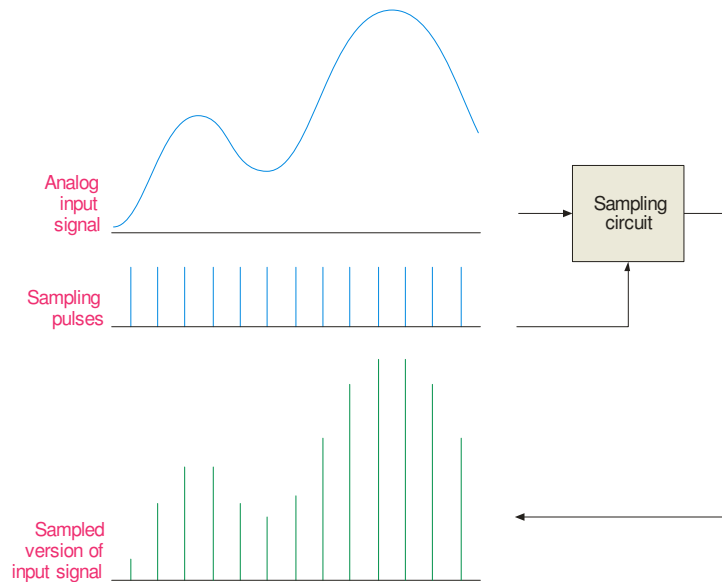


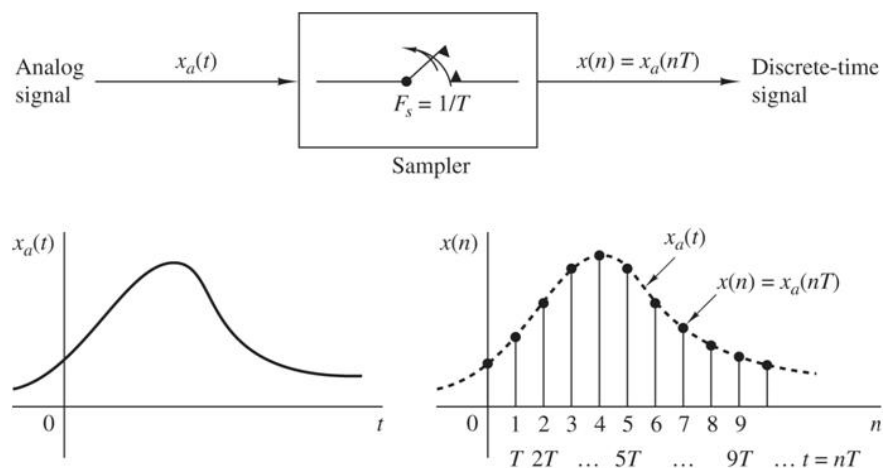
Sampling: Continuous time Signal Conversion to Discrete time Signal

Most input signals to an electronic system start out as analog signals. For processing, the signal is normally converted to a digital signal by sampling the input.

Before sampling, the analog input must be filtered with a low-pass anti-aliasing filter. The filter eliminates frequencies that exceed a certain limit that is determined by the sampling rate.



Periodic Sampling of an Analog Signal

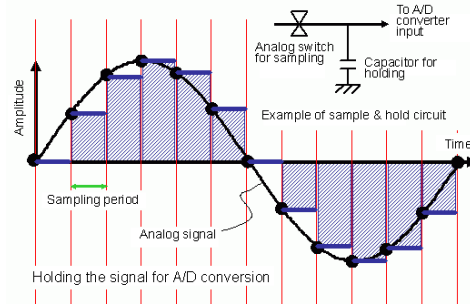


Periodic Sampling (cont'd)

- In practice, the sampling is performed by a S/H circuit.

Sample-and-hold (S/H)

- S/H is an analog circuit that tracks the analog signal during the *sample mode* and holds it during the *hold mode*.
- The time needed for conversion should be less than the hold mode duration.
- The *sampling period* T should be greater than the duration of sample & hold mode



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Sample-and-hold (S/H)

- The goal of the S/H is to continuously *sample* the input and then *hold* the value constant as long as it takes the A/D converter to digitally represent (code) the samples.
- Thus, it allows the A/D converter to operate more slowly than the time needed to acquire a sample.
- S/H is of critical importance in digital conversion of signals that change rapidly (i.e. the signals with large bandwidth).

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Signal Quantization

- ▶ Quantization: conversion of continuous-valued signal into discrete-valued.
- ▶ Quantization effects: reducing quantized levels results in signal quality degradation.
- ▶ Quantization is irreversible: results in loss of information.

