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PMD Solution Set Analyzer

"Kolesar_Kalculator_2011_11_14.xls"

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MMF ad-hoc teleconference

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Read Me (1 of 3)

- SolutionAnalyzer_2011_11_14 description
- This spreadsheet permits comparison of PMD solution sets targeted to support data center environments.
- The worksheet "PMD Sol'n Set" allows comparison of up to four sets, each with up to four PMDs, on a variety of metrics.
- The cells in columns B, C and D in **bold** font are inputs to the analysis.
  - In column B input the description of the PMDs within the sets, in order of ascending reach (i.e. ascending supportable distance) capability.
  - In column C input relative values of the metric to be compared such as cost, power consumption, size, etc.
  - In column D input the reach capability in meters. The column E reach values in US customary units of feet are calculated, not input.
  - Note: The default input values are placeholders.

Read Me (2 of 3)

- The calculation produces Figures of Merit for each of the five data center channel length cumulative density functions (CDFs) provided in columns M thru S and plotted to the right in both metric (meters) and US customary (feet) units.
  - The originating source of the CDFs is referenced within the comments imbedded in the title cells above the CDF columns.
- Two categories of channel CDFs are provided.
  - Columns O and P are the CDFs for access channels between servers and switches in two different time periods that illustrate migration of switch placement closer to servers.
  - Columns Q, R and S are the CDFs for aggregation channels between switches for three different topology mixes detailed in the referenced source material.

Read Me (3 of 3)

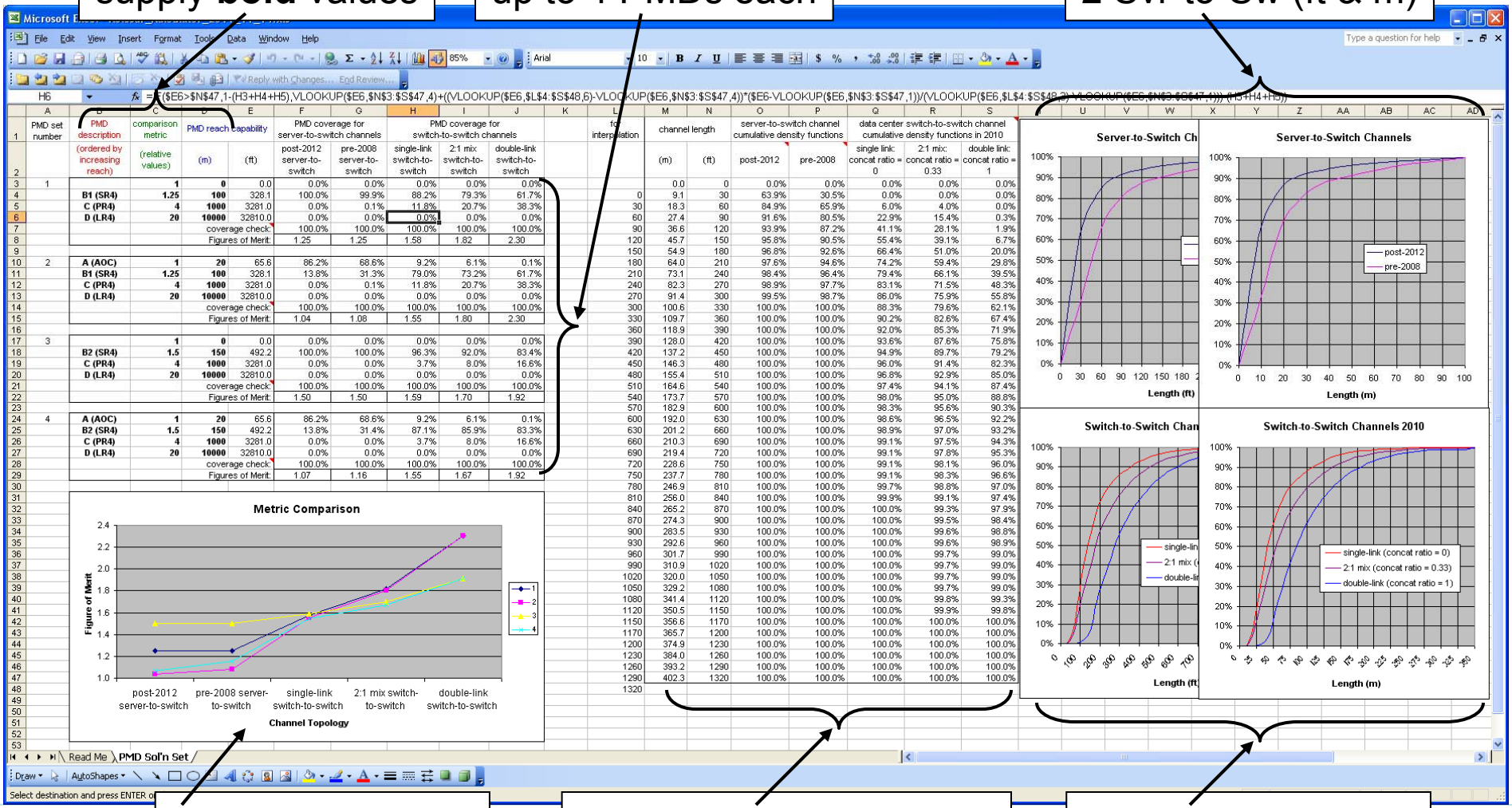
- The calculation proceeds as follows.
  - The channel coverage of each PMD is determined by comparison to the CDFs using linear interpolation starting with the first PMD listed in the set.
  - The channel coverage of the next PMD in the set is determined from where the previous PMD stopped, and so on, thus necessitating ascending reach order.
  - A coverage check is determined by summing the coverage of all the PMDs in the set for each CDF, wherein a value less than 100% indicates that a portion of that CDF is not covered.
  - The Figures of Merit are determined by summing coverage-weighted comparison metrics. These are plotted below the PMD tables in the order of channels with decreasing CDF (i.e. longer channel lengths).
  - Note: Setting reach to 0 effectively eliminates a PMD from the calculation provided that PMD is listed before others in compliance with the ascending reach ordering requirement.

