10 Mb/s Single Twisted Pair Ethernet

Matlab Model for 4B3T PHY Proposal

Intended to be used e.g. for noise or cable simulations

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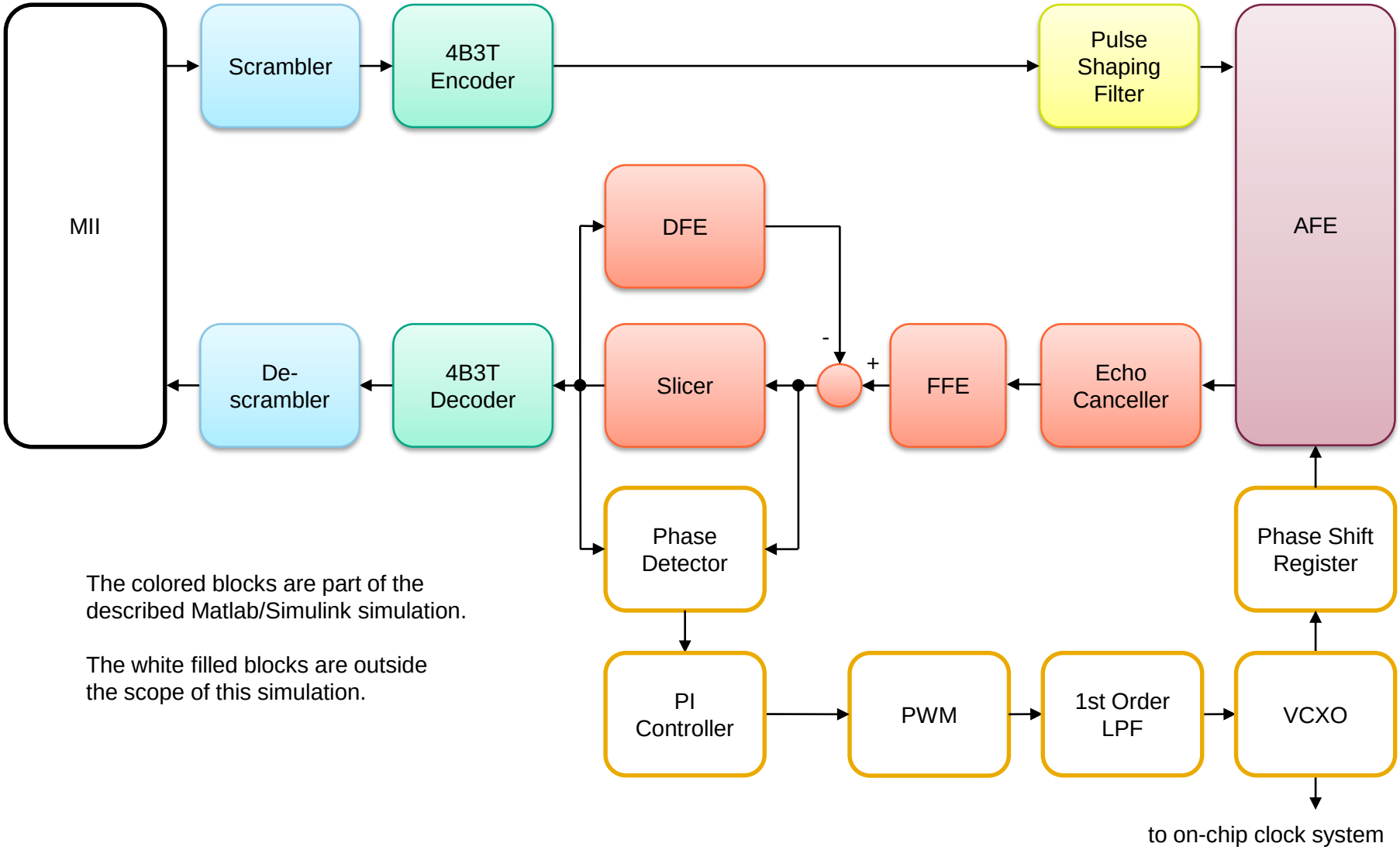
Example PHY Simulation

- Within this presentation a basic Matlab/Simulink model for the „PHY Ideas“ provided in document „http://www.ieee802.org/3/cg/public/Jan2017/Graber_10SPE_10_0117.pdf“ is being shown.
- More technical details can be seen in the mentioned presentation.

