



OPEN
Compute Project



OCP U.S. SUMMIT 2017

Santa Clara, CA



100G Optics Deployment in Facebook Data Centers

Katharine Schmidtke, Reza Niazmand, Abhijit
Chakravarty, Vincent Zeng, Cathie Deal

Facebook

OPEN HARDWARE.

OPEN SOFTWARE.

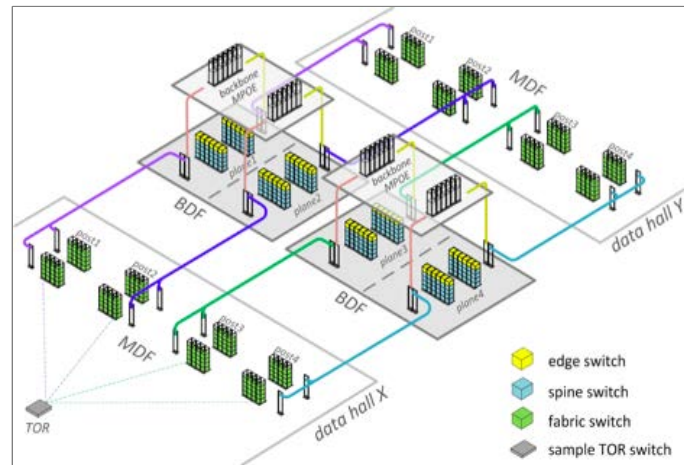
OPEN FUTURE.





DC Switch Network

- Fabric for networking scalability 40G to 100G
- Connects compute, storage and switches



<https://code.facebook.com/posts/360346274145943/introducing-data-center-fabric-the-next-generation-facebook-data-center-network/>

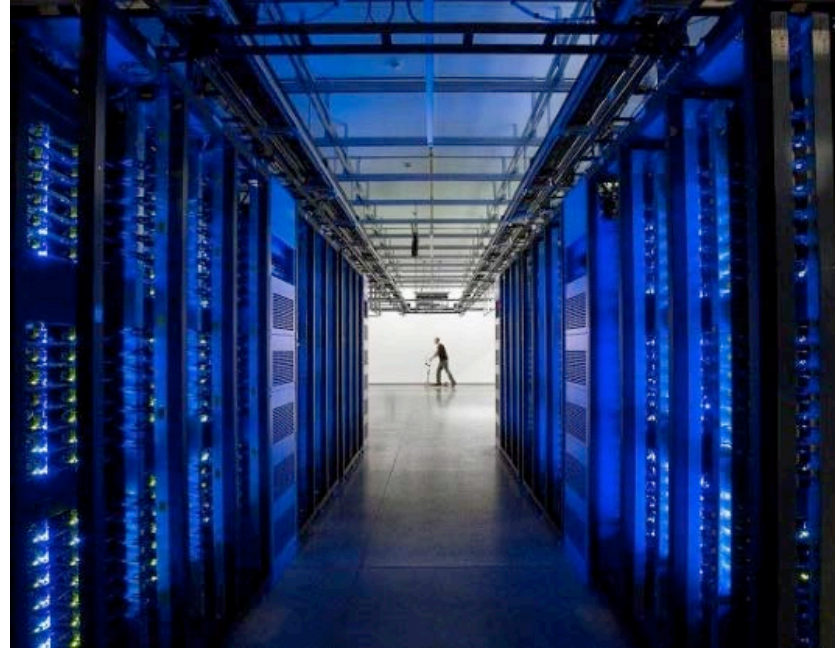
OPEN HARDWARE. OPEN SOFTWARE. OPEN FUTURE.



SMF deployed in the data center



- Lower fiber cost than MM
- Duplex SMF less fiber than parallel
- SMF future proof to higher data-rates
- Depreciated over many upgrade cycles



OPEN HARDWARE.

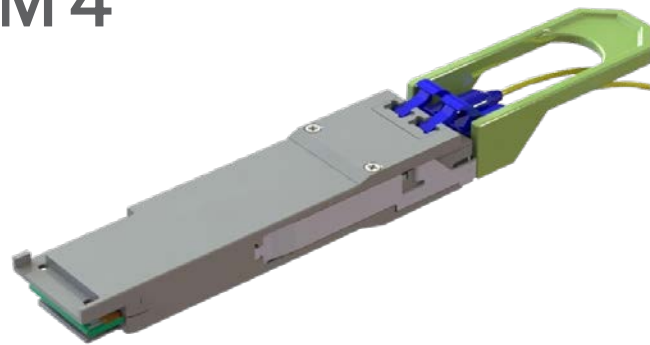
OPEN SOFTWARE.

