

EE482 Communication Systems II

Lab Assignment - II[†]

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[†]Please check the due-date in the course homepage.

This is our second Lab assignment. The MATLAB codes and the corresponding coding experience for the previous Lab must be helpful for this Lab. Please also refer to student sample MATLAB codes of Lab-I.

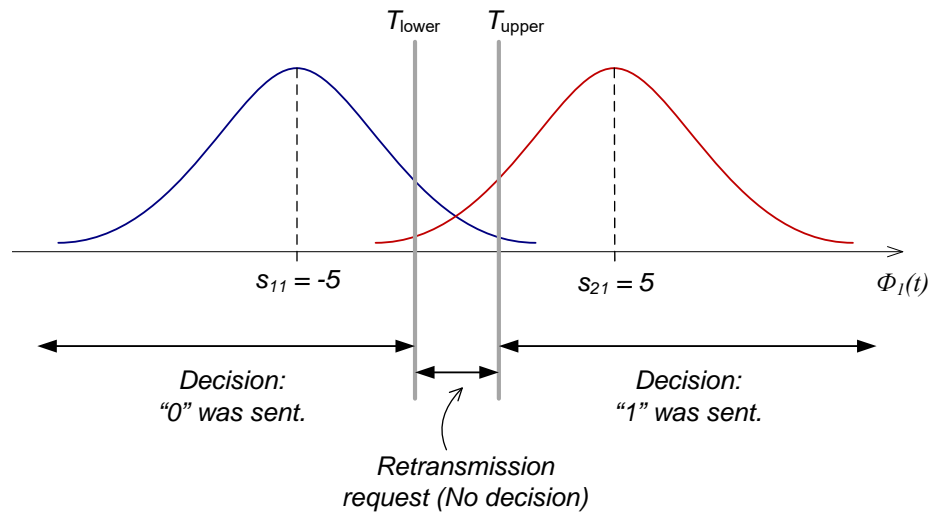


Fig. 1: New decision rule: retransmission request with the lower and upper thresholds, T_{lower} & T_{upper} , respectively

We apply a new decision rule that has the decision region for requesting retransmission with no decision among “0” and “1” as portrayed in Fig. 1. One lesson from our previous Lab is incorrect decisions frequently happen in the vicinity of the crossing point regarding the two curves of normal distribution. Hence, we set the lower and upper thresholds such that we can have the region of no decision.

(1) **[Comparison of the new decision rule to the conventional one]** Generate a large number of samples to be received at the user equipment (UE) or, equivalently mobile station (MS); and apply the new and conventional decision rules. Notice that the conventional one is the minimum-distance decision rule.

For the below scenarios (a), (b), and (c) with $\text{SNR} = 3 \text{ dB}$, draw plots of samples describing correct/incorrect decisions and no decisions; compute error probabilities for the following scenarios; Further, compute the percentage of retransmission request.

(a) $T_{\text{lower}} = -1, T_{\text{upper}} = 1$ with the New decision rule

(b) $T_{\text{lower}} = -2.5, T_{\text{upper}} = 2.5$ with the New decision rule

(c) Threshold, $T = 0$ with the conventional (minimum-distance) decision rule

Further, compute the percentage of retransmission request in (a) and (b).

(2) **[Effects of SNRs on the system performance]** Repeat the aforementioned process for two different SNRs, $\text{SNR} = 6 \text{ dB}$ and 12 dB .

(3) **[Discussions]** Provide the analysis for the given results in (1) and (2). Describe interesting symptoms, in particular, if you meet any unexpected behavior(s). Think about the reason, and describe your reasoning.