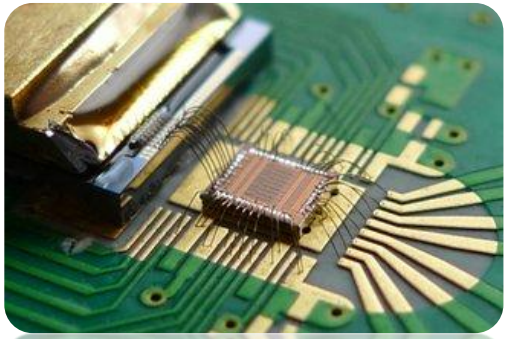

Trends in Optical Interconnects: Size, Power, Cost

Jörg Wieland, GigOptix-Helix AG

SLN-Workshop on Optical Interconnects, 2010-10-28

GIGOPTIX

Outline

- GigOptix and the HX Line
- A new SFP+ solution
- Conclusions

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GigOptix and the HX Line

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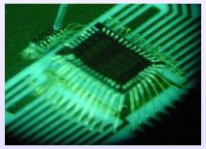
GigOptix Markets

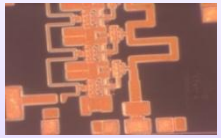
GigOptix addresses multiple applications across the global network

100G Mach Zehnder Modulator

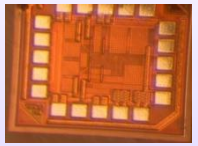
Parallel VCSEL driver/TIA solution

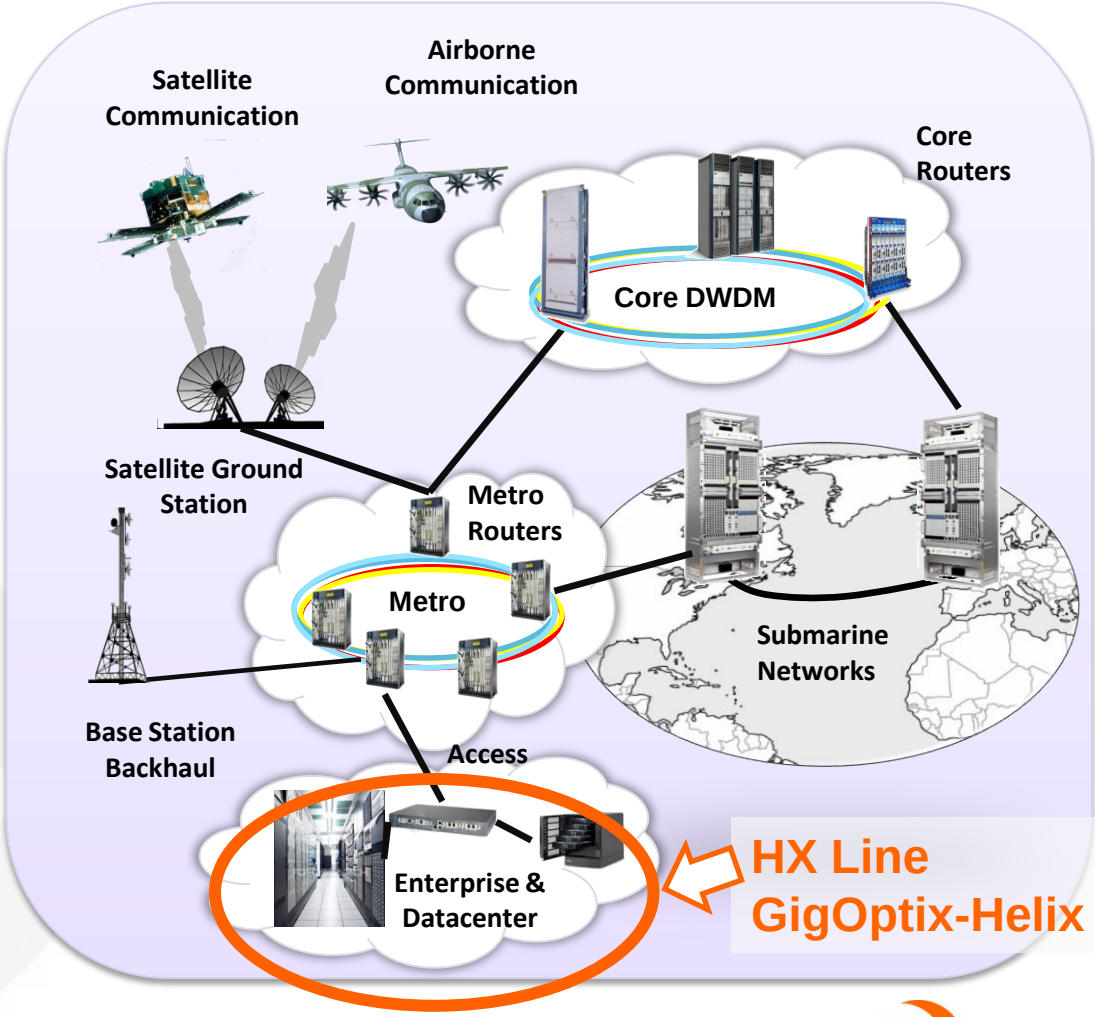


High Power Broadband Amp



Low Power Multi-rate TIA



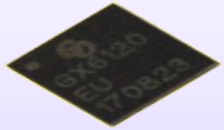


100G DP- QPSK Driver

10G MZM Drivers

40G DPSK Mach Zehnder Modulator

10G EML driver



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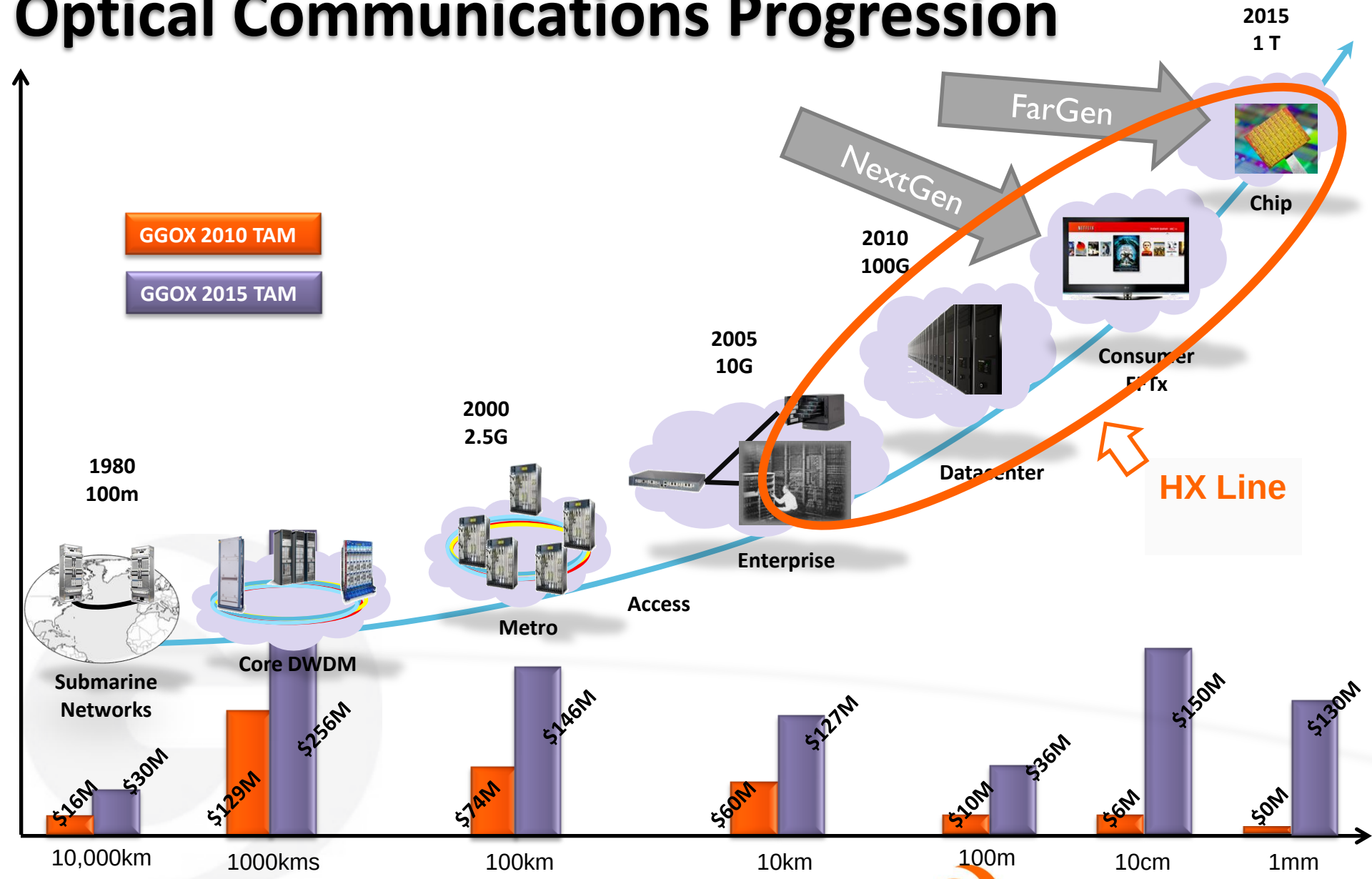
Optical Communications Progression