Overall Dashboard

3 input columns:
supply **bold** values

4 solution sets:
up to 4 PMDs each

Graphical CDFs:
2 Svr-to-Sw (ft & m)



Output graph:
FoM for sol'n sets

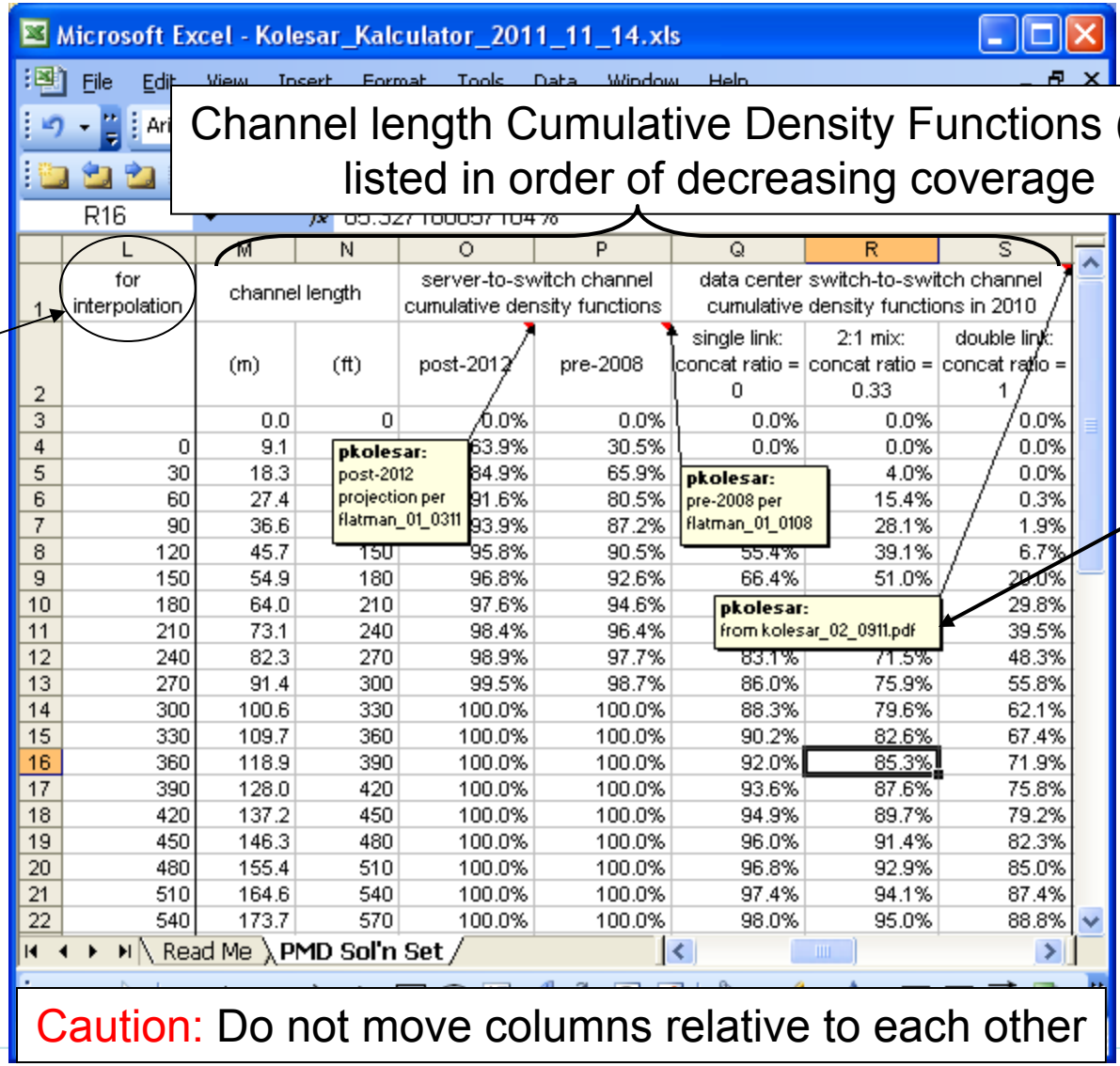
5 numerical CDFs:
2 Srv-to-Sw, 3 Sw-to-Sw

Graphical CDFs:
3 Sw-to-Sw (ft & m)

Numerical CDF Dashboard

Column L for interpolation functionality

Channel length Cumulative Density Functions (CDFs) listed in order of decreasing coverage

