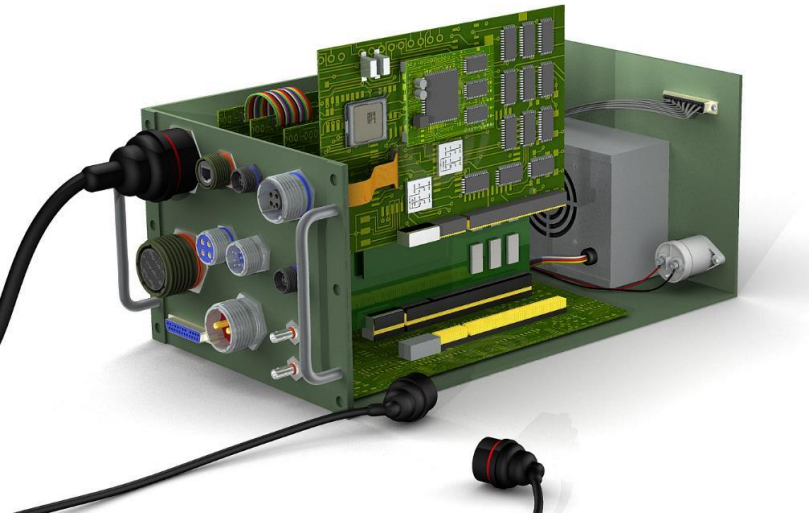
Evolving Interconnect Standards – Keeping Pace with the Embedded Computing Industry



Inventing. Connecting. Inspiring. Thriving.

Michael Walmsley
Standards and Product Management
Aerospace Defense and Marine Business Unit

EVERY CONNECTION COUNTS

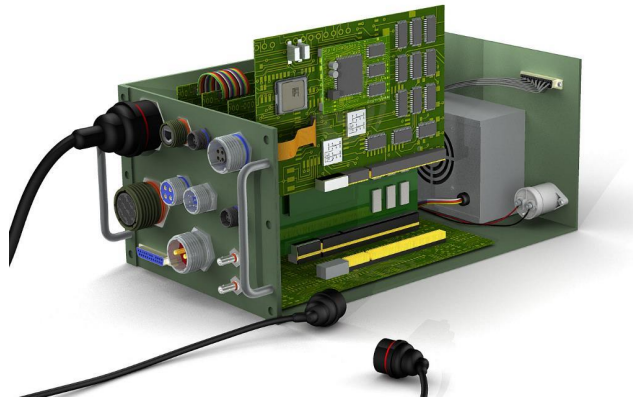
TE connectivity

Interconnect Standards – everyone’s favorite subjects

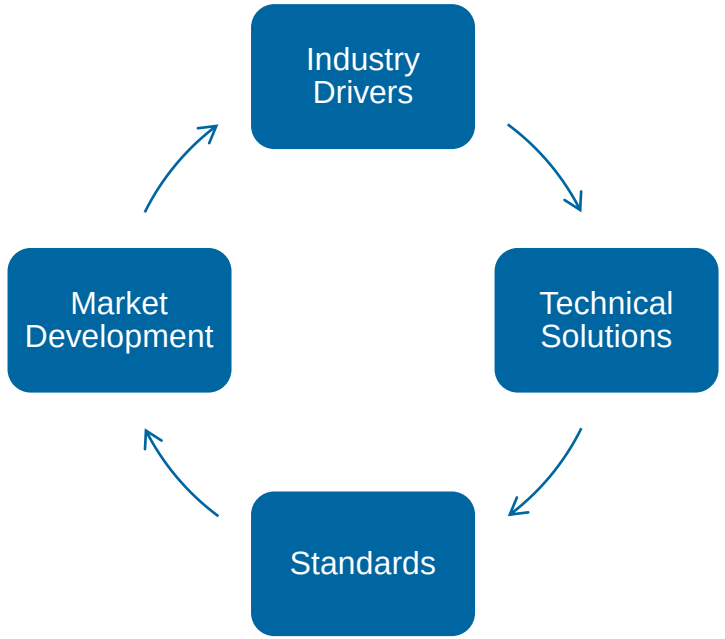
Topics:

- Key industry drivers and influence on connector development
- Status and trends in interconnect standards development
- How can we accelerate connector standardization and implementation
- What are the next challenges and opportunities