Source: Management estimates based on OVUM052046, 047556, 047543, LC

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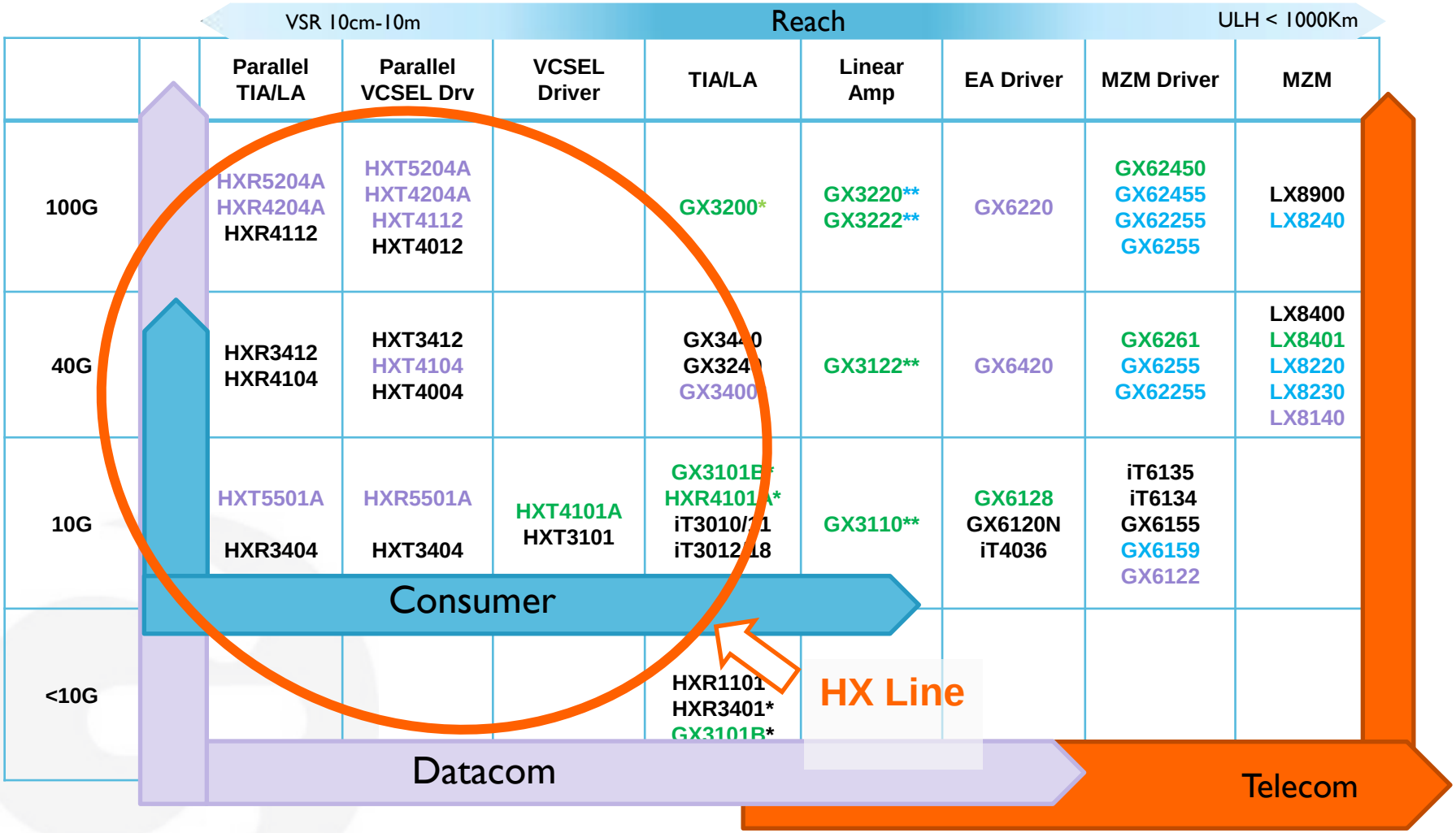
Optical PMD Product Portfolio Overview



Legend : **Available** **2010 Release** **2011 Release** *Potential*

* includes TIA ** includes TIA/AGC

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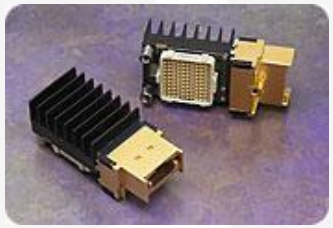
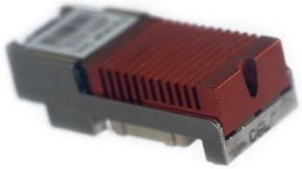
Parallel Optical Modules