OPEN FUTURE.





100G Optics CWDM4



- 100G CWDM4-MSA
 - QSFP-28 form-factor
 - Single-mode duplex fiber
- CWDM4-OCP:
 - Relaxed specification for DCs
 - Reduced temperature range
 - Reduced link budget

	CWDM4-OCP Relaxed Specification	CWDM4 MSA Base Specification
Reach	500 m	2000 m
Link loss	3.5 dB	5 dB
Operating Case Temperature	15-55 deg C	0-70 deg C

OPEN HARDWARE. OPEN SOFTWARE. OPEN FUTURE.

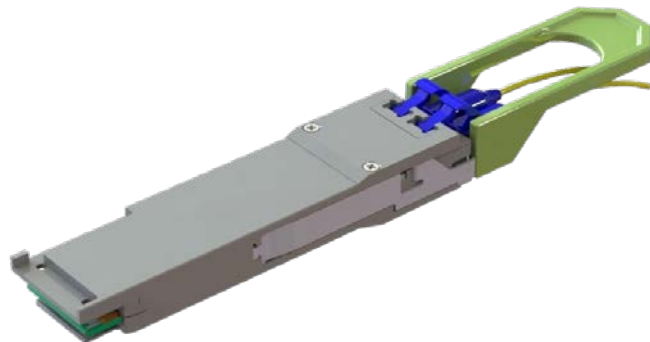




OCP Networking Group Submission



- Open sourcing specification through OCP
- Commercially available optical transceivers



OPEN HARDWARE.

OPEN SOFTWARE.

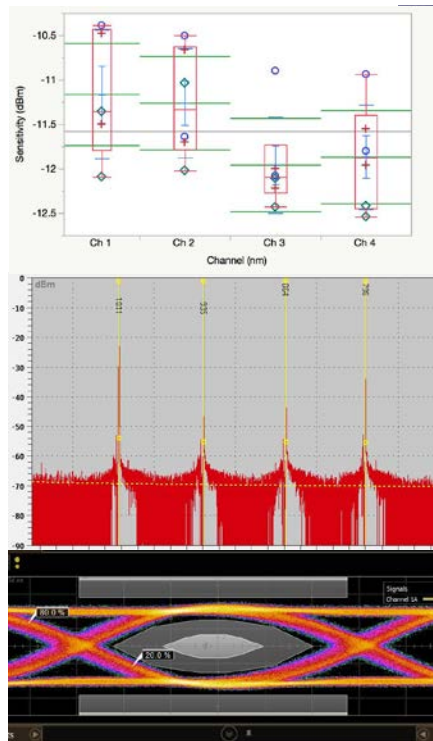
OPEN FUTURE.



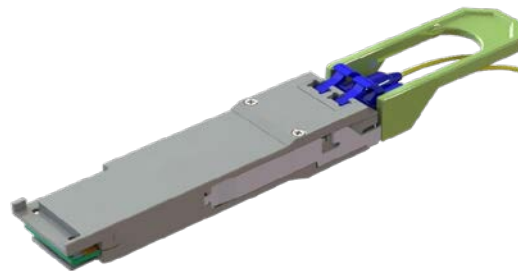
And, it's REAL!



And, it's REAL!



