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Embedded Tech Trends

The Next Generation Space Interconnect Standard (NGSIS) – SpaceVPX (VITA 78)

Outline

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- SpaceVPX (VITA 78)
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 - With that in Mind...
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NGSIS Overarching Goals

NGSIS Goals

- Develop Vendor-independent, non-proprietary, system or device design based on official and/or popular standards.
- This allows all vendors (in competition with one another) to create add-on products that increase a system's (or device's) flexibility, functionality, interoperability, potential use, and useful life.
- And enables the users to customize and extend a system's (or device's) capabilities to suit individual requirements.

SpaceVPX Goals

SpaceVPX Goal

- *Develop an enhanced set of backplane specifications that are **based upon existing commercial standards** with added features required for space applications.*
- ***Increase interoperability and compatibility** between manufacturers and integrators, while simultaneously increasing affordability through the use of standard sets of hardware.*

Who is Involved in NGSIS SpaceVPX (VITA 78)

Honeywell

BAE SYSTEMS

 **Microsemi**

 **XILINX**

HARRIS

 **BOEING**

 **freescale**
semiconductor

 **TE**
connectivity

 **AEROFLEX**

Orbital
Innovation You Can Count On™

LOCKHEED MARTIN

 **IDT**
Integrated Device Technology
The Analog and Digital Company™

 **RapidIO**
The Embedded Fabric Choice

NORTHROP GRUMMAN

 **SE**
SEMI Engineering, Inc.

PRAESUM
COMMUNICATIONS

VITA
Open Standards, Open Markets

 **CISCO**

 **AEROSPACE**
Assuring Space Mission Success

 **Sandia National Laboratories**

ELMA
Your Solution Partner

 **L3**
communications

 **SPACE & MISSILE SYSTEMS CENTER**

 **NAVAL RESEARCH LABORATORY**
WASHINGTON, DC

 **NASA**

JPL
Jet Propulsion Laboratory
California Institute of Technology

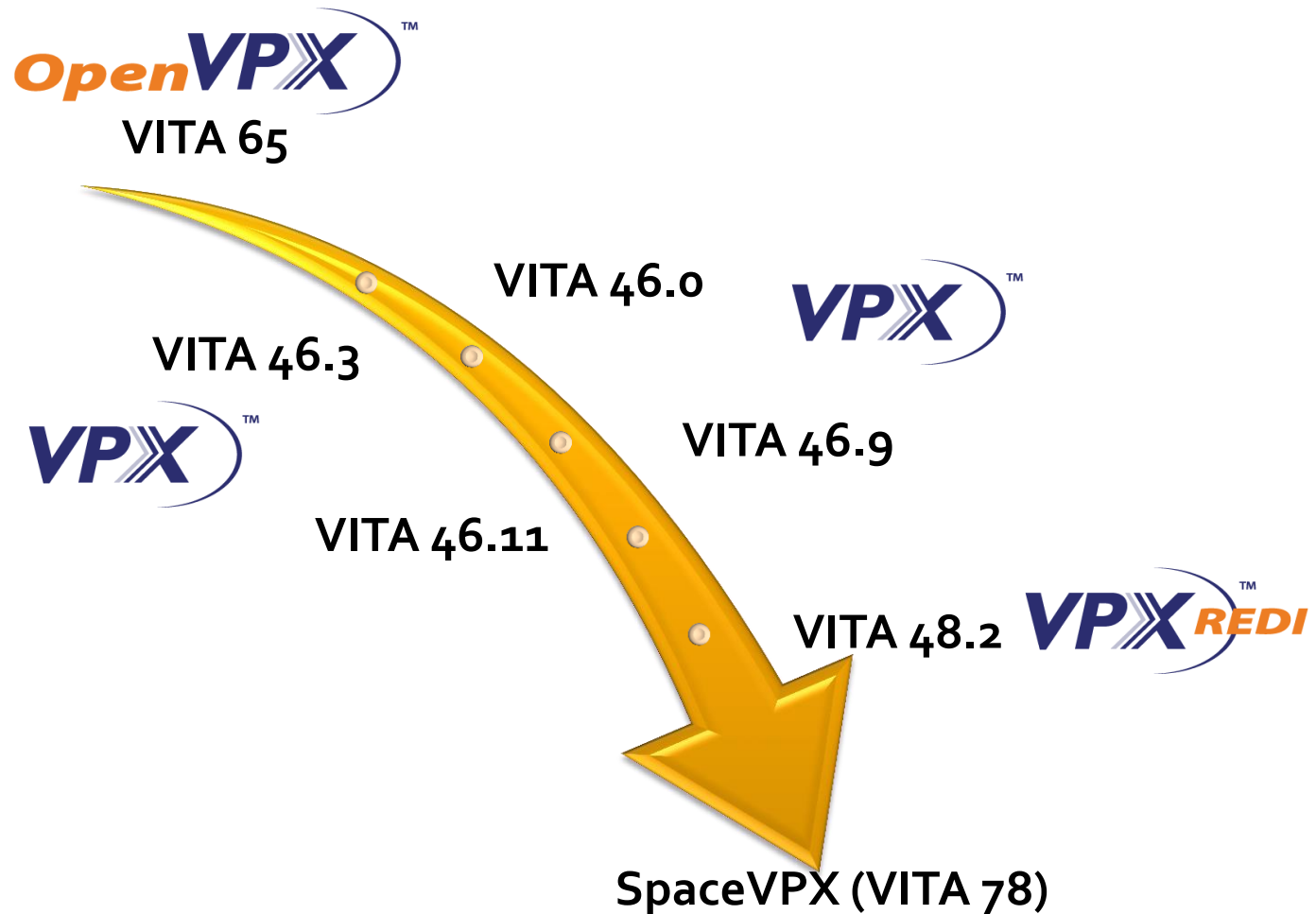
smiths connectors

Amphenol

**Opportunity to Align Industry Practices –
Increase Interoperability, Compatibility, and Reduce Cost**

SpaceVPX (VITA 78)

What is in SpaceVPX (VITA 78)?



With That In Mind....

- **The OpenVPX backplane standard has been chosen as the base for the SpaceVPX backplane standardization effort.**
- The SpaceVPX Systems Specification was created to bridge the VPX standards to the space market.
- SpaceVPX is a **space-capable variation** of the [VITA 65] OpenVPX industry standard developed as an element of the Next Generation Space Interconnect Standard (NGSIS) working group.
- The **primary focus** is to enhance the OpenVPX standard with features required by space applications, such as single-point failure tolerance, spare module support, redundancy, management, and status and diagnostic support.