Industry Drivers – Embedded Systems



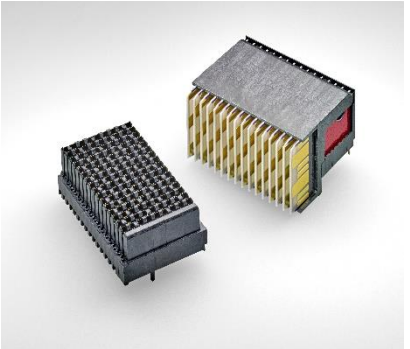
- Faster processors, more cores
- Increased I/O count and functionality within a plug-in module
- Reduced SWaP (Size Weight and Power)
  - smaller packaging
  - lighter weight solutions
  - more efficient power
- Open systems architecture
- Modular, scalable systems

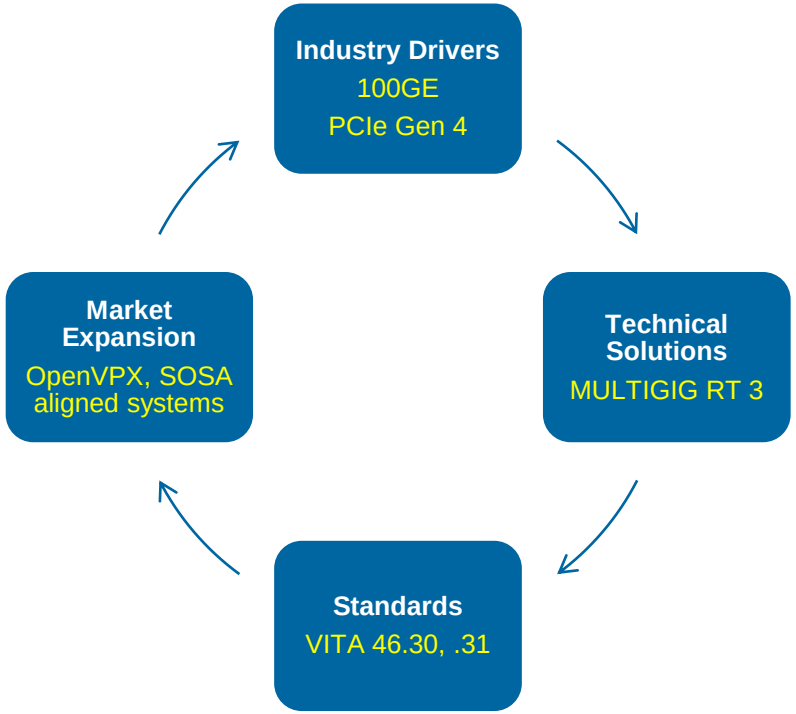


Speed

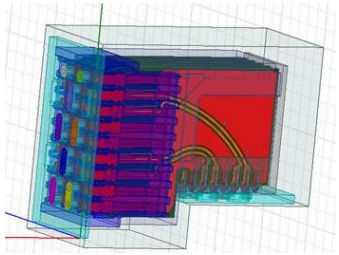
VITA 46 Backplane Connector:

From VPX release in 2006 aimed at 3.125 Gb/s…
…to today's MULTGIG RT 3 Connector at 25 Gb/s

