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The Value of SOSA™ Beyond the US Military

(Hint: It's About Ease of Integration)

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SOSA™
Sensor Open Systems Architecture

Sensor Open System Architecture

Modular, open standard

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Overview

The SOSA Technical Standard defines a reference or objective architecture with software, hardware and electrical mechanical aspects that support real-time sensing solutions. It is aligned with VITA's OpenVPX standard and the objectives governed by directives like CMOSS, HOST and others.

AIR FORCE LCMC

SOSA™
Sensor Open Systems Architecture

HOST
Hardware Open Systems Technologies

C5 Intelligence Surveillance Reconnaissance
CMOSS
Modular Open Suite of Standards

OpenVPX™

System Scope

- EO/IR
- EW
- Radar
- SIGINT
- Communications

SOSA: Sensor Open Systems Architecture

Technical Standard, V1.0

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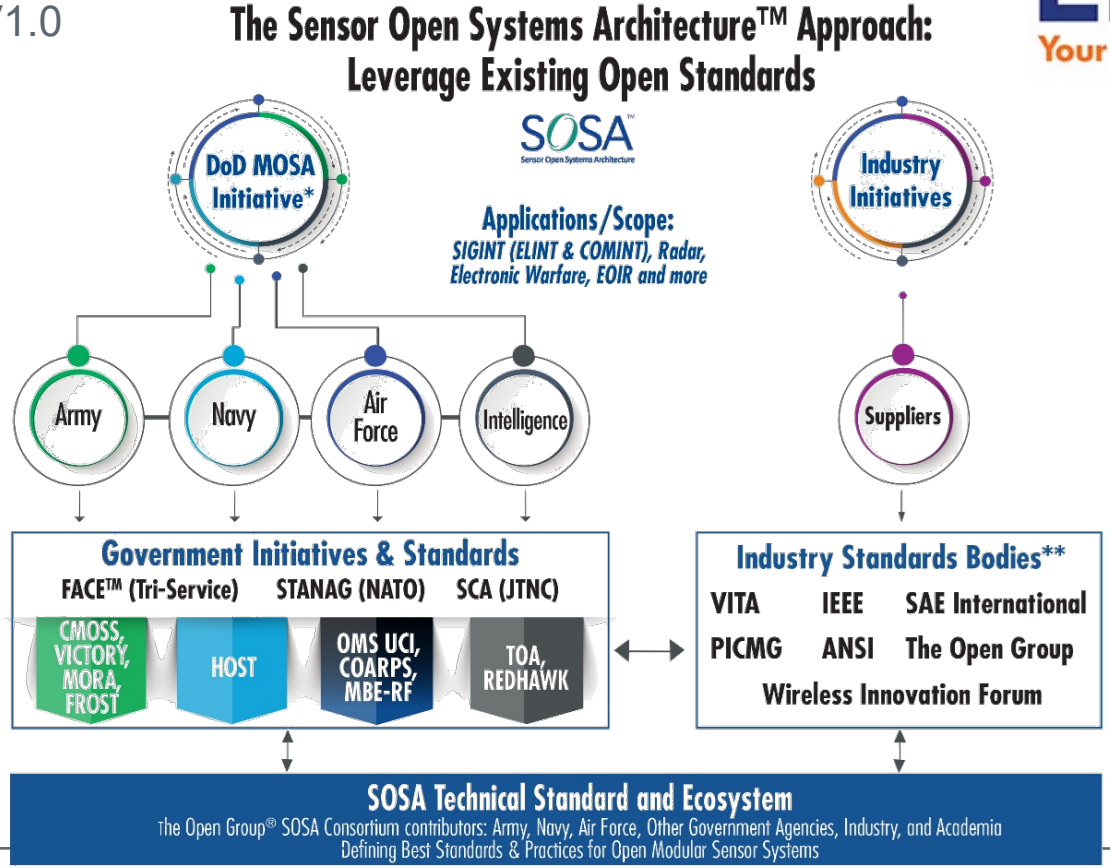

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Sensor Open Systems Architecture

The Scope of the SOSA Technical Standard

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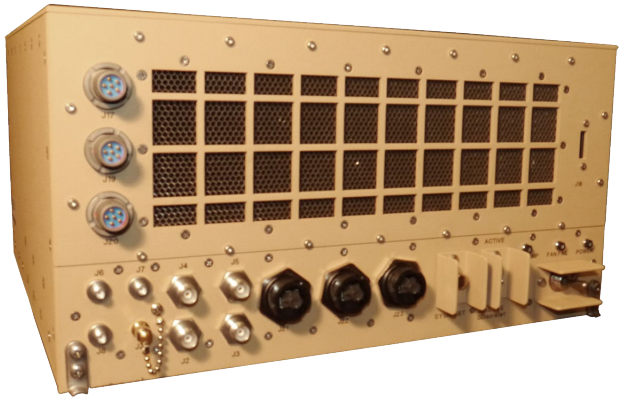
- **The SOSA Technical Standard is a very sizable document**
  - SOSA Technical Standard Version 2 Snapshot 1 is 434 pages
  - Covers hardware, runtime environments, and interaction bindings, in addition to the sensor modules



