

SOSA™ VNX+: Small Form Factor for Ground Vehicle Applications

Mark Littlefield
Elma Electronic
Mark.Littlefield@Elma.com



Sensor Open System Architecture (SOSA)

MODULAR OPEN SYSTEMS APPROACH

• Overview

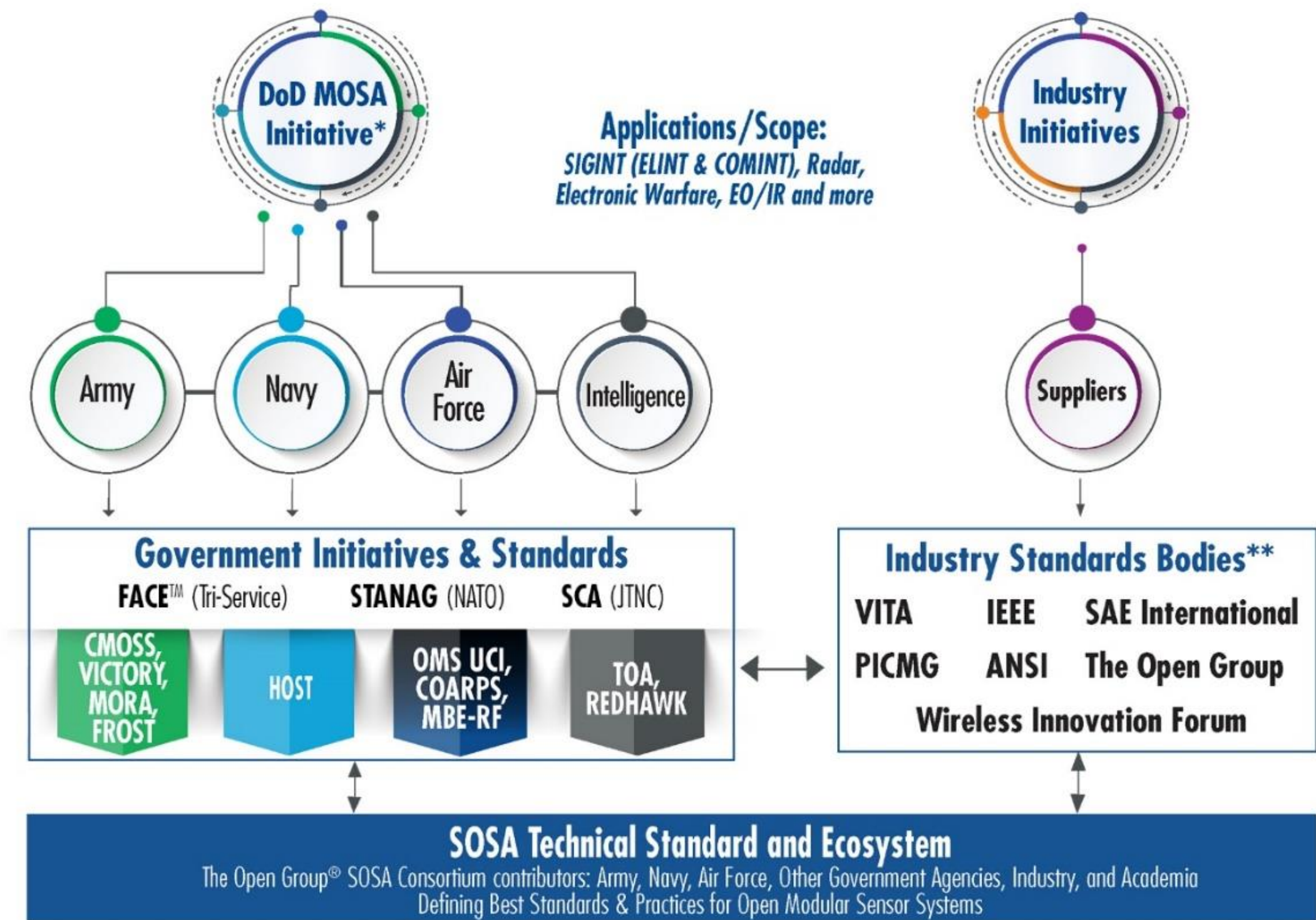
The SOSA Technical Standard defines a reference or objective architecture with software, hardware and electrical mechanical aspects that support real-time sensing solutions. It is aligned with VITA's OpenVPX standard and the objectives governed by directives like CMOSS, HOST, MORA, and others.

• System Scope

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



The Sensor Open Systems Architecture™ Approach: Leverage Existing Open Standards



*In support of the US DoD MOSA Mandate memo.

** Representative group. Not all associated standards are listed.



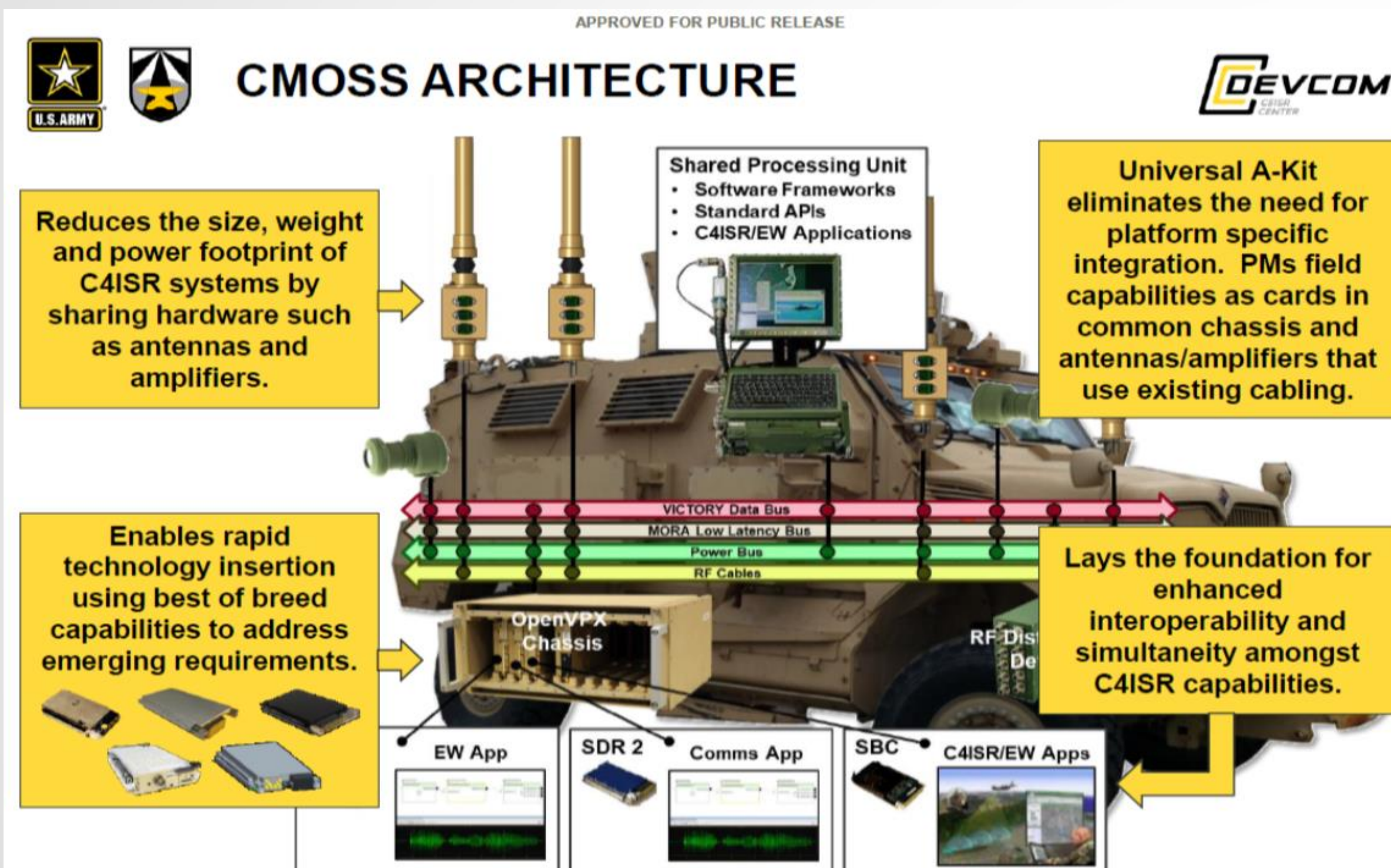
Sensor Open System Architecture (SOSA)