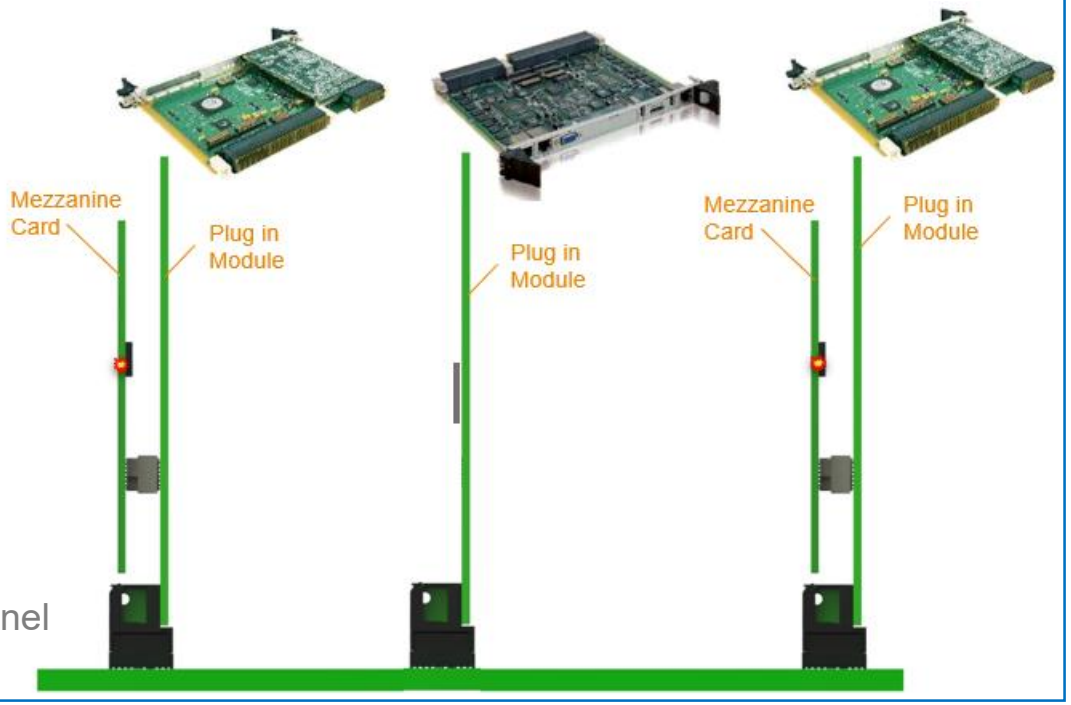




It's not just the connector….

