

“Impact of High Speed Serial links (HSS) in embedded computing”

by Patrick Mechin, president of Techway



01 02 03 04 05

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The way of innovation



Certificat FR12/695125

Embedded Tech Trends 2015
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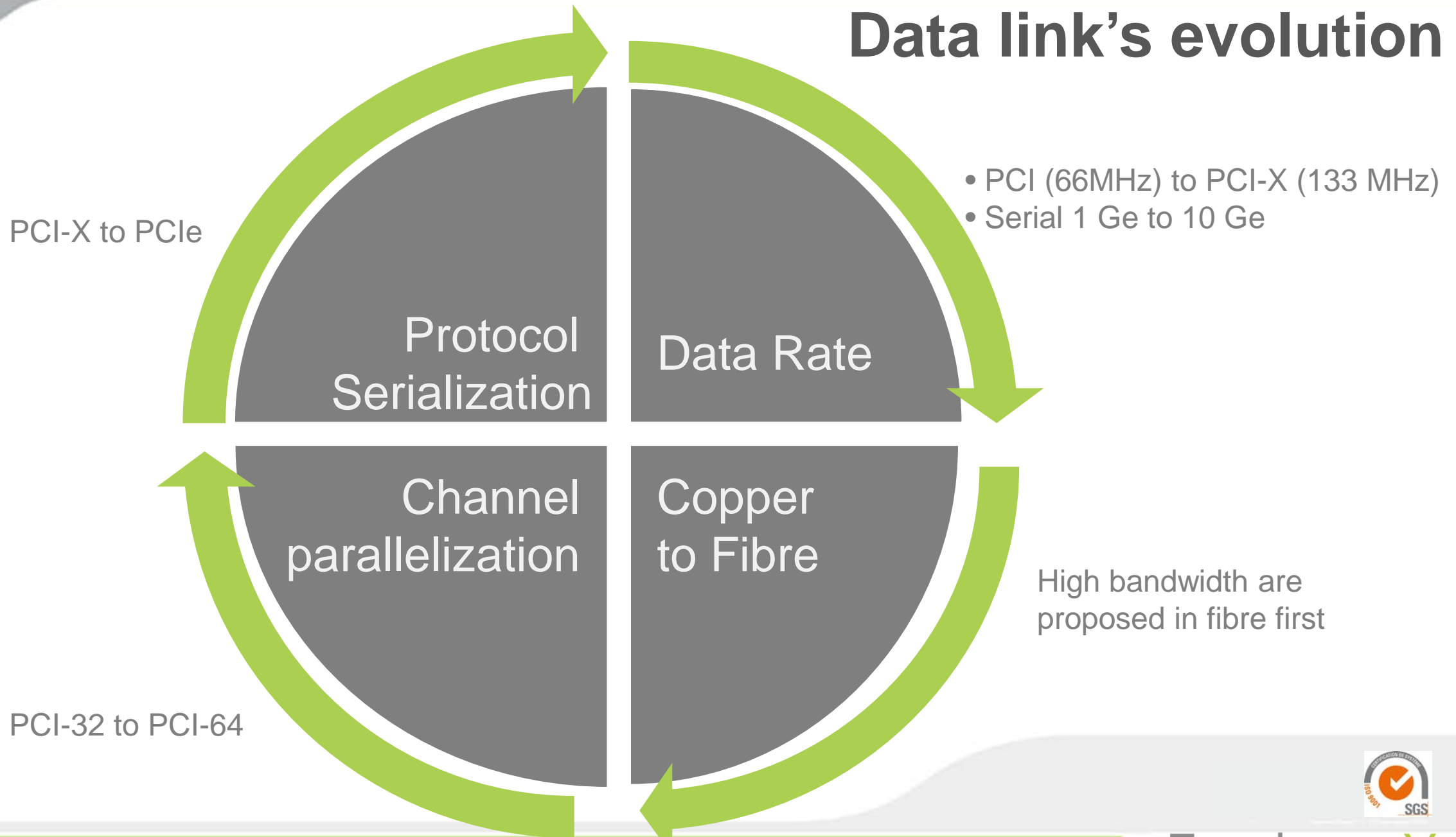
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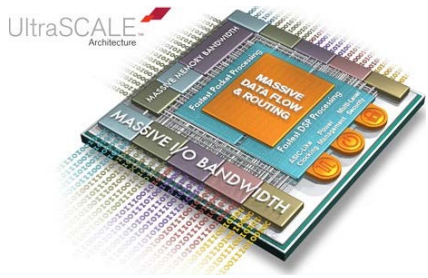
Data link's evolution



