

TP3 “3-impulse” test proposal

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Investigation

- Evaluate PIE-L & PIE-D for a range of spacings and amplitudes
- Compare with PIE-L & PIE-D for installed base (as modelled by Cambridge fibers, version 1.0)
- Check sensitivity of PIE values to variations in spacing and amplitude (ie. check 3-impulse test can be implemented with reasonable tolerances)

Simulation Model

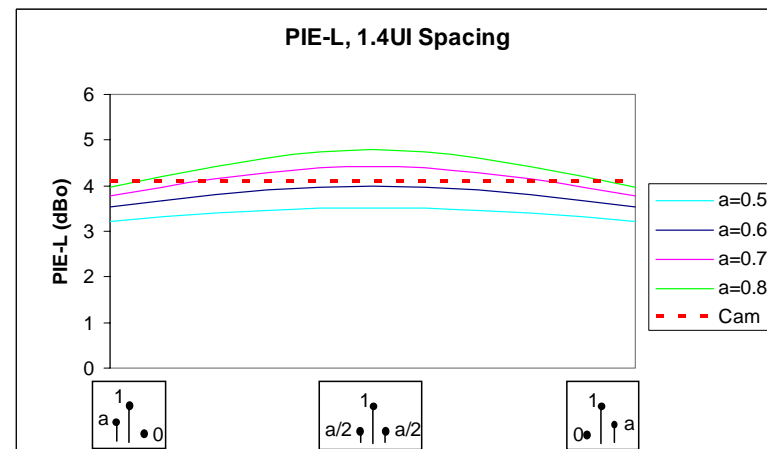
