IEEE802.3aq Channel model ad-hoc

Task2: TP3 - ISI Generator Block for Stressed Sensitivity Test

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1. ISI Generator Block for Stressed Sensitivity Test

Goals

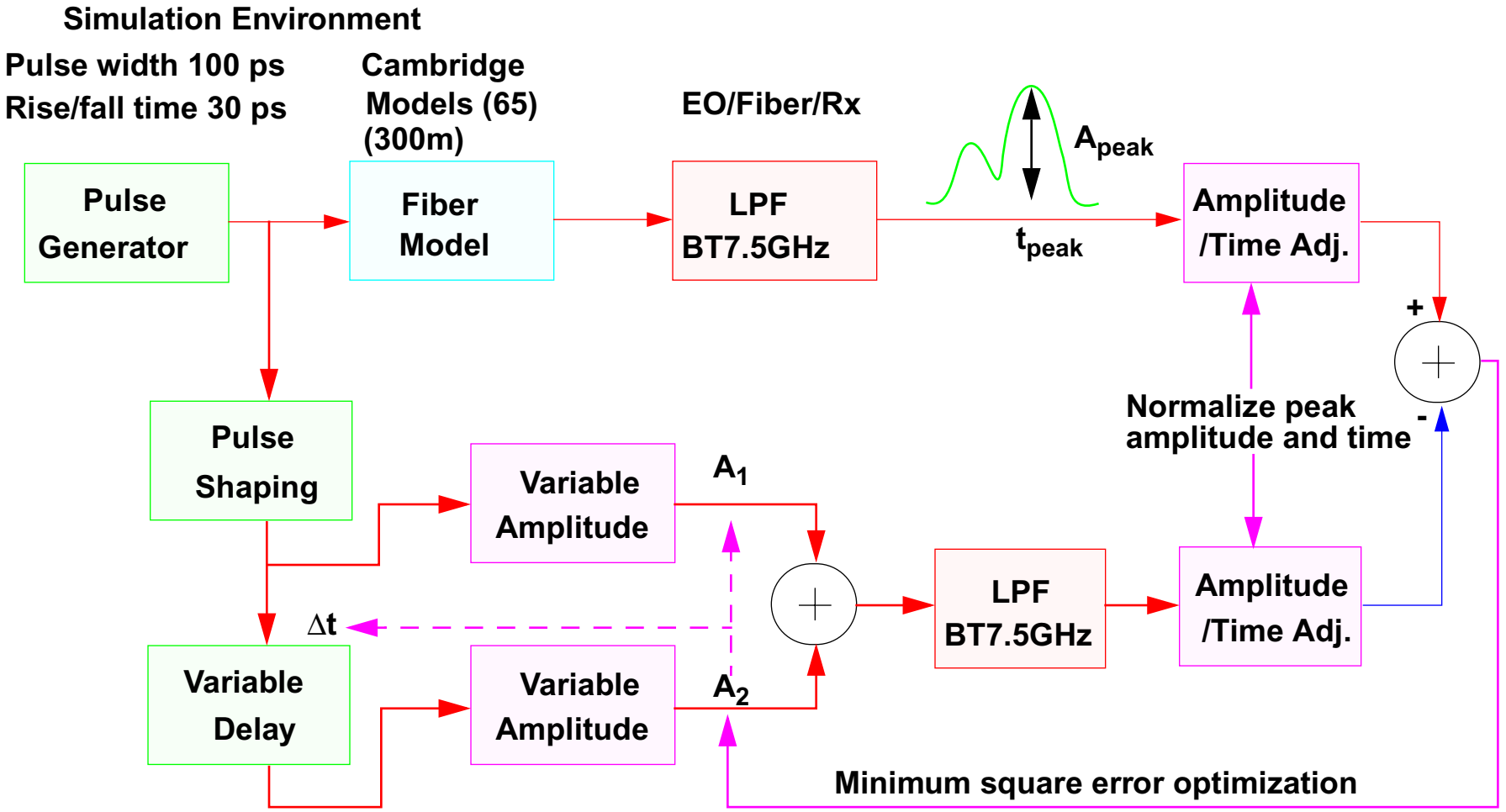
- analysis of three possible implementations (BT LPF, two peak impulse response, and three peak impulse response) as proposed in [aronson_2_0704],
- define reference fibre pulse response to be used for analysis based on available channel models,
- define optimum pulse shape to be used for two or three peak impulse response,
- find a minimum range of values for A1, A2 and Δt, that will satisfy the majority of impulse response as defined by the channel model.

