



The Open Group SOSA™

Dr. Ilya Lipkin
Steering Committee Chair – Gov



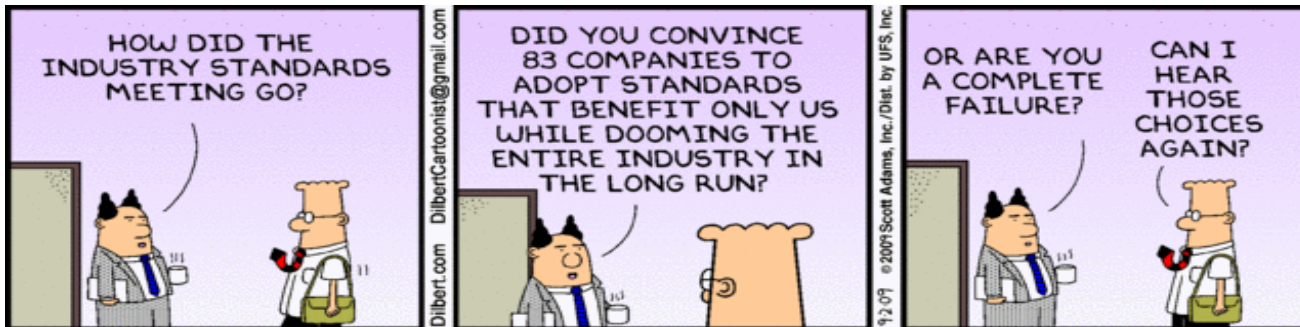
Nick Borton
Steering Committee Vice Chair – Ind

What is SOSA?

- Standards - EVERYBODY HAS ONE:



- HOST
- FACE
- OMS
- VICTORY
- STANAG
- VITA
- REDHAWK/TOA
- COARPS
- BIG IRON
- ARCADE
- OCS
- CMOSS
- MORA
- SCA
-
-



SOSA is an Integrative Collaborative Open Systems Architecture with >100 Partners

Why Sensor Open Systems Architecture (SOSA)?

SOSA Benefits Government & the DoD:

Requirements

SOSA promotes **procurement efficiency** through provision of consistent guidance for system requirements and use of standardized contracting language.

Acquisition

SOSA **shortens acquisition timelines** for standards-based capabilities that maximize component re-use, limit NRE (non-recurring engineering), reduce development costs.

Sustainment

SOSA systems feature increased commonality that enables **more efficient maintenance** using readily interchangeable components.

Interoperability

SOSA sensors allow for dramatically **enhanced systems interoperability**, enabling composable mission capabilities & novel multi-domain solutions.

SOSA Benefits Industry:

Risk

Mature, predictable procurement requirements allow for nimbler industry response with **reduced risk**.

Development Cost

Vendors can leverage proven modular decomposition, known interface definitions, standard tooling, and component re-use to **minimize NRE, lower costs**.

Product Families

Vendors can create functional product families based on the SOSA reference architecture, leveraging the inherent composable nature of the modular standard to focus on **innovative solutions**.

Strategic Sourcing

SOSA **broadens the sensor systems industrial base** by promoting COTS component vendors, creating a sensor ecosystem that lowers the bar to entry for creative small & non-traditional businesses

- *COST Sharing: DoD and Industry Share Costs of Developing SOSA*
 - **Skin in the Game**
 - Critical for Industry Buy In (See A lot Benefits for Participation)
 - **Crowd Sourcing**
 - **Long Term Savings**
- *Development Method: Incrementally develop and demonstrate SOSA components via Snapshots to full version(s)*
- *Series of prototype activities, in-step with intra/inter-service actions*
 - Execution Objective: Validate/verify SOSA specs via synchronized efforts w/ other organizations' efforts
 - Reduce risk for adopting programs by development → test → demonstration
 - Methodology mitigates effort's non-traditional/non-routine scope (i.e. requirement, funding, resources)



