

- $Z(t)$ is a zero-mean additive **colored** Gaussian noise.
- $X'(t)$ and $Z'(t)$ are filtered versions of $X(t)$ and $Z(t)$, respectively, bandlimited to $[0, W]$.
- $Y(t) = X'(t) + Z'(t)$
- $Z'(t)$ is a bandlimited **colored** Gaussian noise with

$$S_{Z'}(f) \begin{cases} \geq 0 & -W \leq f \leq W \\ = 0 & \text{otherwise.} \end{cases}$$

- Regard $X'(t)$ as the channel input and $Z'(t)$ as the additive noise process.
- Impose a power constraint P on $X'(t)$.