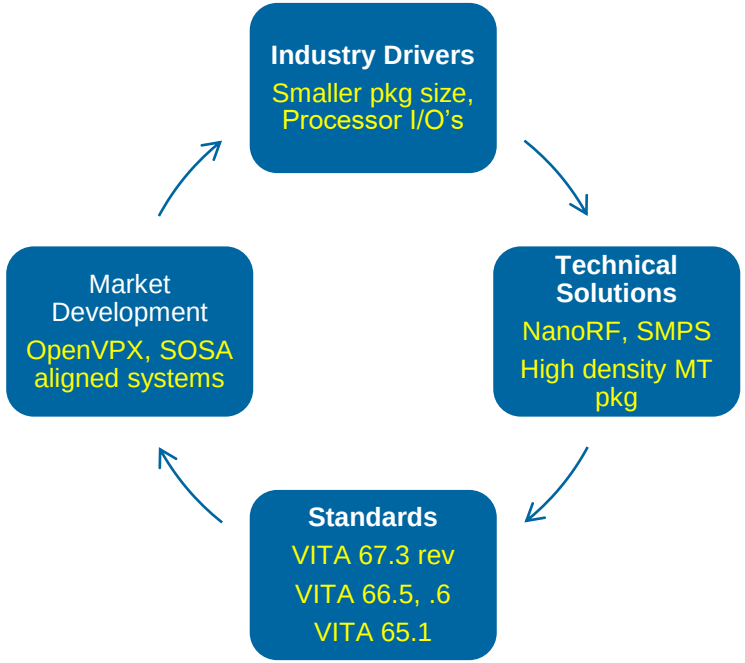


It's the channel

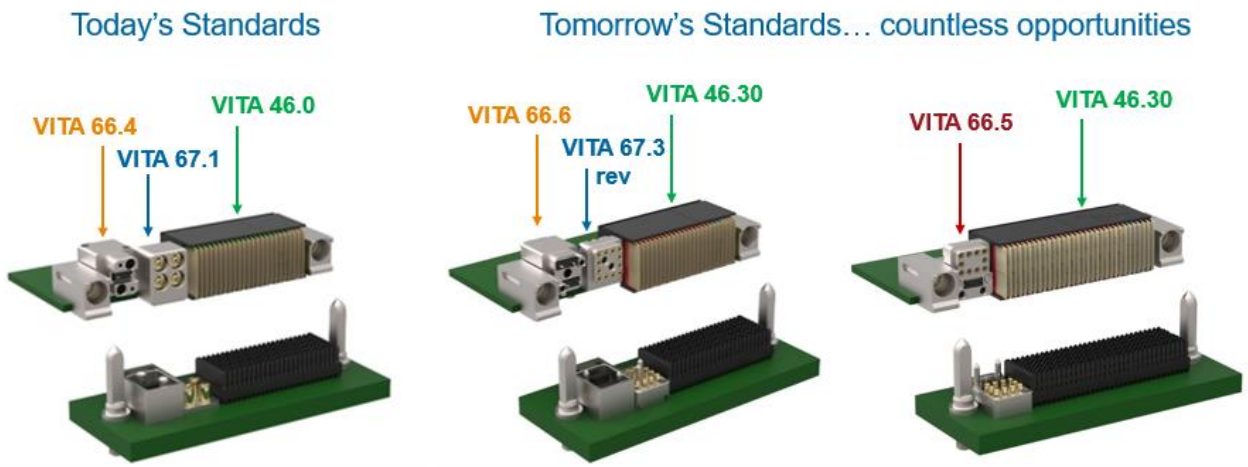


Density

Processors with more I/O, need for SWaP, are driving density requirements to unparalleled levels

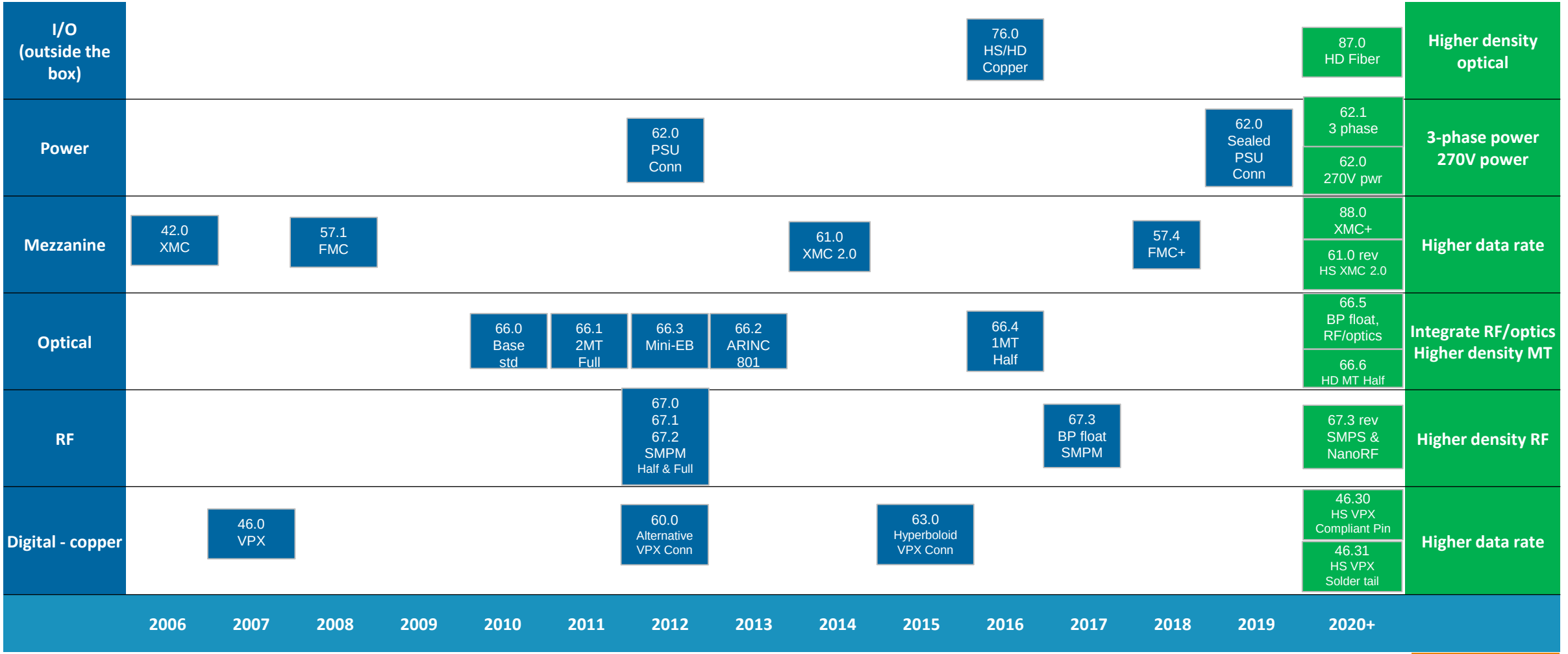


The evolution of a 3U VPX slot interface



Digital	32 diff pairs @ 10Gb/s	32 diff pairs @ 25Gb/s	48 diff pairs @ 25Gb/s
Optical	12-24 optical lanes @ 25Gb/s	24-48 optical lanes @ 25Gb/s	12-24 optical lanes @ 25Gb/s
RF	4 RF contacts @ 26.5 GHz	12 RF contacts @ 70 GHz	10 RF contacts @ 70 GHz