MODULAR OPEN
SYSTEMS APPROACH



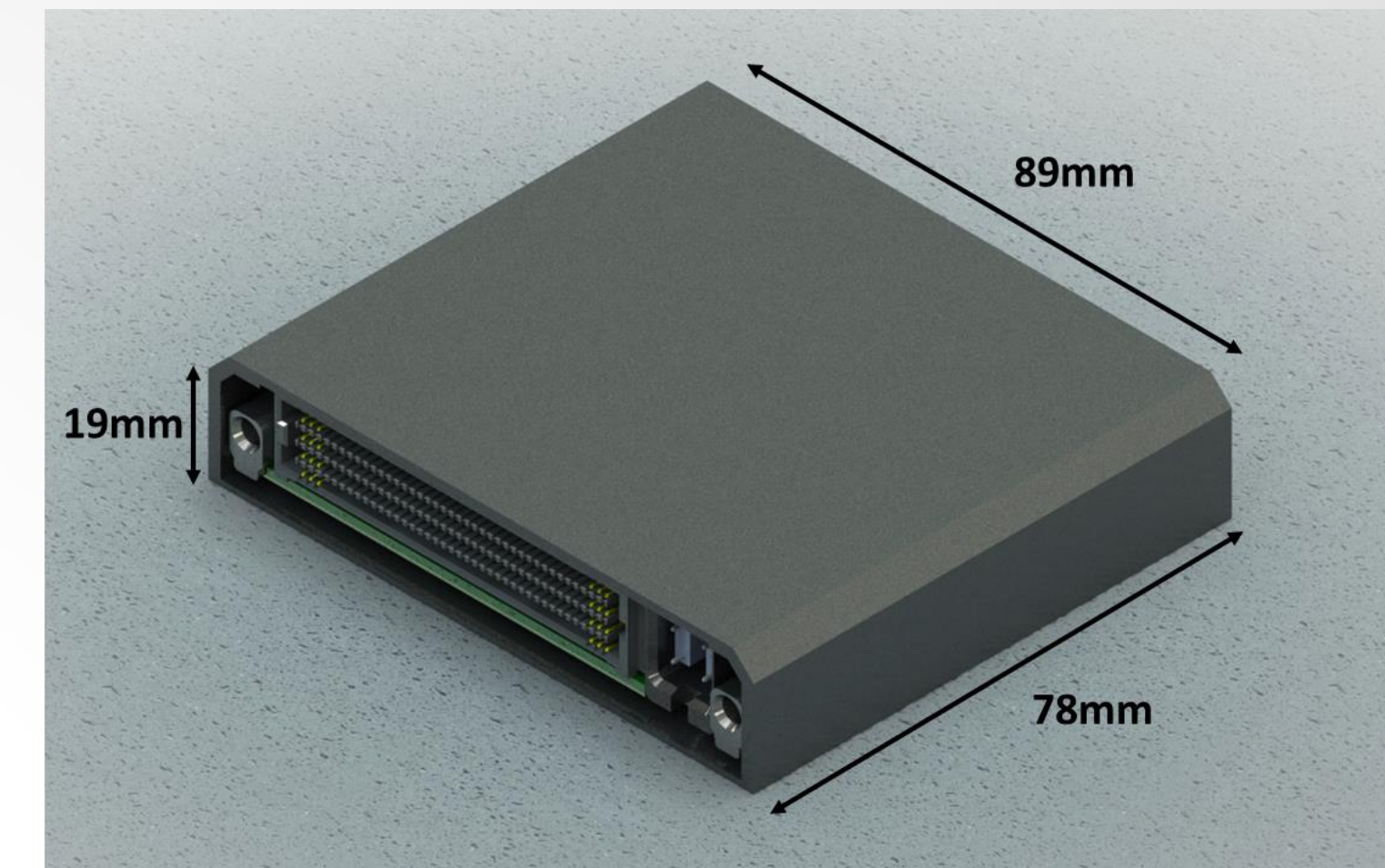
High Level Goals

- Open:
 - Vendor & platform agnostic, MOSA-aligned
- Standardized:
 - Software, Hardware, Mechanical
- Harmonized:
 - Leverage existing and emerging open standards
- Aligned
 - In concert with ongoing service objectives
- Cost Effective:
 - Affordable
- Adaptable:
 - Rapidly responsive to user change requirements



Why Small Form Factor/VNX+?

- SOSA identified a need to include a standards-based form factor “significantly smaller than 3U VPX”
 - Needed for small UxV, space/high-altitude, and common launch tube applications (and similar)
 - Targeted to any SWaP-constrained SOSA application where 3U VPX is too large
- After study, VITA 74/VNX was chosen
 - But significant enhancements were needed to make it suitable for the SOSA Technical Standard
 - VITA 90: VNX+ created to capture the new standard language
- Initially included in the SOSA Technical Standard, version 1.0
 - Significant updates in the latest V2.0 Snapshot 2



Features of SOSA VNX+

MODULAR OPEN SYSTEMS APPROACH

- Two module sizes
 - Single-Height: 78mm x 89mm x 19mm
 - Double-Height: 78mm x 89mm x 39mm
- Four connector options
 - 400-pin, no coaxial/optical aperture
 - 320-pin, dual MT fiber optic
 - 320-pin, hybrid MT/coaxial
 - 240-pin, hybrid MT/coaxial
 - Will be deprecated in future releases
- Fully-defined pin maps – no user-defined pins
- SBC/Payload, Switch, and Time (PNT) profiles defined
- High-performance fabrics (10/40/100 GigE, PCIe Gen4/5)

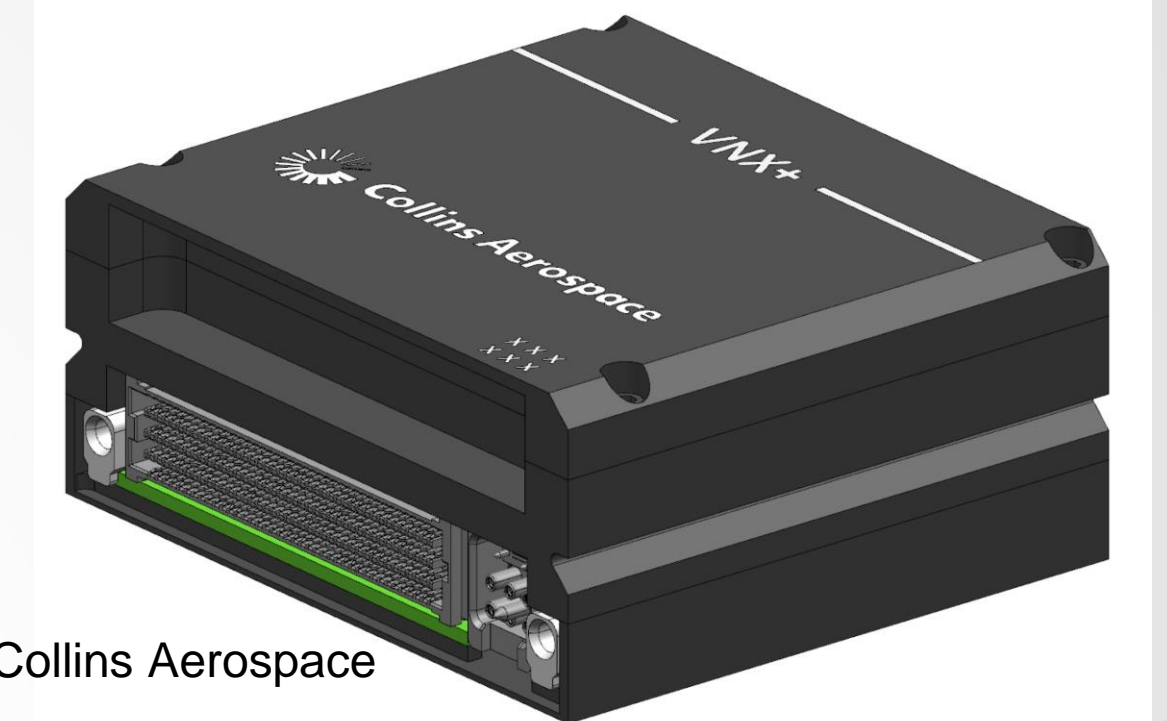
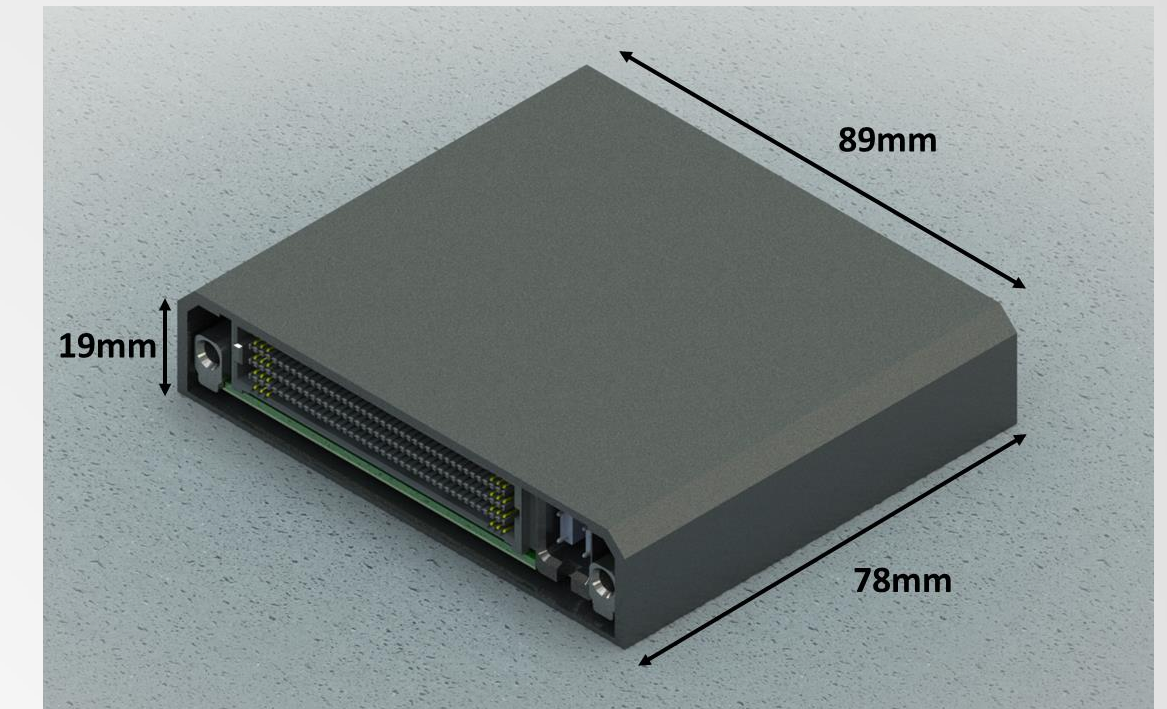


