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System vendor perspective to NG100GE SMF interface

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List of Supporters

Yurii Vlasov IBM

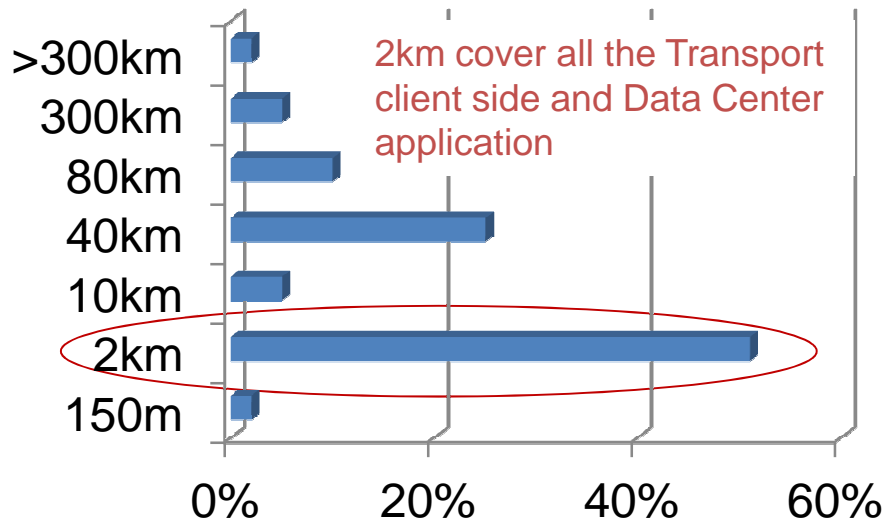
Douglas M Gill IBM

Outline

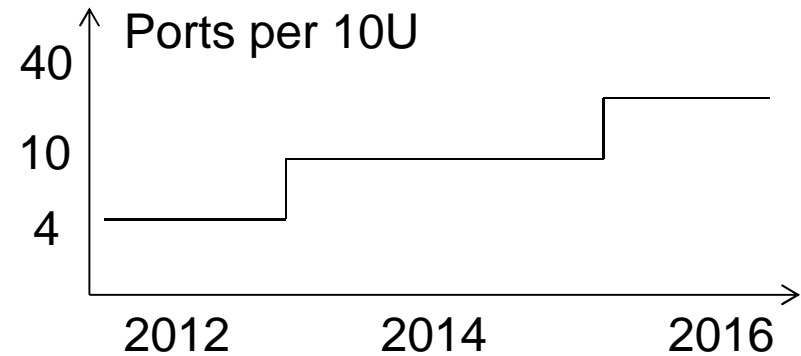
- System vendor requirements
- Proposal
- Comparison among LWDM/CWDM/PSM4
- Conclusions

Carrier IP MKT trend and system requirement

Carrier IP Optical Interface Distribution

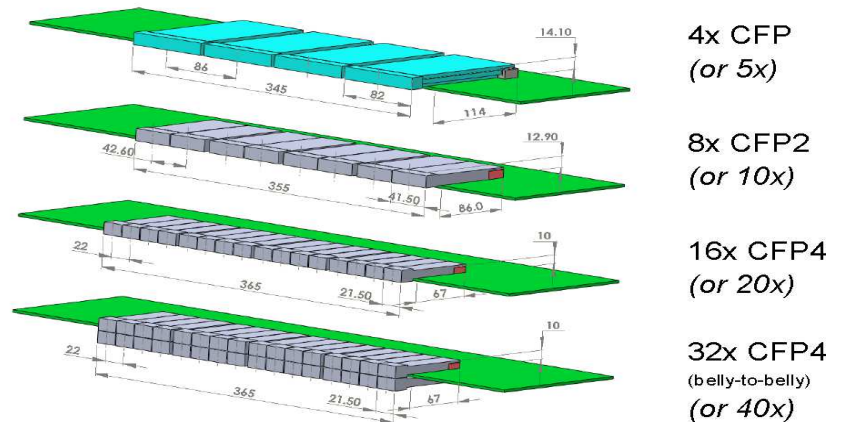


Carrier IP Optical Interface Density Roadmap



Requirements: Optimize cost, density, power consumption for Carrier IP system application:

- Low cost, close to 2.5*40GE;
- Small size & low power to support 40 ports in 10U front panel (CFP4 or QSFP etc) ;
- Reach up to 2km (>50% application)



Potential Solutions: CWDM is the only practical solution for 500m~2km low cost, high density application.