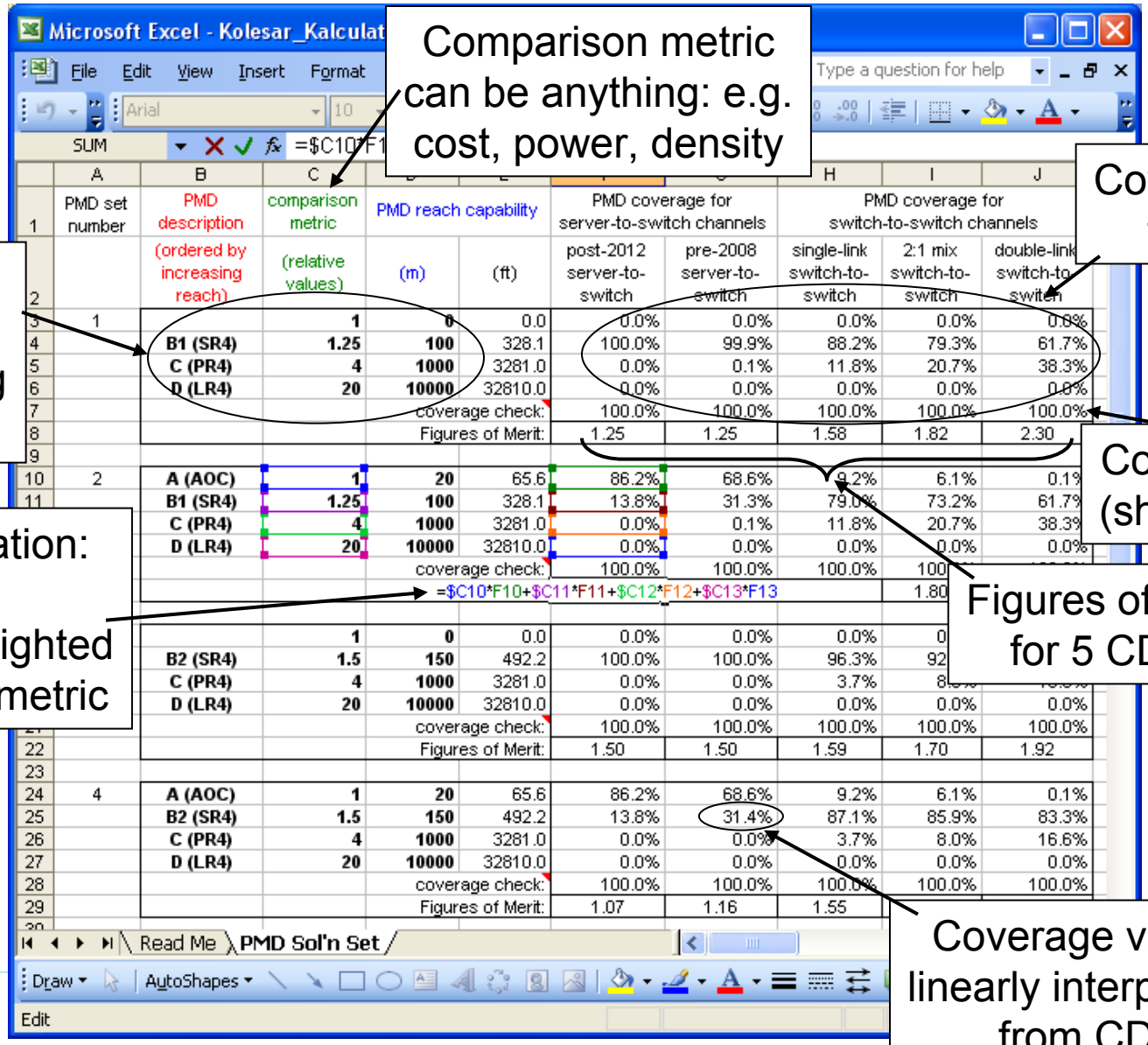


	L	M	N	O	P	Q	R	S
1	for interpolation	channel length		server-to-switch channel cumulative density functions		data center switch-to-switch channel cumulative density functions in 2010		
2		(m)	(ft)	post-2012	pre-2008	single link: concat ratio = 0	2:1 mix: concat ratio = 0.33	double link: concat ratio = 1
3		0.0	0	0.0%	0.0%	0.0%	0.0%	0.0%
4	0	9.1		63.9%	30.5%	0.0%	0.0%	0.0%
5	30	18.3		84.9%	65.9%		4.0%	0.0%
6	60	27.4		91.6%	80.5%		15.4%	0.3%
7	90	36.6		93.9%	87.2%		28.1%	1.9%
8	120	45.7	150	95.8%	90.5%	55.4%	39.1%	6.7%
9	150	54.9	180	96.8%	92.6%	66.4%	51.0%	20.0%
10	180	64.0	210	97.6%	94.6%			29.8%
11	210	73.1	240	98.4%	96.4%			39.5%
12	240	82.3	270	98.9%	97.7%	83.1%	71.5%	48.3%
13	270	91.4	300	99.5%	98.7%	86.0%	75.9%	55.8%
14	300	100.6	330	100.0%	100.0%	88.3%	79.6%	62.1%
15	330	109.7	360	100.0%	100.0%	90.2%	82.6%	67.4%
16	360	118.9	390	100.0%	100.0%	92.0%	85.3%	71.9%
17	390	128.0	420	100.0%	100.0%	93.6%	87.6%	75.8%
18	420	137.2	450	100.0%	100.0%	94.9%	89.7%	79.2%
19	450	146.3	480	100.0%	100.0%	96.0%	91.4%	82.3%
20	480	155.4	510	100.0%	100.0%	96.8%	92.9%	85.0%
21	510	164.6	540	100.0%	100.0%	97.4%	94.1%	87.4%
22	540	173.7	570	100.0%	100.0%	98.0%	95.0%	88.8%

