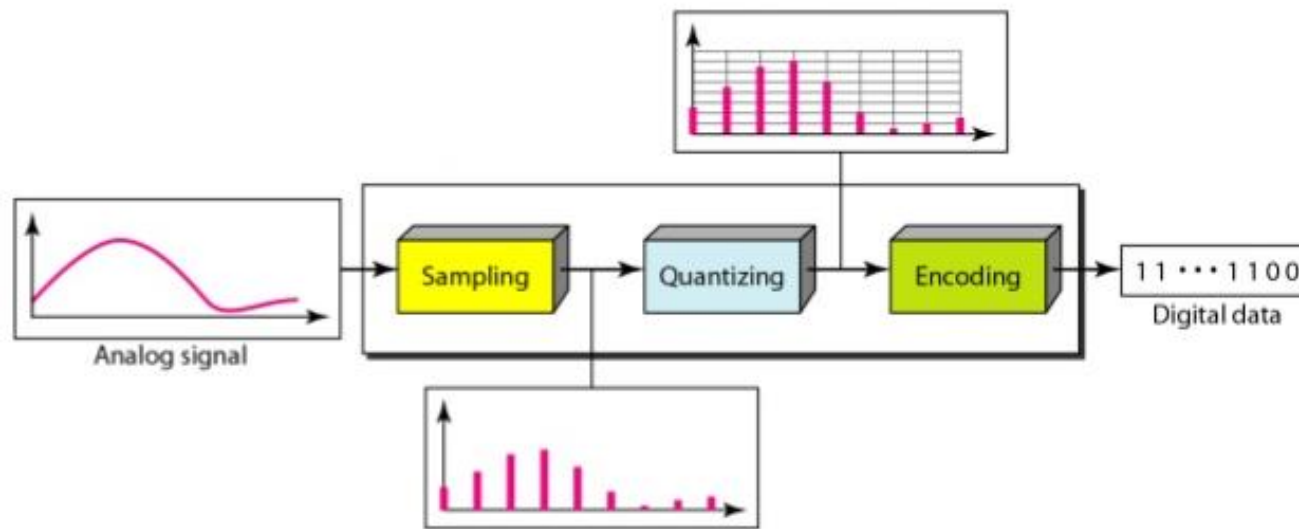

EHB 352

SAYISAL HABERLEŞME

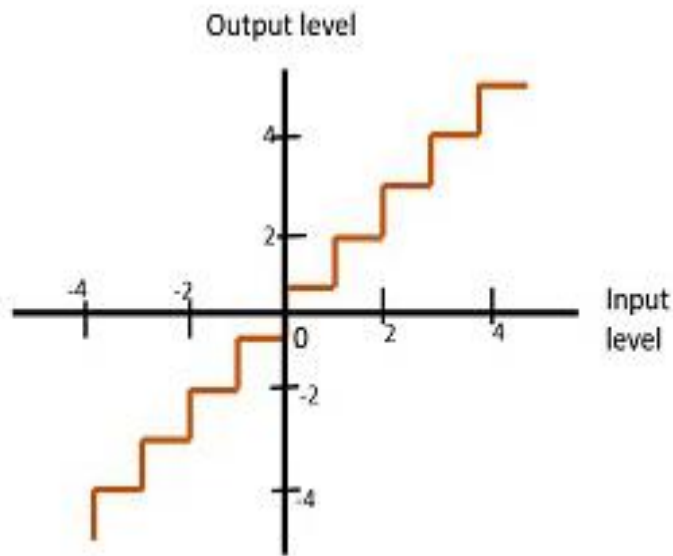
PCM - Line Coding

İbrahim Altunbaş - İTÜ

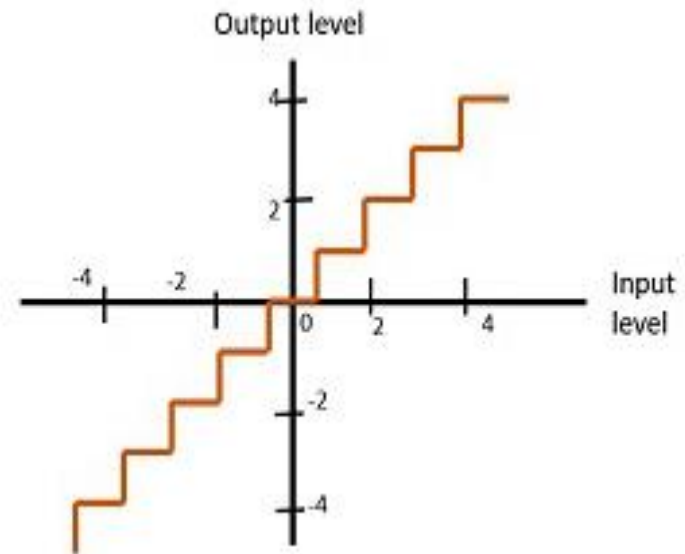
PCM'in Temel Blokları



Düzgün Kuantalama



