State Predicted Interference Cancellation and Equalization (SPICE)

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Problem

- In the presence of severe co-channel interference, a spread-spectrum signal's spreading gain is not enough to extract the signal from co-channel interference and noise.
- New signal processing methods are needed to remove the co-channel interference *prior* to despreading.

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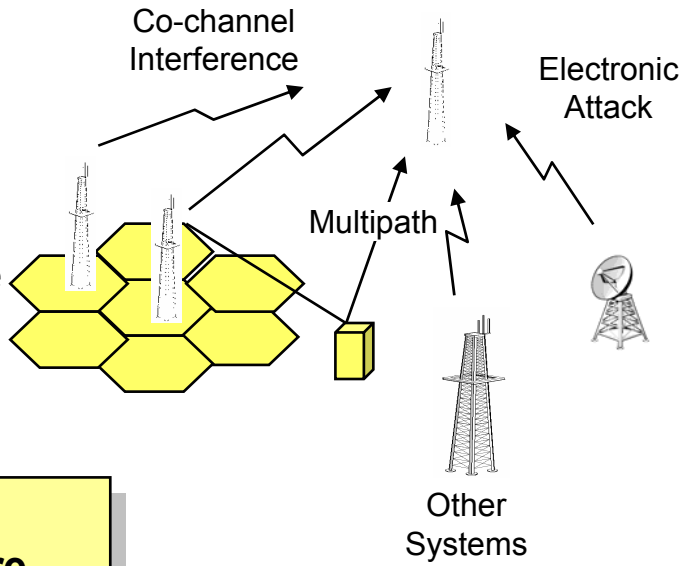
Background

- **Increasingly crowded RF spectrum**
  - High frequency reuse (e.g., CDMA, sectoring)
  - COTS solutions concentrate in specific bands
- **Interference types**
  - Multipath components
  - Co-channel interference
  - Electronic attack



Without additional interference cancellation performance of future communications systems will be limited.

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Objective

- Develop next-generation interference cancellation and equalization (ICE) solution for CDMA systems by formulating advanced nonlinear multi-user detection (MUD) algorithms

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Activities

- Developing state-of-the-art MUD algorithms
  - Multi-stage chip-level parallel interference cancellation
  - Kalman filter-based methods
- Improving computational efficiency
- Increasing system capacity

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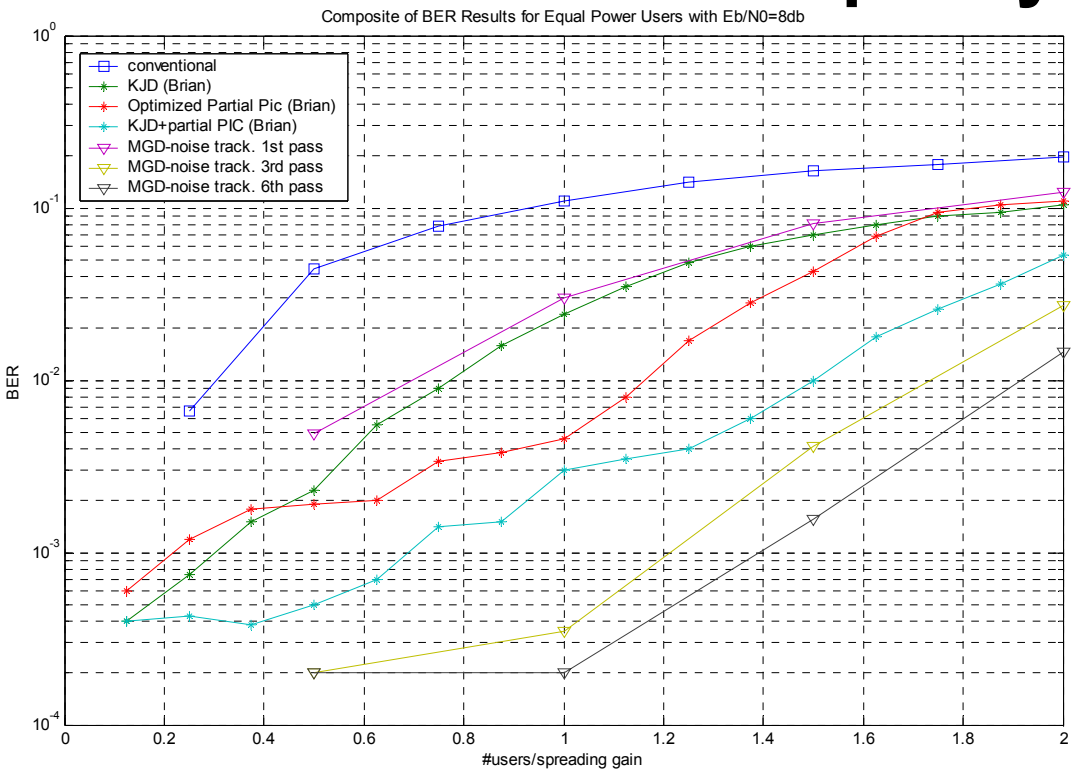
Highlight