Comments give source references

Caution: Do not move columns relative to each other

Input/Output Dashboard (1 of 2)



	A	B	C	D	E	F	G	H	I	J
1	PMD set number	PMD description	comparison metric	PMD reach capability		PMD coverage for server-to-switch channels		PMD coverage for switch-to-switch channels		
2		(ordered by increasing reach)	(relative values)	(m)	(ft)	post-2012 server-to-switch	pre-2008 server-to-switch	single-link switch-to-switch	2:1 mix switch-to-switch	double-link switch-to-switch
3	1		1	0	0.0	0.0%	0.0%	0.0%	0.0%	0.0%
4		B1 (SR4)	1.25	100	328.1	100.0%	99.9%	88.2%	79.3%	61.7%
5		C (PR4)	4	1000	3281.0	0.0%	0.1%	11.8%	20.7%	38.3%
6		D (LR4)	20	10000	32810.0	0.0%	0.0%	0.0%	0.0%	0.0%
7					coverage check:	100.0%	100.0%	100.0%	100.0%	100.0%
8					Figures of Merit:	1.25	1.25	1.58	1.82	2.30
9										
10	2	A (AOC)	1	20	65.6	86.2%	68.6%	9.2%	6.1%	0.1%
11		B1 (SR4)	1.25	100	328.1	13.8%	31.3%	79.0%	73.2%	61.7%
		C (PR4)	4	1000	3281.0	0.0%	0.1%	11.8%	20.7%	38.3%
		D (LR4)	20	10000	32810.0	0.0%	0.0%	0.0%	0.0%	0.0%
					coverage check:	100.0%	100.0%	100.0%	100	
					=$C10*F10+$C11*F11+$C12*F12+$C13*F13				1.80	
			1	0	0.0	0.0%	0.0%	0.0%	0	
		B2 (SR4)	1.5	150	492.2	100.0%	100.0%	96.3%	92	
		C (PR4)	4	1000	3281.0	0.0%	0.0%	3.7%	8	
		D (LR4)	20	10000	32810.0	0.0%	0.0%	0.0%	0.0%	0.0%
					coverage check:	100.0%	100.0%	100.0%	100.0%	100.0%
22					Figures of Merit:	1.50	1.50	1.59	1.70	1.92
23										
24	4	A (AOC)	1	20	65.6	86.2%	68.6%	9.2%	6.1%	0.1%
25		B2 (SR4)	1.5	150	492.2	13.8%	31.4%	87.1%	85.9%	83.3%
26		C (PR4)	4	1000	3281.0	0.0%	0.0%	3.7%	8.0%	16.6%
27		D (LR4)	20	10000	32810.0	0.0%	0.0%	0.0%	0.0%	0.0%
28					coverage check:	100.0%	100.0%	100.0%	100.0%	100.0%
29					Figures of Merit:	1.07	1.16	1.55		

