{1}\times 2^{-3}$ | **Sonuç** |
|---|---|---|---|---|---|---|---|---|
| | 4 | 2 | 1 | ● | 0.5 | 0 | 0.125 | $(\mathbf{7.625})_{10}=\mathbf{7.625}$ |

$$(111.101)_2 = \mathbf{1}\times 2^2 + \mathbf{1}\times 2^1 + \mathbf{1}\times 2^0 + \mathbf{1}\times 2^{-1} + \mathbf{0}\times 2^{-2} + \mathbf{1}\times 2^{-3}$$
$$= 1\times 4 + 1\times 2 + 1\times 1 + 1\times \frac{1}{2} + 0\times \frac{1}{2^2} + 1\times \frac{1}{2^3} = 4+2+1+0.5+0+0.125 = 7.625$$
$$(111.101)_2 = (7.625)_{10}$$

**6.** $(33)_{10}$ Sayısını ikili (binary) sisteme çevirin.

| **Bölme** | **Bölüm** | **Kalan** |
|---|---|---|
| 33 ÷ 2 | 16 | **1** LSB |
| 16 ÷ 2 | 8 | **0** |
| 8 ÷ 2 | 4 | **0** |
| 4 ÷ 2 | 2 | **0** |
| 2 ÷ 2 | 1 | **0** |
| 1 ÷ 2 | 0 | **1** MSB |
| **SONUÇ** | | $(\mathbf{100001})_2$ |

**İspat :**
$$(\mathbf{100001})_2 = \mathbf{1}\times 2^5 + \mathbf{0}\times 2^4 + \mathbf{0}\times 2^3 + \mathbf{0}\times 2^2 + \mathbf{0}\times 2^1 + \mathbf{1}\times 2^0$$
$$= \mathbf{1}\times 32 + \mathbf{0}\times 16 + \mathbf{0}\times 8 + \mathbf{0}\times 4 + \mathbf{0}\times 2 + \mathbf{1}\times 1 = 32+0+0+0+0+1 = 33$$
$$(\mathbf{100001})_2 = (33)_{10}$$