- **Questions I am regularly asked:**
  - *SOSA has way too much baggage to be useful to me, so why should I care about SOSA?*
  - *I have no mandate for SOSA alignment, so why pay attention to it?*
  - *We are European. SOSA is a US Military thing. What possible value is it to us?*

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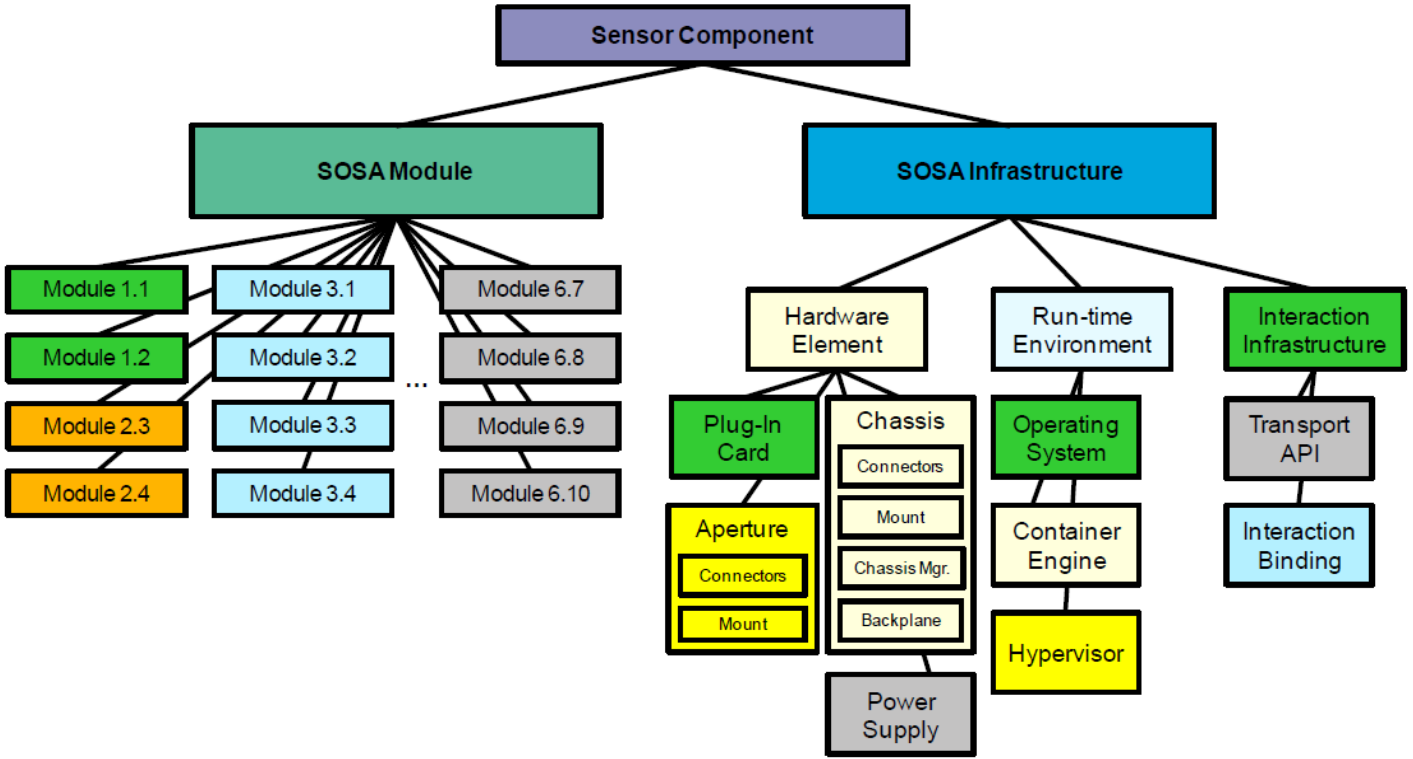
Sensor Open Systems Architecture