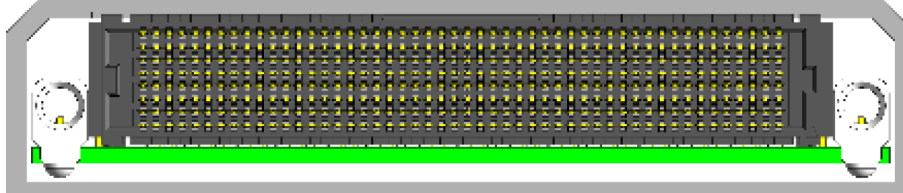
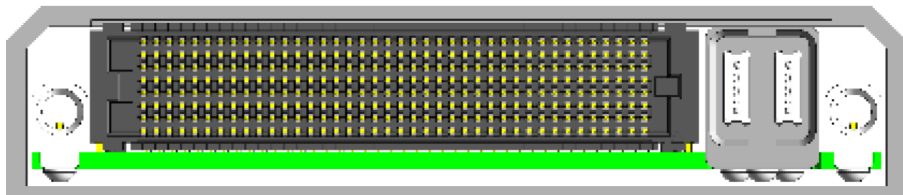
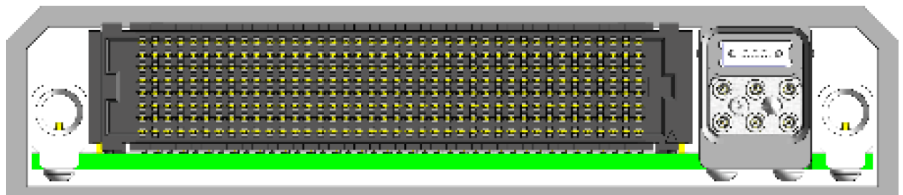
Image courtesy of Collins Aerospace

| Connector/Aperture Combination | Connector Type | Aperture Fill Config | Image |
|---|----------------|----------------------|-------|
| VNX+ Connector Only | 400-pin | None | |
| VNX+ w/ Half Aperture | 320-pin | 2x MT | |
| VNX+ w/ Half Aperture | 320-pin | 1x MT 6x RF | |
| VNX+ w/ Full Aperture (limited to coaxial switch applications) | 240-pin | 2x MT 20x RF | |



SOSA VNX+ Slot Profiles

- Two Payload Slot Profiles
 - 400-pin
 - 320-pin, with aperture
- Two Switch Slot Profiles
 - 400-pin
 - 320-pin, with aperture
- Two Radial Clock Profiles
 - 320-pin, high-density (22 clock pairs)
 - 320-pin, low-density (7 clock pairs, based on payload template)

| Connector/Aperture Combination | Config Class | Connector Type | Aperture Fill Config | Image |
|--------------------------------|--------------|----------------|----------------------|--|
| VNX+ Connector Only | 1 | 400-pin | None |  |
| VNX+ w/ Half Aperture | 2 | 320-pin | 2x MT |  |
| VNX+ w/ Half Aperture | 3 | 320-pin | 1x MT 6x RF |  |



Payload Slot Profile Template

MODULAR OPEN
SYSTEMS APPROACH

| Revision: A002 | | Title: 400-Pin High Speed Connector Planes With Zero Aperture | |
|---|-------|---|-------------|
| Date: 2021-12-03 | | Use: All Payload Profiles | |
| VN ^X + Planes | | | |
| VN ^X + Pin Map for 400-Pin High-Speed Connector with Zero Aperture | | | |
| Col | Plane | Pin | Signal Name |
| 1 | Row A | | |
| 2 | Row B | | |
| 3 | Row C | | |
| 4 | Row D | | |
| 5 | Row E | | |
| 6 | Row F | | |
| 7 | Row G | | |
| 8 | Row H | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | | | |
| 33 | | | |
| 34 | | | |
| 35 | | | |
| 36 | | | |
| 37 | | | |
| 38 | | | |
| 39 | | | |
| 40 | | | |
| 41 | | | |
| 42 | | | |
| 43 | | | |
| 44 | | | |
| 45 | | | |
| 46 | | | |
| 47 | | | |
| 48 | | | |
| 49 | | | |
| 50 | | | |

General arrangement:

- S0 Utility Segment – Green
- S1 Communications Segment – Orange
 - Where Data Planes, Control Planes, and Expansion Planes are located
- S2 Overlay Segment – Lavender
 - Used to define specific slot profiles



S0 Utility Plane

MODULAR OPEN SYSTEMS APPROACH

240-Pin Connector with Full-Operate Pin Assignments

| Col | Row A | | | Row B | | | Row C | | | Row D | | | Row E | | | Row F | | | Row G | | | Row H | | | Col |
|-------|-------|-------------|-------|----------|-------------|----------|-------|-------------|-------|-----------|-------------|-------------|-------|-------------|-------|------------|-------------|-------|-------|-------------|-------|-------|-------------|-----|-----|
| Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col | |
| 1 | A1 | | B1 | GND | C1 | | D1 | GND | E1 | | F1 | GND | G1 | | H1 | | 1 | | | | | | | | |
| 2 | A2 | | B2 | GND | C2 | | D2 | GND | E2 | | F2 | | G2 | VS1 | H2 | VS1 | 2 | | | | | | | | |
| 3 | A3 | GND | B3 | | C3 | GND | D3 | | E3 | GND | F3 | GBE1_MDI0_P | G3 | | H3 | | 3 | | | | | | | | |
| 4 | A4 | | B4 | | C4 | GND | D4 | | E4 | | F4 | GBE1_MDI0_N | G4 | | H4 | | 4 | | | | | | | | |
| 5 | A5 | | B5 | GND | C5 | | D5 | GND | E5 | | F5 | GND | G5 | GND | H5 | GND | 5 | | | | | | | | |
| 6 | A6 | | B6 | GND | C6 | | D6 | GND | E6 | | F6 | GND | G6 | | H6 | | 6 | | | | | | | | |
| 7 | A7 | GND | B7 | | C7 | GND | D7 | | E7 | GND | F7 | GBE1_MDI1_P | G7 | VS2 | H7 | VS2 | 7 | | | | | | | | |
| 8 | A8 | | B8 | | C8 | GND | D8 | | E8 | | F8 | GBE1_MDI1_N | G8 | | H8 | | 8 | | | | | | | | |
| 9 | A9 | | B9 | GND | C9 | | D9 | GND | E9 | | F9 | GND | G9 | | H9 | | 9 | | | | | | | | |
| 10 | A10 | | B10 | GND | C10 | | D10 | GND | E10 | | F10 | GND | G10 | GND | H10 | GND | 10 | | | | | | | | |
| 11 | A11 | GND | B11 | | C11 | GND | D11 | | E11 | GND | F11 | GBE1_MDI2_P | G11 | VS3 | H11 | VS3 | 11 | | | | | | | | |
| 12 | A12 | | B12 | | C12 | | D12 | | E12 | | F12 | GBE1_MDI2_N | G12 | | H12 | | 12 | | | | | | | | |
| 13 | A13 | | B13 | GND | C13 | SM_B_SCL | D13 | GND | E13 | | F13 | GND | G13 | VS4 | H13 | VBAT_12V | 13 | | | | | | | | |
| 14 | A14 | | B14 | GND | C14 | SM_B_SDA | D14 | | E14 | | F14 | GND | G14 | VAUX | H14 | VBAT_3V | 14 | | | | | | | | |
| 15 | A15 | GND | B15 | SM_A_SCL | C15 | GND | D15 | MP01-RD | E15 | GND | F15 | GBE1_MDI3_P | G15 | GND | H15 | GND | 15 | | | | | | | | |
| 16 | A16 | | B16 | SM_A_SDA | C16 | | D16 | MP01-TD | E16 | | F16 | GBE1_MDI3_N | G16 | UEIO_00 | H16 | NVMRO | 16 | | | | | | | | |
| 17 | A17 | | B17 | GND | C17 | | D17 | GND | E17 | REF_CLK_P | F17 | GND | G17 | UEIO_01 | H17 | SYSRESET* | 17 | | | | | | | | |
| 18 | A18 | | B18 | | C18 | | D18 | | E18 | REF_CLK_N | F18 | | G18 | UEIO_02 | H18 | GND | 18 | | | | | | | | |
| 19 | A19 | GND | B19 | | C19 | GND | D19 | | E19 | | F19 | AUX_CLK_P | G19 | GND | H19 | SER01_RX_P | 19 | | | | | | | | |
| 20 | A20 | | B20 | | C20 | GND | D20 | | E20 | GND | F20 | AUX_CLK_N | G20 | UEIO_03 | H20 | SER01_RX_N | 20 | | | | | | | | |
| 21 | A21 | | B21 | GND | C21 | | D21 | GND | E21 | | F21 | GND | G21 | UEIO_04 | H21 | SER01_TX_P | 21 | | | | | | | | |
| 22 | A22 | | B22 | | C22 | | D22 | | E22 | | F22 | GND | G22 | UEIO_05 | H22 | SER01_TX_N | 22 | | | | | | | | |
| 23 | A23 | GND | B23 | | C23 | GND | D23 | | E23 | GND | F23 | USB01_D_P | G23 | GND | H23 | GND | 23 | | | | | | | | |
| 24 | A24 | | B24 | | C24 | GND | D24 | | E24 | GND | F24 | USB01_D_N | G24 | UEIO_06 | H24 | GA0* | 24 | | | | | | | | |
| 25 | A25 | | B25 | GND | C25 | | D25 | GND | E25 | | F25 | GND | G25 | UEIO_07 | H25 | GA1* | 25 | | | | | | | | |
| 26 | A26 | | B26 | | C26 | | D26 | | E26 | | F26 | GND | G26 | USB01_VBUS | H26 | GA2* | 26 | | | | | | | | |
| 27 | A27 | GND | B27 | | C27 | GND | D27 | | E27 | GND | F27 | GP_LVDS0 | G27 | GND | H27 | GA3* | 27 | | | | | | | | |
| 28 | A28 | | B28 | | C28 | GND | D28 | | E28 | | F28 | GP_LVDS1_N | G28 | GDiscrete1 | H28 | GA4* | 28 | | | | | | | | |
| 29 | A29 | | B29 | GND | C29 | | D29 | GND | E29 | | F29 | GND | G29 | GPIO_0 | H29 | GAP | 29 | | | | | | | | |
| 30 | A30 | | B30 | | C30 | | D30 | | E30 | | F30 | GND | G30 | GPIO_1 | H30 | GND | 30 | | | | | | | | |

