Relative Cost Analysis for 100GE SMF applications

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Objective

- Optical vendors had requested HSSG to examine changing the 100GE 10km reach objective to 3/4km reach objective because of lower cost in the last Plenary session at Atlanta.
- For the examination, HSSG is trying to analyze the total system cost of <10km reaches, and further information of relative cost analysis are required.
- We would like to provide our relative cost estimation for different SMF reaches.

Outline

1. power budget and TOSA output power consideration

- ✓ Still using the 2dB connector loss allocation.
- ✓ Assume the Cooled TOSA for DML and EML

2. Relative cost estimation for different reaches

- ✓ Estimated items below are taken into consideration.
  - ➢ EML/DML Wafer yields against output power and wavelength accuracy
  - ➢ TOSA tuning yield against TOSA output power tuning margin (including the EOL/BOL margin and tracking error)
  - ➢ WDM filter assembling yield against wavelength spacing
  - ➢ ROSA ,other BOM ,Production yields and so on
- ✓ Pick up the spacing and source that offers lowest cost for each reaches

3. Cost analysis

- ✓ Analyze the cost with the method of Cole_03_1107

http://grouper.ieee.org/groups/802/3/hssg/public/nov07/cole_03_1107.pdf

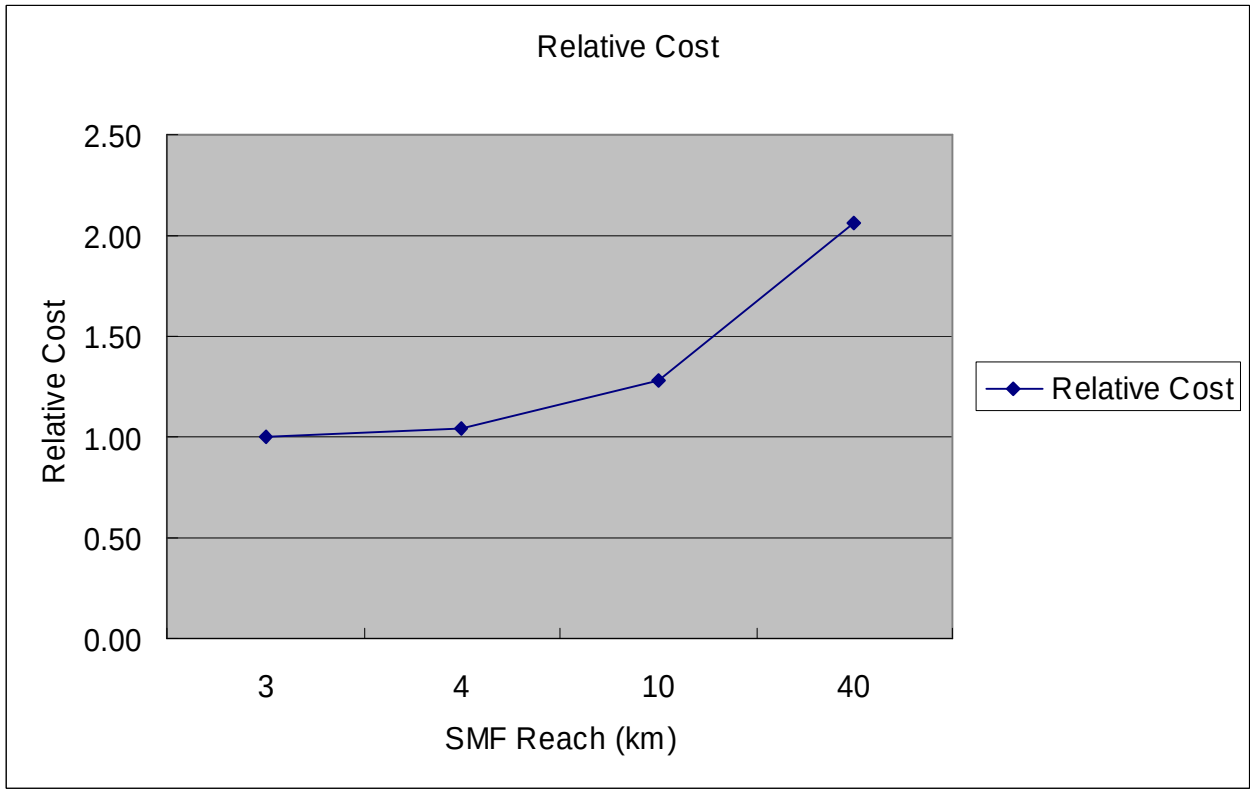
Power Budget and TOSA power consideration