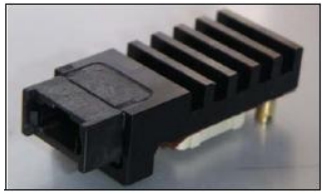
De-facto standards (MSA‘s):

SNAP12 / CXP





QSFP



Other

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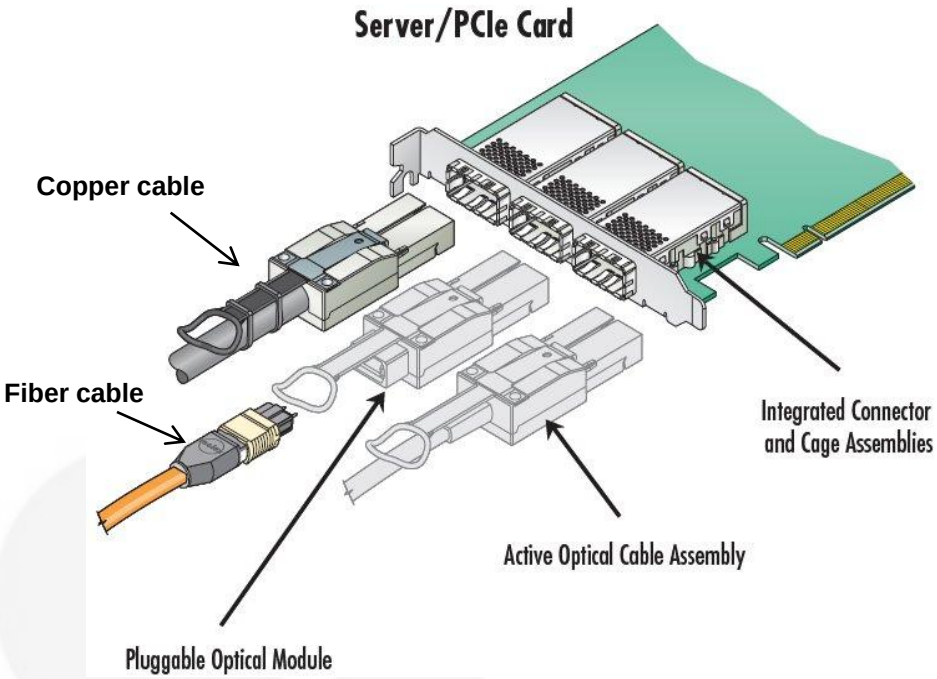
Active Optical Cables (AOC)