FPGAs HSS Evolution

Xilinx FPGAs :
2002 -2014

- 6x HSS
- 6x Faster

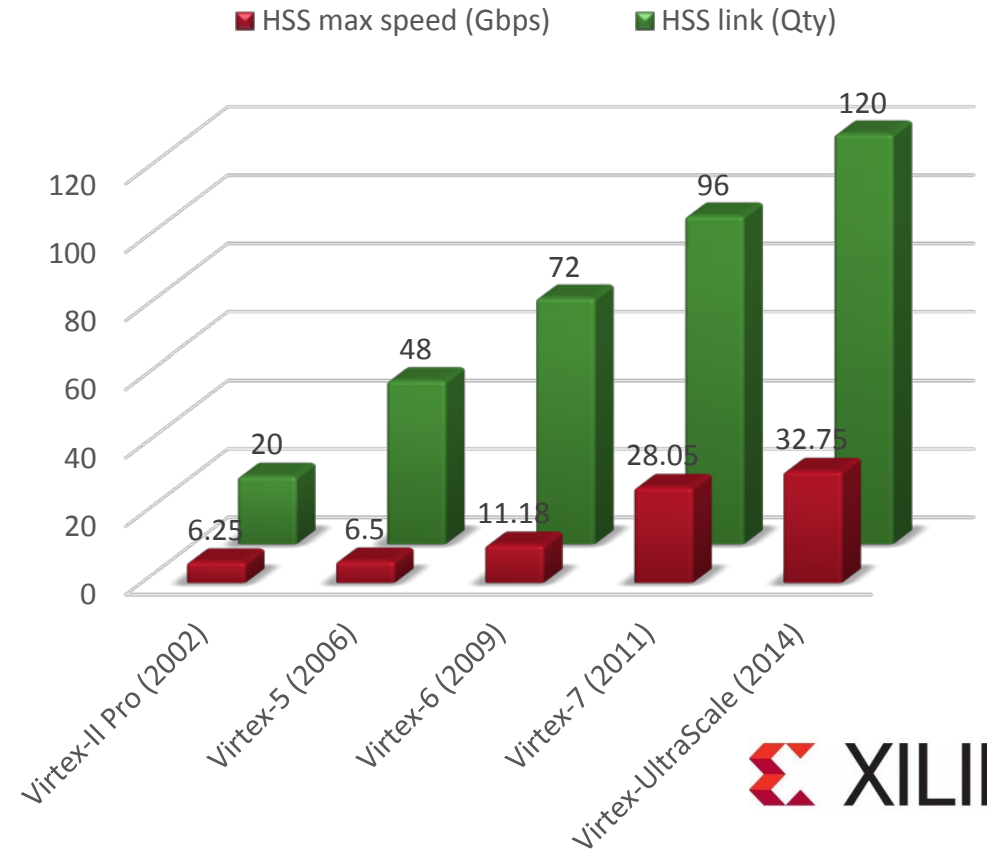


FMC (VITA 57.1)

- 10 HSS links
- @10Gbps
- Bottleneck for today FPGAs



Standard needs to evaluate



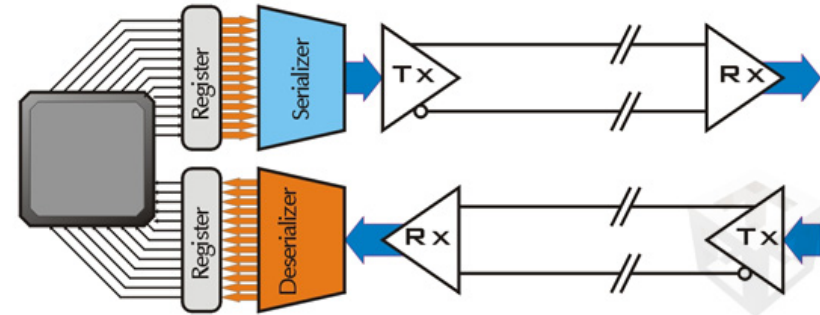
Pros & Cons of HSS interface

Pros:

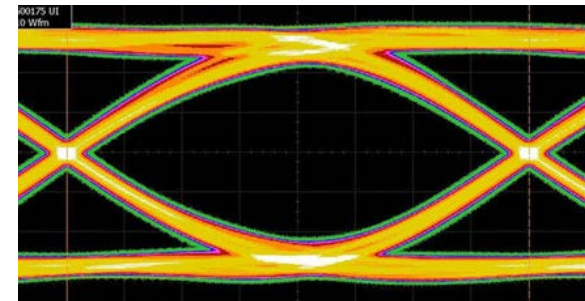
- Increase the bandwidth (>10Gb/s)
- Save power consumption
- Guarantee clock/data alignment
- Relax some PCB constraints
- Increase the transmission length
- Reduce the EMI

Cons:

- Increase the latency significantly (> 20 clock periods)
- Request new PCB technology (~~FR4~~)
- Need training period



Example of copper HSS

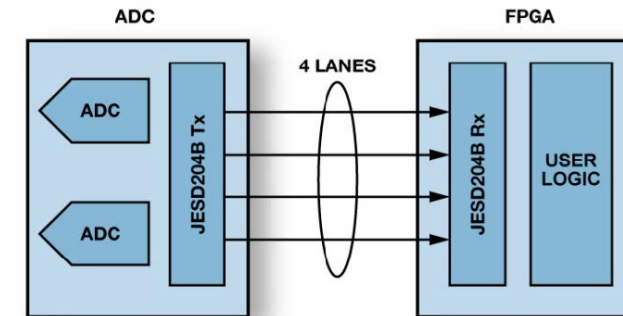


Eye diagram of HSS : Used to check quality and integrity of serial data link

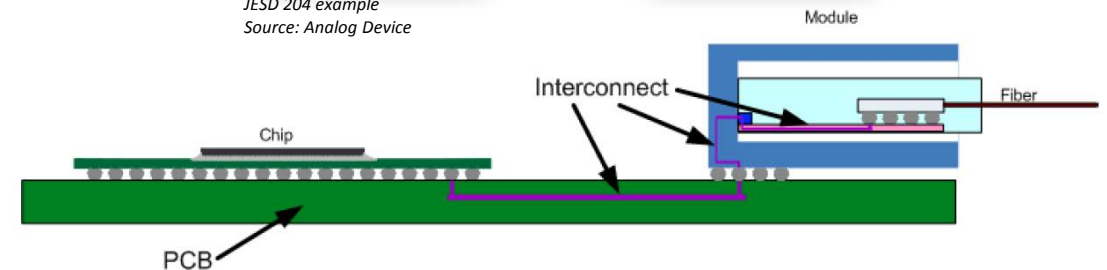
New uses of HSS for chip to chip interface

High speed alternatives for legacy parallel buses:

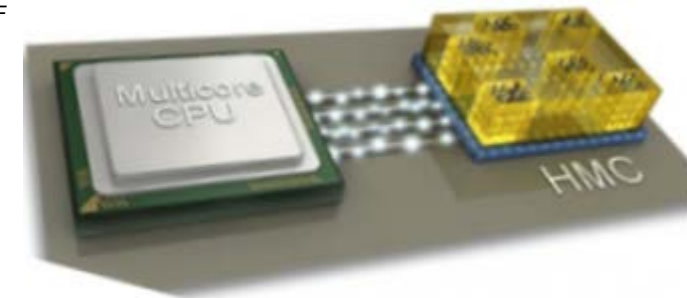
- JESD204: Serial Interface JEDEC Standard up to 12,5Gb/s for Data Converters
- Interlaken: Chip-to-chip packet transfers at rates scaling from 10Gb/s to 100Gb/s and above
- HMC: Hyper Memory Cube interface: next memory generation after DDR4