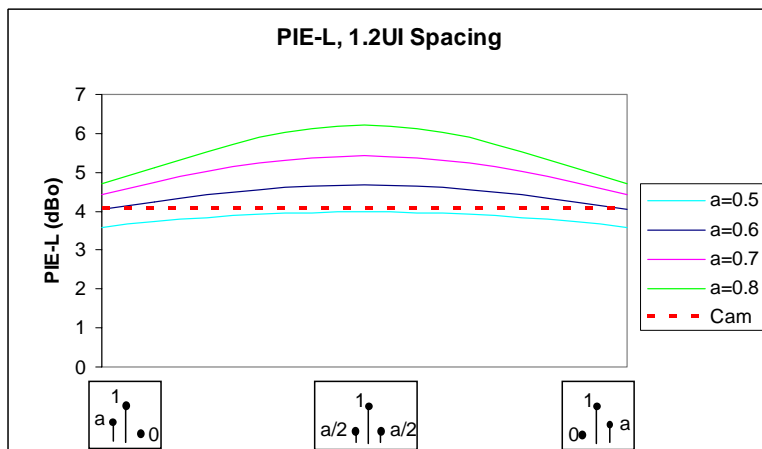
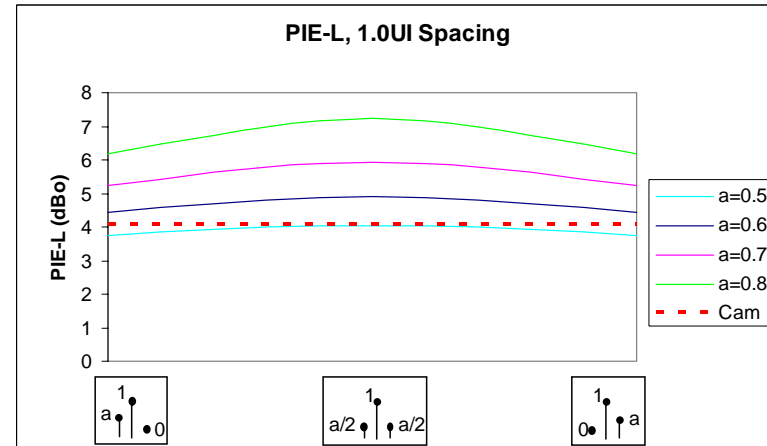
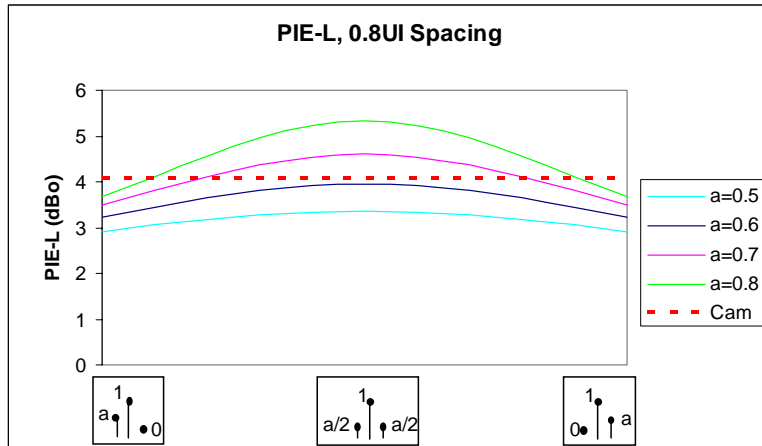
- Filters representing tx & rx consistent with Petre Popescu's TP3 ISI generator work, ie...
- Tx filter = Gaussian; rise time_{20%-80%} = 30 ps
- Rx filter = 4th order Bessel LPF; $f_{-3\text{dB}}$ = 7.5 GHz
- These filters used to compute the PIE metrics both for the 3-impulse test and the Cambridge 99% values