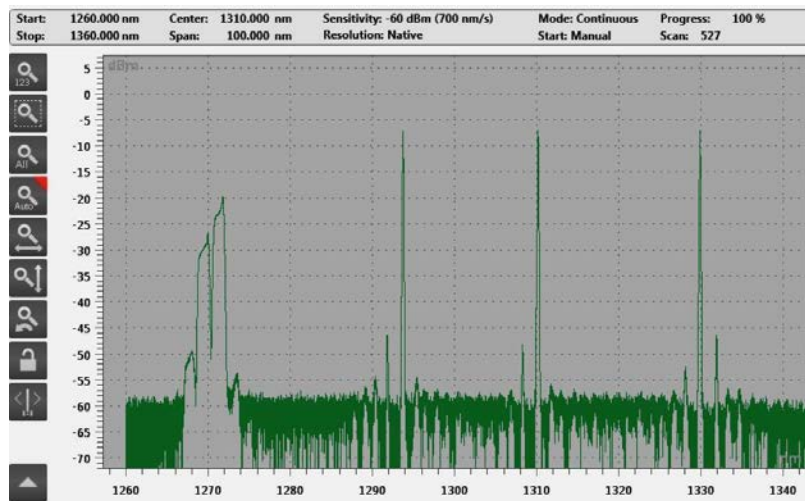
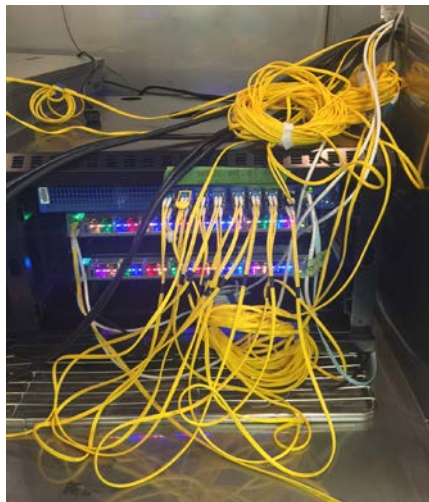
100G CWDM4 Production Readiness Challenge



OPEN HARDWARE. OPEN SOFTWARE. OPEN FUTURE.

Production Readiness Tests Examples

- PCBA failure (System Level Traffic Test)
- SMSR, mode broadening (Power Temp Cycle)

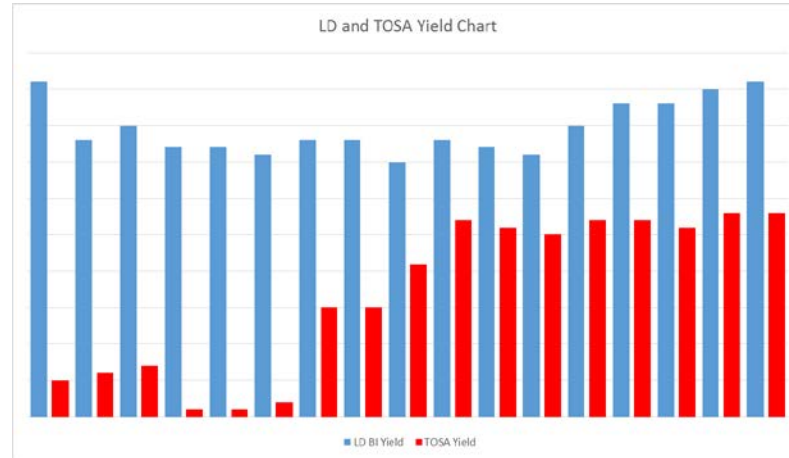


OPEN HARDWARE. OPEN SOFTWARE. OPEN FUTURE.



Quality Control Plan and Executions

- Develop consolidated Quality Control Plan and Execute
 - Flexibility on the long term reliability and deployment schedule
 - Synchronization between Suppliers' Product Quality Plan and our QCP
 - FIT/DPPM predication and co-assessment on the early failure modes
 - Development extra screen process at production to ensure the quality
 - ORT (on-going Reliability Test) in place



OPEN HARDWARE.

OPEN SOFTWARE.

OPEN FUTURE.

