Joint Cochannel Interference Cancellation And Channel Shortening with Space-Time Processing

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Introduction

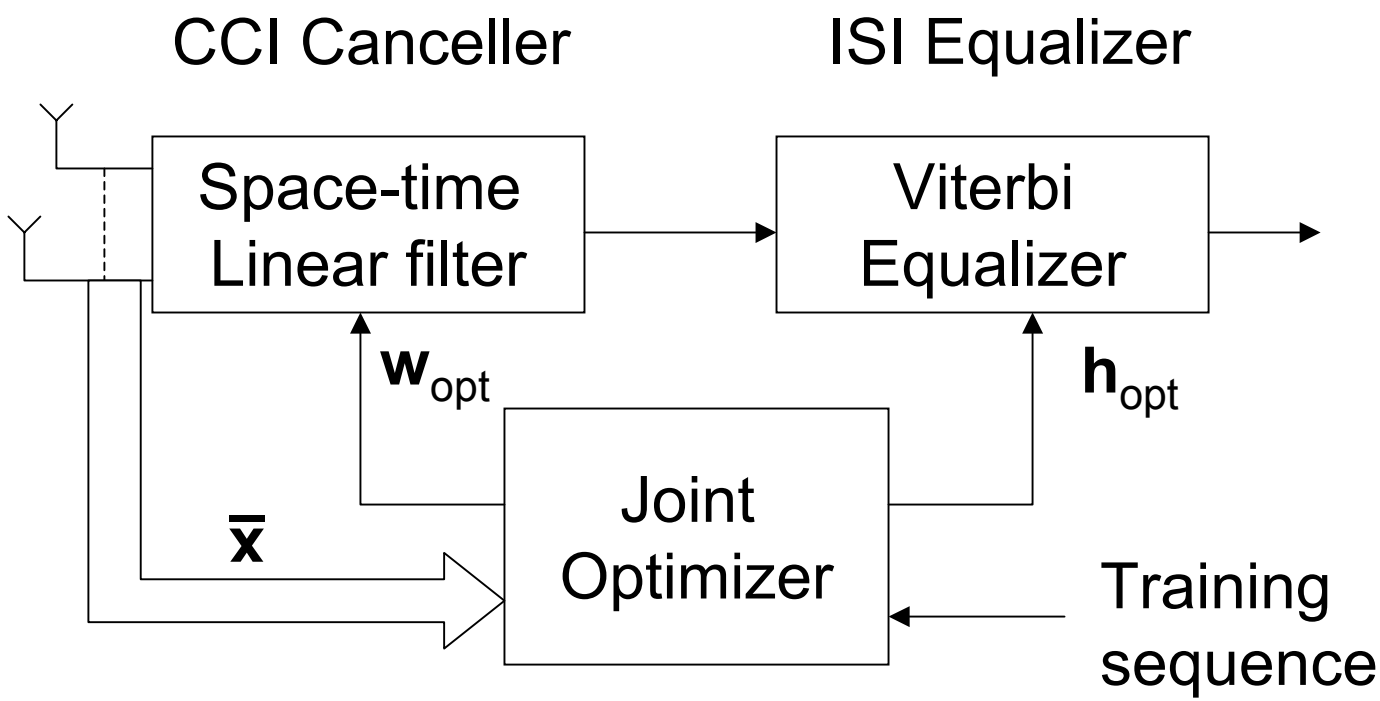
- Cellular systems
  - Cochannel Interference (CCI)
- Frequency-selective Rayleigh fading channels
  - Intersymbol Interference (ISI)
- Motivation
  - Maximize SINR
  - Reduce complexity of receiver

Background

- Separate CCI cancellation and ISI equalization
- Complexity of Viterbi equlalizer ~ length of channel impulse response
- Joint CCI cancellation and channel shortening ??

Key paper # 1

[Liang, Chen and Paulraj, 1997]



Key paper # 2

[Melsa, Younce and Rohrs, 1996]

- Channel shortening for DMT transceivers
- Design time-domain FIR filter, given
  - Original channel impulse response
  - Desired length of impulse response, ν
  - Filter length
- Shortening-signal-to-noise-ratio (SSNR)

$$\text{SSNR} = \frac{\text{Energy in largest } \nu \text{ consecutive samples}}{\text{Energy in remaining samples}}$$

Key paper # 3

[Tkacenko and Vidyanathan, 2002]

- MIMO channel shortening equalizers
  - Noise autocorrelation sequence required
  - Trade-off between SINR and SSNR