

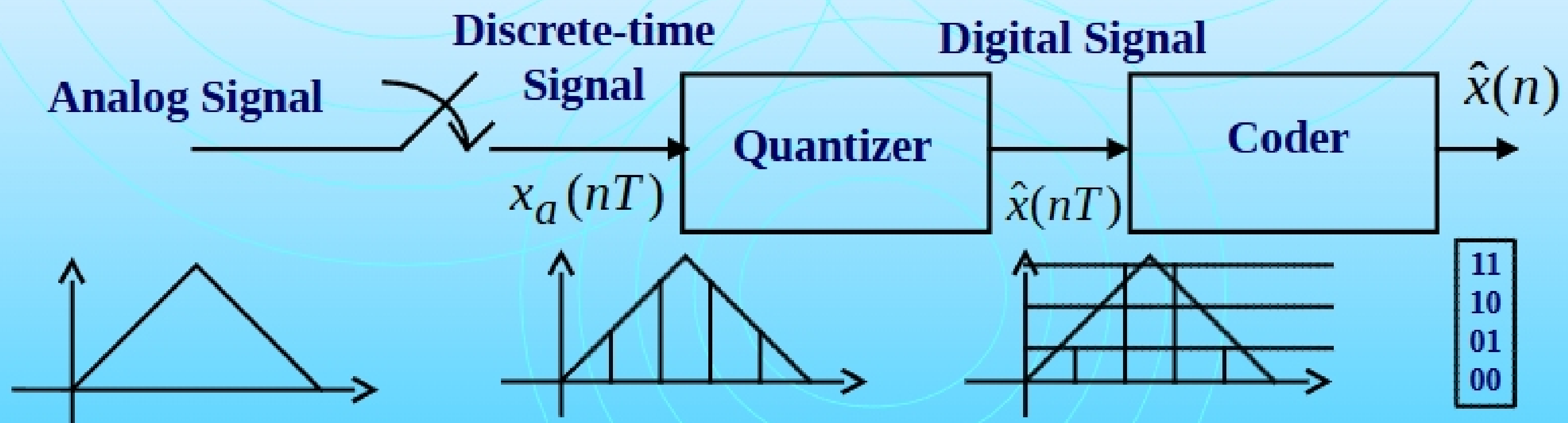
EE513
Audio Signals and Systems

Noise

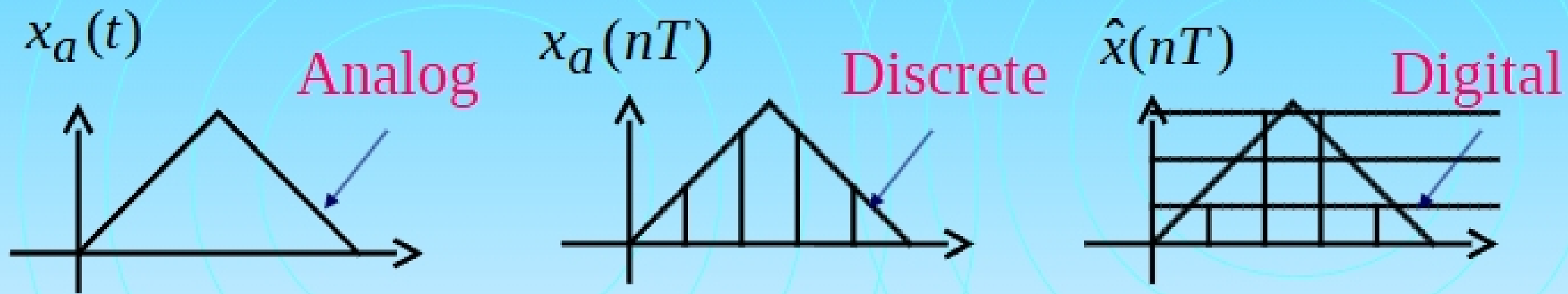
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Quantization Noise

Signal amplitudes take on a continuum of values. A discrete signal must be digitized (mapped to a finite set of values) to be stored and processed on a computer/DSP



Quantization Error and Noise



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- Quantization has the same effects as adding noise to the signal:

$$\varepsilon_q(nT) = x_a(nT) - \hat{x}(nT) \quad x_a(nT) - \varepsilon_q(nT) = \hat{x}(nT)$$

- Intervals between quantization levels are proportional to the resulting quantization noise since they limit the maximum rounding or truncation error.
- For uniform quantization, the interval between signal levels is the maximum signal amplitude value divided by the number of quantization intervals.