JESD 204 example
Source: Analog Device



Interlaken example
Source: OIF



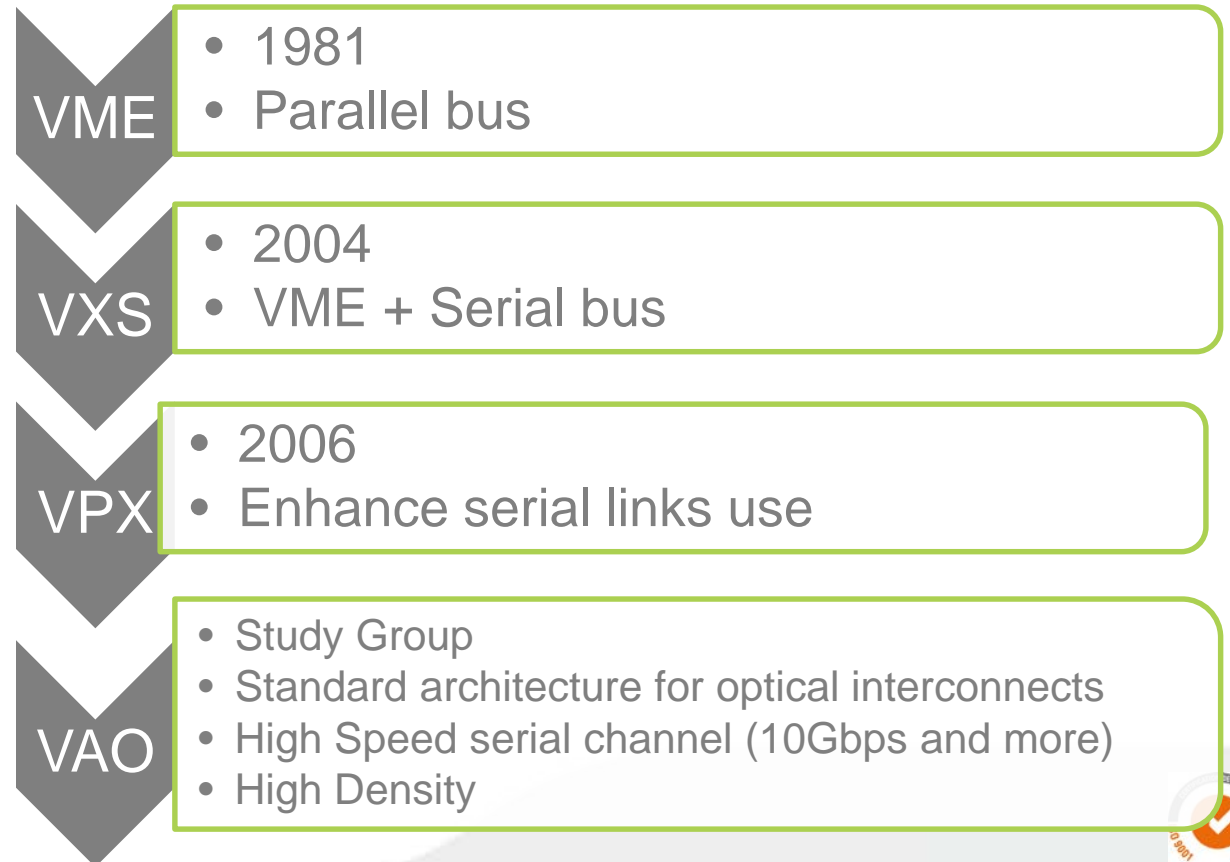
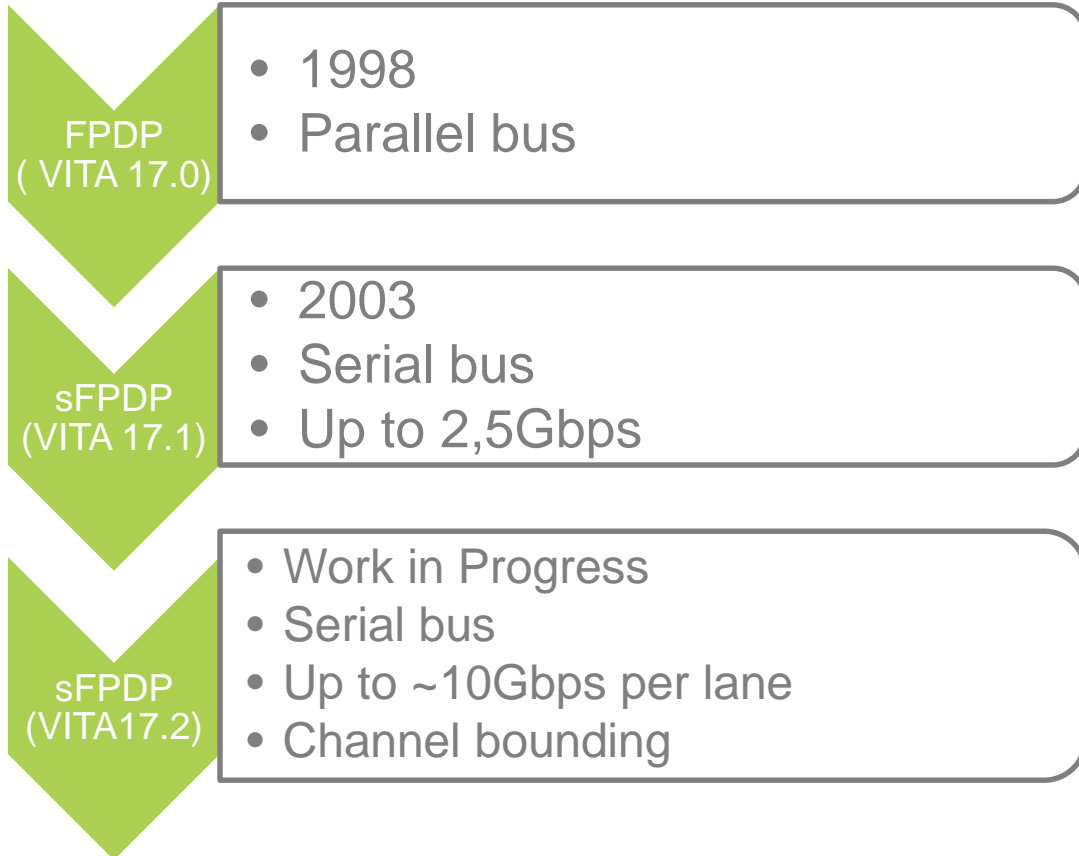
Hyper Memory Cube example
Source ExtremeTech



