AWGN

$r = s + N$

$s \in \{0, 1\}$

$N \sim \mathcal{N}(0; \sigma^2)$

$\Pr\{s = 0\} = \Pr\{s = 1\} = \frac{1}{2}$

$r \mid s = 0 \sim \mathcal{N}(0; \sigma^2)$

$r \mid s = 1 \sim \mathcal{N}(1; \sigma^2)$