Notes on Results

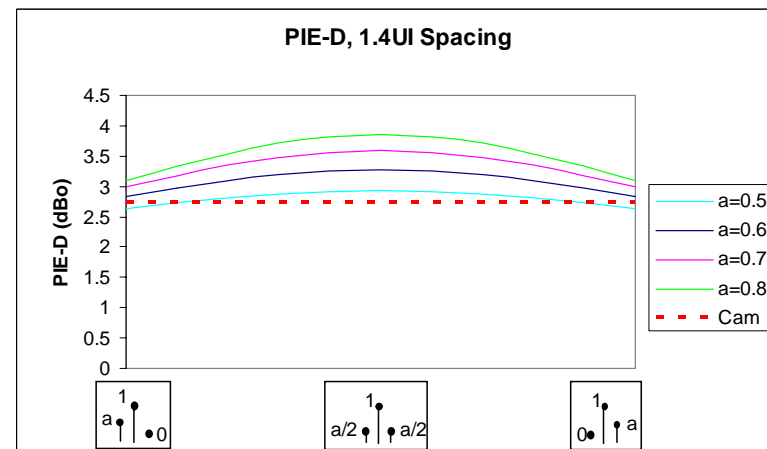
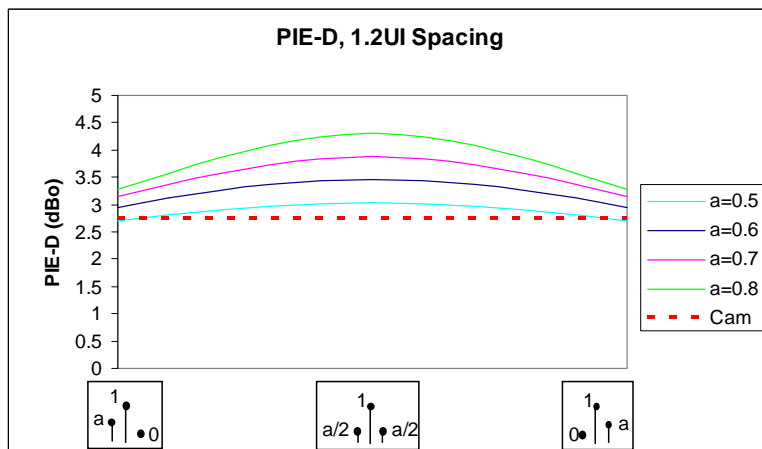
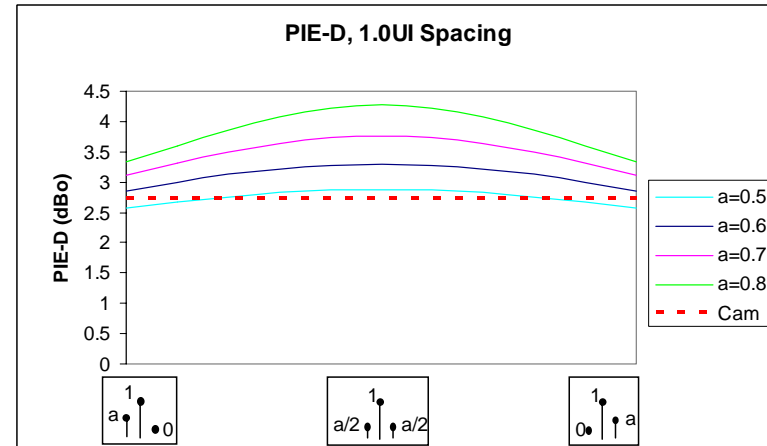
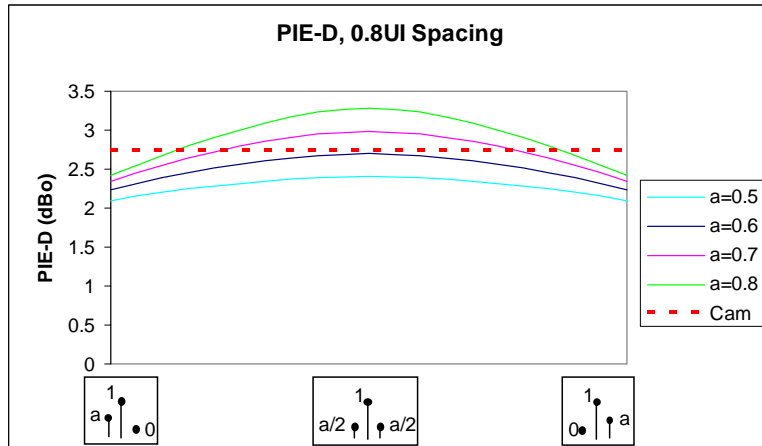
- X axis of graphs shows shift from precursive to postcursive ISI
- Curves are labelled according to the amount of energy in the interferers (relative to a cursor of 1.0)
- Red dotted lines show “99%” PIE for installed base (as modelled by Cambridge fibers) at 220m:

	PIE-L	PIE-D
220m	4.1 dBo	2.7 dBo

PIE-L



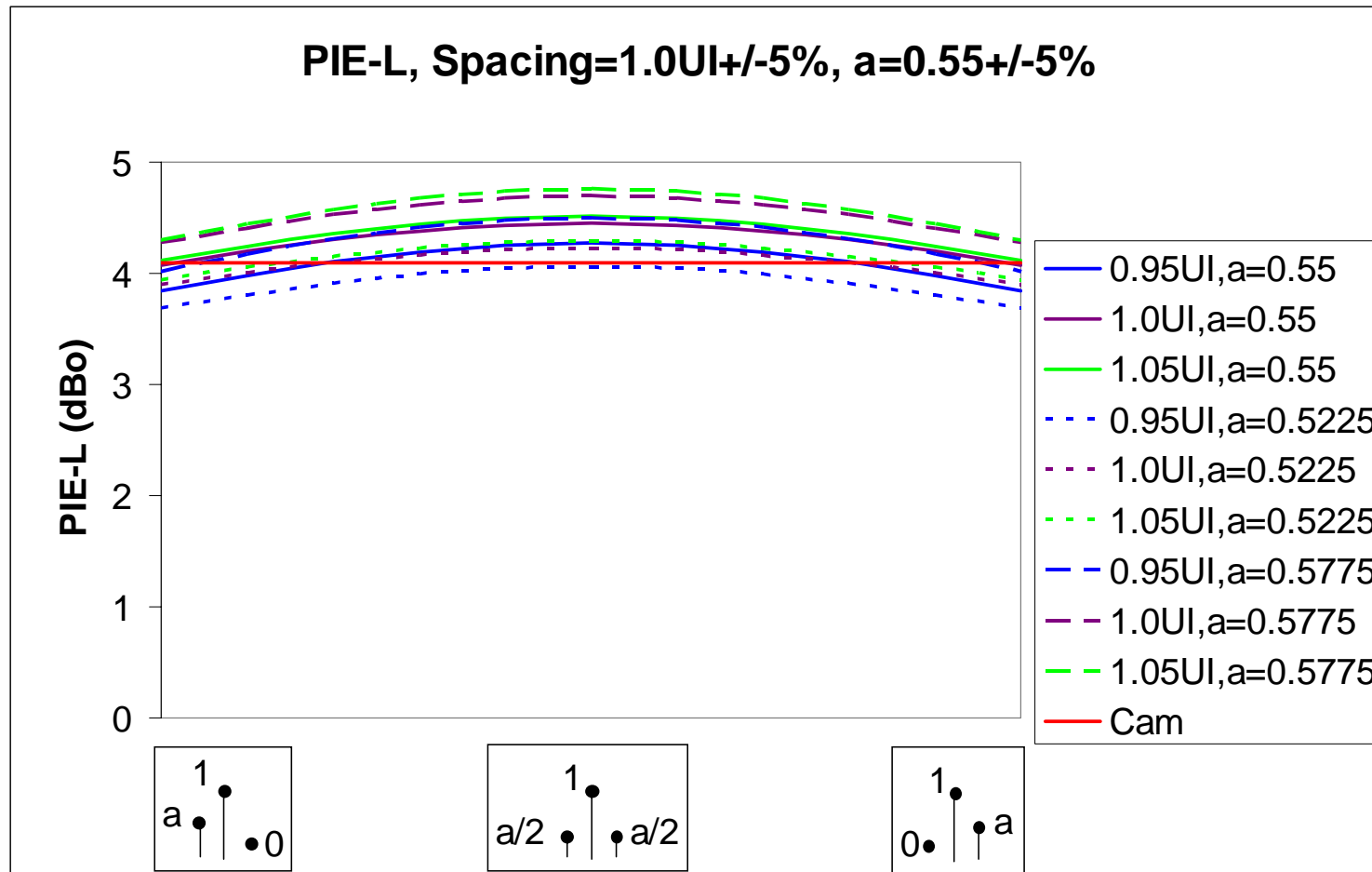
PIE-D



Observations

- At around 1.0 UI spacing, it is possible to choose a value of “a” which results in both PIE-L and PIE-D being close to the installed base 99% values
- Promising candidate for TP3 dynamic test is spacing = 1.0UI, a = 0.55
- Let’s examine sensitivity to implementation accuracy...

