Discrete-time channel model (after matched filter) of received complex symbol:

$$y[n] = b[n] + z[n]$$

1. One complex symbol received every T seconds, with $T = 1/B$, where T is the symbol period and B is the one-sided bandwidth.
2. E_s: Average energy of a complex symbol
3. z[n]: complex Gaussian noise, with iid $N(0, N_0/2)$ components (iid across n and across real/imaginary components)

Signal-to-noise-ratio (SNR):

$$\text{SNR} = \frac{\text{signal power}}{\text{noise power}} = \frac{P}{N_0 B} = \frac{E_s}{N_0} = \frac{\text{signal energy per symbol}}{\text{noise energy per symbol}}$$

Channel Capacity:
Maximum rate of reliable communication over an AWGN channel with one-sided bandwidth B, noise spectral density $N_0/2$ (passband), and signal power P:

$$\begin{aligned} C = \log_2(1 + \text{SNR}) &= \log_2\left(1 + \frac{P}{N_0 B}\right) \text{ bits/complex symbol} \\ &= B \log_2\left(1 + \frac{P}{N_0 B}\right) \text{ bits/sec.} \end{aligned}$$