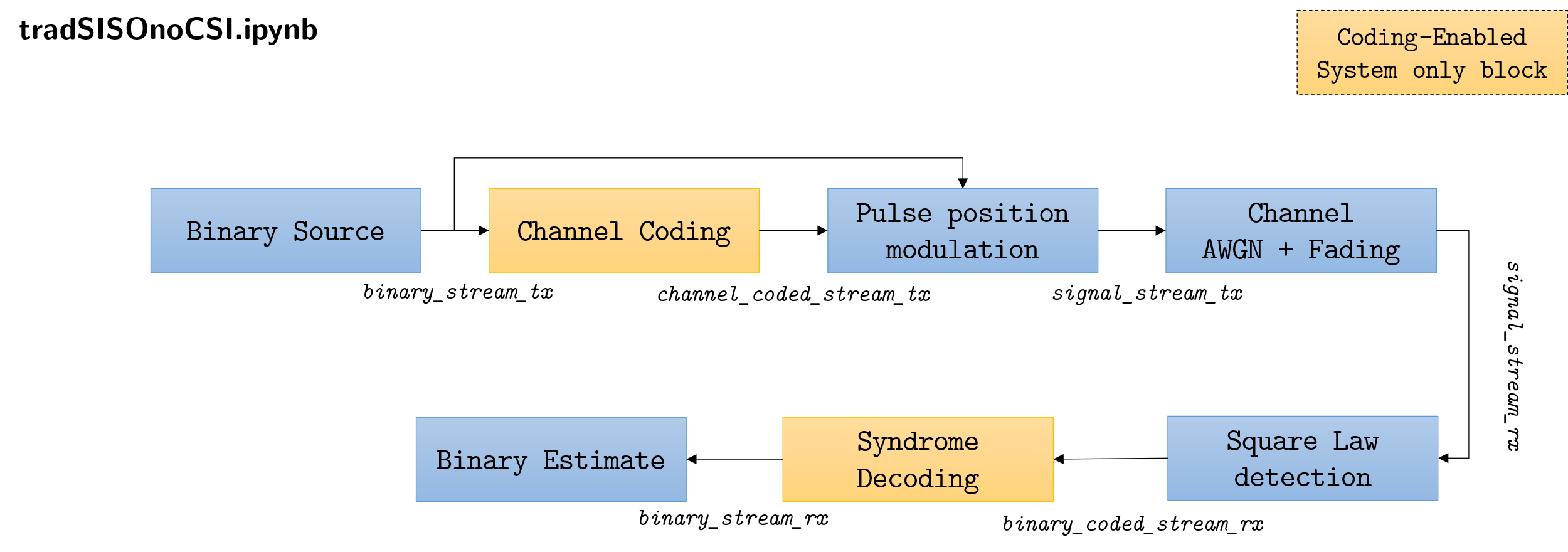
**Documentation for codes for Learned Communication systems by Rishabh Pomaje**

# deepSISOnoCSI.ipynb

1. (7, 4) code system (in case of a coding enabled system)
2. Channel model
   1. AWGN :
   2. Rayleigh fading:
      1. Flat-fading model:
      2. Fast-fading model: Every BPSK symbol experiences a different fading tap sample.
3. **NO CSI** has been assumed either at the transmitter or the receiver.
4. BPSK modulation (only real axis used but channel is complex)

**Benchmarks:**

1. Uncoded (4, 4) BPSK – Orthogonal, *non-coherent* signalling
2. Hamming (7, 4) Hard – Orthogonal, *non-coherent* signalling
   1. MLD is not possible