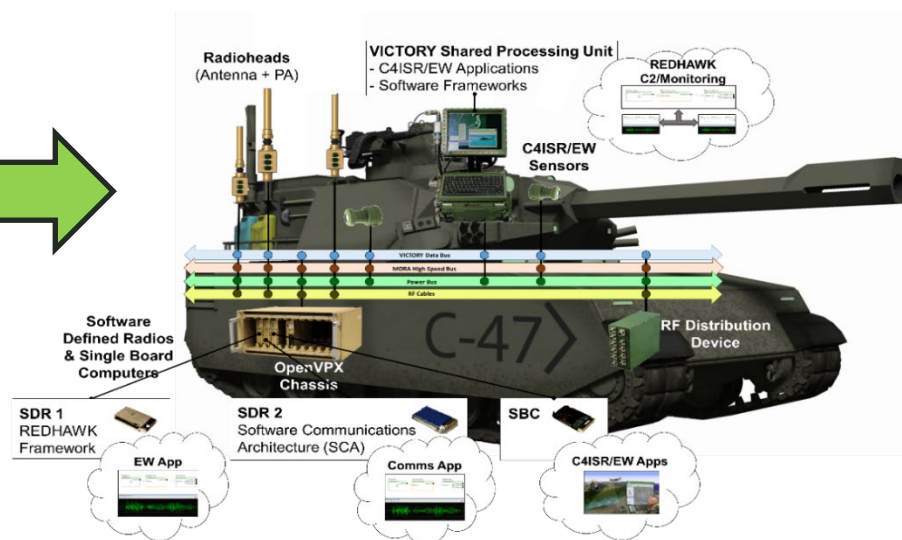
CMOSS OVERVIEW



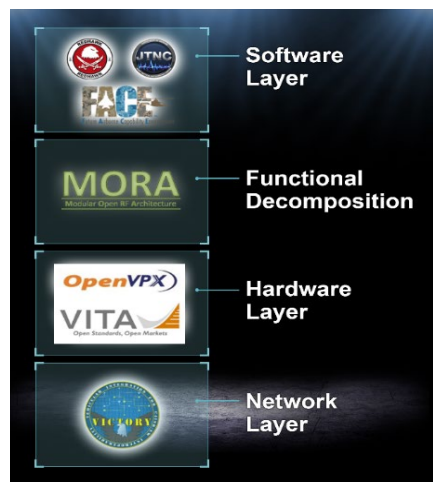
Why Converge?



CMOSS Architecture



C5ISR/EW Modular Open Suite of Standards (CMOSS)



- CMOSS is a suite of standards to support the reduction of the size, weight and power of C5ISR and EW systems while increasing the flexibility and adaptability of these systems
 - Universal A-Kit – Project Managers field capabilities as cards into a common chassis
 - Pooled radio resources such as antennas and amplifiers for Communications, Electronic Warfare (EW), and Signals Intelligence (SIGINT) systems
 - Shared processing resources such as computers and displays
 - Shared data services such as Position, Navigation, and Time (PNT)
 - Foundation for enhanced interoperability and simultaneity between C5ISR systems
 - Reduced life cycle cost through increased competition, smaller logistics tails with common sparing, and upgrading to the latest hardware as parts are replaced
 - Rapid insertion of new technology/capability

Army, Air Force, and Navy collaborate under the SOSA Consortium to develop a holistic open architecture that leverages existing standards, maximizes economies of scale, and provides the flexibility to rapidly insert the latest capabilities to achieve Future Force Modernization.

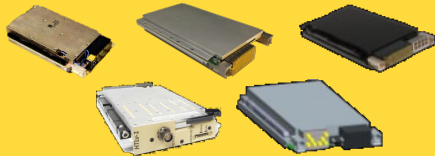


CMOSS ARCHITECTURE



Reduces the size, weight and power footprint of C4ISR systems by sharing hardware such as antennas and amplifiers.