The Evolution of VITA Interconnect Standards

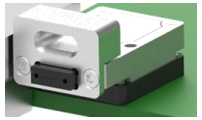


Rapid technology changes are driving interconnect development for rugged embedded systems
The window for next gen interconnect standards shrinks with each generation

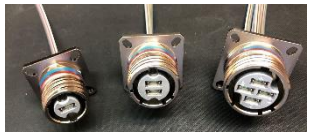
How Do We Accelerate Next Gen Standard Interconnects

Build on existing interconnect standards – don't redefine the interface if we don't need to

Standard MT interface (IEC 61754-5)



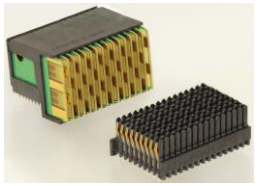
VITA 66 modules (cabled and transceiver)



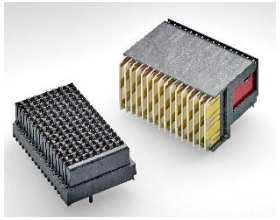
VITA 87 draft std with M38999 shells

Leverage commercial solutions for application in rugged embedded computing

MULTIGIG RT 1 Connectors
Used in data centers for "high speed" signals

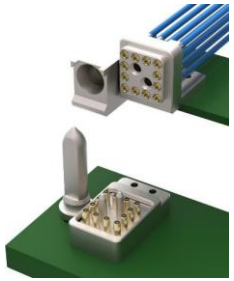


MULTIGIG RT 2, 2-R Connectors
10Gb/s
VITA 46.0



MULTIGIG RT 3 Connectors
25+ Gb/s
VITA 46.30

Establish "building blocks" that can be implemented for a range of system solutions



NanoRF Modules
VITA 67.3 rev

MT Modules
VITA 66.x

Hybrid RF/Optical Module for highest density in a half module

VITA 66.5

Flexibility vs Convergence in Standards

Building blocks support multiple configurations…

… but when is “multiple configurations” too many?

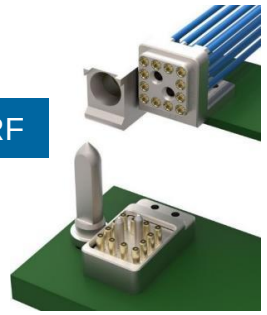
Flexibility vs Convergence – RF/optical modules

VITA 67.3 adds higher density interfaces NanoRF and SMPS and allows flexibility of contact positions (to be defined in VITA 65.1).