Dual IPMB

Maintenance Port

GigE MDI (add magnetics)

Power Planes

VPX Common Signals

USB

UEIO

GPIO

Serial



S1 Communications Segment

S2 Overlay Segment

MODULAR OPEN
SYSTEMS APPROACH

| 320-Pin VNX+ Connector with Half-Aperture Pin Assignments | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----|
| Col | Row A | | | Row B | | | Row C | | | Row D | | | Row E | | | Row F | | | Row G | | | Row H | | | Col |
| | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col |
| 1 | Expansion | A1 | EP1_RX0_P | Expansion | B1 | GND | Expansion | C1 | EP1_RX3_P | Expansion | D1 | GND | Expansion | E1 | EP1_RX6_P | Expansion | F1 | GND | Expansion | G1 | VS1 | Expansion | H1 | VS1 | 1 |
| 2 | Expansion | A2 | EP1_RX0_N | Expansion | B2 | GND | Expansion | C2 | EP1_RX3_N | Expansion | D2 | GND | Expansion | E2 | EP1_RX6_N | Expansion | F2 | GND | Expansion | G2 | VS1 | Expansion | H2 | VS1 | 2 |
| 3 | Expansion | A3 | GND | Expansion | B3 | EP1_RX2_P | Expansion | C3 | GND | Expansion | D3 | EP1_RX5_P | Expansion | E3 | GND | Expansion | F3 | GBE1_MDI0_P | Expansion | G3 | VS1 | Expansion | H3 | VS1 | 3 |
| 4 | Expansion | A4 | GND | Expansion | B4 | EP1_RX2_N | Expansion | C4 | GND | Expansion | D4 | EP1_RX5_N | Expansion | E4 | GND | Expansion | F4 | GBE1_MDI0_N | Expansion | G4 | VS1 | Expansion | H4 | VS1 | 4 |
| 5 | Expansion | A5 | EP1_RX1_P | Expansion | B5 | GND | Expansion | C5 | EP1_RX4_P | Expansion | D5 | GND | Expansion | E5 | EP1_RX7_P | Expansion | F5 | GND | Expansion | G5 | GND | Expansion | H5 | GND | 5 |
| 6 | Expansion | A6 | EP1_RX1_N | Expansion | B6 | GND | Expansion | C6 | EP1_RX4_N | Expansion | D6 | GND | Expansion | E6 | EP1_RX7_N | Expansion | F6 | GND | Expansion | G6 | GND | Expansion | H6 | GND | 6 |
| 7 | Expansion | A7 | GND | Expansion | B7 | DP1_RX1_P | Expansion | C7 | GND | Expansion | D7 | DP2_RX0_P | Expansion | E7 | GND | Expansion | F7 | GBE1_MDI1_P | Expansion | G7 | VS2 | Expansion | H7 | VS2 | 7 |
| 8 | Expansion | A8 | GND | Expansion | B8 | DP1_RX1_N | Expansion | C8 | GND | Expansion | D8 | DP2_RX0_N | Expansion | E8 | GND | Expansion | F8 | GBE1_MDI1_N | Expansion | G8 | VS2 | Expansion | H8 | VS2 | 8 |
| 9 | Data | A9 | DP1_RX0_P | Data | B9 | GND | Data | C9 | DP1_RX3_P | Data | D9 | DP2_RX2_P | Data | E9 | DP2_RX2_P | Data | F9 | GND | Data | G9 | GND | Data | H9 | GND | 9 |
| 10 | Data | A10 | DP1_RX0_N | Data | B10 | GND | Data | C10 | DP1_RX3_N | Data | D10 | GND | Data | E10 | DP2_RX2_N | Data | F10 | GND | Data | G10 | GND | Data | H10 | GND | 10 |
| 11 | Data | A11 | GND | Data | B11 | DP1_RX2_P | Data | C11 | GND | Data | D11 | DP2_RX1_P | Data | E11 | GND | Data | F11 | GBE1_MDI2_P | Data | G11 | VS3 | Data | H11 | VS3 | 11 |
| 12 | Data | A12 | GND | Data | B12 | DP1_RX2_N | Data | C12 | GND | Data | D12 | DP2_RX1_N | Data | E12 | GND | Data | F12 | GBE1_MDI2_N | Data | G12 | VS3 | Data | H12 | VS3 | 12 |
| 13 | Control | A13 | CP1_RX0_P | Control | B13 | GND | Control | C13 | SM_B_SCL | Control | D13 | GND | Control | E13 | DP2_RX3_P | Control | F13 | GND | Control | G13 | VS4 | Control | H13 | VBAT_12V | 13 |
| 14 | Control | A14 | CP1_RX0_N | Control | B14 | GND | Control | C14 | SM_B_SDA | Control | D14 | GND | Control | E14 | DP2_RX3_N | Control | F14 | GND | Control | G14 | VAUX | Control | H14 | VBAT_3V | 14 |
| 15 | Control | A15 | GND | Control | B15 | SM_A_SCL | Control | C15 | GND | Control | D15 | MP01-RD | Control | E15 | GND | Control | F15 | GBE1_MDI3_P | Control | G15 | GND | Control | H15 | GND | 15 |
| 16 | Control | A16 | GND | Control | B16 | SM_A_SDA | Control | C16 | GND | Control | D16 | MP01-TD | Control | E16 | GND | Control | F16 | GBE1_MDI3_N | Control | G16 | UEIO_00 | Control | H16 | NVMRO | 16 |
| 17 | Control | A17 | CP1_TX0_P | Control | B17 | GND | Control | C17 | EP1_TX3_P | Control | D17 | GND | Control | E17 | REF_CLK_P | Control | F17 | GND | Control | G17 | UEIO_01 | Control | H17 | SYSRESET* | 17 |
| 18 | Control | A18 | CP1_TX0_N | Control | B18 | GND | Control | C18 | EP1_TX3_N | Control | D18 | GND | Control | E18 | REF_CLK_N | Control | F18 | GND | Control | G18 | UEIO_02 | Control | H18 | GND | 18 |
| 19 | Expansion | A19 | GND | Expansion | B19 | EP1_TX1_P | Expansion | C19 | GND | Expansion | D19 | EP1_TX5_P | Expansion | E19 | GND | Expansion | F19 | AUX_CLK_P | Expansion | G19 | GND | Expansion | H19 | SER01_RX_P | 19 |
| 20 | Expansion | A20 | GND | Expansion | B20 | EP1_TX1_N | Expansion | C20 | GND | Expansion | D20 | EP1_TX5_N | Expansion | E20 | GND | Expansion | F20 | AUX_CLK_N | Expansion | G20 | UEIO_03 | Expansion | H20 | SER01_RX_N | 20 |
| 21 | Expansion | A21 | EP1_TX0_P | Expansion | B21 | GND | Expansion | C21 | EP1_TX4_P | Expansion | D21 | GND | Expansion | E21 | EP1_TX7_P | Expansion | F21 | GND | Expansion | G21 | UEIO_04 | Expansion | H21 | SER01_TX_P | 21 |
| 22 | Expansion | A22 | EP1_TX0_N | Expansion | B22 | GND | Expansion | C22 | EP1_TX4_N | Expansion | D22 | GND | Expansion | E22 | EP1_TX7_N | Expansion | F22 | GND | Expansion | G22 | UEIO_05 | Expansion | H22 | SER01_TX_N | 22 |
| 23 | Expansion | A23 | GND | Expansion | B23 | EP1_TX2_P | Expansion | C23 | GND | Expansion | D23 | EP1_TX6_P | Expansion | E23 | GND | Expansion | F23 | USB01_D_P | Expansion | G23 | GND | Expansion | H23 | GND | 23 |
| 24 | Expansion | A24 | GND | Expansion | B24 | EP1_TX2_N | Expansion | C24 | GND | Expansion | D24 | EP1_TX6_N | Expansion | E24 | GND | Expansion | F24 | USB01_D_N | Expansion | G24 | UEIO_06 | Expansion | H24 | GA0* | 24 |
| 25 | Expansion | A25 | DP1_TX0_P | Expansion | B25 | GND | Expansion | C25 | DP1_TX3_P | Expansion | D25 | GND | Expansion | E25 | DP2_TX2_P | Expansion | F25 | GND | Expansion | G25 | UEIO_07 | Expansion | H25 | GA1* | 25 |
| 26 | Expansion | A26 | DP1_TX0_N | Expansion | B26 | GND | Expansion | C26 | DP1_TX3_N | Expansion | D26 | GND | Expansion | E26 | DP2_TX2_N | Expansion | F26 | GND | Expansion | G26 | USB01_VBUS | Expansion | H26 | GA2* | 26 |
| 27 | Expansion | A27 | GND | Expansion | B27 | DP1_TX2_P | Expansion | C27 | GND | Expansion | D27 | DP2_TX1_P | Expansion | E27 | GND | Expansion | F27 | GP_LVDS01_P | Expansion | G27 | GND | Expansion | H27 | GA3* | 27 |
| 28 | Expansion | A28 | GND | Expansion | B28 | DP1_TX2_N | Expansion | C28 | GND | Expansion | D28 | DP2_TX1_N | Expansion | E28 | GND | Expansion | F28 | GP_LVDS01_N | Expansion | G28 | GDiscrete1 | Expansion | H28 | GA4* | 28 |
| 29 | Expansion | A29 | DP1_TX1_P | Expansion | B29 | GND | Expansion | C29 | DP2_TX0_P | Expansion | D29 | GND | Expansion | E29 | DP2_TX3_P | Expansion | F29 | GND | Expansion | G29 | GPIO_0 | Expansion | H29 | GAP* | 29 |
| 30 | Expansion | A30 | DP1_TX1_N | Expansion | B30 | GND | Expansion | C30 | DP2_TX0_N | Expansion | D30 | GND | Expansion | E30 | DP2_TX3_N | Expansion | F30 | GND | Expansion | G30 | GPIO_1 | Expansion | H30 | GND | 30 |
| 31 | Control | A31 | GND | Control | B31 | OVERLAY | Control | C31 | GND | Control | D31 | OVERLAY | Control | E31 | GND | Control | F31 | GP_lvds03_P | Control | G31 | GND | Control | H31 | OVERLAY | 31 |
| 32 | Control | A32 | GND | Control | B32 | OVERLAY | Control | C32 | GND | Control | D32 | OVERLAY | Control | E32 | GND | Control | F32 | GP_lvds03_N | Control | G32 | GND | Control | H32 | OVERLAY | 32 |
| 33 | Control | A33 | CP2_TX0_P | Control | B33 | GND | Control | C33 | OVERLAY | Control | D33 | GND | Control | E33 | OVERLAY | Control | F33 | GND | Control | G33 | OVERLAY | Control | H33 | GND | 33 |
| 34 | Control | A34 | CP2_TX0_N | Control | B34 | GND | Control | C34 | OVERLAY | Control | D34 | GND | Control | E34 | OVERLAY | Control | F34 | GND | Control | G34 | OVERLAY | Control | H34 | GND | 34 |
| 35 | Control | A35 | GND | Control | B35 | OVERLAY | Control | C35 | GND | Control | D35 | OVERLAY | Control | E35 | GND | Control | F35 | OVERLAY | Control | G35 | GND | Control | H35 | OVERLAY | 35 |
| 36 | Control | A36 | GND | Control | B36 | OVERLAY | Control | C36 | GND | Control | D36 | OVERLAY | Control | E36 | GND | Control | F36 | OVERLAY | Control | G36 | GND | Control | H36 | OVERLAY | 36 |
| 37 | Control | A37 | CP2_RX0_P | Control | B37 | GND | Control | C37 | OVERLAY | Control | D37 | GND | Control | E37 | OVERLAY | Control | F37 | GND | Control | G37 | OVERLAY | Control | H37 | GND | 37 |
| 38 | Control | A38 | CP2_RX0_N | Control | B38 | GND | Control | C38 | OVERLAY | Control | D38 | GND | Control | E38 | OVERLAY | Control | F38 | GND | Control | G38 | OVERLAY | Control | H38 | GND | 38 |
| 39 | Control | A39 | GND | Control | B39 | OVERLAY | Control | C39 | GND | Control | D39 | OVERLAY | Control | E39 | GND | Control | F39 | GP_lvds04_P | Control | G39 | GND | Control | H39 | OVERLAY | 39 |
| 40 | Control | A40 | GND | Control | B40 | OVERLAY | Control | C40 | GND | Control | D40 | OVERLAY | Control | E40 | GND | Control | F40 | GP_lvds04_N | Control | G40 | GND | Control | H40 | OVERLAY | 40 |