Mid-Rise type Uniform Quantization



Mid-Tread type Uniform Quantization

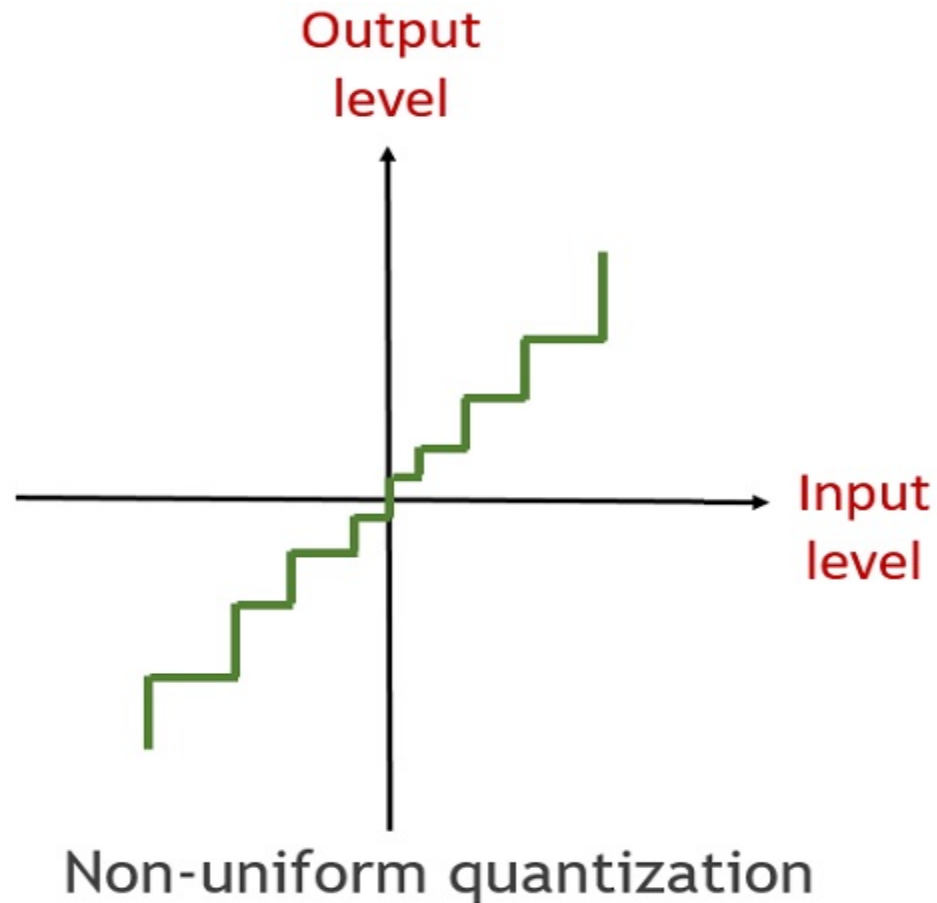
Düzgün Kuantalama İle İlgili Problemler

- Sadece düzgün dağılımlı işaretler için optimal çözüm.
- Konuşma ve müzik işaretleri düzgün dağılımlı değil.

