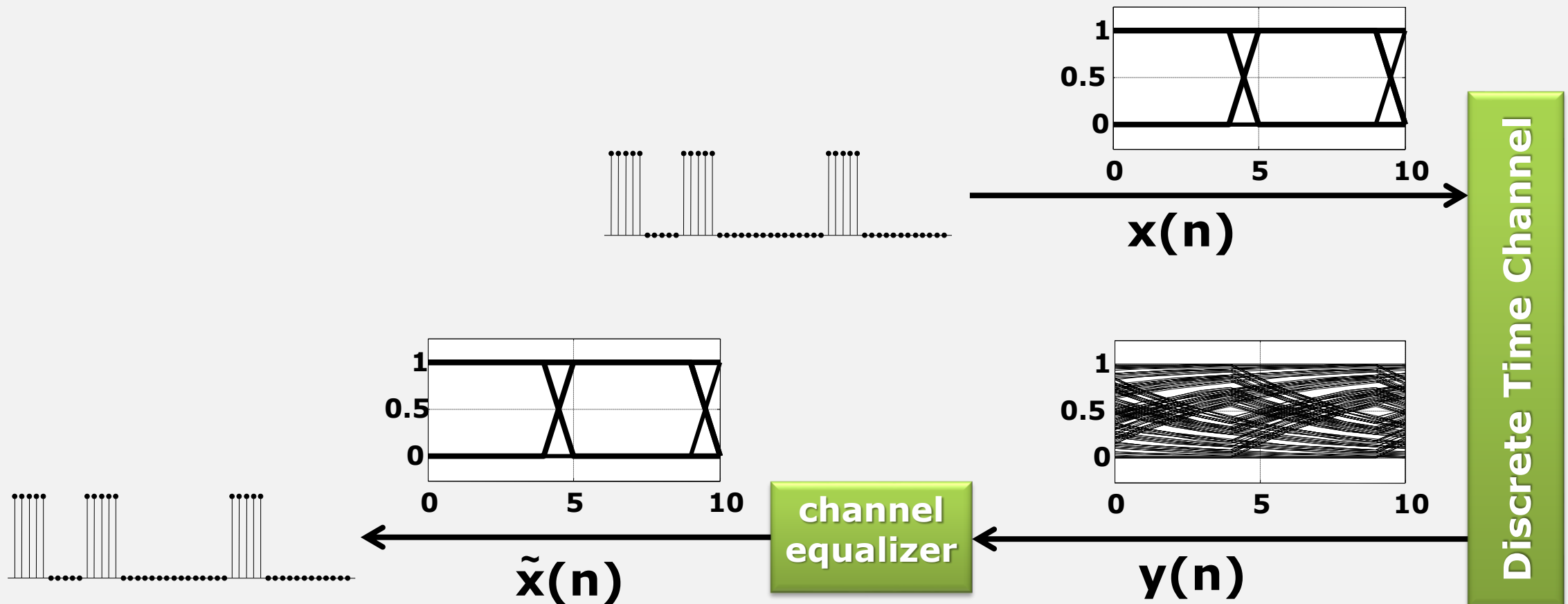


Developing the Equalizer

Equalization

- The channel introduces intersymbol interference, which causes the eye to close.
- The goal of a channel equalizer is to “undo” the effect of the channel.
- This will cause the eye to open.

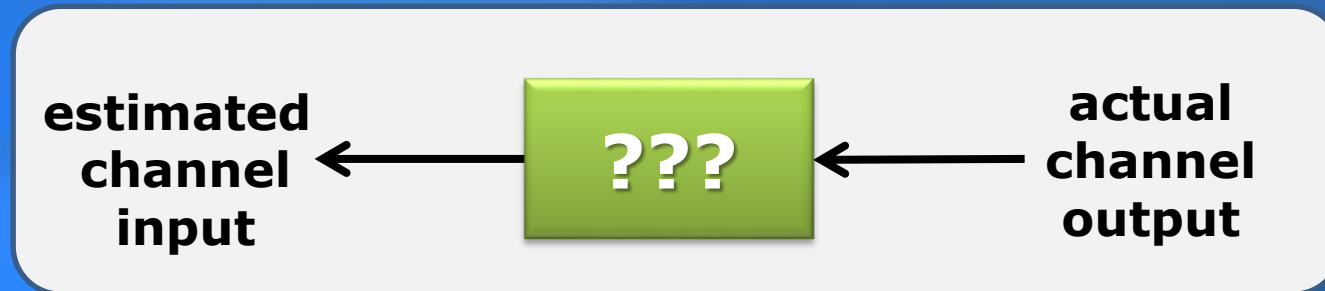


Designing the Equalizer

- We have developed a model that enables us to predict the channel output for any input.