	Optics	Spacing	Power Budget(dB) Connector=2dB	Minimum ER (dB)	TX min. averaged output power (dBm)	TX max. averaged output power (dBm)	output power tuning margin (dB) (excluding any margines)
3km Link	Cooled EA	400GHz	6.4	5	0.7	5.5	4.8
		800GHz	6.4	5	0.7	5.5	4.8
		CWDM	6.5	5	0.8	5.5	4.7
	Cooled DML	400GHz	6.9	3.5	2.6	5.5	2.9
		800GHz	6.9	3.5	2.6	5.5	2.9
		CWDM	7.2	3.5	2.9	5.5	2.6
4km Link	Cooled EA	400GHz	6.8	5	1.1	5.5	4.4
		800GHz	6.8	5	1.1	5.5	4.4
		CWDM	6.8	5	1.1	5.5	4.4
	Cooled DML	400GHz	7.3	3.5	3.0	5.5	2.5
		800GHz	7.3	3.5	3.0	5.5	2.5
		CWDM	7.9	3.5	3.6	5.5	1.9
10km Link	Cooled EA	400GHz	9.1	7	2.3	5.5	3.2
		800GHz	9.1	7	2.3	5.5	3.2
		CWDM	9.2	7	2.4	5.5	3.1
	Cooled DML	400GHz	9.8	3.5	5.5	5.5	0.0
		800GHz	10.0	3.5	5.7	5.5	-0.2
		CWDM	10.9	3.5	6.6	5.5	-1.1
40km Link	Cooled EA	400GHz	21.0	7	2.7	5.5	2.8
		800GHz	21.1	7	2.8	5.5	2.7

- **Could not use DML for >10km reach objectives**

Relative Cost Estimation for Different Reaches

Reach	Relative Cost
3km Link	1.0
4km Link	1.1
10km Link	1.3
40km Link	2.1



- **Pick up the spacing and source that offers lowest cost for each reaches**

Cost Analysis
- Just reviewing Cole_03_1107 -

- Define:
  - v3 = volume of 0km to 3/4km 100GE ports
    (= x*10GBASE-LR volume, x=X/48 from goergen_01_1107)
  - v10 = volume of 3/4km to 10km 100GE ports
    (= (1-x)*10GBASE-LR volume, x = X/48 from goergen)
  - c3 = cost of 3/4km Transceiver
  - c10 = cost of 10km Transceiver
  - c40 = cost of 40km Transceiver
- Scenario 1: 10km is kept as a 100GE reach objective
  - total_cost1 = (v3 + v10)*c10
- Scenario 2: 3/4km is adopted as a new 100GE reach objective
  - total_cost2 = v3*c3 + v10*c40

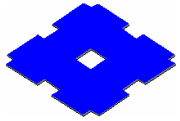
- **10km (Scenario 1) should be change to 3/4km if:**
  total_cost1>total_cost2
  (v3+v10)*c10>v3*c3+v10*c40
  (v4+v10)*c10>v4*c4+v10*c40

Cost Analysis
- Solving for 3km/4km -

- ✓ **10km (Scenario 1) should be change to 3/4km if:**
  total_cost1>total_cost2:
  (v3+v10)*c10>v3*c3+v10*c40
  (v4+v10)*c10>v4*c4+v10*c40

  - ✧ **Case1: 3km Reach assumption set in P5**
    V3/V10 > 2.8
    (V10 < V3*36%)
  - ✧ **Case2: 4km Reach assumption set in P5**
    V4/V10 > 3.3
    (V10 < V4*31%)

- ✓ **These results depend on the power budget.**
  Further works will refine this analysis.



Thank You!