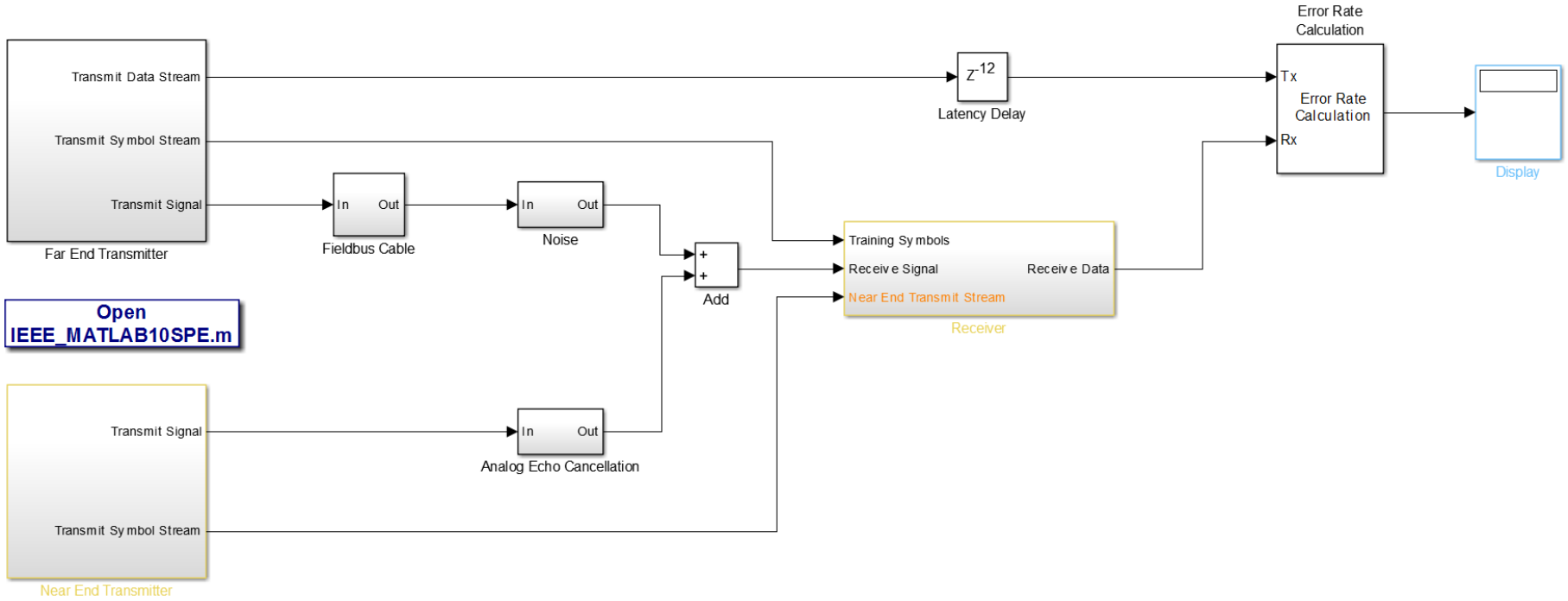
Example PHY Block Diagram



The colored blocks are part of the described Matlab/Simulink simulation.

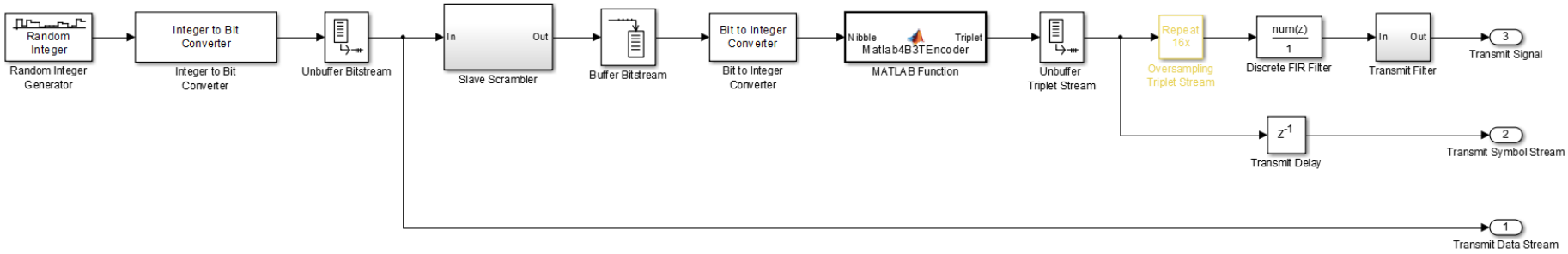
The white filled blocks are outside the scope of this simulation.