Evaluation methodology

- evaluate the possibility of using a BT LPF for ISI generator block,
- select a limited number of fibres with performance at the limit allowed in the link budget (I will use representative fibres having PIE-L values between 4 and 5 dB, see note),
- use pulse shapes that can be generated in the lab with minimal new equipment,
- optimize A1 and A2 for minimum square error (MSE), with reasonable resolution (2 or 3 digits).

Note: We have to start with a limited number of selected fibres in order to understand the feasibility of implementation and how many sets of variables have to be defined. We can decide if we want to cover all channels or limited number of significant cases, based on the complexity and importance.

2. Two/three peak impulse response ISI generator block

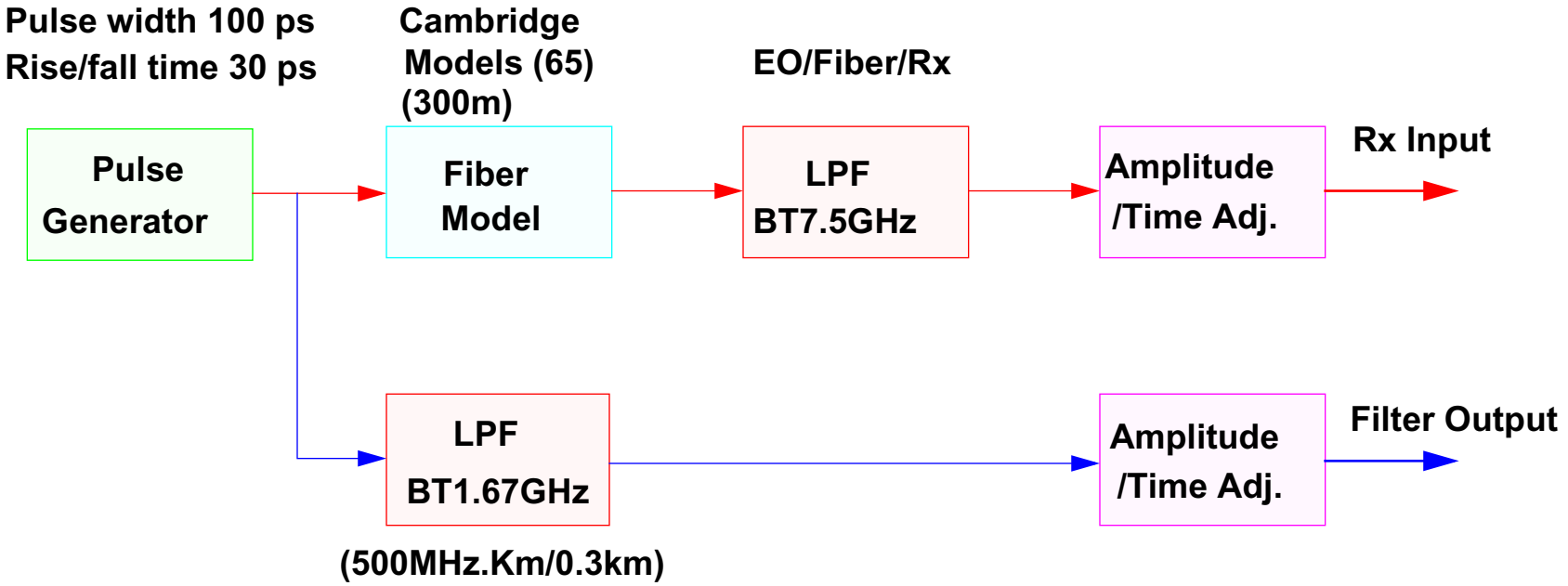


The simulation environment for fiber path consists of the fiber model (Cambridge model), a BT LPF 7.5 GHz and a normalization block to adjust for peak amplitude value and time.

The ISI generator block path consists of a pulse shaping block, a variable delay block, two variable amplitude blocks, an adder and the same BT LPF and normalization block.