VITA Technologies' progress



Front Panel Data Port VITA 17



Optical solution for performance breakthrough

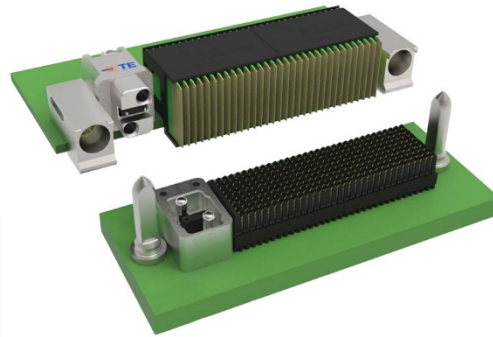
Backplane communication : VITA 66



VPX 3U card

Source: Alpha Data

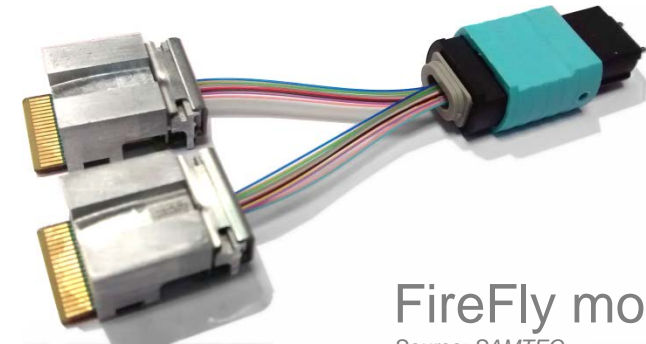
VPX Optical
(VITA66)



Source: TE connectivity

Optical module from SAMTEC.