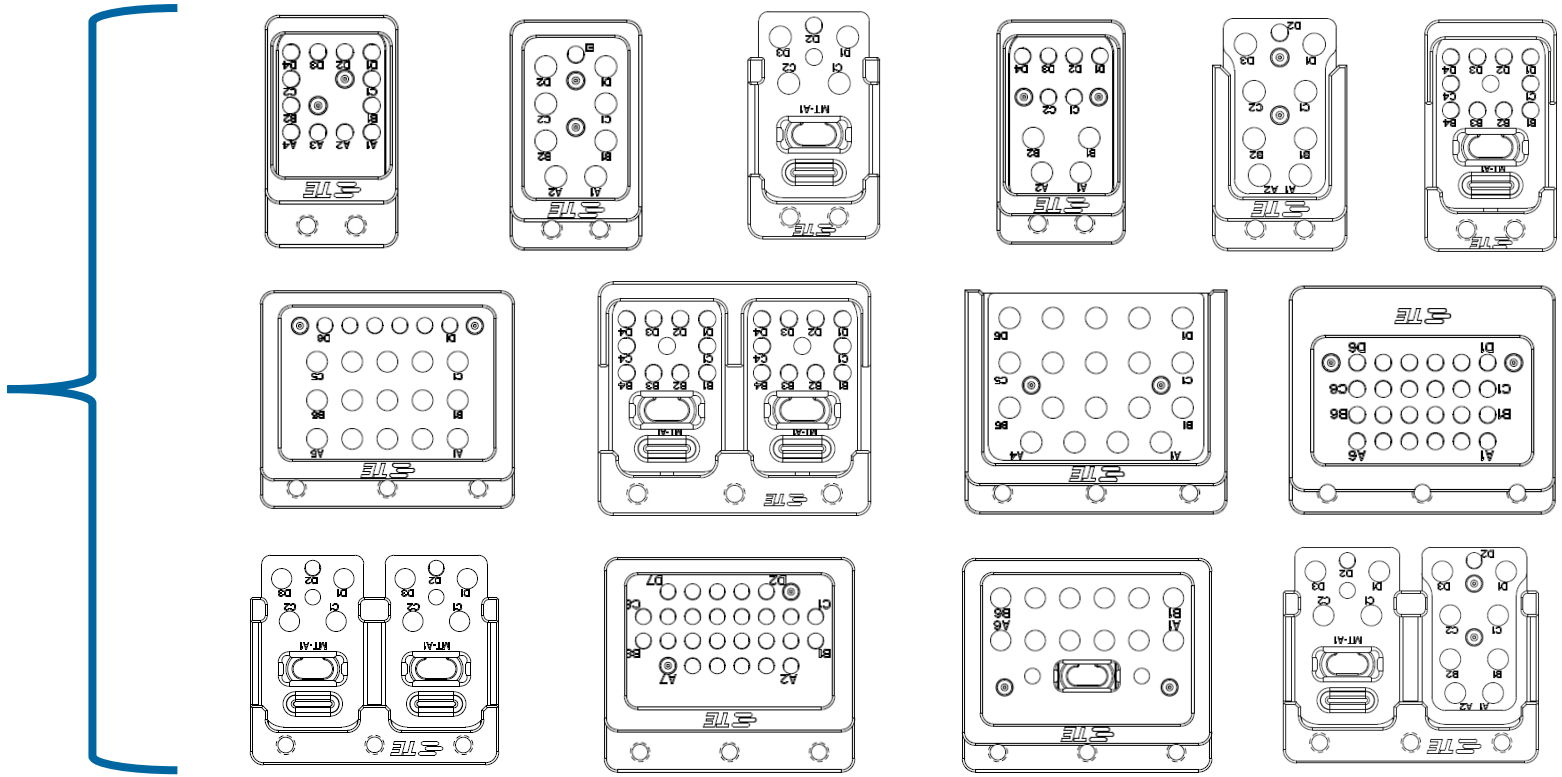
How do we maximize use of the module area for various use cases?

Numerous configurations and iterations were explored…

NanoRF



VITA 66



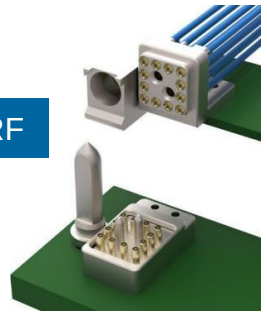
Building blocks allow for flexibility.

Flexibility vs Convergence – RF/optical modules

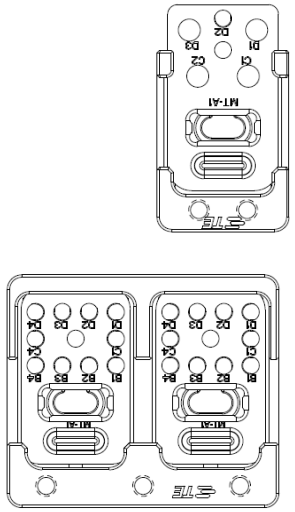
SOSA™ (Sensors Open Systems Architecture) is aligning with several key designs to support 80% of use cases

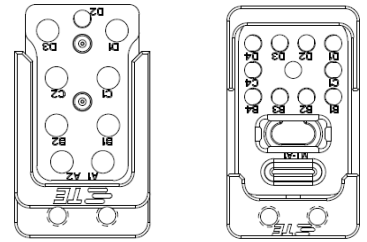
Fewer, more common standard modules brings economies of scale, increases interoperability, shortens development cycles, reduces costs.