Example Matlab/Simulink Model



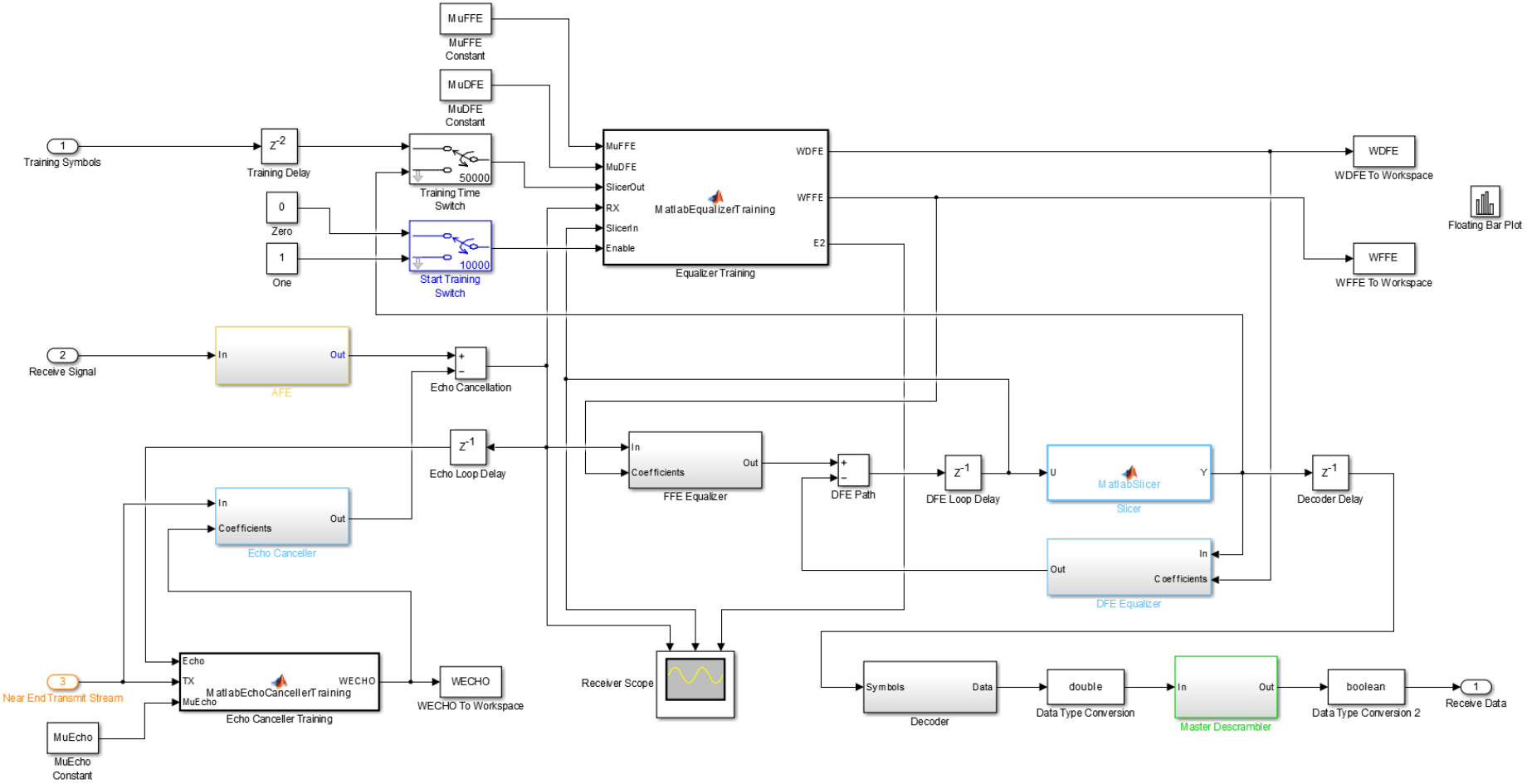
- The far end and near end transmitters, the analog echo canceller and the receiver including echo canceller and equalizer are being simulated.
- As cable simulation a simple model for 4 different cable lengths is being used.
- As a result of the simulation the receive error rate can be calculated.
- The model contains the signal chain without the clock recovery and regulation blocks.
- Both transmitters and the receiver operate with the same fixed clock and phase.
- For the training of the echo canceller and the equalizer an LMS algorithm is being used.