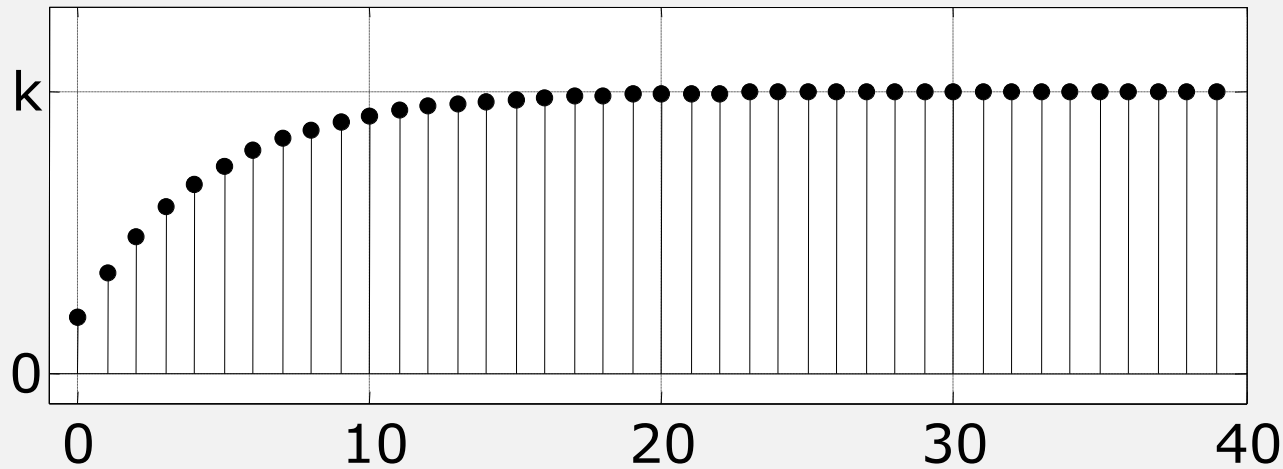


- Can we reverse this model, i.e. estimate the input from the output?



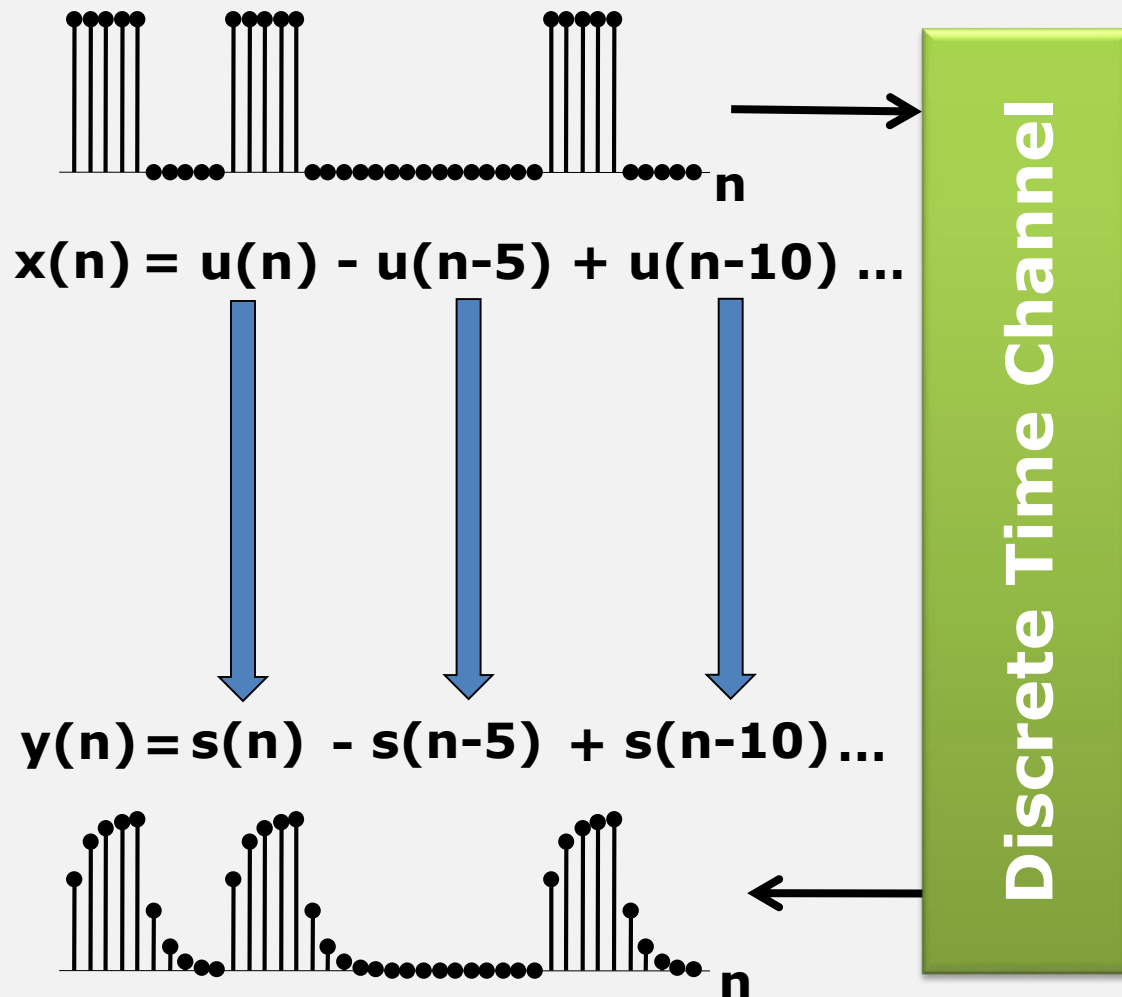
Step Response Model

- We have modeled the communication channel by assuming
 - It is linear and time invariant (LTI)
 - It has known step response $s(n)$.



$$s(n) = k(1-a^{n+1})u(n)$$
$$0 < a < 1$$

Step Response Model



- Given an input $x(n)$, we can predict the output $y(n)$ by
 - Expressing the input as the sum and difference of unit steps
 - Predict the outputs to each step individually
 - Combine the individual responses
- Unfortunately, it is not easy to reverse this process, i.e. given the output, estimate the input.

Equivalent Models

- A model of the channel is a way of predicting the channel output given the channel input.
- Given the same input, equivalent models make the same prediction for the output, but are expressed in a different way.
- Why do we need more than one model?
 - The more models we have, the better we understand the system.
 - Different models may be better suited for different purposes, i.e. developing the equalizer