Modeling and Simulation of an ADSL Transmitter

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ADSL Overview

- ## High-bitrate Digital Subscriber Line
  - Asymmetric data throughput
    - Upto 6Mbps upstream and 640Kbps downstream
  - Advantages and Application
    - Simultaneous high-speed data transmission and normal telephone services
    - Optimal channel usage based on channel noise conditions
    - Easy deployment
    - Internet Access
  - Discrete Multitone Modulation
    - Very powerful DSPs

Project Objectives

- ## Simulation in Ptolemy

  - SDF actors

  - Configurable Environment

  - Extensible

  - Performance Analysis

- ## Contributions to Ptolemy

  - SDF stars with generic functionality

  - Useful in communication applications

Implementation Specifics

- Subset of ADSL G.Lite
  - Splitterless
  - 128 Channels

- Transmitter Components
  - Error Protection Blocks: CRC, Scrambler, Reed Solomon Encoder, Interleaver
  - Function Blocks: Constellation encoder, 256-point IFFT, Cyclic prefix

- SDF Actors
- Receives parameters determined through initialisation through files

Implementation Specifics (2)

- Features
  - Configurable CRC, Scrambler, Reed Solomon Coder and Interleaver blocks
  - Supports the optional modes of RS code and Interleaver
  - Parameter compatability check
  - Performance Evaluation Environment
    - Error rate evaluation
    - Effect of channel noise on the data rate

Conclusions

- Contributions
  - Configurable and Extensible simulation environment for ADSL transmitter
  - Reference Design
  - Ptolemy
    - Programmable Reed Solomon Coder
    - Programmable CRC
    - Programmable Interleaver

- Limitations
  - Different Initialisation and Data transfer models
  - Handshake with receiver