S2-B Half Aperture
RF & Optical

8x Expansion
Plane Lanes

2x FP Data
Planes

2x UTP
Control
Planes

Copper and Aperture
Overlay Region



400 Pin Payload

MODULAR OPEN SYSTEMS APPROACH

- 2x Data Plane ports (Orange)
- 2x Control Plane ports (Blue)
- 8 lanes of Expansion Plane (Amber)
- USB 3 port (with power) (Pale Blue)
- Video port (Yellow)
- Peripheral port (Purple)
- 21 lanes (42 pins) for mezzanine mapped I/O (Lilac)

| VNX+ Pin Map | | Revision: C003 | Title: 400-Pin Payload Module Pin Map With Zero Aperture | | | | VITA 90.1 Slot Profile: VITA 90 400-Pin IO Intensive Compute Profile | | | | | | | | | | | | | | | | | | |
|---|-----------|------------------|--|-----------|-----|-------------|--|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|---------|-----|-------------|---------|-----|-------------|---------|-----|------------|----|
| | | Date: 2022-10-13 | Use: Compute, Single Video, Mezz I/O | | | | AMPS String TBD | | | | | | | | | | | | | | | | | | |
| 400-Pin VNX+ Connector with Zero-Aperture Pin Assignments | | | | | | | | | | | | | | | | | | | | | | | | | |
| Col | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col | | | |
| 1 | Expansion | A1 | EP1_RX0_P | Expansion | B1 | GND | Expansion | C1 | EP1_RX3_P | Expansion | D1 | GND | Expansion | E1 | EP1_RX6_P | Utility | F1 | GND | Utility | G1 | VS1 | Utility | H1 | VS1 | 1 |
| 2 | Expansion | A2 | EP1_RX0_N | Expansion | B2 | GND | Expansion | C2 | EP1_RX3_N | Expansion | D2 | GND | Expansion | E2 | EP1_RX6_N | Utility | F2 | GND | Utility | G2 | VS1 | Utility | H2 | VS1 | 2 |
| 3 | Expansion | A3 | GND | Expansion | B3 | EP1_RX2_P | Expansion | C3 | GND | Expansion | D3 | EP1_RX5_P | Expansion | E3 | GND | Utility | F3 | GBE1_MDIO_P | Utility | G3 | VS1 | Utility | H3 | VS1 | 3 |
| 4 | Expansion | A4 | GND | Expansion | B4 | EP1_RX2_N | Expansion | C4 | GND | Expansion | D4 | EP1_RX5_N | Expansion | E4 | GND | Utility | F4 | GBE1_MDIO_N | Utility | G4 | VS1 | Utility | H4 | VS1 | 4 |
| 5 | Expansion | A5 | EP1_RX1_P | Expansion | B5 | GND | Expansion | C5 | EP1_RX4_P | Expansion | D5 | GND | Expansion | E5 | EP1_RX7_P | Utility | F5 | GND | Utility | G5 | GND | Utility | H5 | GND | 5 |
| 6 | Expansion | A6 | EP1_RX1_N | Expansion | B6 | GND | Expansion | C6 | EP1_RX4_N | Expansion | D6 | GND | Expansion | E6 | EP1_RX7_N | Utility | F6 | GND | Utility | G6 | GND | Utility | H6 | GND | 6 |
| 7 | Data | A7 | GND | Data | B7 | DP1_RX1_P | Data | C7 | GND | Data | D7 | DP2_RX0_P | Data | E7 | GND | Utility | F7 | GBE1_MD1_P | Utility | G7 | VS2 | Utility | H7 | VS2 | 7 |
| 8 | Data | A8 | GND | Data | B8 | DP1_RX1_N | Data | C8 | GND | Data | D8 | DP2_RX0_N | Data | E8 | GND | Utility | F8 | GBE1_MD1_N | Utility | G8 | VS2 | Utility | H8 | VS2 | 8 |
| 9 | Data | A9 | DP1_RX0_P | Data | B9 | GND | Data | C9 | DP1_RX3_P | Data | D9 | GND | Data | E9 | DP2_RX2_P | Utility | F9 | GND | Utility | G9 | GND | Utility | H9 | GND | 9 |
| 10 | Data | A10 | DP1_RX0_N | Data | B10 | GND | Data | C10 | DP1_RX3_N | Data | D10 | GND | Data | E10 | DP2_RX2_N | Utility | F10 | GND | Utility | G10 | GND | Utility | H10 | GND | 10 |
| 11 | Data | A11 | GND | Data | B11 | DP1_RX2_P | Data | C11 | GND | Data | D11 | DP2_RX1_P | Data | E11 | GND | Utility | F11 | GBE1_MD2_P | Utility | G11 | VS3 | Utility | H11 | VS3 | 11 |
| 12 | Data | A12 | GND | Data | B12 | DP1_RX2_N | Data | C12 | GND | Data | D12 | DP2_RX1_N | Data | E12 | GND | Utility | F12 | GBE1_MD2_N | Utility | G12 | VS3 | Utility | H12 | VS3 | 12 |
| 13 | Control | A13 | CP1_RX0_P | Utility | B13 | GND | Utility | C13 | SM_B_SCL | Utility | D13 | GND | Utility | E13 | DP2_RX3_P | Utility | F13 | GND | Utility | G13 | VS4 | Utility | H13 | VBAT_12V | 13 |
| 14 | Control | A14 | CP1_RX0_N | Utility | B14 | GND | Utility | C14 | SM_B_SDA | Utility | D14 | GND | Utility | E14 | DP2_RX3_N | Utility | F14 | GND | Utility | G14 | VAUX | Utility | H14 | VBAT_3V | 14 |
| 15 | Control | A15 | GND | Utility | B15 | SM_A_SCL | Utility | C15 | GND | Utility | D15 | MP01-RD | Utility | E15 | GND | Utility | F15 | GBE1_MD3_P | Utility | G15 | GND | Utility | H15 | GND | 15 |
| 16 | Control | A16 | GND | Utility | B16 | SM_A_SDA | Utility | C16 | GND | Utility | D16 | MP01-TD | Utility | E16 | GND | Utility | F16 | GBE1_MD3_N | Utility | G16 | UEIO_00 | Utility | H16 | NVMRO | 16 |
| 17 | Control | A17 | CP1_TX0_P | Expansion | B17 | GND | Expansion | C17 | EP1_TX3_P | Expansion | D17 | GND | Expansion | E17 | REF_CLK_P | Utility | F17 | GND | Utility | G17 | UEIO_01 | Utility | H17 | SYSRESET* | 17 |
| 18 | Control | A18 | CP1_TX0_N | Expansion | B18 | GND | Expansion | C18 | EP1_TX3_N | Expansion | D18 | GND | Expansion | E18 | REF_CLK_N | Utility | F18 | GND | Utility | G18 | UEIO_02 | Utility | H18 | GND | 18 |
| 19 | Expansion | A19 | GND | Expansion | B19 | EP1_TX1_P | Expansion | C19 | GND | Expansion | D19 | EP1_TX5_P | Expansion | E19 | GND | Utility | F19 | AUX_CLK_P | Utility | G19 | GND | Utility | H19 | SER01_RX_P | 19 |
| 20 | Expansion | A20 | GND | Expansion | B20 | EP1_TX1_N | Expansion | C20 | GND | Expansion | D20 | EP1_TX5_N | Expansion | E20 | GND | Utility | F20 | AUX_CLK_N | Utility | G20 | UEIO_03 | Utility | H20 | SER01_RX_N | 20 |
| 21 | Expansion | A21 | EP1_TX0_P | Expansion | B21 | GND | Expansion | C21 | EP1_TX4_P | Expansion | D21 | GND | Expansion | E21 | EP1_TX7_P | Utility | F21 | GND | Utility | G21 | UEIO_04 | Utility | H21 | SER01_TX_P | 21 |
| 22 | Expansion | A22 | EP1_TX0_N | Expansion | B22 | GND | Expansion | C22 | EP1_TX4_N | Expansion | D22 | GND | Expansion | E22 | EP1_TX7_N | Utility | F22 | GND | Utility | G22 | UEIO_05 | Utility | H22 | SER01_TX_N | 22 |