- **I am here today to answer these questions.**

SOSA Taxonomy



SOSA Taxonomy

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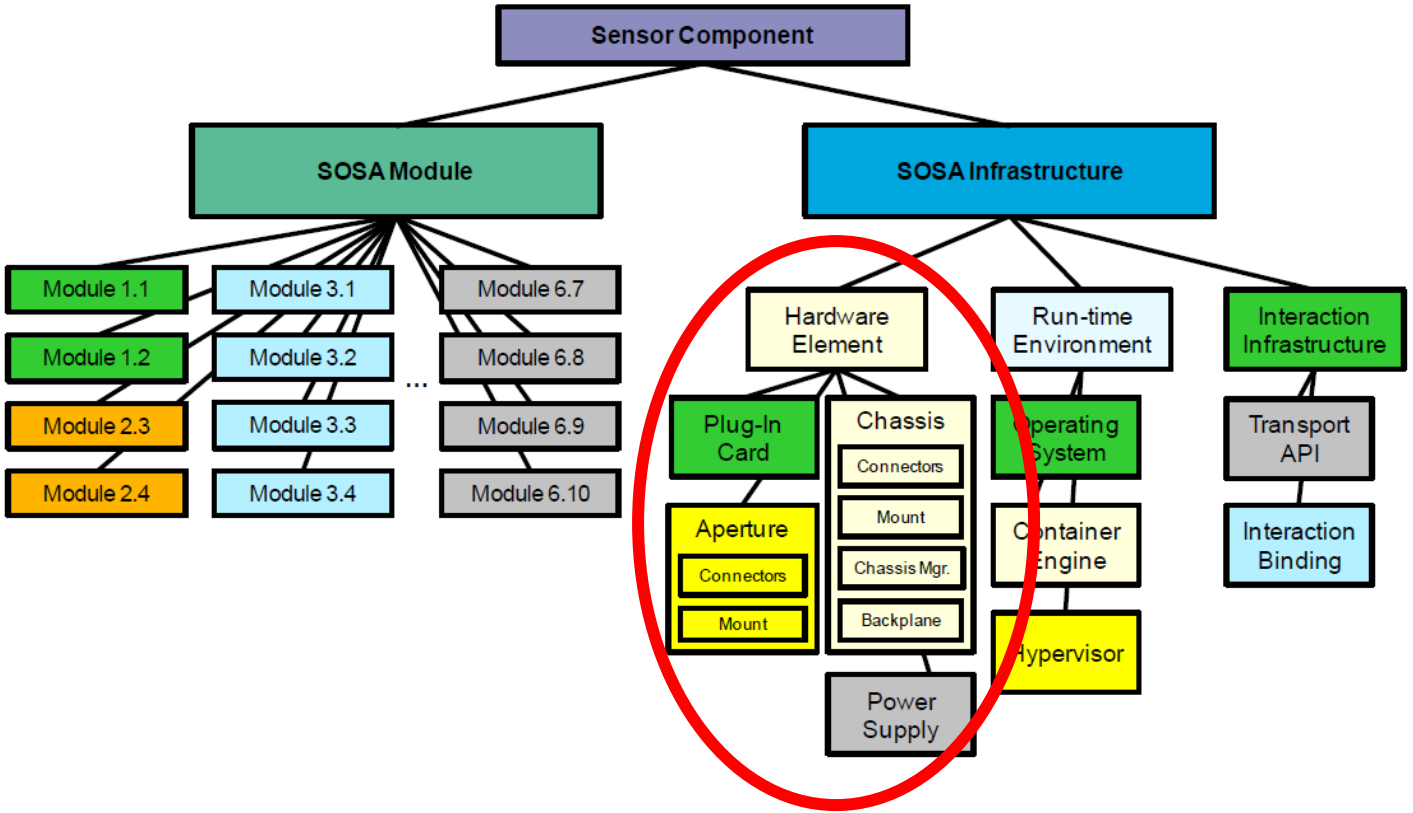

Why Focus on Hardware

- **The VPX-based hardware elements are the most mature of all SOSA conformable elements**
  - SOSA Aligned plug-in cards have been available since late 2018
  - Nearly every type of plug-in card is available
    - SBC, switches, GPUs, receivers and other I/O, storage, power supplies, etc.
  - SOSA aligned backplanes are available COTS
- **Thus SOSA aligned hardware provides the best examples of the benefits of SOSA**

Why Should I Care About SOSA?

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There is a fundamental problem with OpenVPX

- **OpenVPX defines many slot profiles**
  - 30 6U (20 Payload/Peripheral, 6 switch, 4 miscellaneous)
  - 63 3U (37 Payload/Peripheral/Storage, 24 Switch, 2 miscellaneous)
  - Nearly all have user defined pins
- **Result: Board suppliers use custom pin-outs**
- **Result: Custom backplanes are required for every system**
- **Result: Board suppliers achieve vendor-lock – technology refresh can only be achieved with products from the previous supplier**

OpenVPX™

Why Should I Care About SOSA?