Quality Control Plan and Executions



GR468 and CpK Control
process in place

Solid Test process to keep
no factory escape/ ORT

IQC/OQC on items/
Traceability

RMA/FA Event

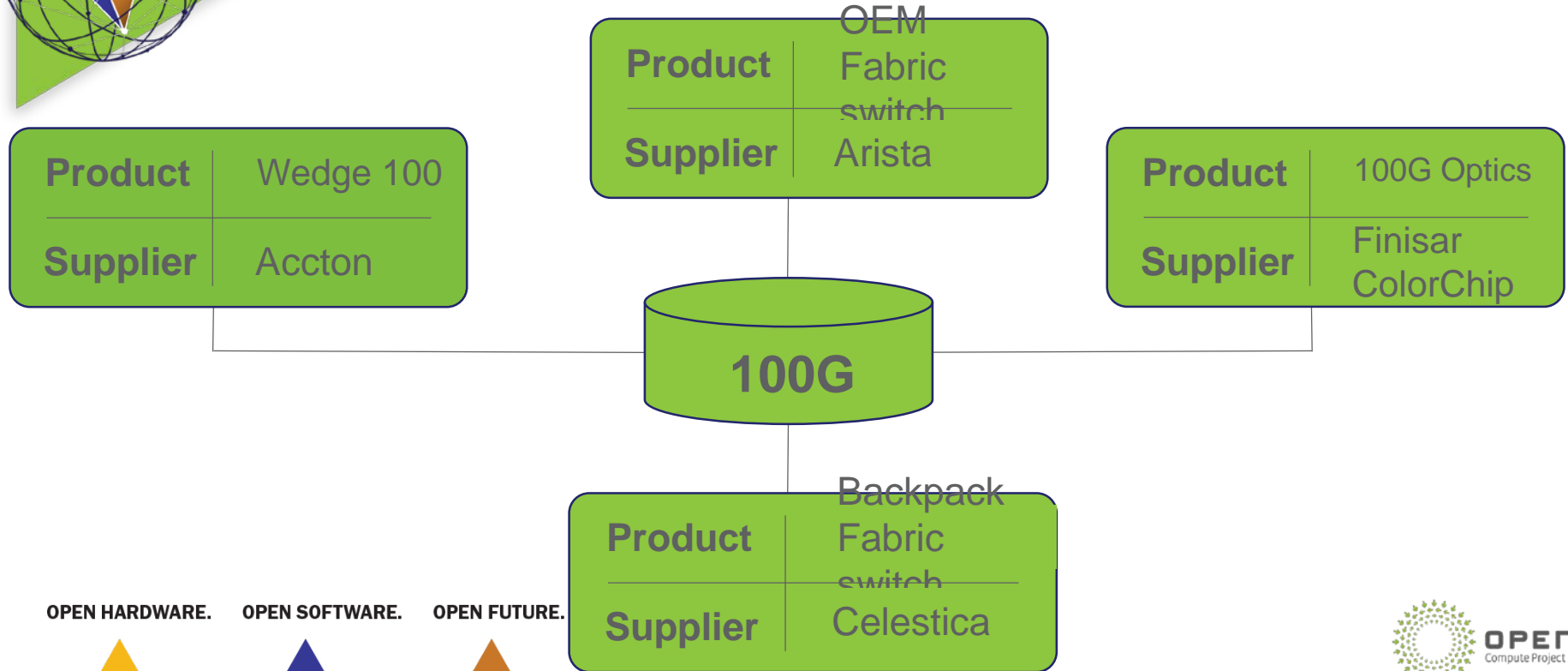
TAT Requirement

Risk Assessment

OPEN HARDWARE. OPEN SOFTWARE. OPEN FUTURE.

Networking Ecosystem

All components are commercially available and work together



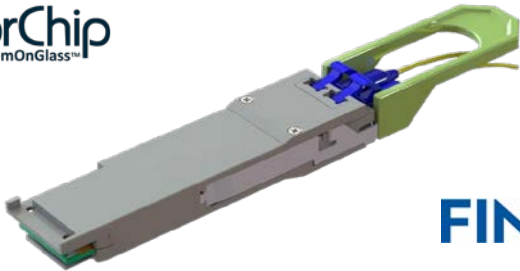
100G Networking Ecosystem

- Commercially available CWDM4-OCP optical transceivers include:

Optical Transceiver Manufacturers	CWDM4-OCP Model Number
Colorchip	C100 Q005 CWDM4 02B
Finisar	FTLC1152RGPL6

- Ecosystem of switch equipment

Compatible Switches	Model Number
Edgecore Networks	Wedge100-32X
Celestica	D8020 (Backpack 100G)



FINISAR®



What's Next?

- 400G switch interconnects beyond 2020
 - New optics technology 400G-FR4 using PAM4
 - QSFP-DD form factor

OPEN HARDWARE.

OPEN SOFTWARE.

OPEN FUTURE.





Conclusion

100G is deployed and in production
Sharing with the community via OCP

400G and QSFPDD in the future

OPEN HARDWARE.

OPEN SOFTWARE.

OPEN FUTURE.





OPEN
Compute Project