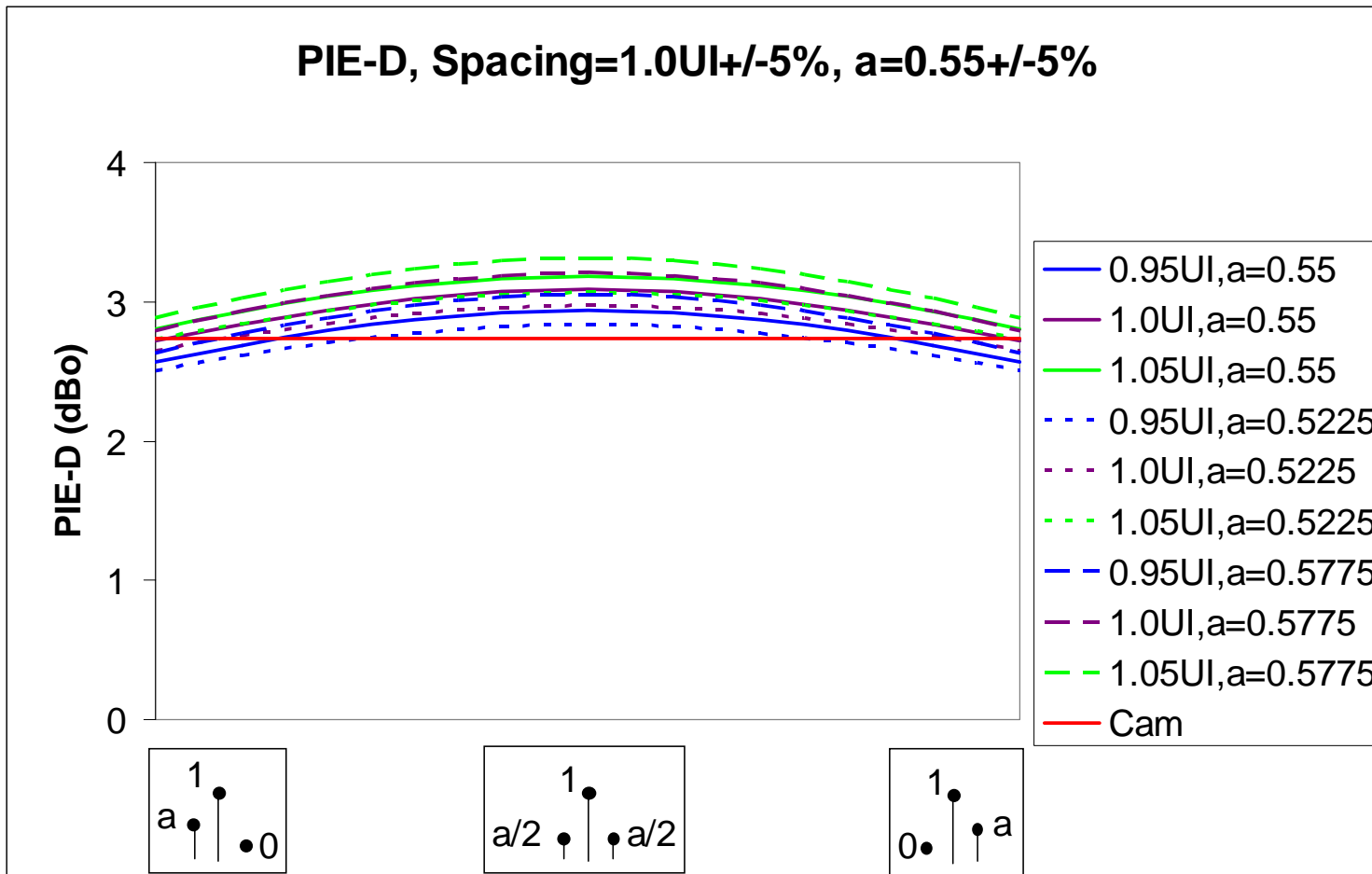
Sensitivity to Implementation Accuracy, PIE-L



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Sensitivity to Implementation Accuracy, PIE-D



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Conclusions

- A single 3-impulse TP3 dynamic test can provide stress consistent with the fiber model, measured by both PIE-L and PIE-D metrics
- We recommend the following values, which result in a rigorous test:
 - **impulse spacings = 1.0 UI \pm 5%**
 - **“a” = 0.55 \pm 5%**

(we also looked at \pm 10%, but found range of metrics too large. Can \pm 5% be implemented?)

Proposed dynamic penalty test

- Dynamic penalty is the difference between the two sensitivity measurements:
 - With static ISI (precursor = postcursor = 0.275)
 - With modulated ISI
- As a starting point for further discussion, we also suggest modulation of the ISI between fully precursive and fully postcursive, with:
 - Modulation waveform: sinusoidal
 - Modulation frequency: 1KHz