Datacom
Examples: QSFP, CXP



From: http://www.molex.com/cmc_upload/0/000/-15/805/DS_iPass_HSC_CXP.pdf

Consumer
Example: HDMI/DVI

From: http://www.opticis.com/english/02_product/product01_01.htm#

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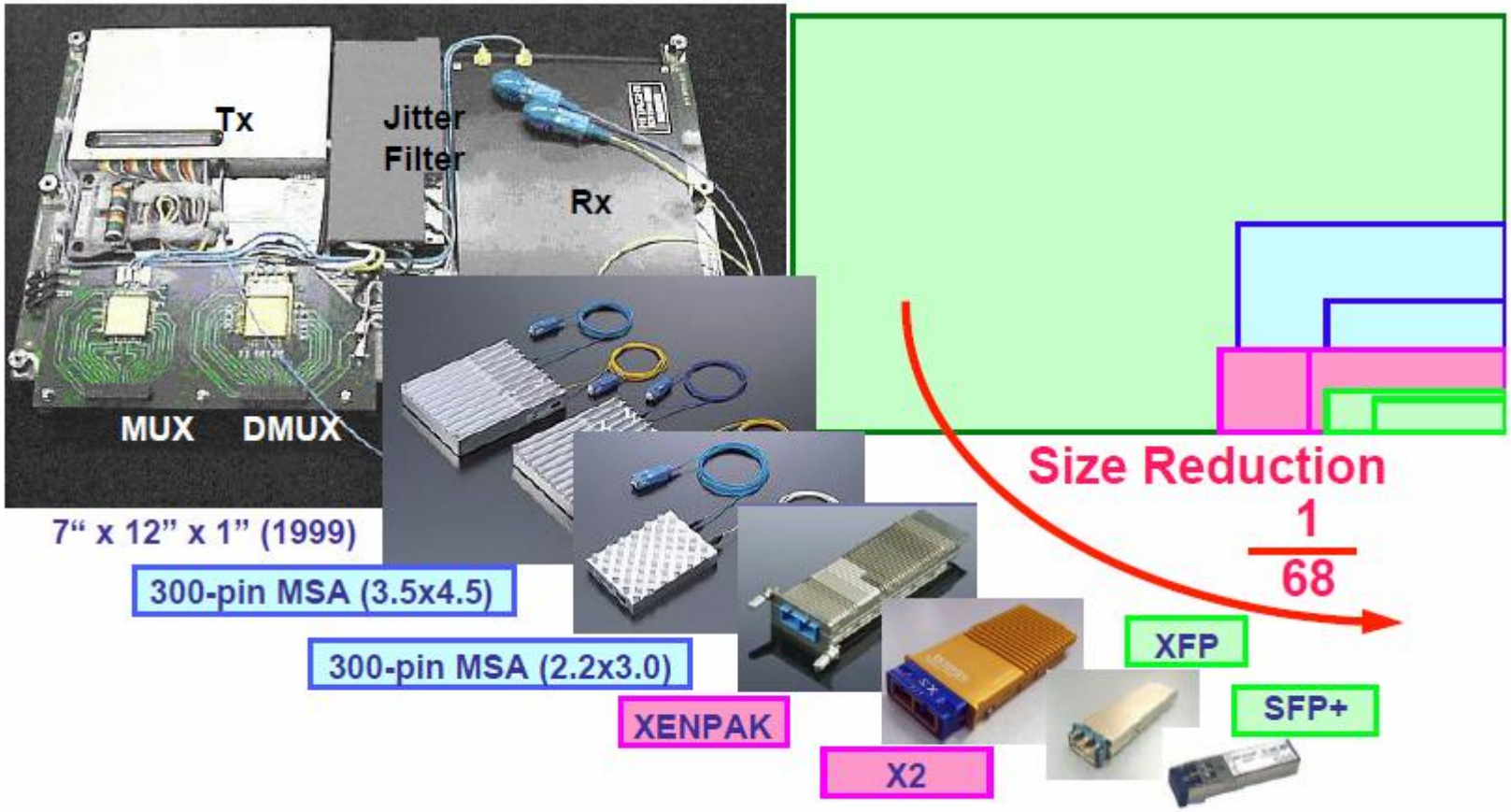
10G History –MSA Evolution



Evolved towards smaller solutions

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Fab-less Chip Vendor

GigOptix forms the supply-chain interface between „silicon“ world and „optical“ world

System Vendor

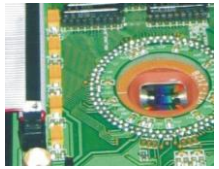
Optical Module / Cable Manufacturer

Products

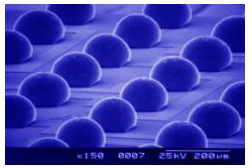
Know-How

Logistics

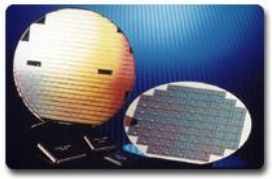
Test, Dice, Sort



Post-processing



Silicon Wafer Foundry



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GIGOPTIX

A new SFP+ solution

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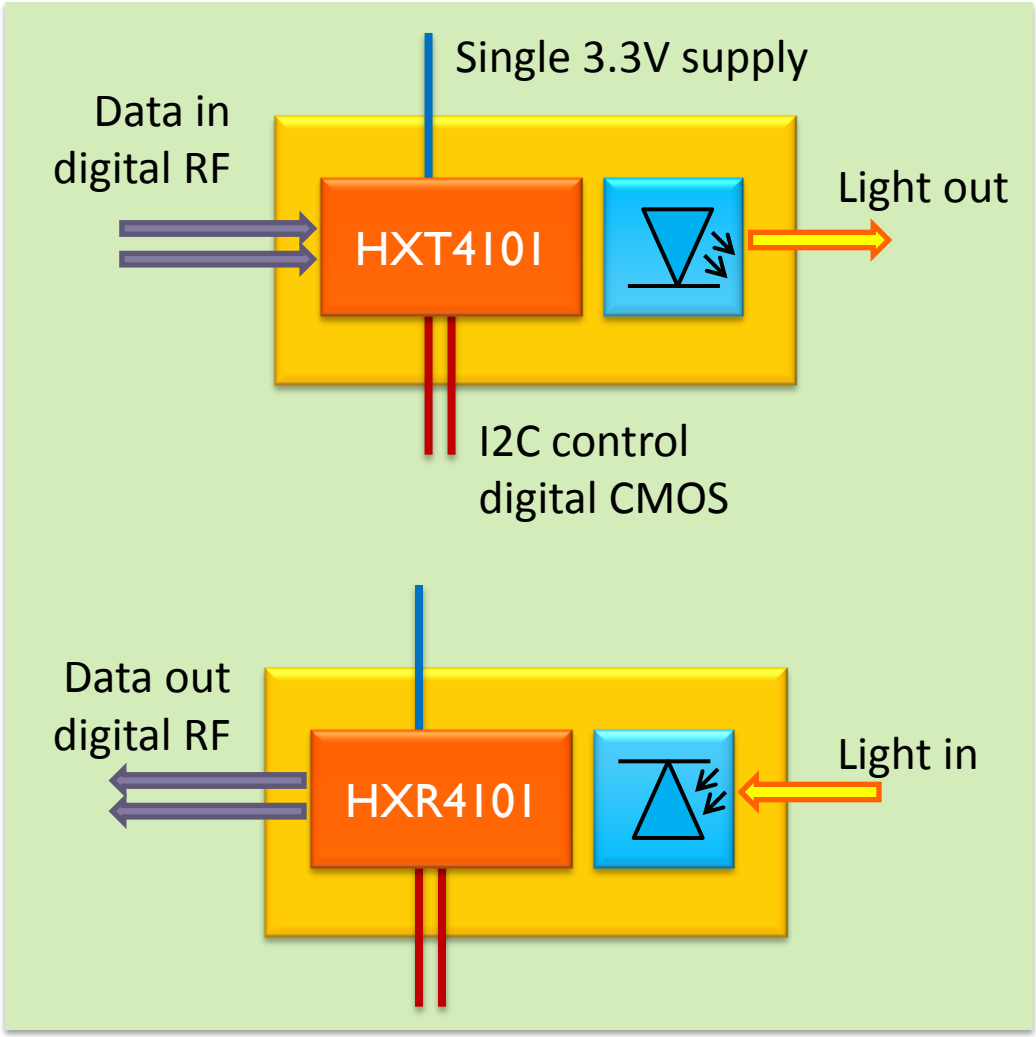
The Smart OSA Concept