| 23 | Expansion | A23 | GND | Expansion | B23 | EP1_TX2_P | Expansion | C23 | GND | Expansion | D23 | EP1_TX6_P | Expansion | E23 | GND | Utility | F23 | USB01_D_P | Utility | G23 | GND | Utility | H23 | GND | 23 |
| 24 | Expansion | A24 | GND | Expansion | B24 | EP1_TX2_N | Expansion | C24 | GND | Expansion | D24 | EP1_TX6_N | Expansion | E24 | GND | Utility | F24 | USB01_D_N | Utility | G24 | UEIO_06 | Utility | H24 | GA0* | 24 |
| 25 | Data | A25 | DP1_TX0_P | Data | B25 | GND | Data | C25 | DP1_TX3_P | Data | D25 | GND | Data | E25 | DP2_TX2_P | Utility | F25 | GND | Utility | G25 | UEIO_07 | Utility | H25 | GA1* | 25 |
| 26 | Data | A26 | DP1_TX0_N | Data | B26 | GND | Data | C26 | DP1_TX3_N | Data | D26 | GND | Data | E26 | DP2_TX2_N | Utility | F26 | GND | Utility | G26 | USB01_VBUS | Utility | H26 | GA2* | 26 |
| 27 | Data | A27 | GND | Data | B27 | DP1_TX2_P | Data | C27 | GND | Data | D27 | DP2_TX1_P | Data | E27 | GND | Utility | F27 | GP_LVDS01_P | Utility | G27 | GND | Utility | H27 | GA3* | 27 |
| 28 | Data | A28 | GND | Data | B28 | DP1_TX2_N | Data | C28 | GND | Data | D28 | DP2_TX1_N | Data | E28 | GND | Utility | F28 | GP_LVDS01_N | Utility | G28 | GDiscrete1 | Utility | H28 | GA4* | 28 |
| 29 | Data | A29 | DP1_TX1_P | Data | B29 | GND | Data | C29 | DP2_TX0_P | Data | D29 | GND | Data | E29 | DP2_TX3_P | Utility | F29 | GND | Utility | G29 | GPIO_0 | Utility | H29 | GAP* | 29 |
| 30 | Data | A30 | DP1_TX1_N | Data | B30 | GND | Data | C30 | DP2_TX0_N | Data | D30 | GND | Data | E30 | DP2_TX3_N | Utility | F30 | GND | Utility | G30 | GPIO_1 | Utility | H30 | GND | 30 |
| 31 | Control | A31 | GND | Overlay | B31 | VID01_D1_P | Overlay | C31 | GND | Overlay | D31 | PP01_TX2_P | Overlay | E31 | GND | Utility | F31 | Mezz I/O | Utility | G31 | GND | Utility | H31 | VID01_D4_P | 31 |
| 32 | Control | A32 | GND | Overlay | B32 | VID01_D1_N | Overlay | C32 | GND | Overlay | D32 | PP01_TX2_N | Overlay | E32 | GND | Utility | F32 | Mezz I/O | Utility | G32 | GND | Utility | H32 | VID01_D4_N | 32 |
| 33 | Control | A33 | CP2_TX0_P | Overlay | B33 | GND | Overlay | C33 | PP01_TX1_P | Overlay | D33 | GND | Overlay | E33 | USB02_SST_P | Utility | F33 | GND | Utility | G33 | Mezz I/O | Utility | H33 | GND | 33 |
| 34 | Control | A34 | CP2_TX0_N | Overlay | B34 | GND | Overlay | C34 | PP01_TX1_N | Overlay | D34 | GND | Overlay | E34 | USB02_SST_N | Utility | F34 | GND | Utility | G34 | Mezz I/O | Utility | H34 | GND | 34 |
| 35 | Overlay | A35 | GND | Overlay | B35 | VID01_D2_P | Overlay | C35 | GND | Overlay | D35 | PP01_RX2_P | Overlay | E35 | GND | Utility | F35 | Mezz I/O | Utility | G35 | GND | Utility | H35 | VID01_D5_P | 35 |
| 36 | Overlay | A36 | GND | Overlay | B36 | VID01_D2_N | Overlay | C36 | GND | Overlay | D36 | PP01_RX2_N | Overlay | E36 | GND | Utility | F36 | Mezz I/O | Utility | G36 | GND | Utility | H36 | VID01_D5_N | 36 |
| 37 | Overlay | A37 | Mezz I/O | Overlay | B37 | GND | Overlay | C37 | PP01_RX1_P | Overlay | D37 | GND | Overlay | E37 | USB02_SSR_P | Utility | F37 | GND | Utility | G37 | Mezz I/O | Utility | H37 | GND | 37 |
| 38 | Overlay | A38 | Mezz I/O | Overlay | B38 | GND | Overlay | C38 | PP01_RX1_N | Overlay | D38 | GND | Overlay | E38 | USB02_SSR_N | Utility | F38 | GND | Utility | G38 | Mezz I/O | Utility | H38 | GND | 38 |
| 39 | Overlay | A39 | GND | Overlay | B39 | VID01_D3_P | Overlay | C39 | GND | Overlay | D39 | VID01_D0_P | Overlay | E39 | GND | Utility | F39 | USB02_D_P | Utility | G39 | GND | Utility | H39 | USB02_VBUS | 39 |
| 40 | Overlay | A40 | GND | Overlay | B40 | VID01_D3_N | Overlay | C40 | GND | Overlay | D40 | VID01_D0_N | Overlay | E40 | GND | Utility | F40 | USB02_D_N | Utility | G40 | GND | Utility | H40 | RFU | 40 |
| 41 | Overlay | A41 | USB02_SS TX_P | Overlay | B41 | GND | Overlay | C41 | Mezz I/O | Overlay | D41 | GND | Overlay | E41 | Mezz I/O | Utility | F41 | GND | Utility | G41 | Mezz I/O | Utility | H41 | GND | 41 |
| 42 | Overlay | A42 | USB02_SS TX_N | Overlay | B42 | GND | Overlay | C42 | Mezz I/O | Overlay | D42 | GND | Overlay | E42 | Mezz I/O | Utility | F42 | GND | Utility | G42 | Mezz I/O | Utility | H42 | GND | 42 |
| 43 | Overlay | A43 | GND | Overlay | B43 | Mezz I/O | Overlay | C43 | GND | Overlay | D43 | Mezz I/O | Overlay | E43 | GND | Utility | F43 | Mezz I/O | Utility | G43 | GND | Utility | H43 | Mezz I/O | 43 |
| 44 | Overlay | A44 | GND | Overlay | B44 | Mezz I/O | Overlay | C44 | GND | Overlay | D44 | Mezz I/O | Overlay | E44 | GND | Utility | F44 | Mezz I/O | Utility | G44 | GND | Utility | H44 | Mezz I/O | 44 |
| 45 | Overlay | A45 | USB02_SS RX_P | Overlay | B45 | GND | Overlay | C45 | Mezz I/O | Overlay | D45 | GND | Overlay | E45 | Mezz I/O | Utility | F45 | GND | Utility | G45 | Mezz I/O | Utility | H45 | GND | 45 |
| 46 | Overlay | A46 | USB02_SS RX_N | Overlay | B46 | GND | Overlay | C46 | Mezz I/O | Overlay | D46 | GND | Overlay | E46 | Mezz I/O | Utility | F46 | GND | Utility | G46 | Mezz I/O | Utility | H46 | GND | 46 |
| 47 | Control | A47 | GND | Overlay | B47 | Mezz I/O | Overlay | C47 | GND | Overlay | D47 | Mezz I/O | Overlay | E47 | GND | Utility | F47 | GP_LVDS02_P | Utility | G47 | GND | Utility | H47 | Mezz I/O | 47 |
| 48 | Control | A48 | GND | Overlay | B48 | Mezz I/O | Overlay | C48 | GND | Overlay | D48 | Mezz I/O | Overlay | E48 | GND | Utility | F48 | GP_LVDS02_N | Utility | G48 | GND | Utility | H48 | Mezz I/O | 48 |
| 49 | Control | A49 | CP2_RX0_P | Overlay | B49 | GND | Overlay | C49 | Mezz I/O | Overlay | D49 | GND | Overlay | E49 | Mezz I/O | Utility | F49 | GND | Utility | G49 | Mezz I/O | Utility | H49 | GND | 49 |
| 50 | Control | A50 | CP2_RX0_N | Overlay | B50 | GND | Overlay | C50 | Mezz I/O | Overlay | D50 | GND | Overlay | E50 | Mezz I/O | Utility | F50 | GND | Utility | G50 | Mezz I/O | Utility | H50 | GND | 50 |