Mapping Interfaces to SpaceVPX Slots

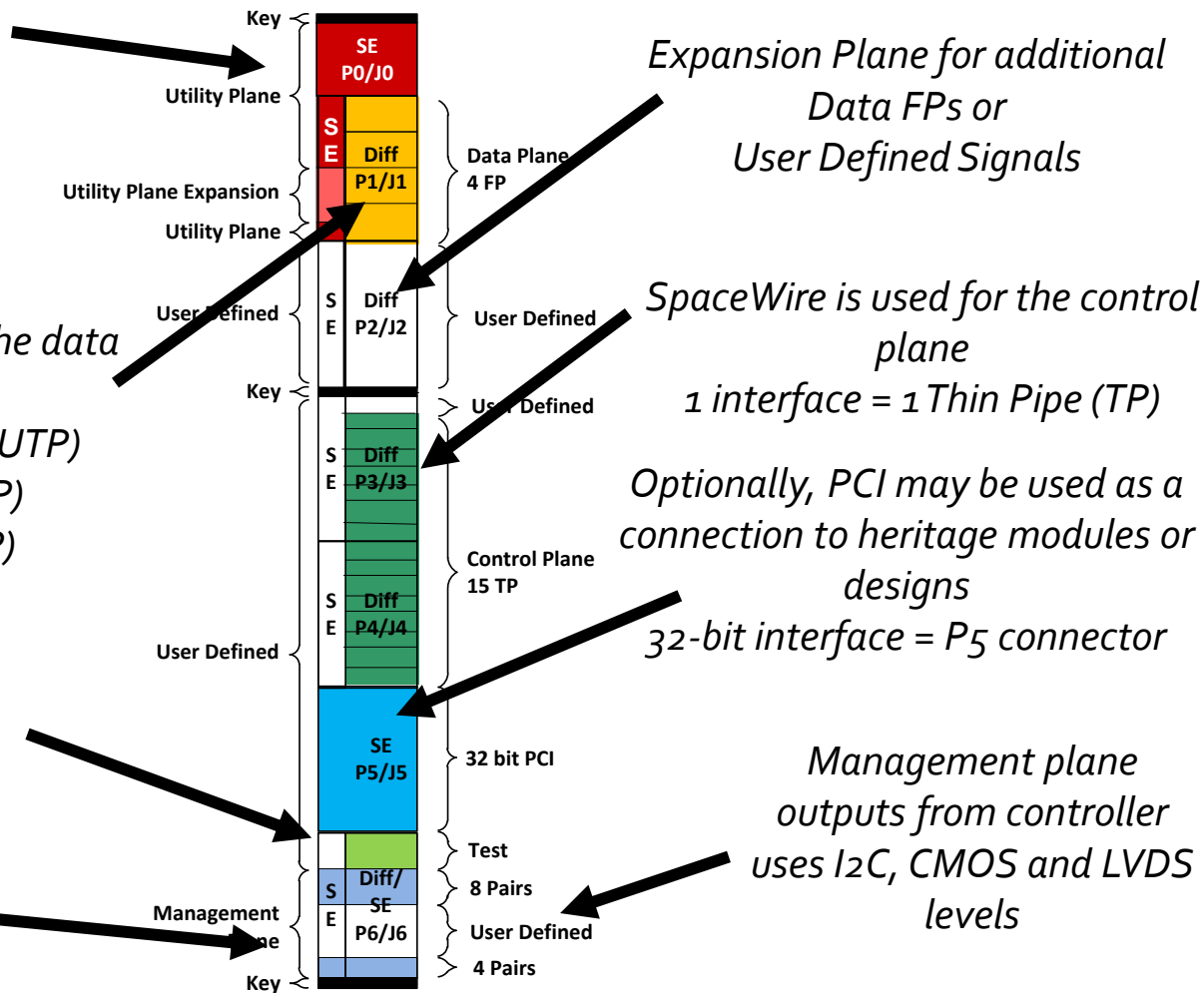
Utility plane provides power, configuration, timing and management input signals using I2C, CMOS and LVDS levels

Serial RapidIO (sRIO) is used for the data plane

x1 interface = 1 Ultra thin pipe (UTP)
 x2 interface = 1 Thin Pipe (TP)
 x4 interface = 1 Fat Pipe (FP)