- GigOptix' Smart OSA's consist of one Silicon chip and one O/E chip
- All high speed and analog electronics is integrated, only standard digital interfaces
  - Simplified design
  - Improved RF performance
  - Lower power dissipation
  - Lower EMI



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The HXT4101 / HXR4101 Chipset: Overview

- The chipset is made of:
  - The HXT4101A 14 Gb/s Compact VCSEL Driver
  - The HXR4101A 4.0 G / 14 Gb/s Dual-Band Limiting TIA
- Common Feature Set
  - Configuration via I2C, or selection of predefined modes via wirebonds
  - Lowest power dissipation vs performance
    - 100mW for consumer applications
    - 150mW 100m links
    - 250mW 300m links
  - Small Form Factor
    - Minimal external components required
    - Small die size: ~1mm x 1mm
  - Speed up to 14 Gb/s
  - On-chip A/D Converter for control and diagnostic read-outs

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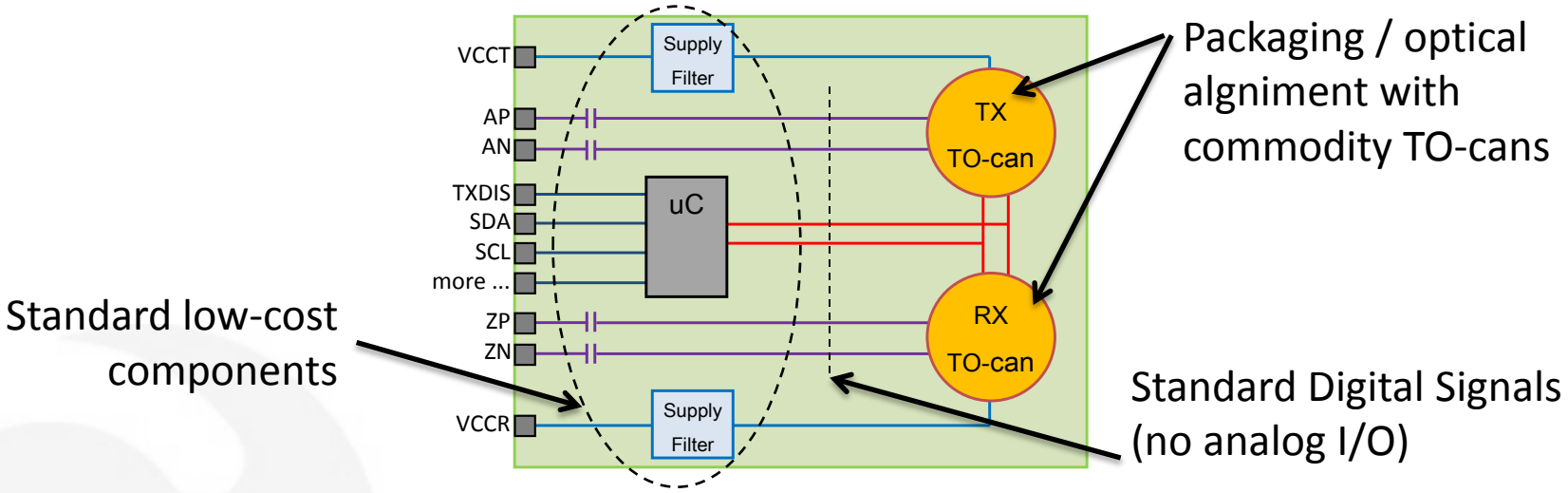
Example: Green SFP+ Module using Smart OSA's

