

- The capacity of the discrete-time channel is

$$\frac{1}{2} \log \left(1 + \frac{P/2W}{N_0/2} \right) = \frac{1}{2} \log \left(1 + \frac{P}{N_0 W} \right) \text{ bits per sample.}$$

- Since there are $2W$ samples per unit time, the capacity is

$$W \log \left(1 + \frac{P}{N_0 W} \right) \text{ bits per unit time.}$$