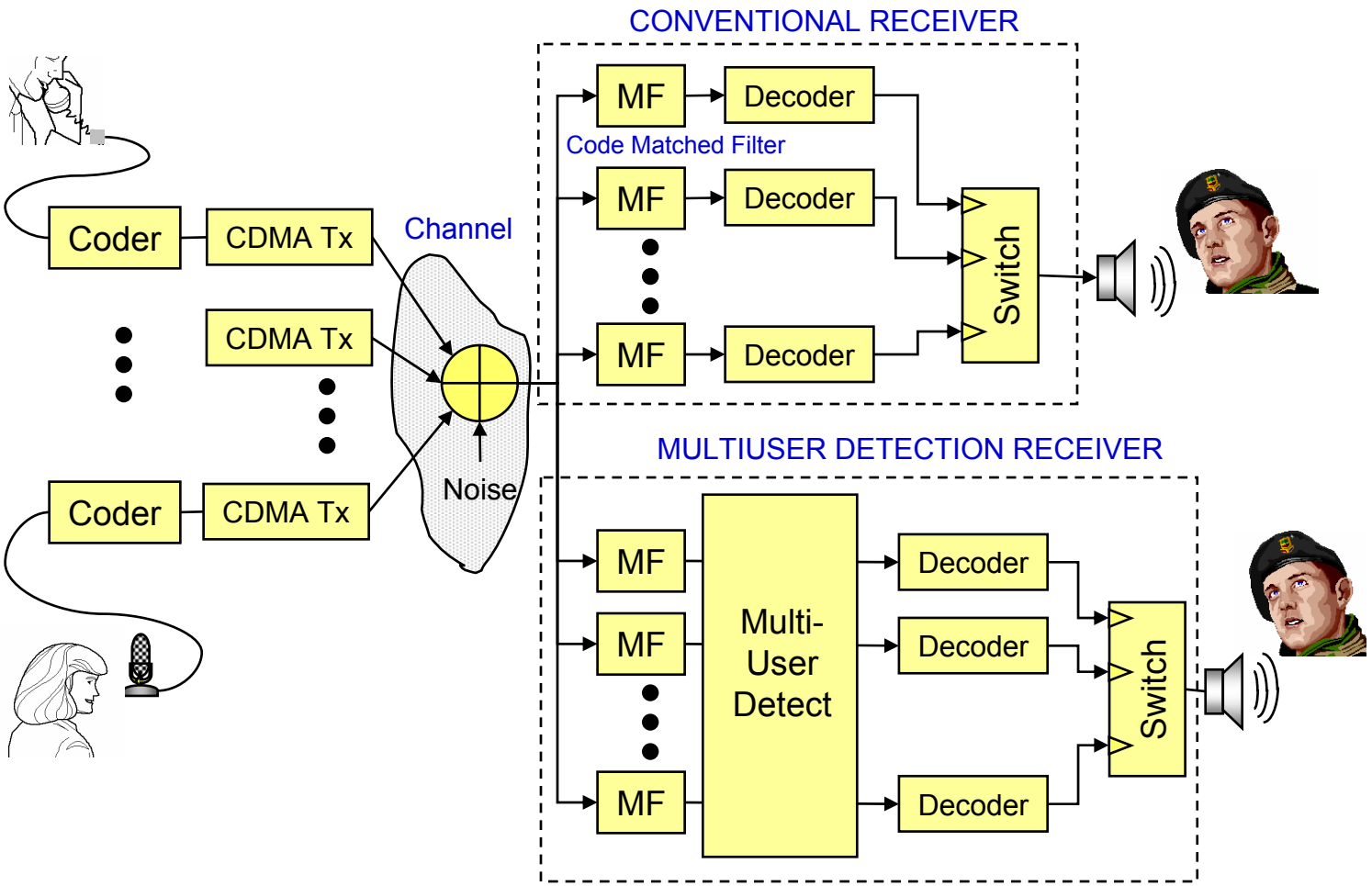
- **MUD Algorithms:**
  - **Improve detection performance**
  - **Increase network capacity**



Bit Error Rate

Number of Users

Demonstration



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Impacts

- Transitions to directly funded projects
- Performance improvement of cellular systems
  - Increased capacity
- Insertion of PCS/cellular technology into the battlefield
  - Interference cancellation
  - Ad hoc networks

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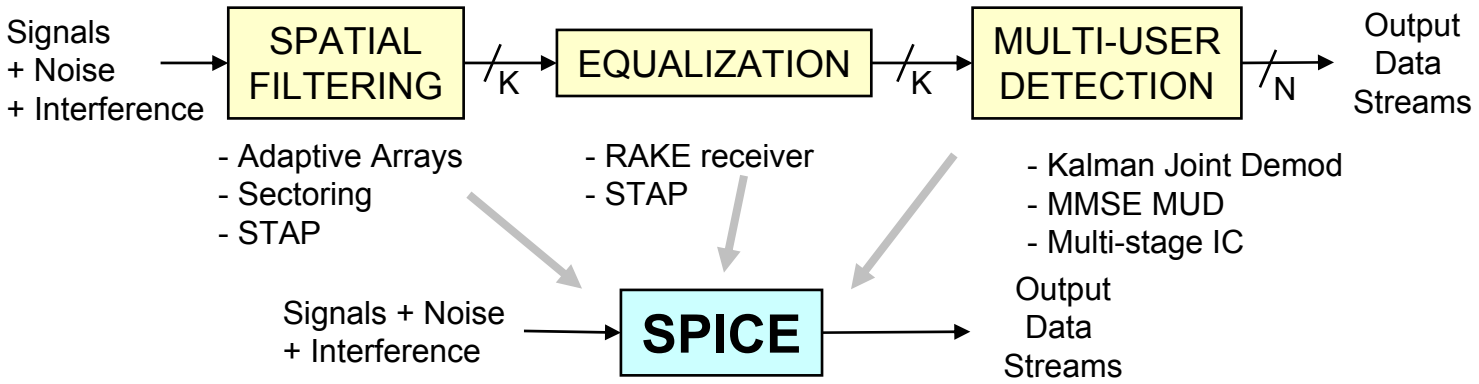
Future Plans

- Integration of advanced equalization techniques
- Demonstration and test against real-world signals
- Consider both forward and reverse link



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