	Technology Readiness	Power (<6W)*	Size (CFP4)	Cost (500m)	Cost (2km)	Remark
LWDM LR4	Y	?	?	H	H	1.Need TEC 2.Need hermetic package
1λ PAMn	N (5, 8, 9)	N (6, 7)	N	?	?	1.Need prove in feasibility 2.Need high gain FEC, higher power.
1λ DMT	N	N	N	?	?	1.Need prove in feasibility 2.Need high gain FEC, higher power
PSM4	Y	Y	Y	M	H	1.Expensive fiber cost 2.Need FEC, higher power
CWDM	Y (1)	Y (2)	Y (1, 3)	L (4)	L (4)	1.Uncooled, no TEC; 2.CWDM filter same as 40GE 3.Can use COB and Integration tech.

* CFP4 transceiver requires power consumption <6W.

1: http://www.ieee802.org/3/100GNGOPTX/public/nov11/palkert_01_1111_NG100GOPTX.pdf

2: http://www.ieee802.org/3/100GNGOPTX/public/mar12/plenary/palkert_01c_0312_NG100GOPTX.pdf

3: http://www.ieee802.org/3/100GNGOPTX/public/jul12/martin_01_0712_optx.pdf

4: http://www.ieee802.org/3/bm/public/sep12/martin_02_0912_optx.pdf

5: http://www.ieee802.org/3/bm/public/nov12/cole_01_1112_optx.pdf

6: http://www.ieee802.org/3/bm/public/nov12/lyubomirsky_01a_1112_optx.pdf

7: http://www.ieee802.org/3/bm/public/nov12/bhoja_01a_1112_optx.pdf

8: http://www.ieee802.org/3/100GNGOPTX/public/jul12/lewis_01a_0712_optx.pdf

9: http://www.ieee802.org/3/bm/public/sep12/lewis_01_0912_optx.pdf

Why CWDM is low cost/low power

1. Use uncooled packaging technology for transceiver, leading to >35% cost reduction and low power consumption (<6W);

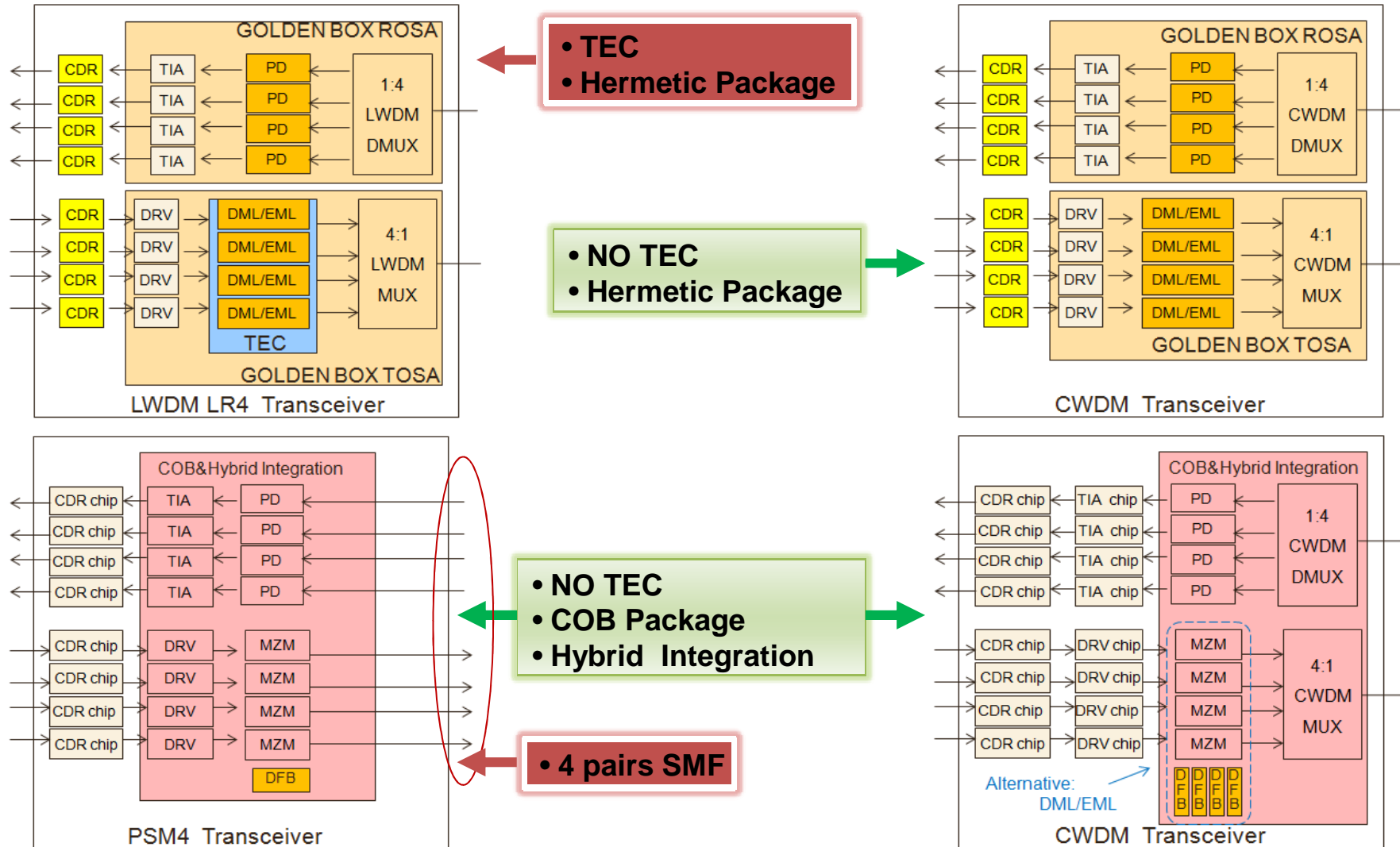
http://www.ieee802.org/3/100GNGOPTX/public/mar12/plenary/palkert_01c_0312_NG100GOPTX.pdf