Comparison metric can be anything: e.g. cost, power, density

Coverage output for 5 CDFs

Define PMD solution set in ascending reach order

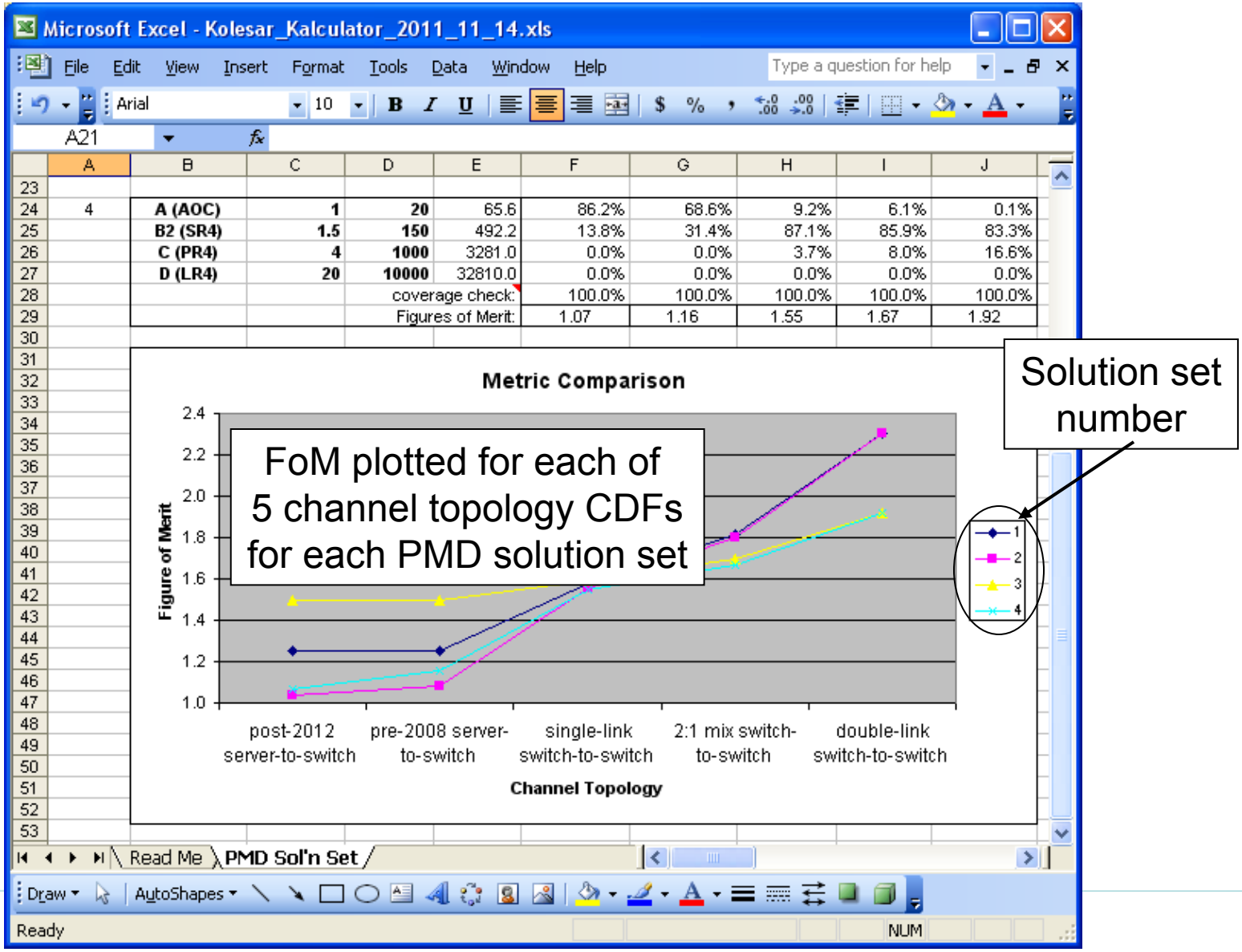
Coverage check (should = 100%)

FoM calculation: sum of coverage-weighted comparison metric

Figures of Merit for 5 CDFs

Coverage values linearly interpolated from CDF

Input/Output Dashboard (2 of 2)



24	4	**A (AOC)**	**1**	**20**	65.6	86.2%	68.6%	9.2%	6.1%	0.1%
25		**B2 (SR4)**	**1.5**	**150**	492.2	13.8%	31.4%	87.1%	85.9%	83.3%
26		**C (PR4)**	**4**	**1000**	3281.0	0.0%	0.0%	3.7%	8.0%	16.6%
27		**D (LR4)**	**20**	**10000**	32810.0	0.0%	0.0%	0.0%	0.0%	0.0%
28				coverage check:		100.0%	100.0%	100.0%	100.0%	100.0%
29				Figures of Merit:		1.07	1.16	1.55	1.67	1.92

Future Work

- Add worksheet with cabling cost analyzer
  - To permit complete physical layer cost comparisons.

Questions?