- For backplane
- For front end IO

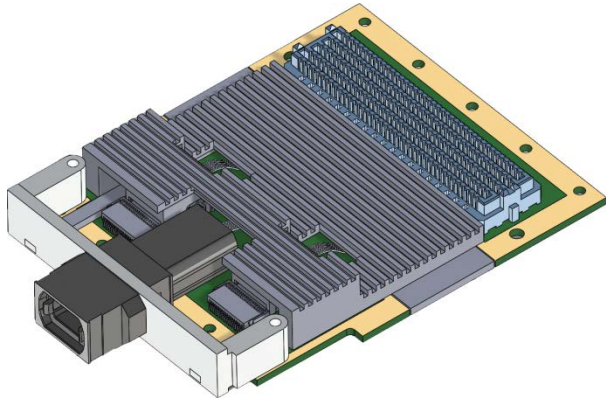


FireFly module

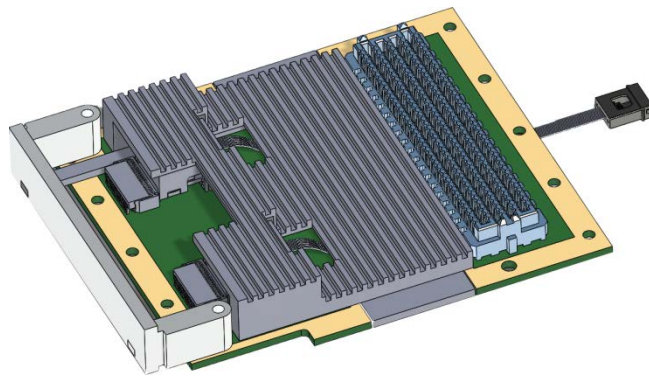
Source: SAMTEC

Techway's TigerFMC

MTP Front-End connectivity



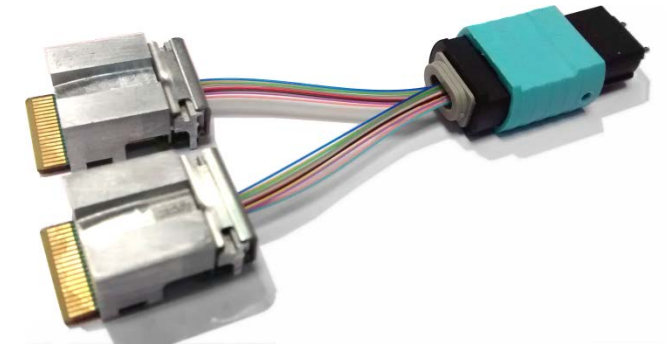
MT Rear-End Connectivity



- VITA 57.1 FMC Mezzanine (fully compliant)
- **10 full duplex** links
- Rate up to **10Gbps per link** (Protocol agnostic)
- Air cooled and Conduction Cooled
- Front or Rear connectivity



FireFly™ Active Optical cable inside



[Samtec, Inc. And TechwaY Press Release](#)