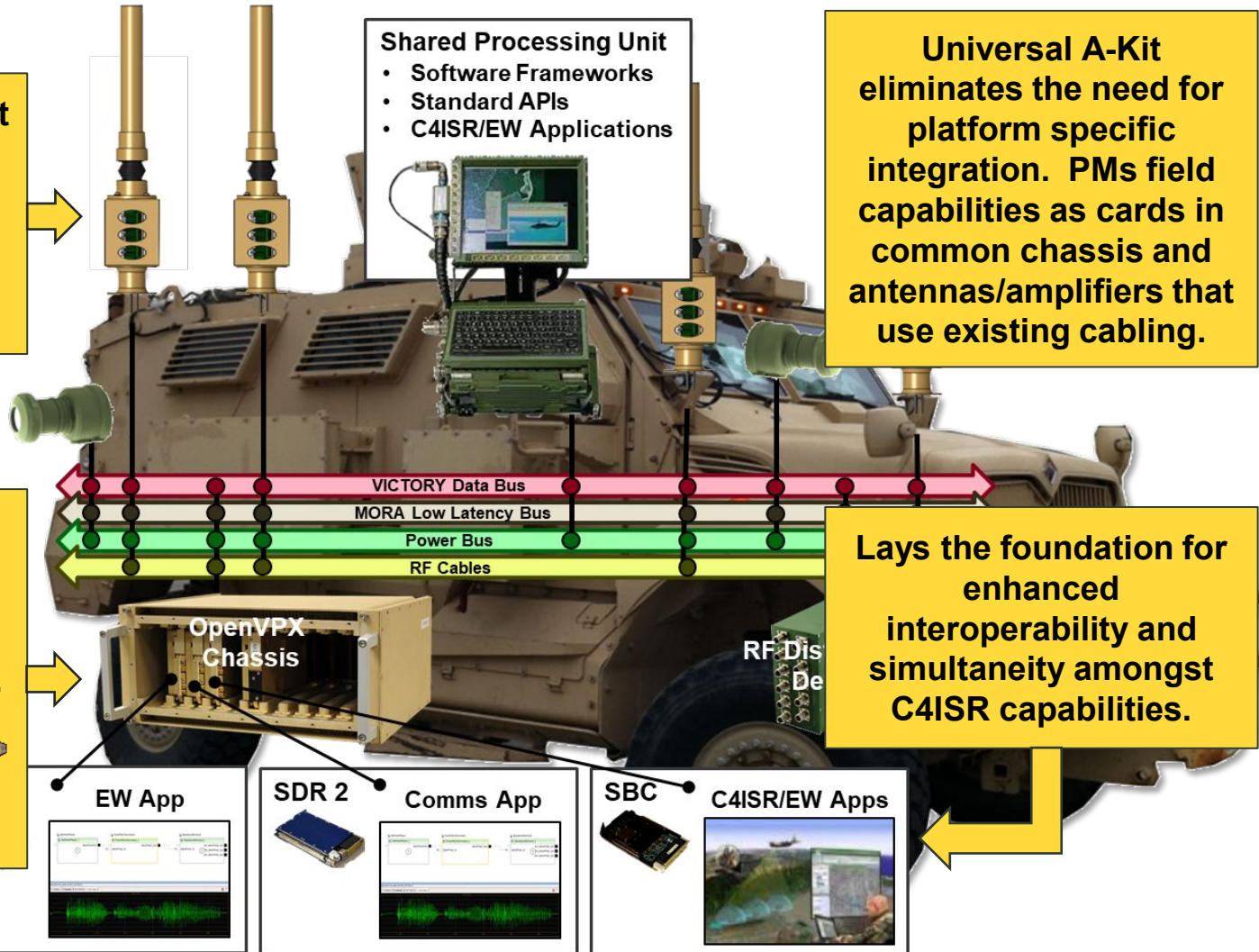
Enables rapid technology insertion using best of breed capabilities to address emerging requirements.



Shared Processing Unit

- Software Frameworks
- Standard APIs
- C4ISR/EW Applications

Universal A-Kit eliminates the need for platform specific integration. PMs field capabilities as cards in common chassis and antennas/amplifiers that use existing cabling.



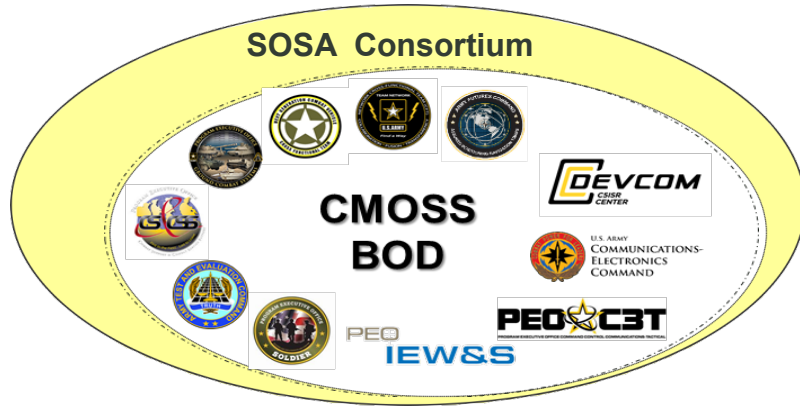
Reduces logistics tails by enabling common sparing. Eliminates the need for “End of Life” buys for a 30+ years sustainment by enabling hardware modernization every 5-10 years.