One fat pipe of test signals reserved

User defined signals available for user purposes



Example SpaceVPX (VITA 78) Backplane Profile

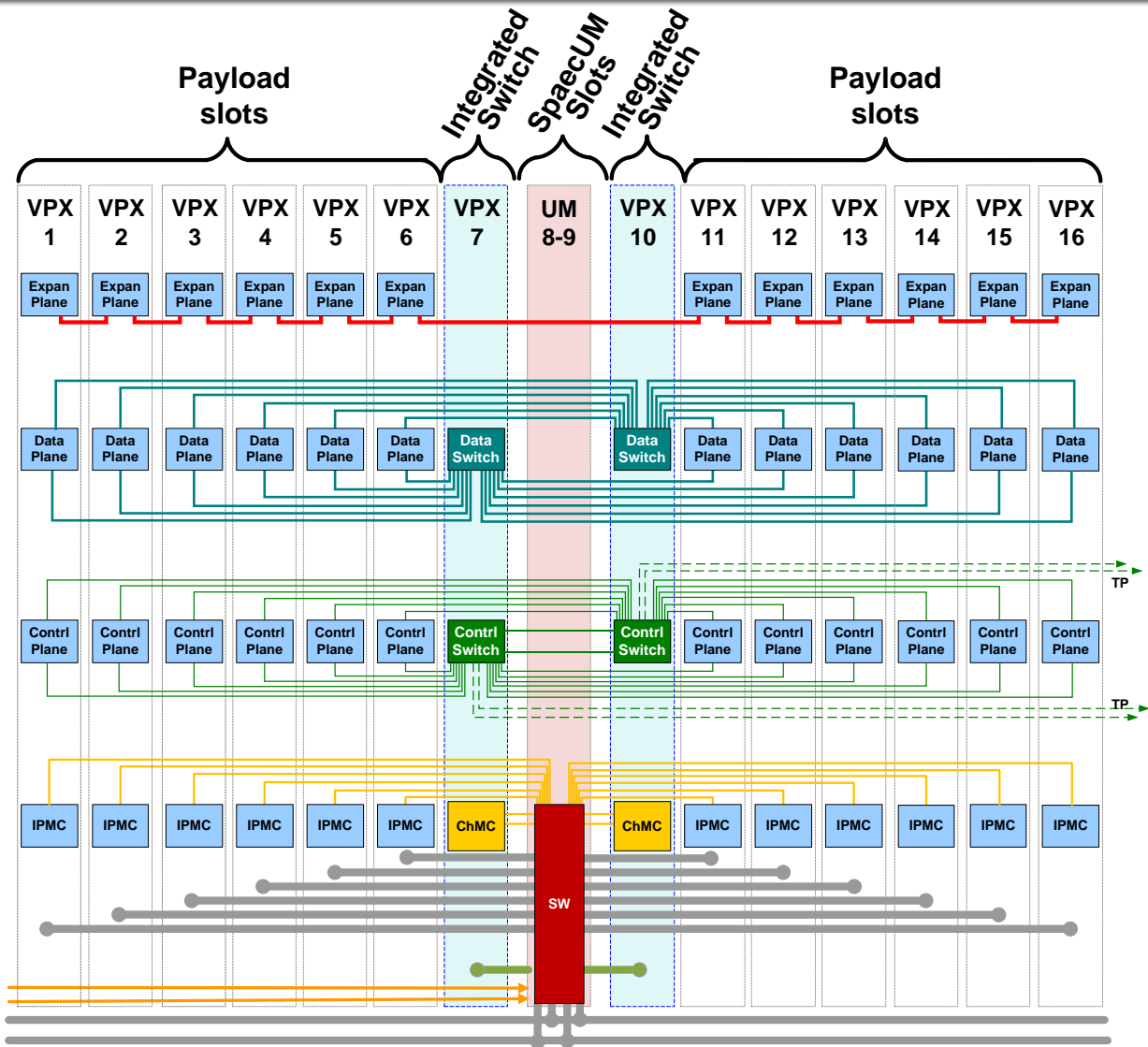
Slot numbers are logical, physical slot numbers may be different

Expansion Plane (DFP)

Data Plane (FP)

Control Plane (TP)

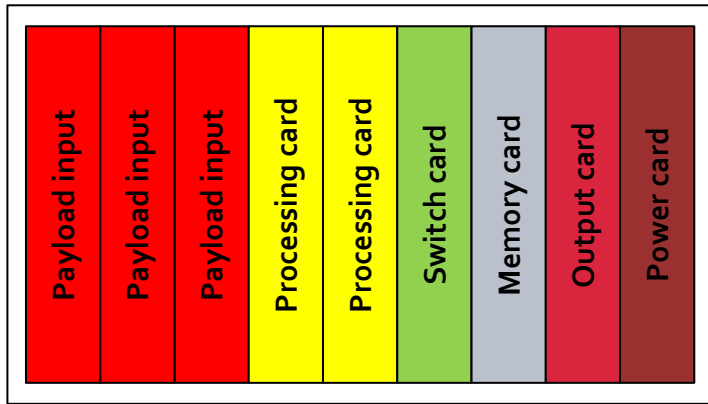
Switched Management Plane (IPMB)
Switched Utility Plane
Includes power
Controller Selection
A and B (HLD)
Power A and B