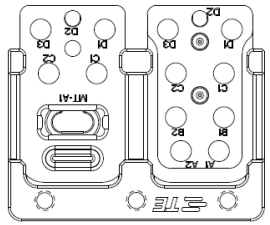
NanoRF



VITA 66







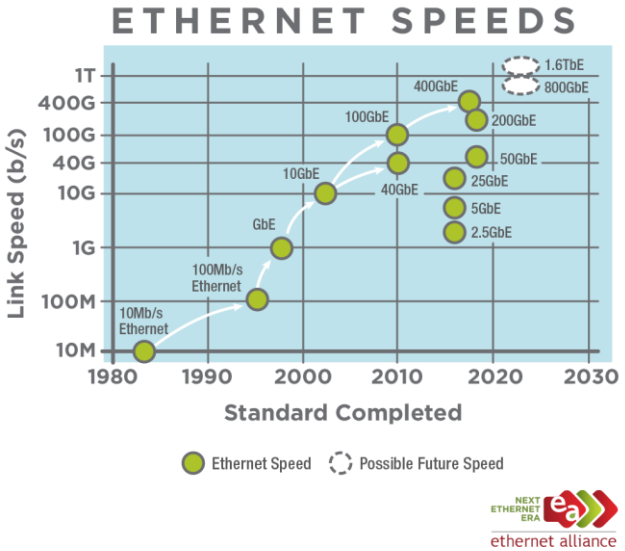
Standardizing the options brings economies of scale and interoperability.

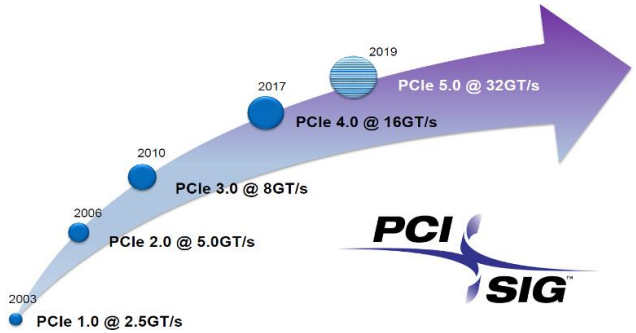
What will drive next gen interconnect standards?

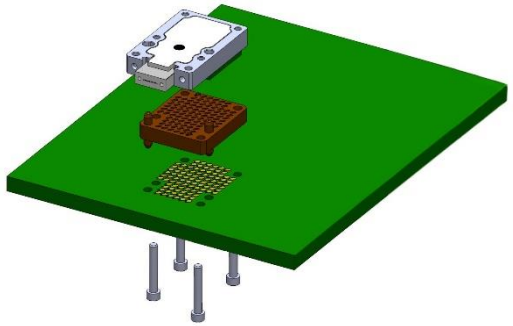
Speed

Ethernet, PCIe doubling data rates every 2-3 years

200G Ethernet, PCIe Gen 5 around the corner







Increased adoption of optics
Higher fiber counts, higher speeds

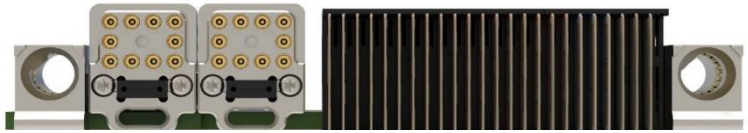
Next Gen copper backplane interconnect?
Cabled backplanes?

What will drive next gen interconnect standards?

Speed

Density

How much more can we squeeze out of 3U VPX?
Higher pin density backplane solutions?