GigOptix™ SFP+ VSR (Very Short Reach) format will cover most frequently used reaches (up to 100m) in Datacenter/HPC while consuming merely 150mW. That is **4x** lower power dissipation per plug than current SFP+ products.



GigOptix owns the chipset, the firmware and is deeply involved in the module design, CM selection, O/E selection, production setup and monitoring.

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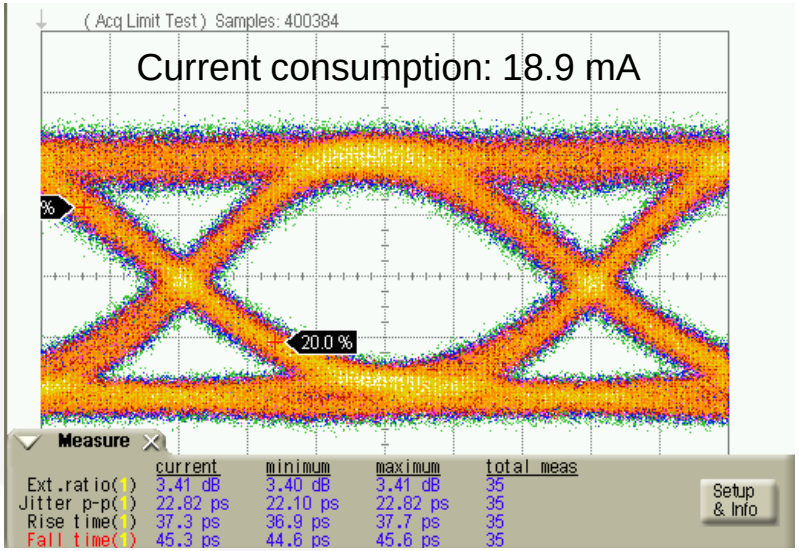
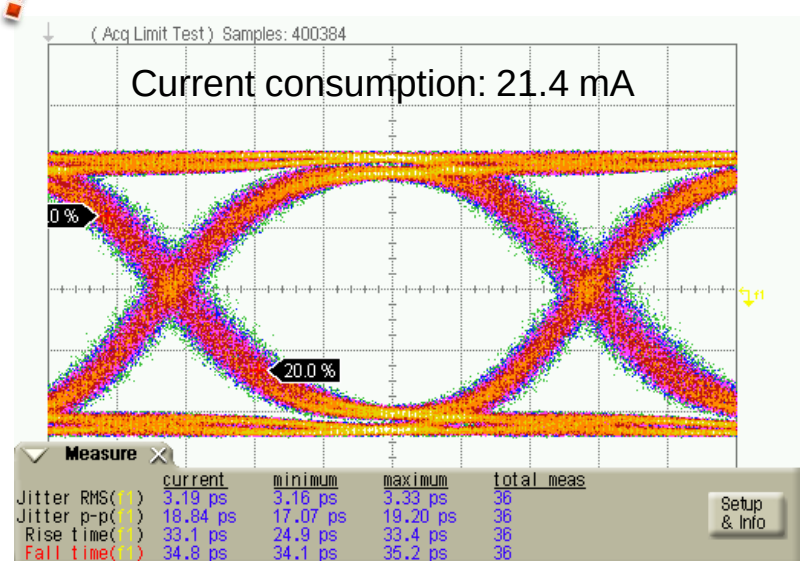
Low Power Consumption 10.3 Gbit/s Link

- HXT4101A Settings:
  - Driving Current:
    - Average = 25 (5.2 mA)
    - Modulation = 25 (5.2 mA_{pp})
  - Pulse Width Adjust = 2
  - Bandwidth Adjust = 0
  - Drive Tune Constant = 3
  - Emitter Follower Constant = 3

133mW!