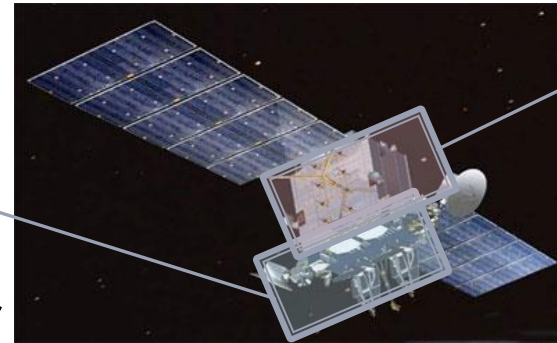
Example Switched Backplane

Putting it All Together For SpaceVPX

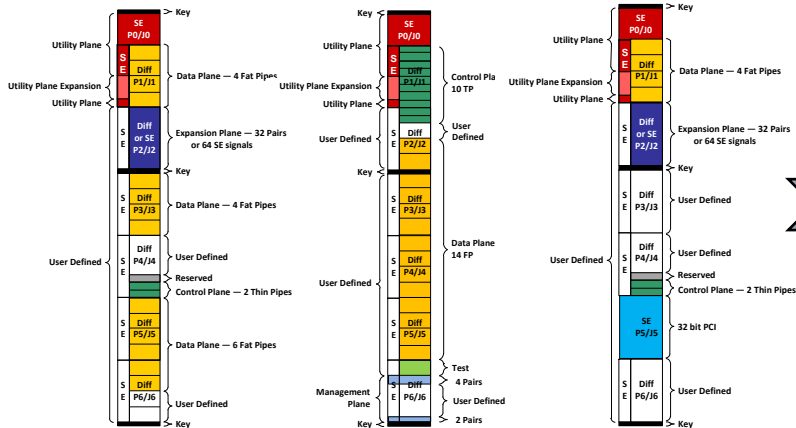
- Protocols: RapidIO, SpaceWire, I2C, etc.



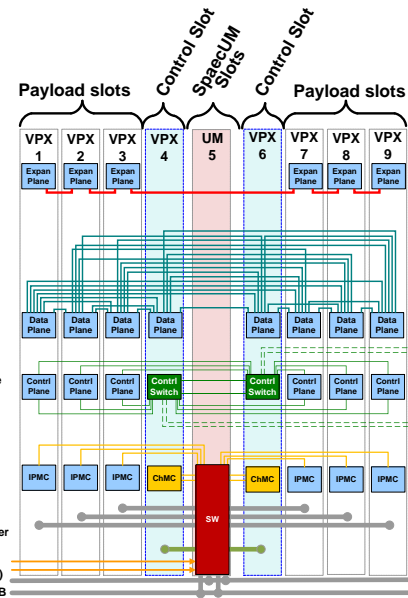
Payload



MILSATCOM System



Slot numbers are logical, physical slot numbers may be different



Conclusions

- SpaceVPX (VITA 78) provides a path to increased interoperability and compatibility across industry vendors.
- The **adoption** across industry allows for considerable reduction in SWaP, program life-cycle cost, with concurrent increase in re-configurability, and potential re-use of hardware, firmware, and software.
- SpaceVPX (VITA 78) slated for ballot and approval by the middle of February 2014.
- Organic adoption by Government customer, prime contractors, and vendor suppliers is underway in a phased approach