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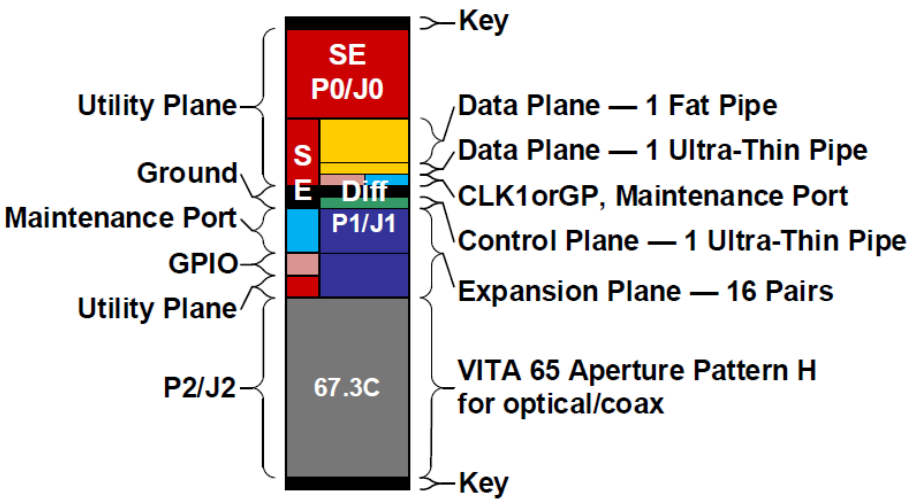
SOSA fixes this fundamental problem with OpenVPX

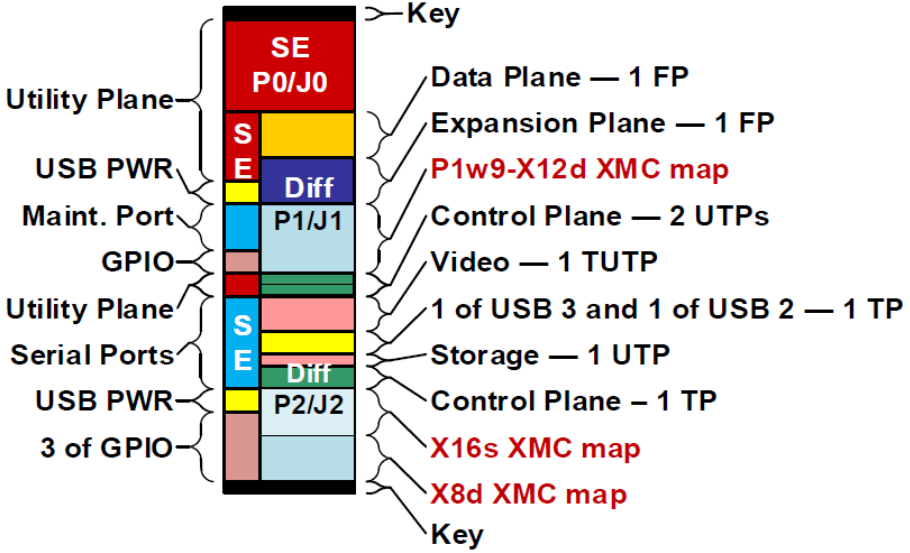
- **SOSA defines a limited set of slot profiles**
  - 3U: Three payloads, three switches, one radial clock, one RF switch, one “special” for legacy I/O
  - 6U: Three payloads, one switch, one “special” for legacy I/O
  - Only the “special” profiles have user defined pins (and they are limited by the standard)
- **Result: Slot profile choice is driven by function**
- **Result: Boards and backplanes from different suppliers can be used in any given slot**
  - Sometimes boards with entirely different functions
- **Result: Vendor lock is broken**

OpenVPX™

Two Detailed Examples

To Highlight Basic Features





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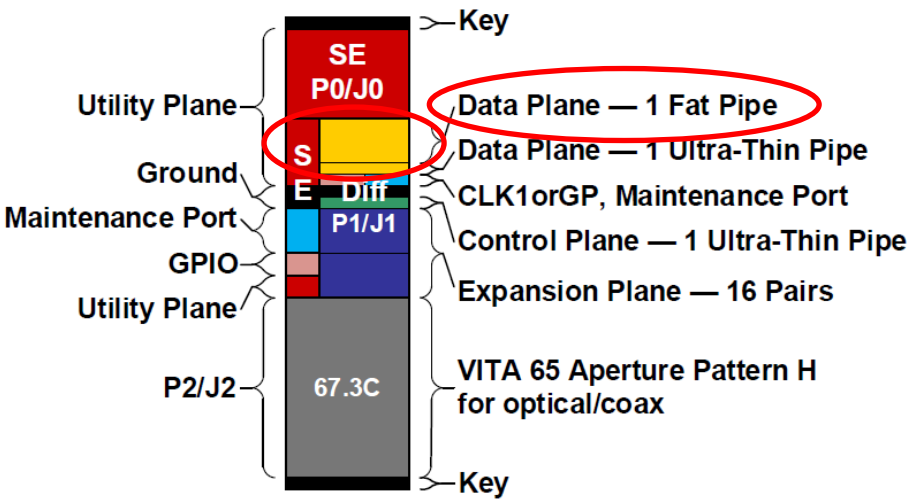