320 Pin Payload

MODULAR OPEN SYSTEMS APPROACH

- 2x Data Plane ports (Orange)
- 2x Control Plane ports (Blue)
- 8 lanes of Expansion Plane (Amber)
- Additional pins to extend USB01 to USB 3 speeds (with power) (Pale Blue)
- Video port (Yellow)
- Peripheral port (Purple)

| VNX+ Pin Map | | Revision: C003 | Title: 320-Pin Payload Module Pin Map With Half Aperture | | | | VITA 90.1 Slot Profile: VITA 90 320-Pin IO Intensive Compute Profile AMPS String TBD | | | | | | | | | | | | | | | | | | |
|---|-----------|------------------|--|-----------|-----|-------------|--|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|-------------|-----------|-----|------------|----|
| | | Date: 2022-10-13 | Use: Compute, Single Video | | | | | | | | | | | | | | | | | | | | | | |
| 320-Pin VNX+ Connector with Half-Aperture Pin Assignments | | | | | | | | | | | | | | | | | | | | | | | | | |
| Col | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col | | | |
| 1 | Expansion | A1 | EP1_RX0_P | Expansion | B1 | GND | Expansion | C1 | EP1_RX3_P | Expansion | D1 | GND | Expansion | E1 | EP1_RX6_P | Utility | F1 | GND | Utility | G1 | VS1 | Utility | H1 | VS1 | 1 |
| 2 | Expansion | A2 | EP1_RX0_N | Expansion | B2 | GND | Expansion | C2 | EP1_RX3_N | Expansion | D2 | GND | Expansion | E2 | EP1_RX6_N | Utility | F2 | GND | Utility | G2 | VS1 | Utility | H2 | VS1 | 2 |
| 3 | Expansion | A3 | GND | Expansion | B3 | EP1_RX2_P | Expansion | C3 | GND | Expansion | D3 | EP1_RX5_P | Expansion | E3 | GND | Utility | F3 | GBE1_MDIO_P | Utility | G3 | VS1 | Utility | H3 | VS1 | 3 |
| 4 | Expansion | A4 | GND | Expansion | B4 | EP1_RX2_N | Expansion | C4 | GND | Expansion | D4 | EP1_RX5_N | Expansion | E4 | GND | Utility | F4 | GBE1_MDIO_N | Utility | G4 | VS1 | Utility | H4 | VS1 | 4 |
| 5 | Expansion | A5 | EP1_RX1_P | Expansion | B5 | GND | Expansion | C5 | EP1_RX4_P | Expansion | D5 | GND | Expansion | E5 | EP1_RX7_P | Utility | F5 | GND | Utility | G5 | GND | Utility | H5 | GND | 5 |
| 6 | Expansion | A6 | EP1_RX1_N | Expansion | B6 | GND | Expansion | C6 | EP1_RX4_N | Expansion | D6 | GND | Expansion | E6 | EP1_RX7_N | Utility | F6 | GND | Utility | G6 | GND | Utility | H6 | GND | 6 |
| 7 | Data | A7 | GND | Data | B7 | DP1_RX1_P | Data | C7 | GND | Data | D7 | DP2_RX0_P | Data | E7 | GND | Utility | F7 | GBE1_MD1_P | Utility | G7 | VS2 | Utility | H7 | VS2 | 7 |
| 8 | Data | A8 | GND | Data | B8 | DP1_RX1_N | Data | C8 | GND | Data | D8 | DP2_RX0_N | Data | E8 | GND | Utility | F8 | GBE1_MD1_N | Utility | G8 | VS2 | Utility | H8 | VS2 | 8 |
| 9 | Data | A9 | DP1_RX0_P | Data | B9 | GND | Data | C9 | DP1_RX3_P | Data | D9 | GND | Data | E9 | DP2_RX2_P | Utility | F9 | GND | Utility | G9 | GND | Utility | H9 | GND | 9 |
| 10 | Data | A10 | DP1_RX0_N | Data | B10 | GND | Data | C10 | DP1_RX3_N | Data | D10 | GND | Data | E10 | DP2_RX2_N | Utility | F10 | GND | Utility | G10 | GND | Utility | H10 | GND | 10 |
| 11 | Data | A11 | GND | Data | B11 | DP1_RX2_P | Data | C11 | GND | Data | D11 | DP2_RX1_P | Data | E11 | GND | Utility | F11 | GBE1_MD2_P | Utility | G11 | VS3 | Utility | H11 | VS3 | 11 |
| 12 | Data | A12 | GND | Data | B12 | DP1_RX2_N | Data | C12 | GND | Data | D12 | DP2_RX1_N | Data | E12 | GND | Utility | F12 | GBE1_MD2_N | Utility | G12 | VS3 | Utility | H12 | VS3 | 12 |
| 13 | Control | A13 | CP1_RX0_P | Utility | B13 | GND | Utility | C13 | SM_B_SCL | Utility | D13 | GND | Utility | E13 | DP2_RX3_P | Utility | F13 | GND | Utility | G13 | VS4 | Utility | H13 | VBAT_12V | 13 |
| 14 | Control | A14 | CP1_RX0_N | Utility | B14 | GND | Utility | C14 | SM_B_SDA | Utility | D14 | GND | Utility | E14 | DP2_RX3_N | Utility | F14 | GND | Utility | G14 | VAUX | Utility | H14 | VBAT_3V | 14 |
| 15 | Control | A15 | GND | Utility | B15 | SM_A_SCL | Utility | C15 | MP01-RD | Utility | D15 | MP01-TD | Utility | E15 | GND | Utility | F15 | GBE1_MD3_P | Utility | G15 | GND | Utility | H15 | GND | 15 |
| 16 | Control | A16 | GND | Utility | B16 | SM_A_SDA | Utility | C16 | GND | Utility | D16 | MP01-TD | Utility | E16 | GND | Utility | F16 | GBE1_MD3_N | Utility | G16 | UEIO_00 | Utility | H16 | NVMRO | 16 |
| 17 | Control | A17 | CP1_TX0_P | Expansion | B17 | GND | Expansion | C17 | EP1_TX3_P | Expansion | D17 | GND | Expansion | E17 | REF_CLK_P | Utility | F17 | GND | Utility | G17 | UEIO_01 | Utility | H17 | SYSRESET* | 17 |
| 18 | Control | A18 | CP1_TX0_N | Expansion | B18 | GND | Expansion | C18 | EP1_TX3_N | Expansion | D18 | GND | Expansion | E18 | REF_CLK_N | Utility | F18 | GND | Utility | G18 | UEIO_02 | Utility | H18 | GND | 18 |
| 19 | Expansion | A19 | GND | Expansion | B19 | EP1_TX1_P | Expansion | C19 | GND | Expansion | D19 | EP1_TX5_P | Expansion | E19 | GND | Expansion | F19 | AUX_CLK_P | Expansion | G19 | GND | Expansion | H19 | SER01_RX_P | 19 |
| 20 | Expansion | A20 | GND | Expansion | B20 | EP1_TX1_N | Expansion | C20 | GND | Expansion | D20 | EP1_TX5_N | Expansion | E20 | GND | Expansion | F20 | AUX_CLK_N | Expansion | G20 | UEIO_03 | Expansion | H20 | SER01_RX_N | 20 |
| 21 | Expansion | A21 | EP1_TX0_P | Expansion | B21 | GND | Expansion | C21 | EP1_TX4_P | Expansion | D21 | GND | Expansion | E21 | EP1_TX7_P | Expansion | F21 | GND | Expansion | G21 | UEIO_04 | Expansion | H21 | SER01_TX_P | 21 |
| 22 | Expansion | A22 | EP1_TX0_N | Expansion | B22 | GND | Expansion | C22 | EP1_TX4_N | Expansion | D22 | GND | Expansion | E22 | EP1_TX7_N | Expansion | F22 | GND | Expansion | G22 | UEIO_05 | Expansion | H22 | SER01_TX_N | 22 |
| 23 | Expansion | A23 | GND | Expansion | B23 | EP1_TX2_P | Expansion | C23 | GND | Expansion | D23 | EP1_TX6_P | Expansion | E23 | GND | Expansion | F23 | USB01_D_P | Expansion | G23 | GND | Expansion | H23 | GND | 23 |
| 24 | Expansion | A24 | GND | Expansion | B24 | EP1_TX2_N | Expansion | C24 | GND | Expansion | D24 | EP1_TX6_N | Expansion | E24 | GND | Expansion | F24 | USB01_D_N | Expansion | G24 | GND | Expansion | H24 | GA0* | 24 |
| 25 | Data | A25 | DP1_TX0_P | Data | B25 | GND | Data | C25 | DP1_TX3_P | Data | D25 | GND | Data | E25 | DP2_TX2_P | Data | F25 | GND | Data | G25 | UEIO_06 | Data | H25 | GA1* | 25 |
| 26 | Data | A26 | DP1_TX0_N | Data | B26 | GND | Data | C26 | DP1_TX3_N | Data | D26 | GND | Data | E26 | DP2_TX2_N | Data | F26 | GND | Data | G26 | UEIO_07 | Data | H26 | GA1* | 26 |
| 27 | Data | A27 | GND | Data | B27 | DP1_TX2_P | Data | C27 | GND | Data | D27 | DP2_TX1_P | Data | E27 | GND | Data | F27 | GP_LVDS01_P | Data | G27 | GND | Data | H27 | GA3* | 27 |
| 28 | Data | A28 | GND | Data | B28 | DP1_TX2_N | Data | C28 | GND | Data | D28 | DP2_TX1_N | Data | E28 | GND | Data | F28 | GP_LVDS01_N | Data | G28 | GND | Data | H28 | GA4* | 28 |
| 29 | Data | A29 | DP1_TX1_P | Data | B29 | GND | Data | C29 | DP2_TX0_P | Data | D29 | GND | Data | E29 | DP2_TX3_P | Data | F29 | GND | Data | G29 | GDiscrete1 | Data | H29 | GA4* | 29 |
| 30 | Data | A30 | DP1_TX1_N | Data | B30 | GND | Data | C30 | DP2_TX0_N | Data | D30 | GND | Data | E30 | DP2_TX3_N | Data | F30 | GND | Data | G30 | GPIO_0 | Data | H30 | GAP* | 30 |
| 31 | Control | A31 | GND | Overlay | B31 | VID01_D1_P | Overlay | C31 | GND | Overlay | D31 | PP01_TX2_P | Overlay | E31 | GND | Overlay | F31 | RFU | Overlay | G31 | GPIO_1 | Overlay | H31 | VID01_D4_P | 31 |
| 32 | Control | A32 | GND | Overlay | B32 | VID01_D1_N | Overlay | C32 | GND | Overlay | D32 | PP01_TX2_N | Overlay | E32 | GND | Overlay | F32 | RFU | Overlay | G32 | GND | Overlay | H32 | VID01_D4_N | 32 |
| 33 | Control | A33 | CP2_TX0_P | Overlay | B33 | GND | Overlay | C33 | PP01_TX1_P | Overlay | D33 | GND | Overlay | E33 | USB02_SST_P | Overlay | F33 | GND | Overlay | G33 | GND | Overlay | H33 | GND | 33 |
| 34 | Control | A34 | CP2_TX0_N | Overlay | B34 | GND | Overlay | C34 | PP01_TX1_N | Overlay | D34 | GND | Overlay | E34 | USB02_SST_N | Overlay | F34 | GND | Overlay | G34 | GND | Overlay | H34 | GND | 34 |
| 35 | Control | A35 | GND | Overlay | B35 | VID01_D2_P | Overlay | C35 | GND | Overlay | D35 | PP01_RX2_P | Overlay | E35 | GND | Overlay | F35 | RFU | Overlay | G35 | GND | Overlay | H35 | VID01_D5_P | 35 |
| 36 | Control | A36 | GND | Overlay | B36 | VID01_D2_N | Overlay | C36 | GND | Overlay | D36 | PP01_RX2_N | Overlay | E36 | GND | Overlay | F36 | RFU | Overlay | G36 | GND | Overlay | H36 | VID01_D5_N | 36 |
| 37 | Control | A37 | CP2_RX0_P | Overlay | B37 | GND | Overlay | C37 | PP01_RX1_P | Overlay | D37 | GND | Overlay | E37 | USB02_SSR_P | Overlay | F37 | GND | Overlay | G37 | GND | Overlay | H37 | GND | 37 |
| 38 | Control | A38 | CP2_RX0_N | Overlay | B38 | GND | Overlay | C38 | PP01_RX1_N | Overlay | D38 | GND | Overlay | E38 | USB02_SSR_N | Overlay | F38 | GND | Overlay | G38 | GND | Overlay | H38 | GND | 38 |
| 39 | Control | A39 | GND | Overlay | B39 | VID01_D3_P | Overlay | C39 | GND | Overlay | D39 | VID01_D0_P | Overlay | E39 | GND | Overlay | F39 | USB02_D_P | Overlay | G39 | GND | Overlay | H39 | USB02_VBUS | 39 |
| 40 | Control | A40 | GND | Overlay | B40 | VID01_D3_N | Overlay | C40 | GND | Overlay | D40 | VID01_D0_N | Overlay | E40 | GND | Overlay | F40 | USB02_D_N | Overlay | G40 | GND | Overlay | H40 | RFU | 40 |