Çözüm:

- Düzgün olmayan kuantalama (Non-uniform quantization)

Düzgün Olmayan Kuantalama



μ Tipi ve A Tipi Sıkıştırma (ITU-T)

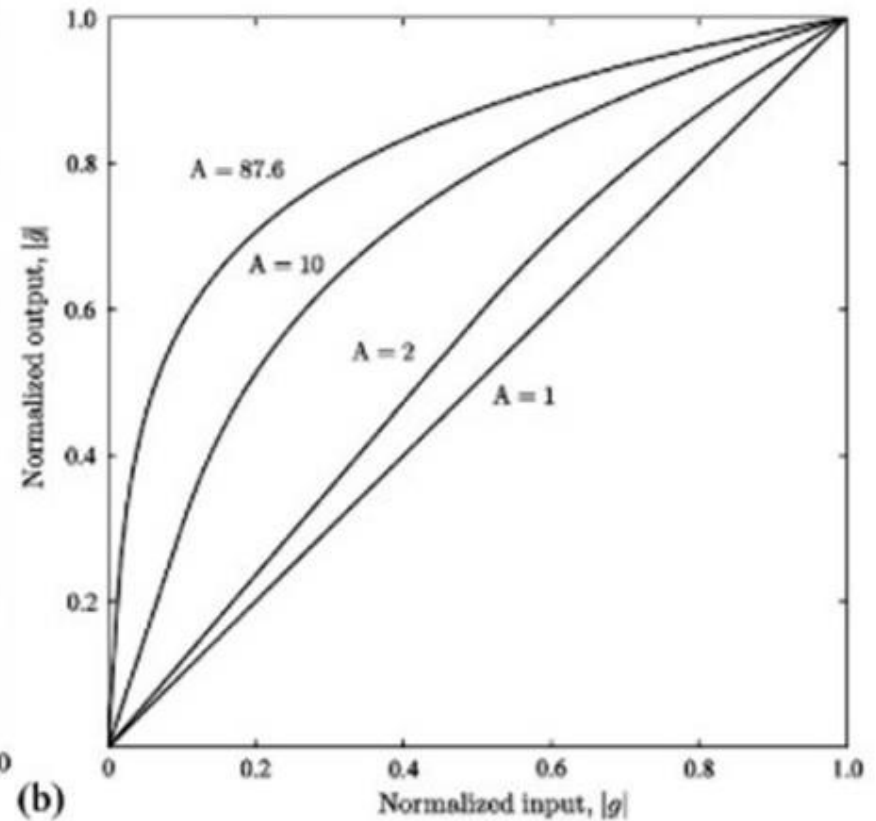
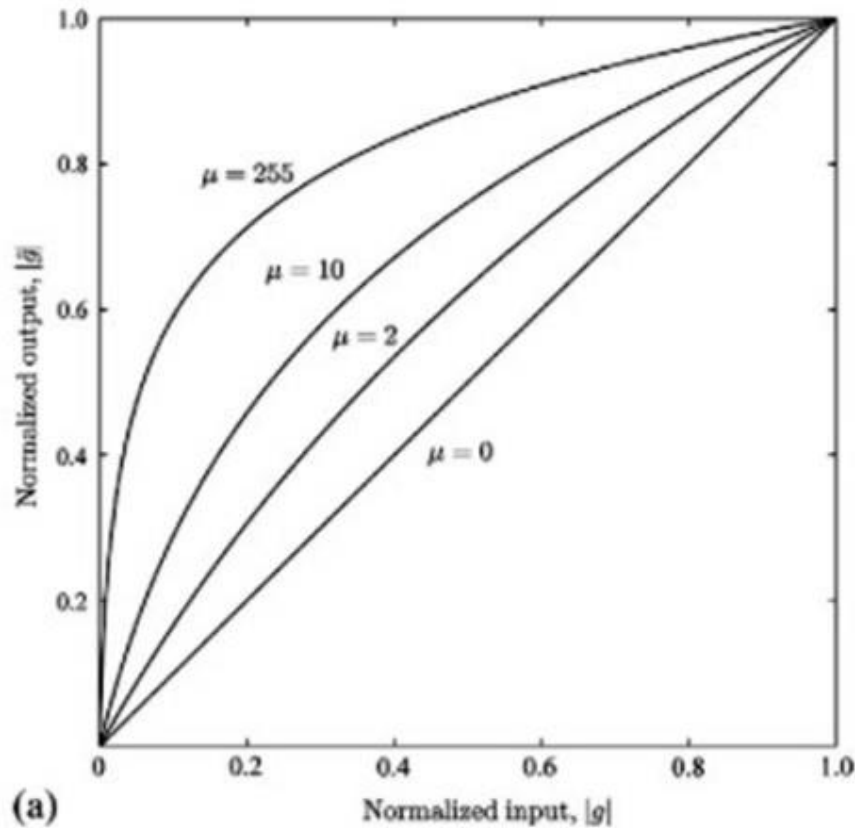
μ Tipi Sıkıştırma (μ -law Compressing): Kuzey Amerika ve Japonya