3. BT Low Pass Filter Option

Simulation Environment



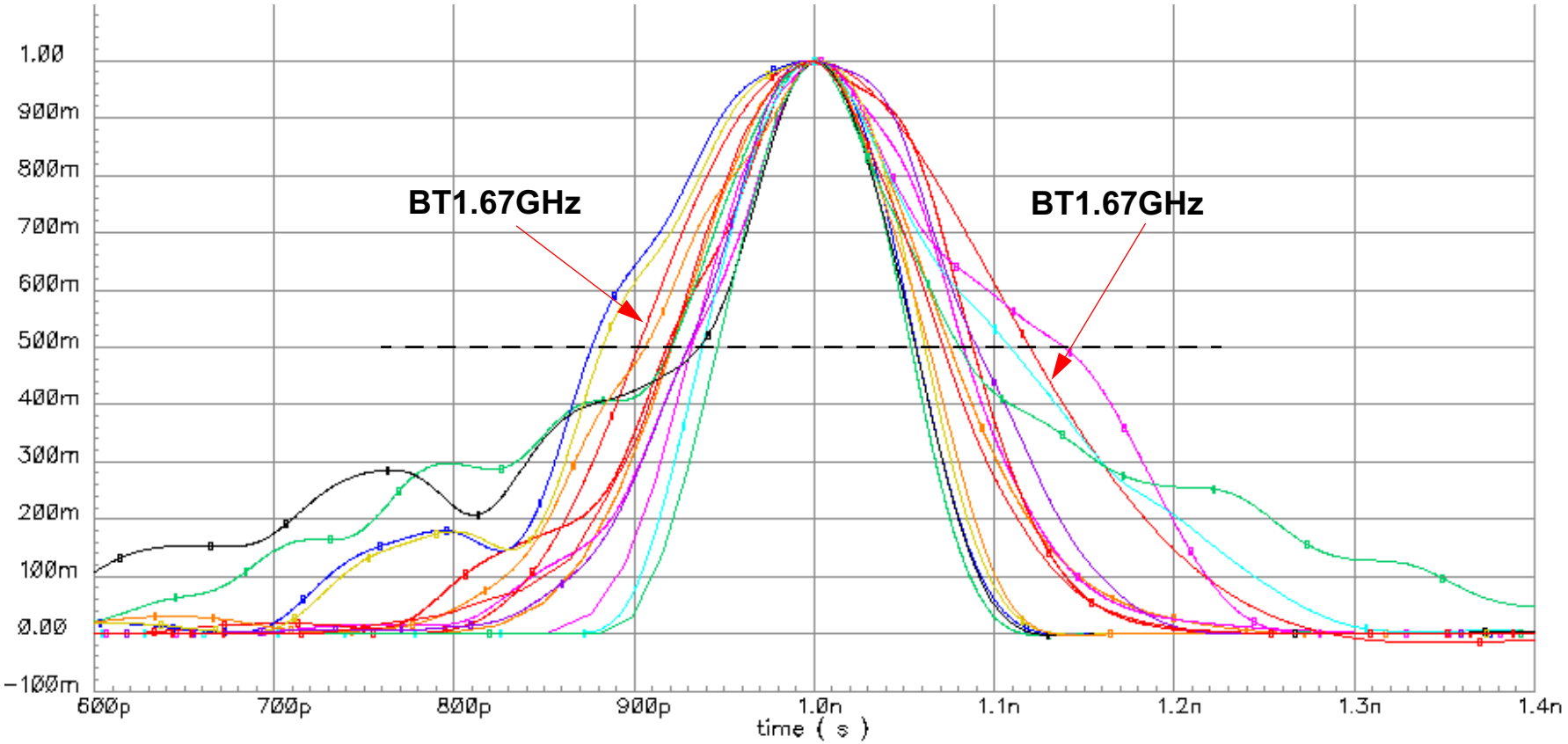
Two simulations using two groups of selected models based on PIE-L value:

- 4 dB < PIE-L < 5 dB
- PIE-L > 5 dB

For the first group, the amplitude and time are adjusted for same peak value.