2. Chip on Board package combining with hybrid integration, results in additional 30% cost reduction;

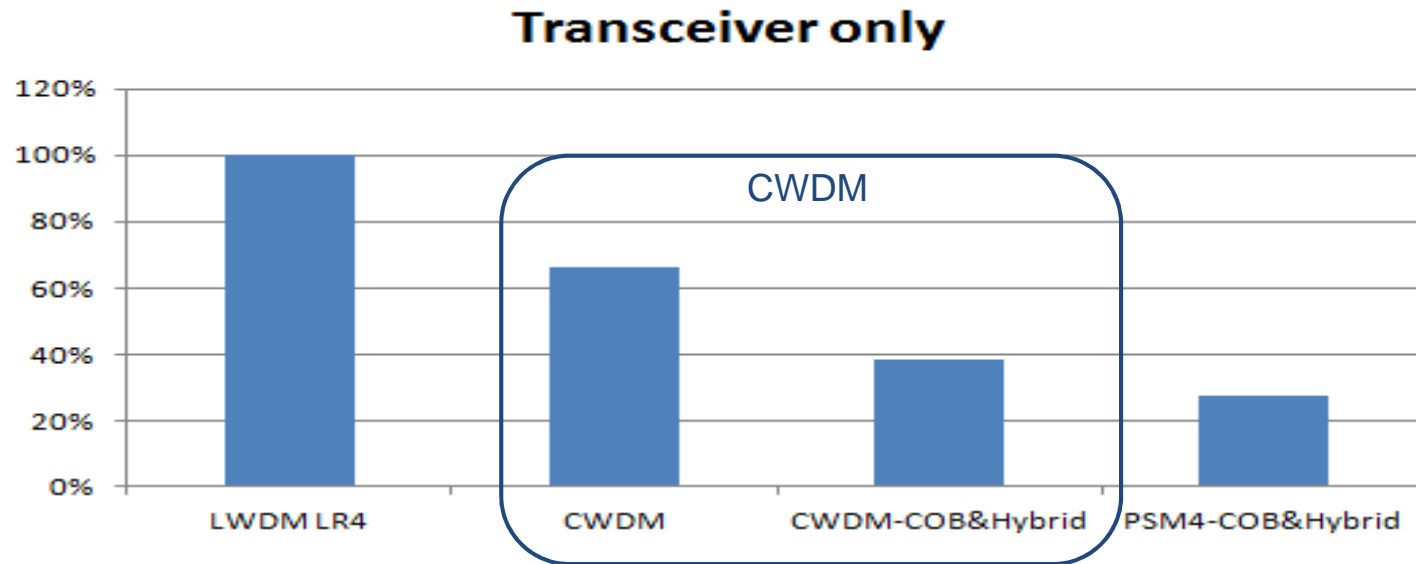
http://www.ieee802.org/3/bm/public/sep12/martin_02_0912_optx.pdf

3. Single fiber pair for low link cost.

Comparison among LWDM/CWDM/PSM4 Transceivers



Cost Comparison of Transceivers(no link fiber)



Note: CWDM/PSM4 transceiver is CFP4 form factor w CDR, LWDM LR4 transceiver is CFP2 form factor.