S2-B Half Aperture
RF & Optical



Radial Clocks

Two Profiles Defined

| VN ^X + Pin Map | | Revision: B002 | Title: 320-Pin REF/AUX Clock Overlay Pin Map With Half Aperture | VITA 90 Baseline Slot Profile: TBD | | | | | | | | | | | | | | | | | | | |
|--|-------|------------------|---|------------------------------------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-----|--|
| | | Date: 2022-08-25 | Use: Radial Ref & Aux Clocks with Half Aperture | Overlay Designation: TBD | | | | | | | | | | | | | | | | | | | |
| 320-Pin VN ^X + Connector with Half-Aperture Pin Assignments | | | | | | | | | | | | | | | | | | | | | | | |
| Col | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col | |
| S2 Half Aperture RF & Optical | | | | | | | | | | | | | | | | | | | | | | | |

| VN ^X + Pin Map | | Revision: B002 | Title: 320-Pin Dedicated REF/AUX Clock Pin Map With Half Aperture | VITA 90 Slot Profile: TBD | | | | | | | | | | | | | | | | | | | |
|--|-------|------------------|---|---------------------------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-------|-----|-------------|-----|--|
| | | Date: 2022-08-25 | Use: Dedicated Ref & Aux Clocks with Half Aperture | Overlay Designation: TBD | | | | | | | | | | | | | | | | | | | |
| 320-Pin VN ^X + Connector with Half-Aperture Pin Assignments | | | | | | | | | | | | | | | | | | | | | | | |
| Col | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Plane | Pin | Signal Name | Col | |
| S2 Half Aperture RF & Optical | | | | | | | | | | | | | | | | | | | | | | | |

- 2x Data Plane ports (Orange)
- 2x Control Plane ports (Blue)
- 8 lanes of Expansion Plane (Amber)
- 7x REF_CLK/AUX_CLK pairs (Lilac)
- Based on the payload template

- 2x Control Plane ports (Blue)
- 22x REF_CLK/AUX_CLK pairs (Lilac)



Features and Benefits of VNX+ for Ground Vehicle Applications

MODULAR OPEN
SYSTEMS APPROACH

| Feature | Benefit |
|---|--|
| S0: Common utility signals with OpenVPX (NVMRO, SYSRESET, radial clocks, etc.) | System design patterns established with OpenVPX can be replicated with VNX+. Also, software designed for VPX platforms can run with little or no change on VNX+ hardware. |
| S0: Common I/O (Ethernet, Serial, GPIO/GP_LVDS, etc.) | Common I/O ports in predictable locations in the payload profiles increases design reuse. |
| S0: VITA 46.11 System Management | Out-of-band system management is a key element in SOSA based systems. It provides a reliable mechanism for hard monitoring and control, as well as diagnostic/prognostic capabilities. |
| S0: UEIO | Ideal for port expansion, low-speed interfaces (i.e. CANBus), device control (relays, LEDs, etc.). |
| S1: Data Plane | Primary inter-PIC data path. Based on Ethernet. Identical to OpenVPX. Easily integrated into the VICTORY architecture. |
| S1: Control Plane | Command/data inter-PIC path, separate from the Data Plane. Based on Ethernet. Identical to OpenVPX. Easily integrated into the VICTORY architecture. |
| S1: Expansion Plane | Wide path for board-to-board communications, GPUs, FPGAs, etc. |
| S2: Copper ports (Video, USB, Peripheral port) | Interfaces commonly found on single-board computers. |
| S2: Mezzanine-mapped I/O | Supports expansion through mezzanine cards with I/O mapped to the backplane. VITA 93 QMC is under development in VITA and will utilize these pins. |
| S2: Apertures | Provides high-performance coaxial or MT-based optical (or both) for out-of-box connectivity to sensor heads, other systems, upstream networks, etc. |



Advantages and Disadvantages to VNX+ When Compared to 3U OpenVPX

| Feature | Notes |
|---|---|
| Size | VNX+ is ~30% of the size (volume) of 3U OpenVPX on a per-slot basis |
| Power | 3U VPX is generally limited to 65-85W (conduction cooled) at high operating temperatures (70°C Ambient) – higher with alternative cooling VNX+ is limited to about 35W under the same conditions – higher with alternative cooling |
| Shock, Vibration, and other environmental factors | Comparable |
| Utility Segment | VNX+ offers all of the features of OpenVPX |
| Additional features | VNX+ offers standard interfaces that OpenVPX lacks |



Where to Apply VNX+?

MODULAR OPEN SYSTEMS APPROACH

Answer: most SWaP-constrained environments requiring high-performance computing and I/O – i.e. SOSA-type systems

- Autonomous ground vehicles
- 360° situational awareness systems
- Active protection systems
- SIGINT/EW
- Software defined radios
- Network processors



Thank you!