The fastest serial communication FMC

Example of high density optical interface equipment

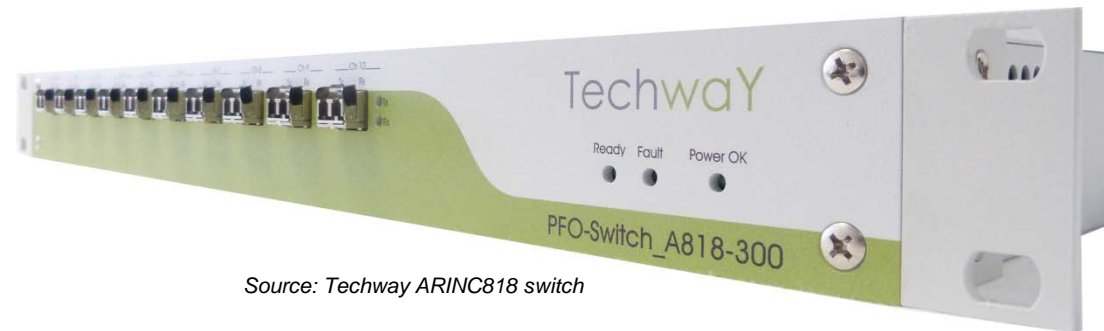
ARINC818 10x10 switch

- Use in AIRBUS A350 program
- Use in US Air Force



Key features

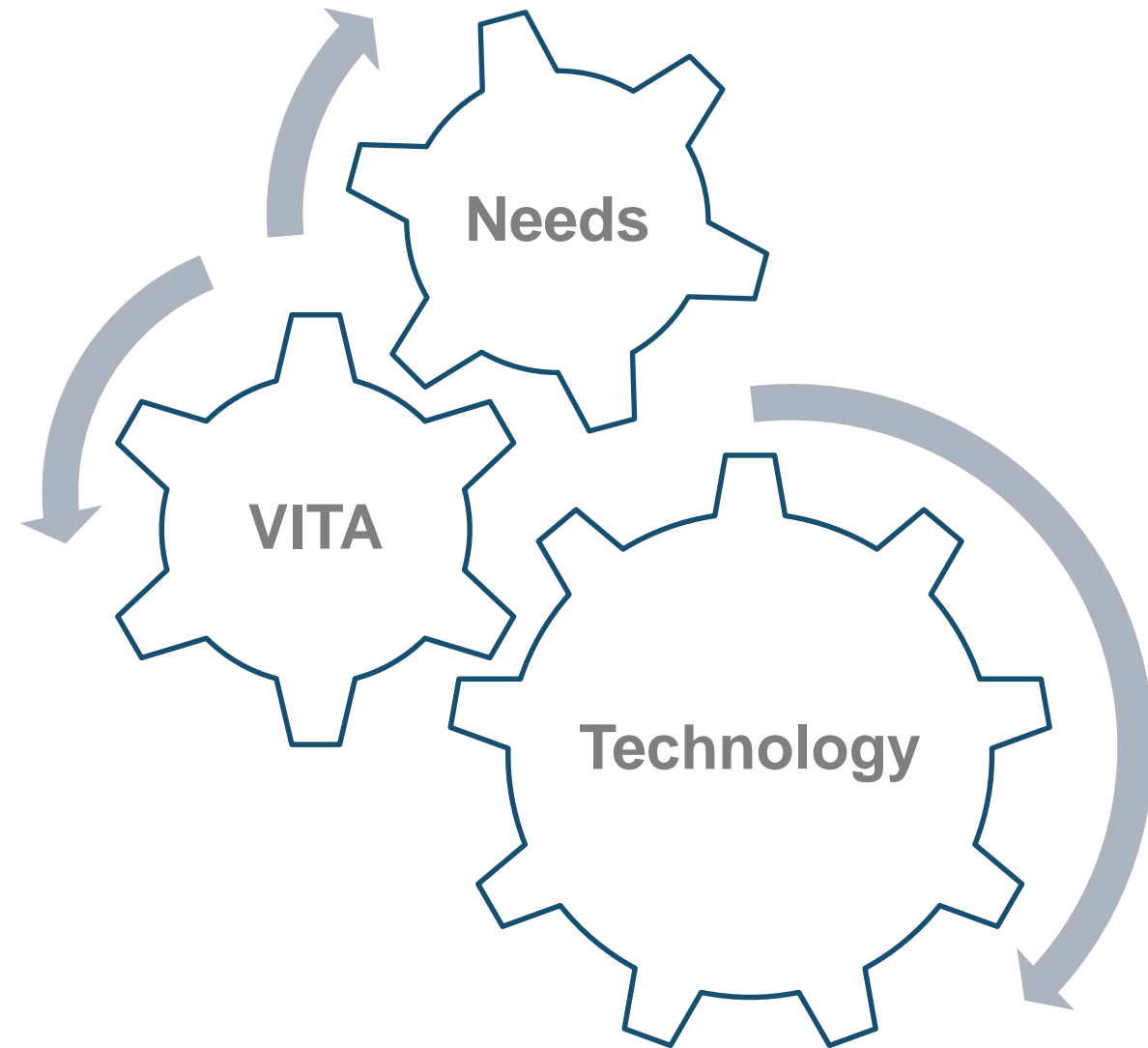
- 1 FPGA Kintex7 card
- 1 optical FMC card
- 10 Rx@10Gbs
- 10 Tx @10Gps



Source: Techway ARINC818 switch

Wrap up

- High speed and high density serial communications needs are growing
- Technology already address this needs
- VITA works to enforce HSS based new standard is mandatory
- FMC standard is a good example of a standard that need to evolve.
 - Proposal: VITA 57.4 with 33 Gbps support and 32 links for example



Thank You for your attention



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