The analysis results show:

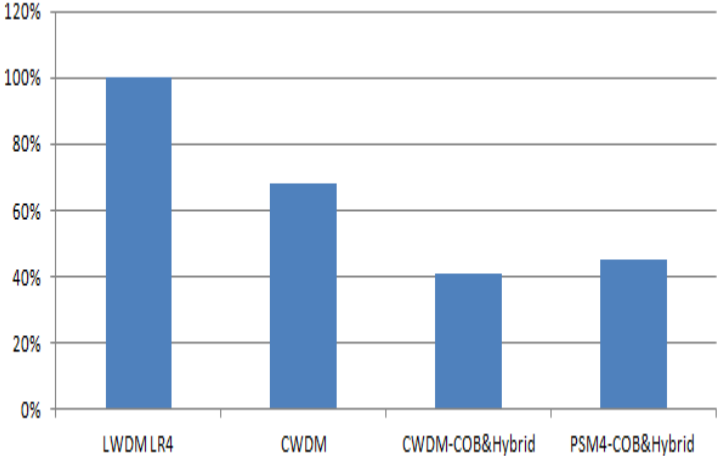
- Using hybrid integration and COB packaging, can be 65% cheaper than LWDM LR4 transceiver, which is close to the result of 67% in “vlasov_01a_1112_optx”
- Using uncooled hermetic packaging, is >35% cheaper than LWDM LR4 transceiver;

Cost Comparison of double link channel

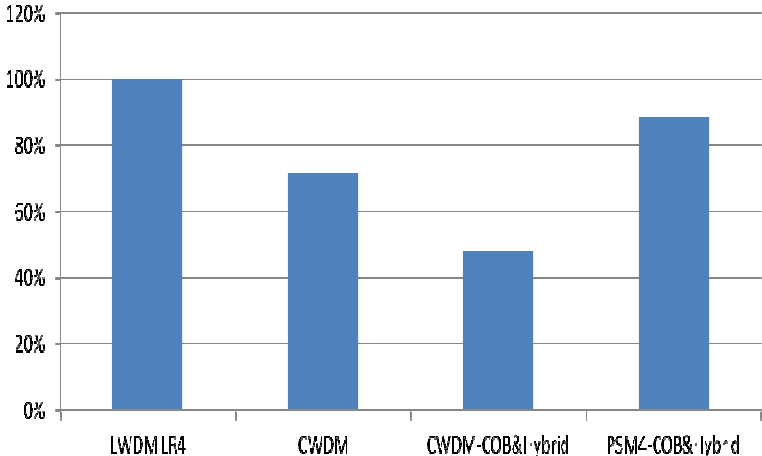
	LWDM LR4	CWDM	PSM4	Notes
Double link Cabling cost at CCL	1.75	1.75	7	Kolesar_01a_0512_opt

Channel Cost = Fiber cabling + 2 * Module

500m Channel Cost



2km Channel Cost



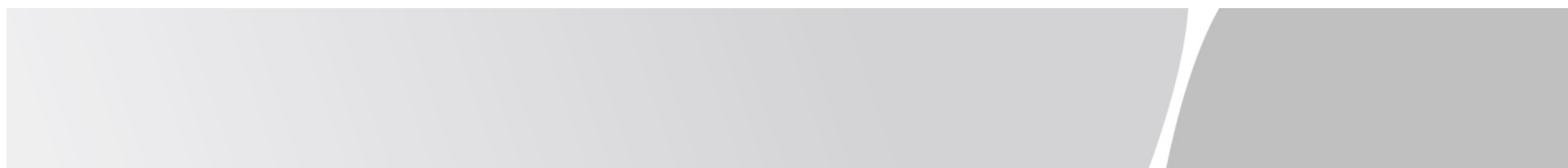
Conclusions

CWDM solution is the best answer for NG100GE using SMF at at least 500m reach, offering:

- Lowest cost;
- Small size and low power consumption to support 40 ports in 10U front panel (CFP4 or QSFP etc)
- Up to 2km reach

Thank you

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List of 100GE CWDM proposals

http://www.ieee802.org/3/bm/public/nov12/gill_01b_1112_optx.pdf

http://www.ieee802.org/3/bm/public/nov12/vlasov_01a_1112_optx.pdf

http://www.ieee802.org/3/100GNGOPTX/public/mar12/plenary/vlasov_01_0312_NG100GOPTX.pdf

http://www.ieee802.org/3/100GNGOPTX/public/nov11/anderson_01_1111_NG100GOPTX.pdf

http://www.ieee802.org/3/ba/public/mar08/traverso_03_0308.pdf

http://www.ieee802.org/3/ba/public/mar08/traverso_02_0308.pdf

http://www.ieee802.org/3/ba/public/mar08/traverso_01_0308.pdf

These referenced proposals demonstrated that CWDM has low cost and less power consumption compare to LWDM LR4 .