$$\frac{F_{\mu}(x)}{F_{maks}} = \text{sgn}(x) \frac{\ln(1 + \mu |x| / x_{maks})}{\ln(1 + \mu)}$$

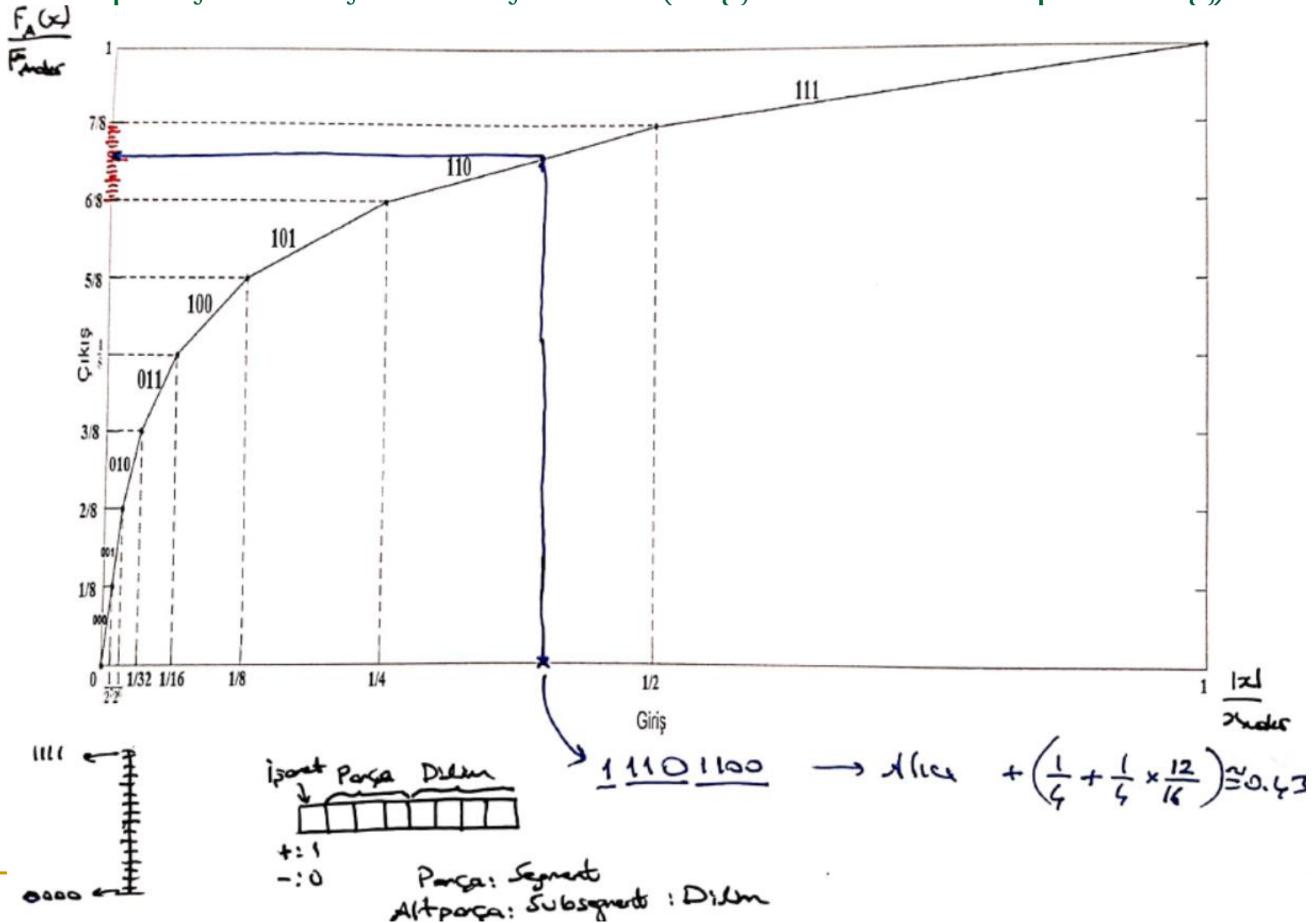
A Tipi Sıkıştırma (A-law Compressing): Diğer Bölgeler