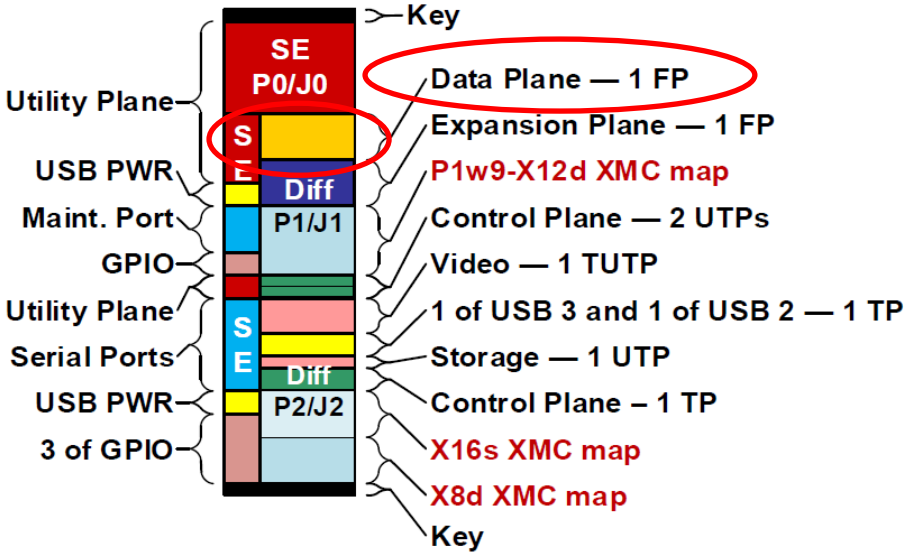

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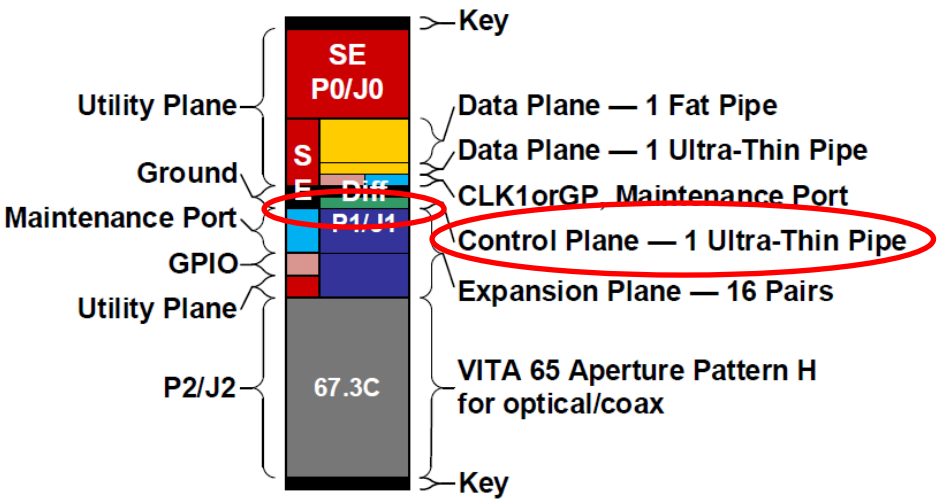

