Optical System Budgeting.

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MMF ad hoc July 3, 2013

- **The optical system budget in 802.3bm draft 1.0 does not add up, and I've made comment 173 against this.**

- **This presentation is a review of my understanding of how to obtain the numbers required for the standard and the relationships required. It does not intend to suggest what the independent variable numbers are.**

- **It assumes that there is already an agreed system model (spreadsheet) with appropriate basic parameters. I've listed some columns for the 10GBE spreadsheet but the method is also applicable to modified spreadsheets with appropriate modifications.**

Some Comments on specific items.

- **TDP**
  - TDP should be determined by performing the TDP test using the spreadsheet. For MMF systems the test does not have a significant length of Fiber, or modal noise, RIN isn't maximized, but the receiver bandwidth is narrower than the standard so we should be looking at a short link with no modal noise and the RIN removed with the Rx bandwidth equal to what it is for the calibration and the test. (may be different or the same). The intent of the test is that the effect of the basic parameters (eg risetime, jitter etc.) that are being controlled by the test (and can be traded for each other) is no worse in the full system than in the TDP test.
- **Penalties used in the stressed sensitivity test.**
  - These should be approximately equivalent to the expected worst case stress that a Rx will be subjected to. Typically the bandwidth effects in the link are modelled by VECP. Jitter is made similar to what the link is expected to produce and any noise like impairments (eg Modal noise) are not included in these penalties but are accounted for by setting the stressed input power at a lower value.

Independent variables and relationships.

Parameter	variable or equation	Alternative equation	Source
Channel insertion loss	a		Value in spreadsheet. (column C in 10GBE).
Allocation for penalties(for max TDP)	b		Equals the penalties number in the spreadsheet (in 10GBE was column V if assuming central eye sampling.) plus unallocated margin which will appear in the spreadsheet as margin (column W in 10GBE.)
Additional insertion loss allowed.	c		
Unallocated margin			Not shown in the Standard. Included in the allocation for penalties. Often set to zero.
Power Budget (for max TDP)	=a+b+c	=e+f-g	
Launch power in OMA minus TDP(min)	e		
TDP (max)	f		Obtained from Spreadsheet by doing the TDP test in the spreadsheet.
NomSens OMA	g		Does not appear in standard (unless informativite only). Used in the spreadsheet only.
Penalties used in stressed test.	h		This is the penalties given by the spreadsheet set up with the calibrated stressed sensitivity test. Another way of calculating this is as b (allocation for penalties) minus (any penalties (degradations) not included in the stressed signal (eg effect of receiver offset timing).
Stressed sensitivity.	=e+f-a-c-(b-h)	g+h	

Further Comments on items.

- **TDP**
  - Because the TDP test does not include all the effects of the link the Max TDP should be less than the allocation for penalties. (Typical additional penalties are modal noise, RIN, Mode Partition noise, and the larger "cross" penalty generated by these. Note that these penalties are controlled by separate specs. (modal noise by max connector loss, RIN by a separate spec, Mode Partition noise by spectral width and fiber dispersion)

- **Penalties used in the stressed sensitivity test.**
  - This is calculated separately and should not be expected to be identical to TDP.