$$\frac{F_A(x)}{F_{maks}} = \begin{cases} \text{sgn}(x) \frac{A |x| / x_{maks}}{1 + \ln A}, & 0 \leq |x| / x_{maks} \leq 1 / A \\ \text{sgn}(x) \frac{1 + \ln(A |x| / x_{maks})}{1 + \ln A}, & 1 / A \leq |x| / x_{maks} \leq 1 \end{cases}$$

μ Tipi ve Λ Tipi Sıkıştırma



A Tipi İçin Parçalı Sıkıştırma (Segmented Compressing)



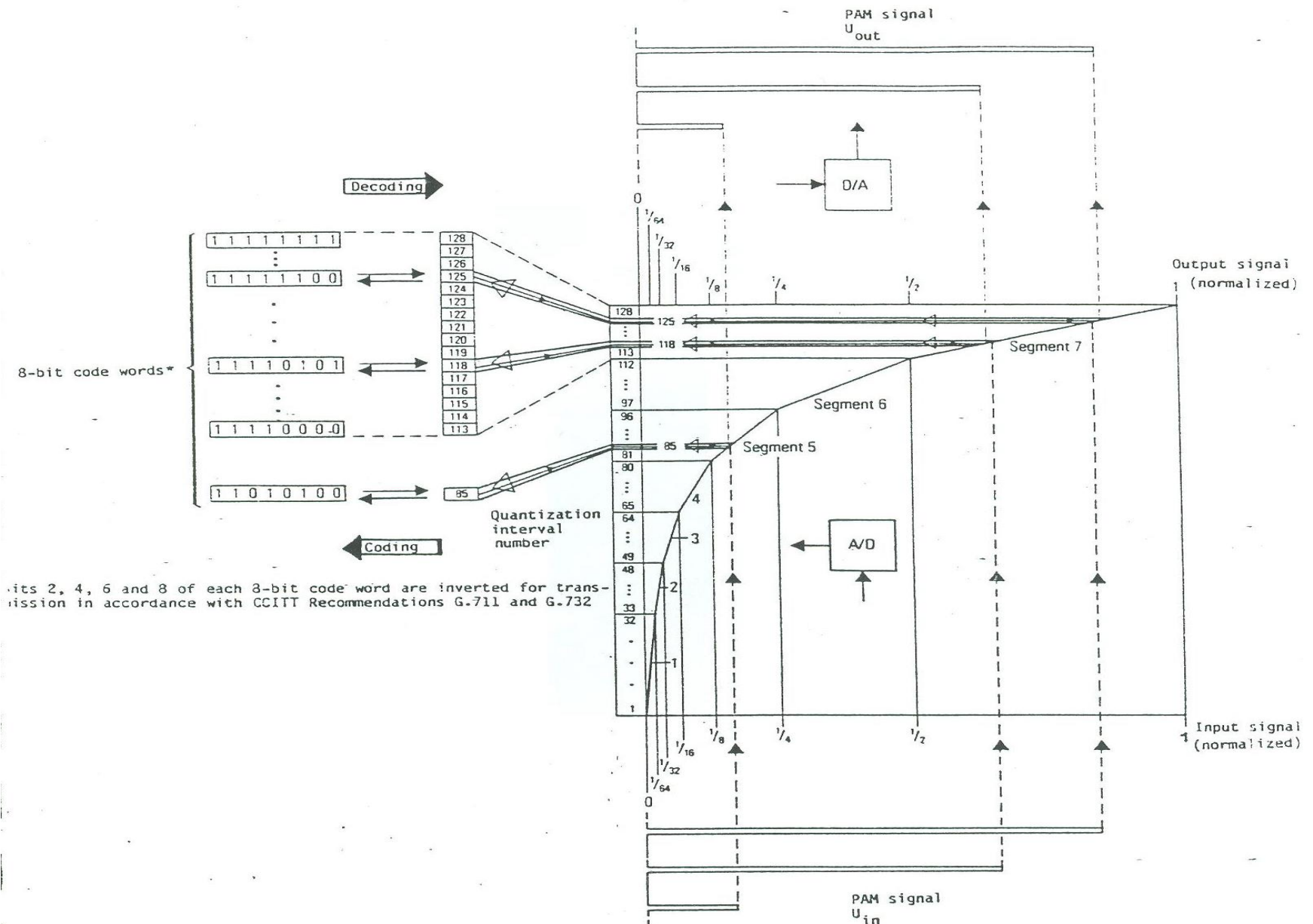
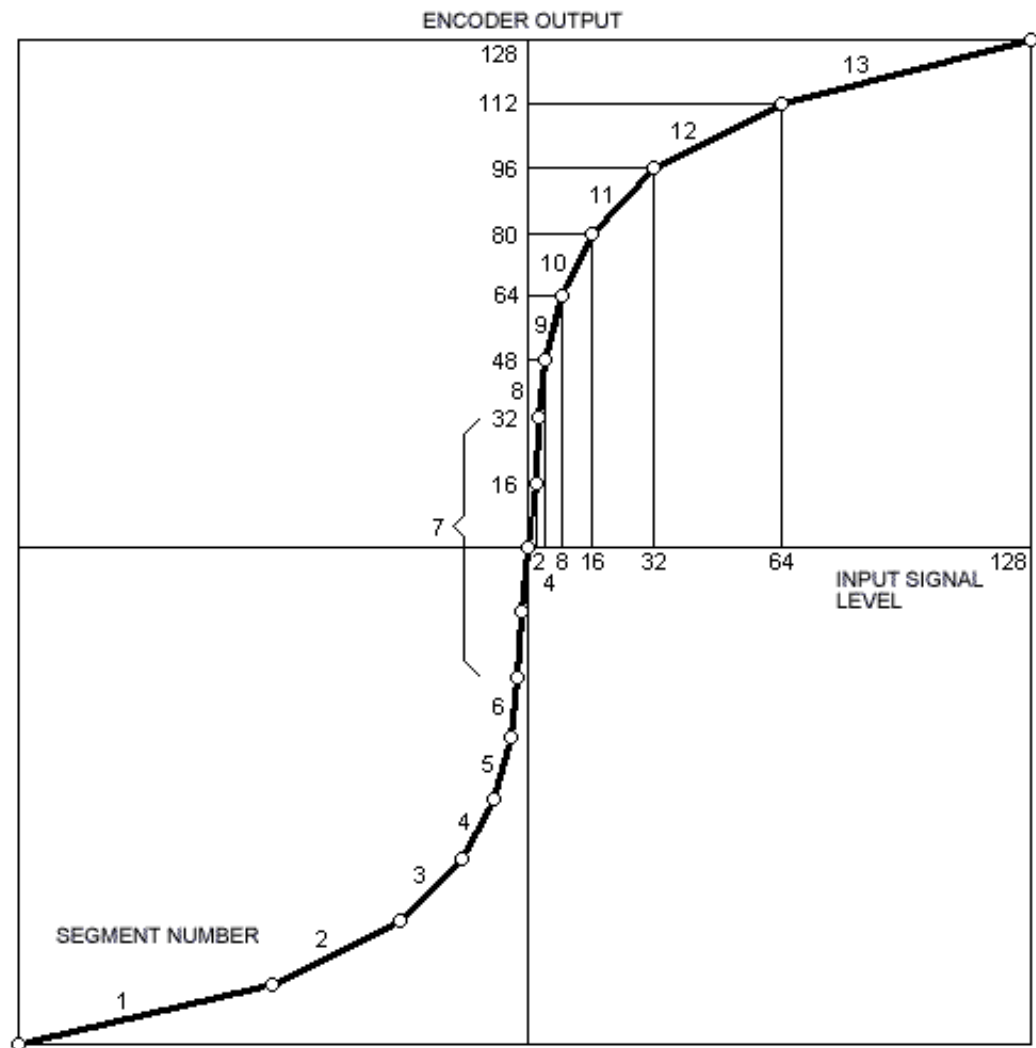
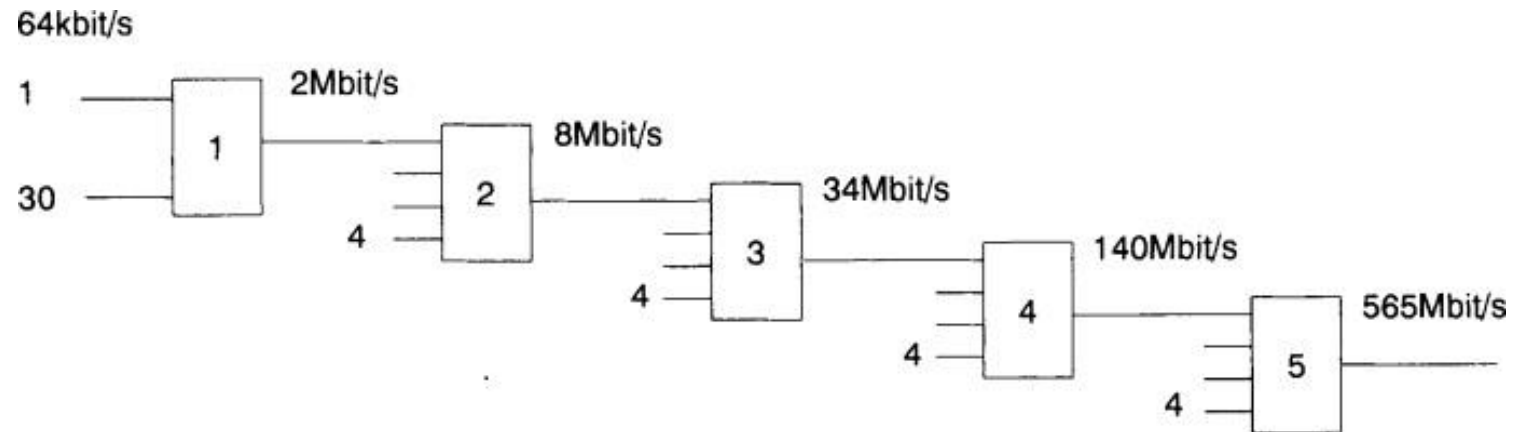