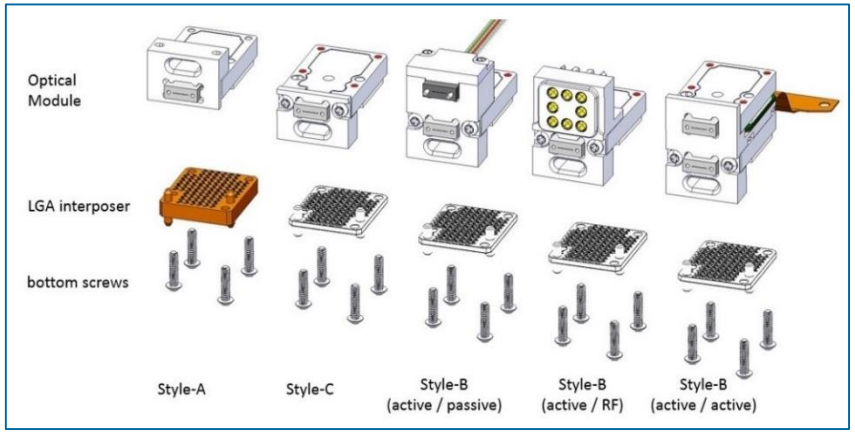
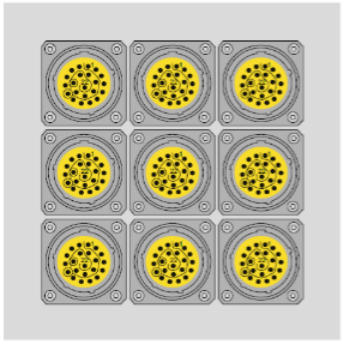
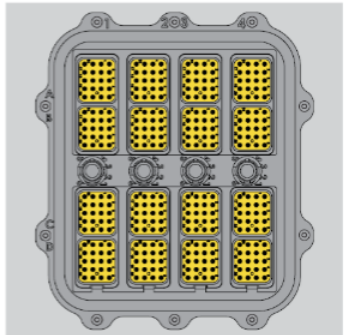


Image courtesy of Reflex Photonics

Rectangular I/O vs Circular?

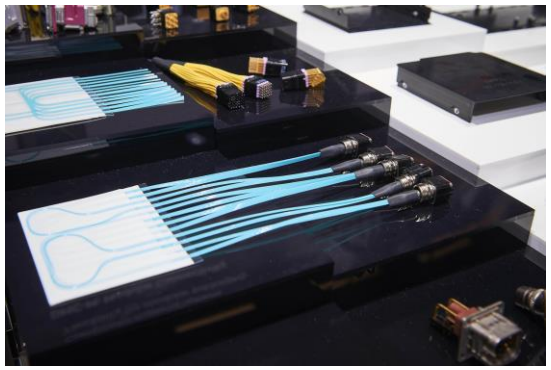


Circular Connectors
Insert 13-35
Size 22 Contacts, 5A
198 contacts
309 g (without panel)
36 mounting screws
9 panel cutouts



DMC-M Connectors
Insert 20-22
Size 22 Contacts, 5A
320 contacts
149 g (without panel)
10 mounting screws
1 panel cutout

Optical density… at the card edge and within a plug-in module



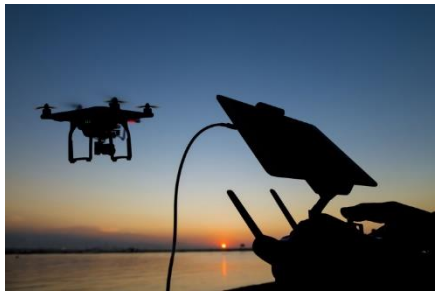
What will drive next gen interconnect standards?

Speed

Density

Size

Small Form Factor (SFF) applications are growing…



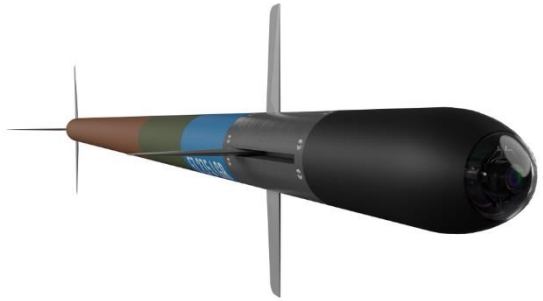


Image courtesy of Curtiss-Wright Corporation

… what will be the standard architecture for next gen SFF applications (smaller than 3U VPX)?

What will drive next gen interconnect standards?

Speed

Density

Size

Power

With increase in electrical systems over mechanical, voltages are increasing…

- 270VDC becoming more standard for aviation
- 600VDC ground vehicle systems
- 1000-1500VDC on the horizon

Power efficiency / density is more critical

… interconnect will need to support development in power supplies and power distribution systems

Standards development is challenging…

But needed…

… to support emerging technologies
… to build the ecosystem
… and to be a vital part of the industry development

And it has never been as active as it is today.

Inventing. Connecting. Inspiring. Thriving.

Thank You