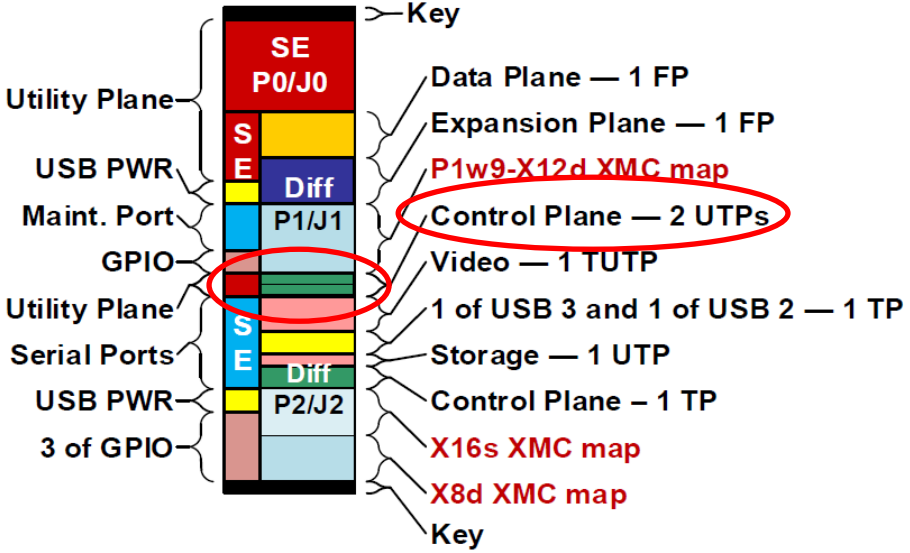

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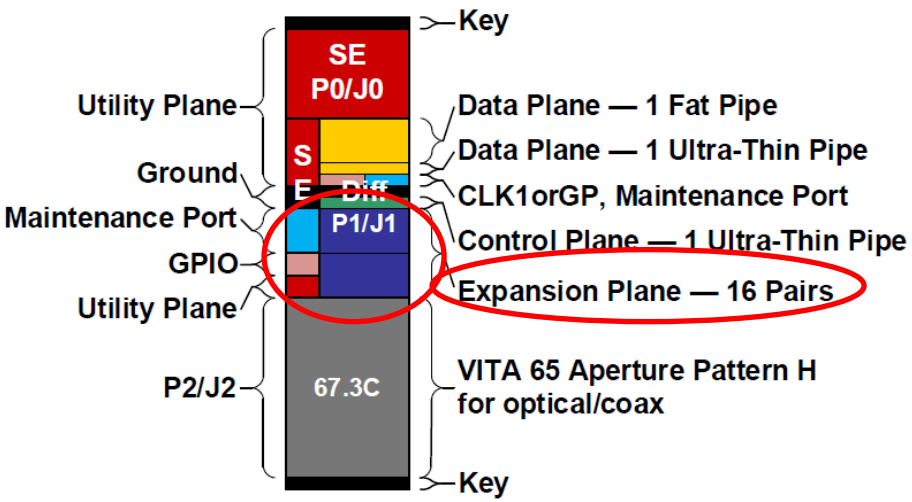

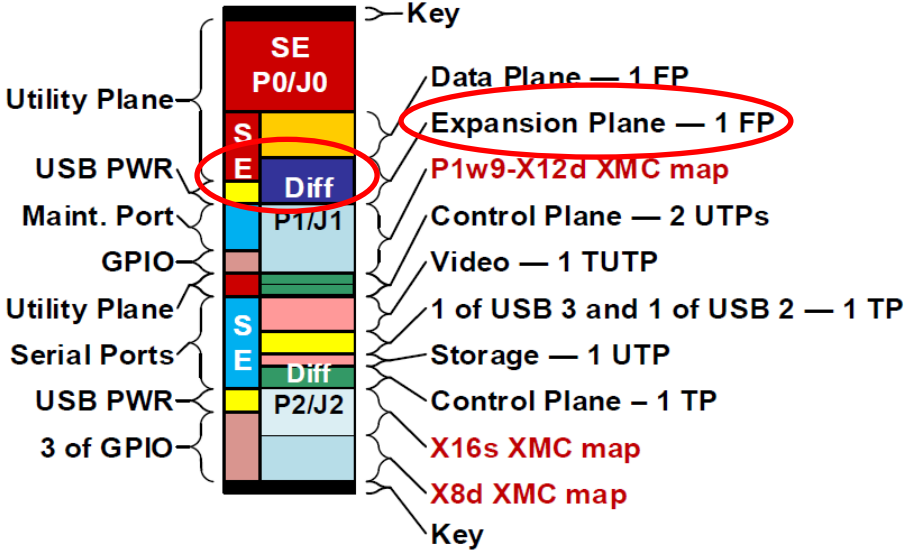

Two Detailed Examples

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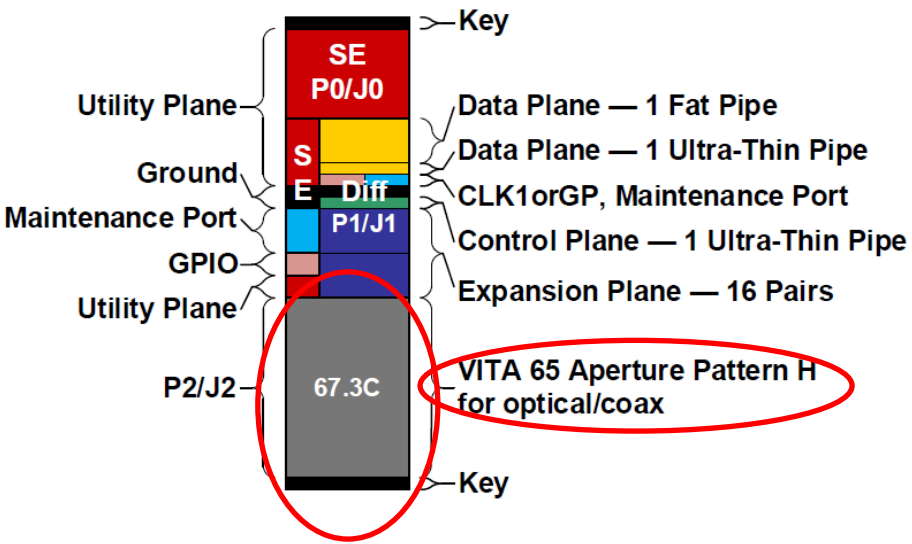