Fig. 5: Positive part of the 13-segment characteristic curve (A-law)



PCM-TDM Hiyerarşik Sistemi: E-30



Hat Kodlama (Line Coding)

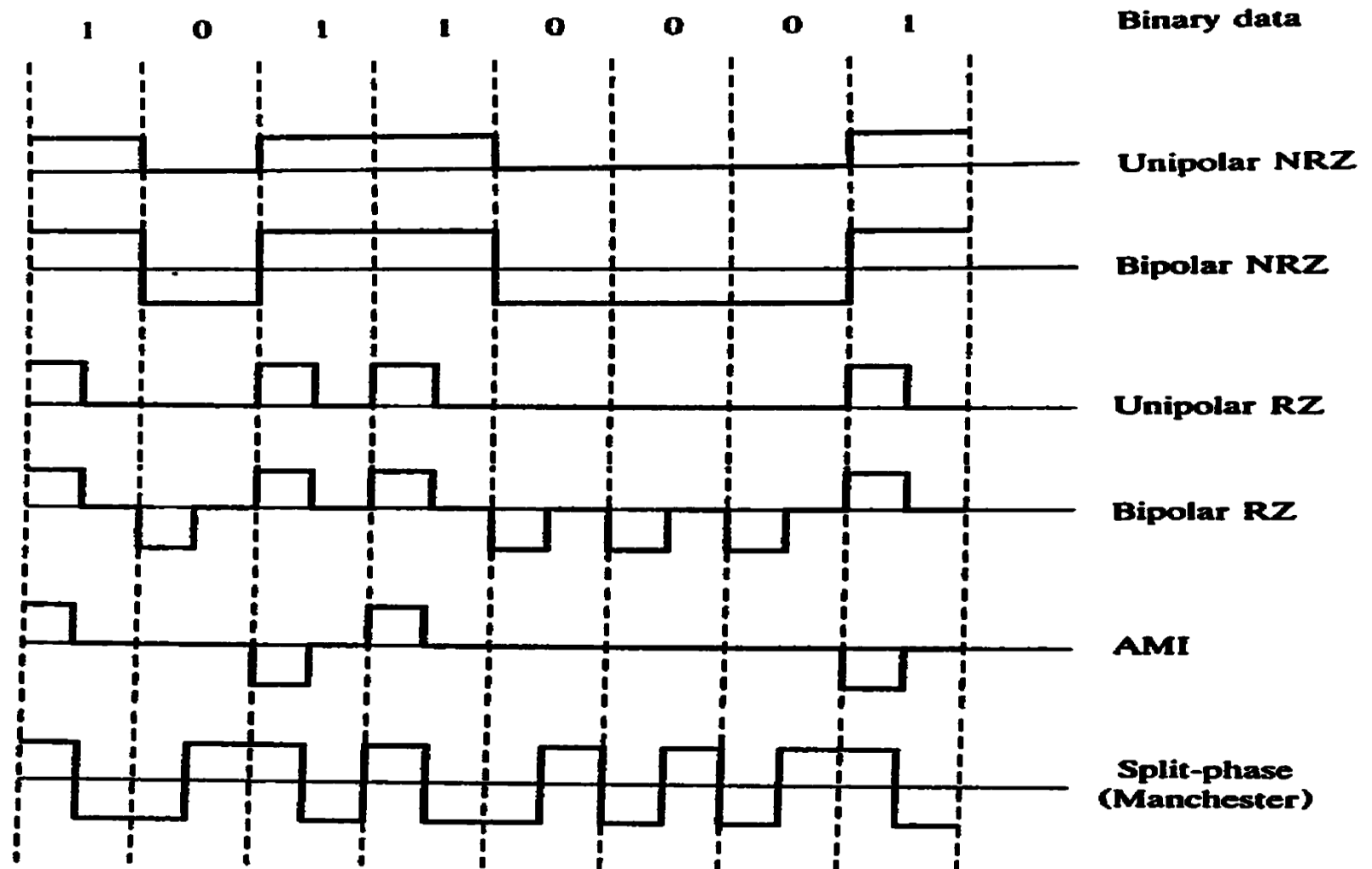


Fig. 5-10 Binary signaling formats