****

**Observations:**

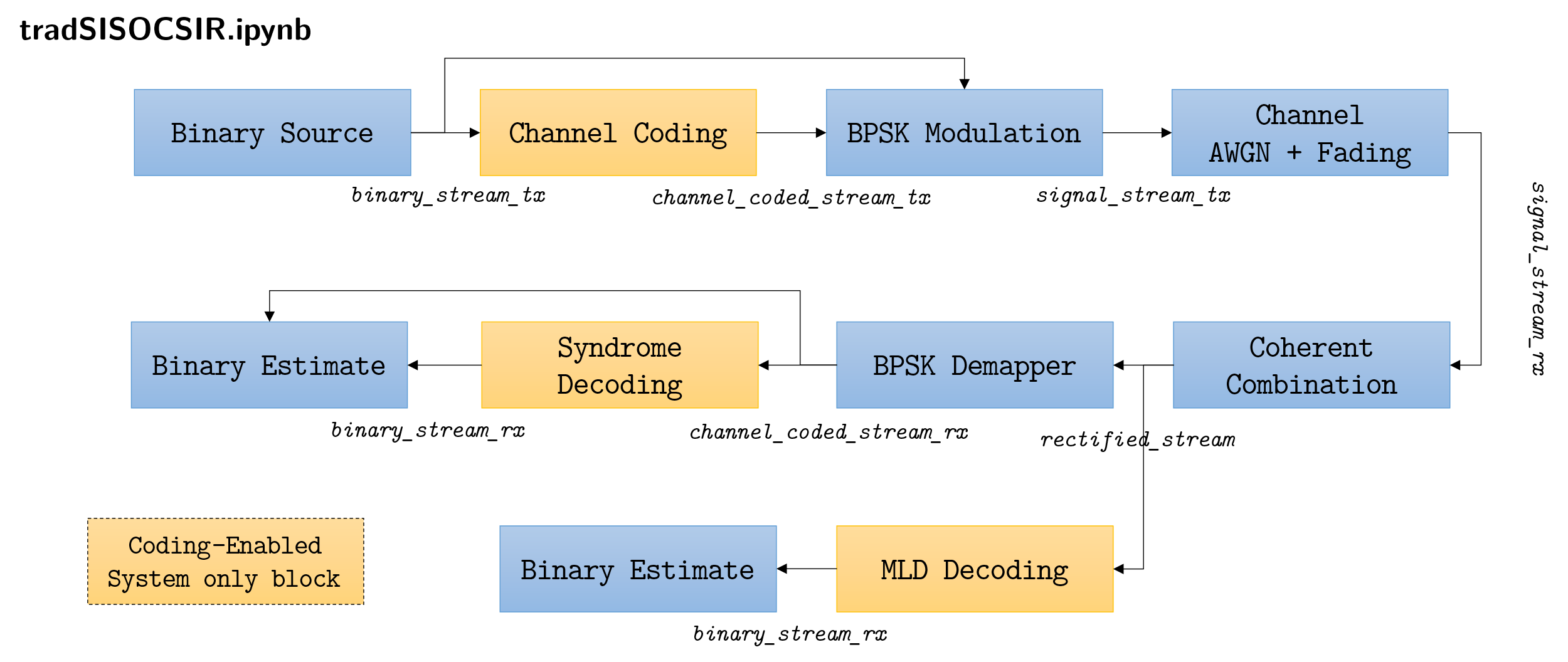
* In no coding case, I found that if the training SNR was higher, sometimes the training would plateau at ~50% accuracy, indicating it got stuck in a local minimum?
* It is clear in either case that it is best to train at a SNR the system would be expected to perform.
* When it came to design of the neural net of the coding case, it was quite troublesome with poor performance observed for a lot of the architectures. The trend as well was quite poor with respect to the generalization for SNR (test)

# deepSISOCSIR.ipynb

1. (7, 4) code system (in case of a coding enabled system)
2. Channel model
   1. AWGN :
   2. Rayleigh fading :
      1. Flat-fading model:
      2. Fast-fading model: Every BPSK symbol experiences a different fading tap sample.
3. **Perfect CSI** at receiver has been assumed either at the receiver exclusively.
4. BPSK modulation (only real axis used but channel is complex)

**Benchmarks:**

1. Uncoded (4, 4) BPSK; Coherent Detection
2. Hamming (7, 4) Hard; Coherent Detection
3. Hamming (7, 4) MLD; Coherent Detection



**Observations:**

* With 15 dB as the training SNR, competitive performance observed compared to the existing system. This is especially true for higher SNRs of testing.

# tradSISOCSIT.ipynb