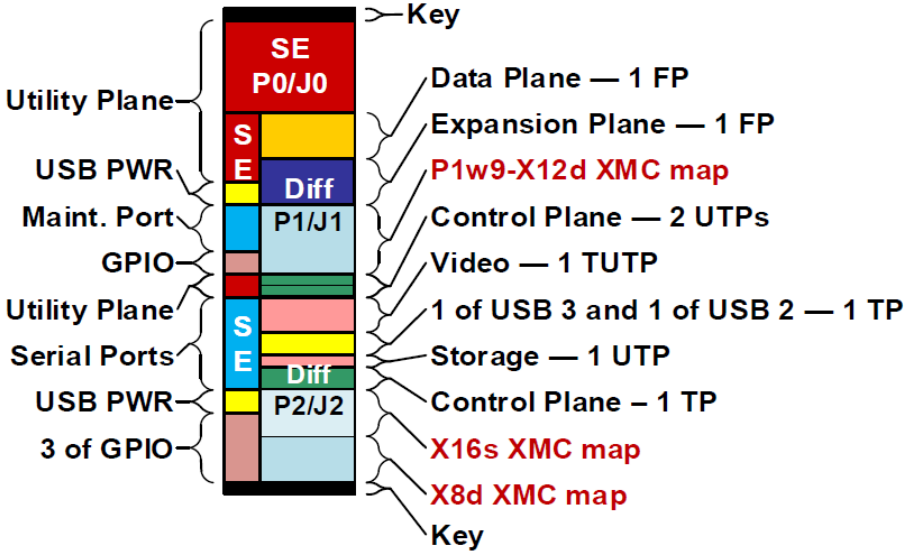

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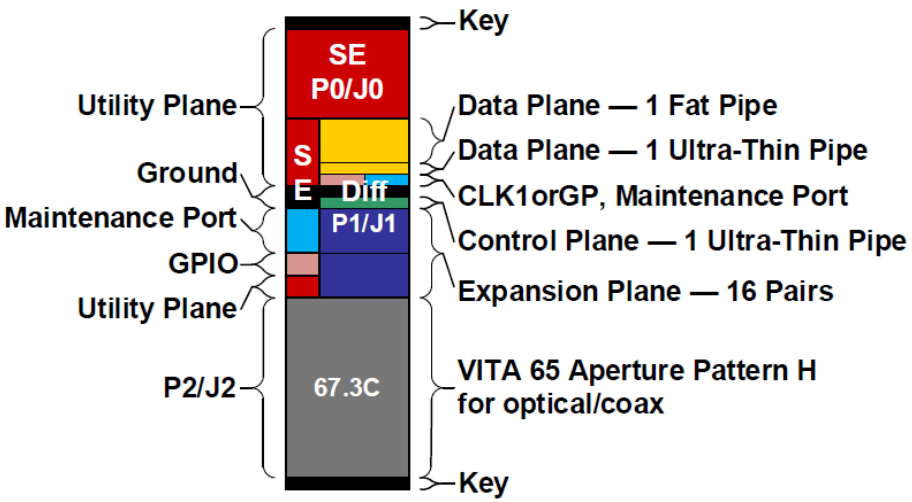

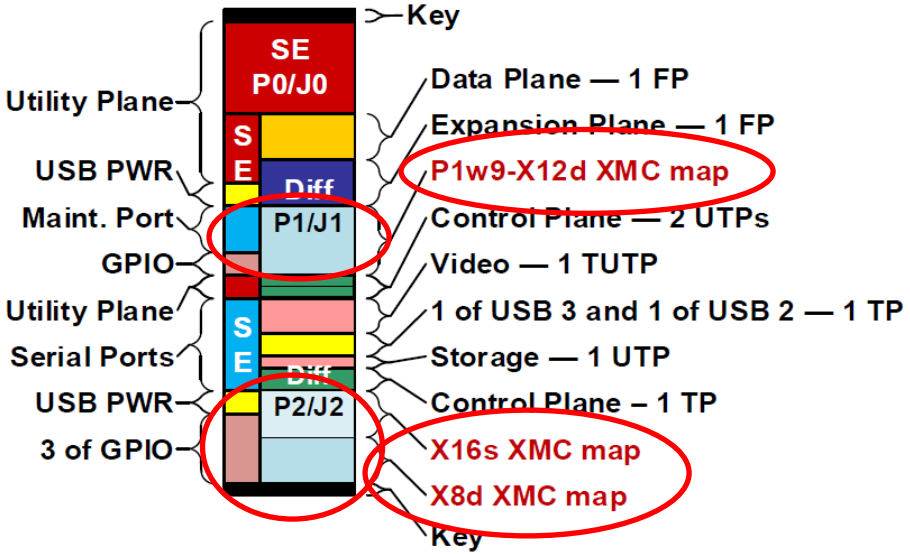

Backplane Power Simplified

SOSA defines 12V Centric Power, and encourages use of VITA 62 power supplies

- **Simplifies power budgeting**
- **Makes COTS power supplies a reality**
- **Product differentiation still posssible**

Image courtesy Behlman Power

3U Plug-In Module Power Supplies		
Pin name	2017 usage	Proposed Recommendations
VS1	+12 VDC	+12 VDC
VS2	+3.3 VDC	Not used
VS3	+5 VDC	Not used
+12V_AUX	+12 VDC	Not used
-12V_AUX	-12 VDC	Not used
3.3V_AUX	+3.3 VDC	+3.3 VDC
VBAT	+3 VDC	+3 VDC