- HXR4101A Settings:
  - Signal detection & AGC disabled
  - Swing Size = 0
  - Emitter follower current = 0
  - Gain = 0
  - Output Degeneration = 3
  - TIA bandwidth = 0
  - EF current (output) = 1





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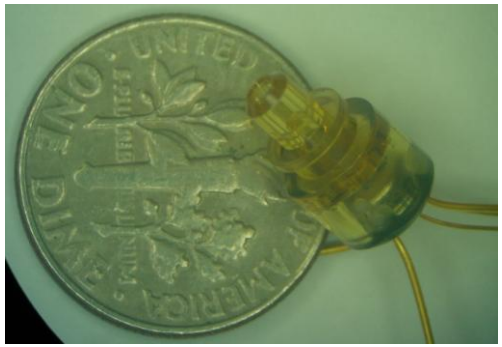
TOSA/ROSA Product map

	TOSA 5pin (HXT4101A in stand-alone mode)	TOSA 6pin (HXT4101A in I2C-controlled mode)	ROSA 5pin (HXR4101A in stand-alone mode)	ROSA 6pin (HXR4101A in I2C-controlled mode)
Datacom		X Smart OSA	X Conventional usage	X Smart OSA
Consumer	X	X [1)]	X	X [1)]
Avionics	X [2)]		X	
Telecom				X long-wavelength SM I2C to set bit-slicing

Notes:

1) Advanced consumer applications, e.g. to save power or wide temperature range

2) Avionics may need special TX subassemblies to cover very large temperature range while avoiding the use of a microcontroller



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Conclusions

- GigOptix chip-sets enable ever more compact assemblies of optical interconnect solutions
- Smaller sized packages require more careful design
  - Cooperation with contract manufacturers
  - OSA products
- Lower power and cost reduction through reduction of interfaces / integration of functionality
- Create end-customer pull to accelerate time-to-market

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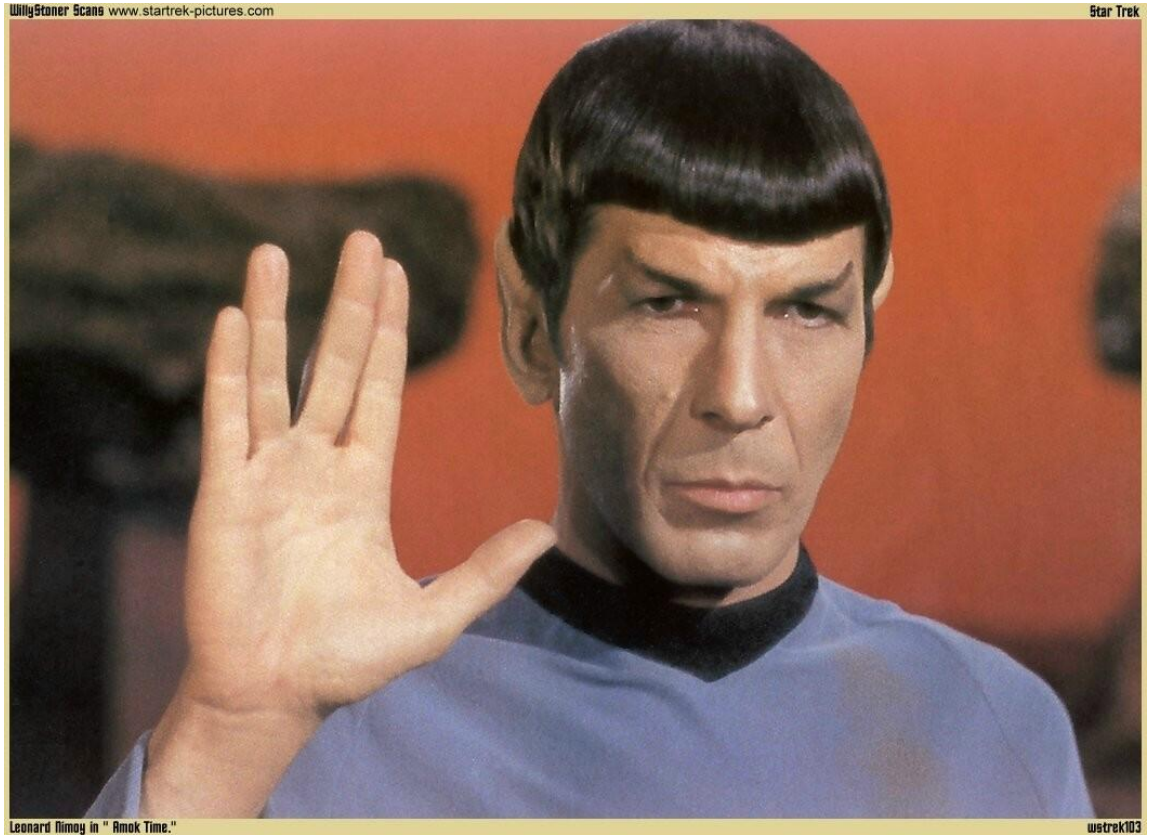
SPOC!



Size, Power, Cost

The 5 year mission starts here ...

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