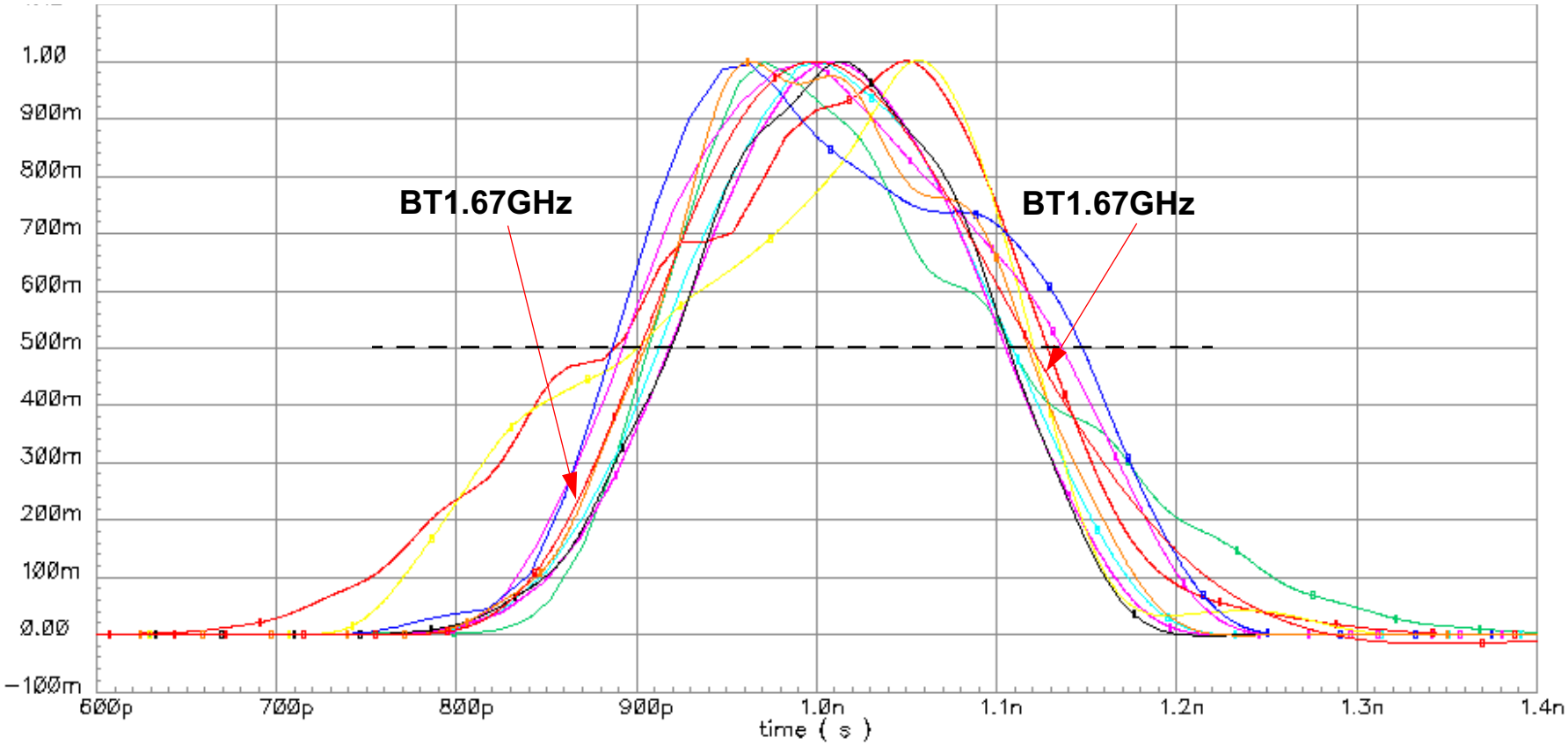
For the second group, the amplitudes are adjusted for the same peak value (1V) and the time is adjusted for equal error at the sampling point (LPF output 0.5V amplitude).

4. First group 4 dB < PIE-L < 5 dB



- For symmetrical pulse response fibres, the filter approximation is pessimistic,
- For non-symmetrical pulse response fibres, the maximum error at the slicing level (BT1.67GHz output amplitude 500 mV) is 200 mV (40%)

5. Second group PIE-L > 5 dB



For symmetrical and non-symmetrical pulse response fibres, the maximum error at the slicing level (BT1.67GHz output amplitude 500 mV) is 150 mV (30%)

6. Two Peak Impulse Response Approximation

Next week, after we agree on goals and methodology.

7. Summary

- The low pass filter option, can be used as a first approximation. For 300m MMF with PIE-L better than 5 dB, the approximation is to pessimistic. For fibres with PIE-L higher than 5 dB, the maximum error, at the slicing level, is less than 30%.