SRT Success with SOSA

These chassis push SOIs to the tactical edge in a CMOSS/SOSA modular form factor

- **SharkCage / Expeditionary Cyber Chassis / TRAC**
- **TRL 9 deployed – in excess of 300 systems**
- **Aimed at various user bases including EW, Cyber, SI etc.**
- **Two or Three SOSA 3U VPX Slots enabling operations with different card combinations**
- **Manpack, vehicle, airborne or fixed platform integrations**
- **SOSA has enabled SRT to package and build several solutions to the Open Standard and focus our R&D on our core competencies instead of hardware cabling, packaging etc.**
  - Focus on rapidly meeting customer needs
  - Reduces SRT / customer NRE on packaging
  - Enables third party plug and play in SRT chassis solutions
  - Reduces integration time between industry partners and end users

SOSA Small Form Factor: VITA 90 VNX+

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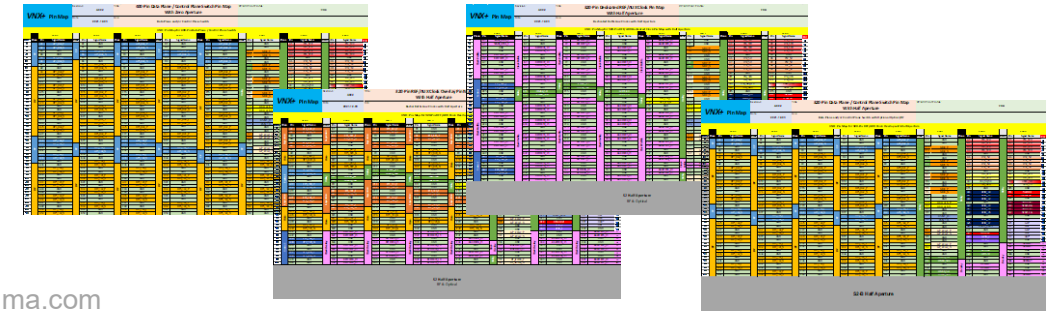
- **Added to the Technical Standard in Version 1.0**
  - Continuing to be refined
- **~30% of the size of 3U VPX per-slot**
- **100% in alignment with SOSA principles**
- **Follows Data Plane / Control Plane / Expansion Plane model**
- **Includes blind-mate coax and optical**
- **Includes VITA 46.11 System Management**
- **Payloads, switch, radial clock slot profiles defined**



SOSA Small Form Factor: VITA 90 VNX+

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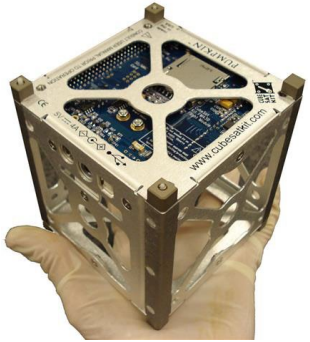

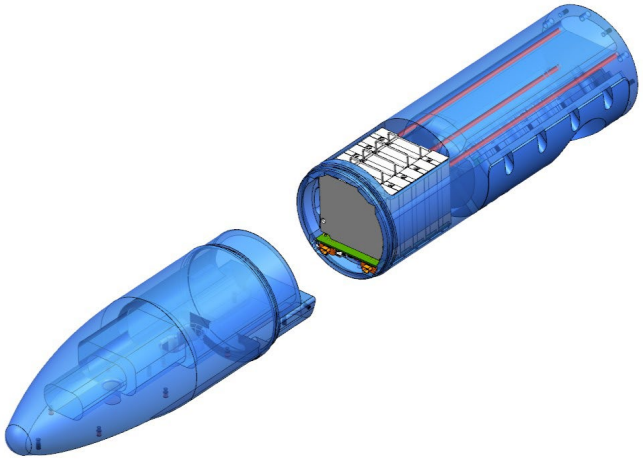

Enables systems not possible with VPX

- Common Launch Tube applications
- Missile-bodies
- Cubesats
- Small unmanned vehicles
- Potentially very attractive to non-defense applications

Additional Notes and Take-Aways

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- **SOSA is a component specification and not a system specification**
  - There are no SOSA systems, only systems consisting of SOSA components
  - Integrators are free to use or not use SOSA components as they like
- **SOSA is an all-or-nothing proposition**
  - For the component suppliers, yes, that's true – there are no partial-SOSA boards
  - For the integrator, no
- **SOSA is driving the adoption of VITA 46.11 System Management**
  - A key component of the SOSA architecture, and a requirement for all plug-in cards
  - Enables "intelligent chassis"
  - Valuable for diagnostics and prognostics
- **Use of SOSA components makes for easier prototyping**
  - COTS backplanes, chassis, and plug in cards
  - Allows for faster project starts
- **Faster system integration**
  - Means less expensive and faster time-to-deployment
- **Easier backplane development**
  - Backplanes are all variations on a theme
  - Faster and less expensive

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