Example Matlab/Simulink Model



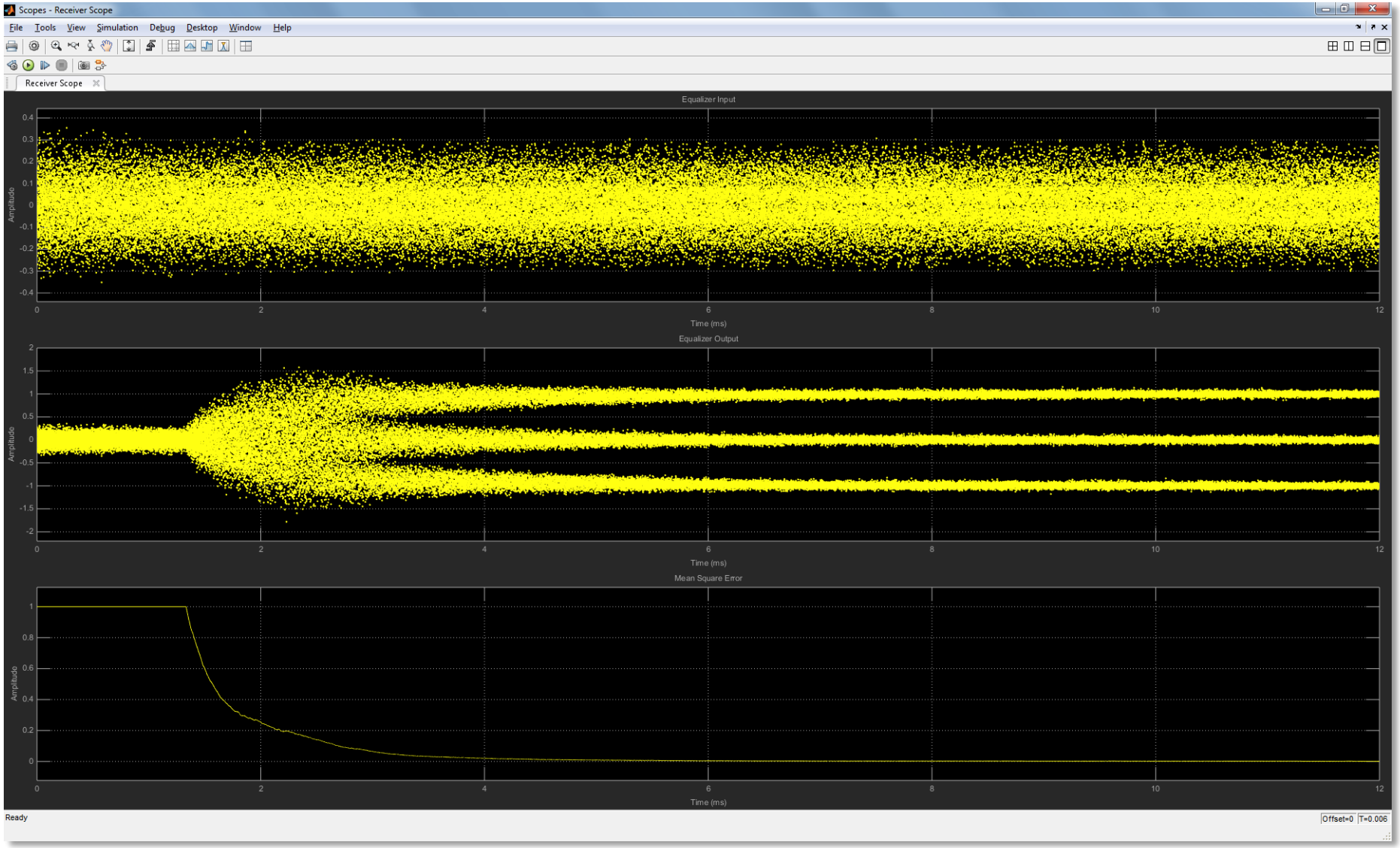
- Each of the two transmitters is build in the same way.
- A pseudo random 4-bit integer sequence is being generated.
- After scrambling the data, the bit stream is being 4B3T encoded.
- An FIR filter is being used for signal shaping.

Example Matlab/Simulink Model



- Initially the echo canceller is being trained, afterwards the equalizer is being trained.
- For simplicity the equalizer in this model uses LMS training, with training symbols being provided (alternatively blind training without a training sequence would be possible).

Simulating 1032 m AWG18/1 Cable



Matlab/Simulink Code

- Those who are willing to perform simulations, e.g. noise or cable simulations and want to share the results with the group can get the Matlab/Simulink code from me.
- The used Matlab Version is R2013b with Simulink, Communication System and DSP System toolboxes being installed.

Thank You