

Definition 11.10 For all $1 \leq w \leq M$, let

$$\lambda_w = \Pr\{\hat{W} \neq w | W = w\} = \int_{\{\mathbf{y} \in \mathcal{Y}^n : g(\mathbf{y}) \neq w\}} f_{\mathbf{Y}|\mathbf{X}}(\mathbf{y} | e(w)) d\mathbf{y}$$

be the conditional probability of error given that the message is w .

Definition 11.11 The maximal probability of error of an (n, M) code is defined as

$$\lambda_{max} = \max_w \lambda_w.$$

Definition 11.12 The average probability of error of an (n, M) code is defined as

$$P_e = \Pr\{\hat{W} \neq W\}.$$