Fiber Splice Loss Budgets

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Fiber optic budget need to account from splice losses

- Web search reveled several studies on the characteristics of fusion splices
  - Corning Application Note AN2008
  - Sterlite Tech Application Note "Optical Fiber Splice Loss"
- Data is summarized in the table to the right.

Splice loss at 1310 nm

Fiber Type	Splices	Mean	Std Dev	Max
Corning AN2008 G.652D & G.657.A1 to …				
G.652D & G.657.A1	50	0.02	0.013	0.07
G.652.D	30	0.02	0.008	0.04
200micron fiber G.652D & G.657A1	28	0.02	0.012	0.05
G.657.A2	28	0.04	0.016	0.08
G.657.B3	28	0.04	0.018	0.1
optical_fiber_splice_loss-_final.pdf				
G.652.D with G.567.A1	30	0.04	0.017	0.075
G.652.D - G.657.A2	24	0.054	0.015	0.09
G.657.A1 - G.657.A2	30	0.031	0.01	0.05
Max		**0.054**	**0.018**	**0.1**

Splice loss based in measured data

- For 10 km assume worst case (0.1 dB/splice)
- For 20 km assume worst case mean minus 2 x Std Dev
- For 40 km assume worst case mean minus 1 x Std Dev
- Allow for 1 splice/km (maybe excessive, see following)

PMD	Splices	per Splice Loss	Total Loss
xxGBASE-BR10	10	0.1	1.00 dB
xxGBASE-BR20	20	0.09	1.80 dB
xxGBASE-BR40	40	0.072	2.88 dB

Where are splices and how many are there?

- ~75% of an ODN is trunk fiber with the remaining 25% in the drop
  - Splices in trunks occur about once every 3 km
  - Splices in drop are closer to one every km
- If we assume 0.1 dB/splice (worst case) then we arrive at the following.

Reach	Trunk (75%)		Drop (25%)		Total splices	Loss (@ 0.1 db/splice)
	Length	Splices (@3 km)	Length	Splice (@1km)		
10	7.5	3	2.5	3	6	0.6 dB
20	15	5	5	5	10	1 dB
40	30	10	10	10	20	2 dB

Two or three options

- Statistical
- Splice Count
- Some combination

Reach	Method		
	Statistical	Splice count	Combined
10	1.0	0.6	1
20	1.8	1.0	1.5
40	2.9	2.0	2.5

- Straw Poll: I would prefer to account for Splice Loss in the ODN using the
  - Statistical method ____
  - Splice Count method ____
  - Combined method ____
  - Other ____

Thank you

References

- Corning SMT-28 Ultra Optical Fiber Fusion Splicing Report, AN2008, Oct 2017, https://www.corning.com/media/worldwide/coc/documents/Fiber/AN2008_10.17.pdf
- Optical Fiber Splice Loss, Madhan Thollabandi, Arvind Mishra, Sudipta Bhaumik, Sterlite Tech, July 2013, https://www.sterlitetech.com/sterlite-live/application_notes/25/original/optical_fiber_splice_loss-_final.pdf?1505735554