Link Channels and ISI

- 20-30dB loss at 3GHz
- How bad is that?
- Two related issues:
  - (1) Noise and min. signal amplitude
  - (2) Intersymbol interference
Inter-symbol interference (ISI)

- Channel is low pass
  - Short TX pulses get spread out

Impact of ISI

- Middle sample is corrupted by 0.2 trailing ISI (from previous symbol) and 0.1 leading ISI (from next symbol)
- Total ISI: 0.3 total ISI
  - Middle symbol incorrectly detected
Equalization

• ISI is proportional to TX swing
  • Generally can’t just boost signal to overcome it

• Solution: Equalization
  • If channel applies filter \( H(s) \)
  • Pass the signal through another filter \( H^{-1}(s) \)

Equalization cont’d

• Link channel basically low-pass
  • Equalizer boosts high frequency, attenuates low frequency
Equalizer Requirements

Equalizer Requirements cont’d
Equalizer Options and Limitations

RX Equalizer
RX Equalizer Implementations
RX Equalizer Implementations
Programmability

Aside: Switched Cap. Resistor
Aside: Switched Cap Low-Pass Filter