
MATLAB Lab: Impact of SNR on ASK Communication System

```
clear; clc; close all;

% --- Parameters ---
fs = 1000; % Sampling frequency in Hz
t = 0:1/fs:1; % Time vector (1 second duration)
f_c = 50; % Carrier frequency in Hz
SNR_values = [10, 5, 0, -5]; % SNR values in dB to test

% --- Generate Binary Message Signal ---
% Creating a random binary sequence. randi([0 1]) generates 0s and 1s.
message_signal = randi([0 1], 1, length(t));

% --- Modulation (Amplitude Shift Keying - ASK) ---
% In ASK, the carrier is multiplied by the binary message.
carrier = sin(2*pi*f_c*t);
modulated_signal = message_signal .* carrier;

% --- Simulation & Plotting ---
figure('Name', 'Impact of SNR on ASK Demodulation');

for i = 1:length(SNR_values)
    % 1. Add Gaussian White Noise (AWGN)
    % awgn() is a built-in function to add noise based on specific dB
    received_signal = awgn(modulated_signal, SNR_values(i), 'measured');

    % 2. Demodulate (Envelope Detection / Thresholding)
    % We take the absolute value (rectification) and apply a simple threshold
    demodulated_raw = abs(received_signal) > 0.5;

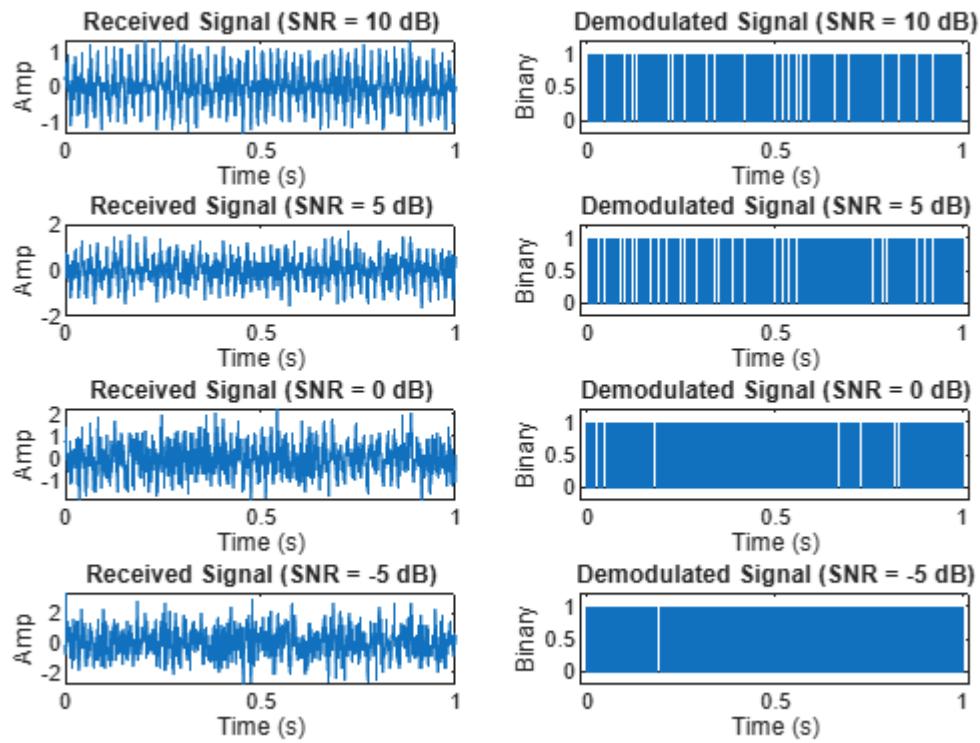
    % 3. Plotting results for each SNR
    subplot(4, 2, 2*i-1);
    plot(t, received_signal);
    title(['Received Signal (SNR = ', num2str(SNR_values(i)), ' dB)']);
    xlabel('Time (s)'); ylabel('Amp');

    subplot(4, 2, 2*i);
    stem(t, demodulated_raw, 'Marker', 'none');
    ylim([-0.2 1.2]);
    title(['Demodulated Signal (SNR = ', num2str(SNR_values(i)), ' dB)']);
    xlabel('Time (s)'); ylabel('Binary');

end

sgtitle('Comparison of Signal Degradation Across SNR Levels');
```

Comparison of Signal Degradation Across SNR Levels



Published with MATLAB® R2025b