C5ISR CMOSS STRATEGY



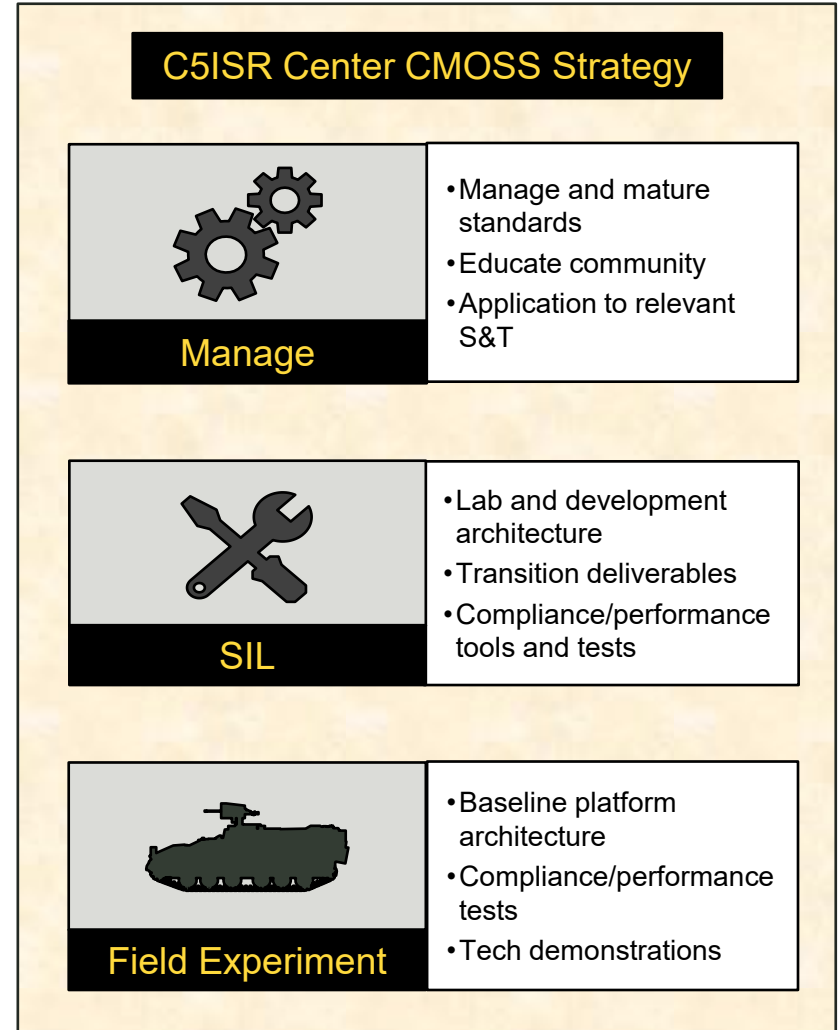
ORGANIZE



SYNCHRONIZE

- Multiple C5ISR Center CMOSS prototyping efforts
- Multi-Function Electronic Warfare - Air Large (MFEW-AL)
- Tactical Cyber Equipment - CMOSS Chassis (TCE-CC)
- Terrestrial Layer System (TLS)
- CMOSS Mounted Form Factor Abbreviated - Capability Development Document (CMFF A-CDD)
- N-CFT TEM 4 – CMOSS
- Assured Positioning, Navigation Timing (A-PNT) Prototyping
- PM Tactical Radios (TR) CMOSS SBIRs
- A-PNT Open Innovation Lab (OIL)
- Tri-Service Open Architecture Interoperability Demonstration (TSOA-ID)

EXECUTE



JOINT CFT/PEO/S&T GOVERNANCE AND EXECUTION



ENDORSEMENTS AND DIRECTIVES



Office of the Secretary of the Navy
1000 Navy Pentagon
Washington, DC 20350-1000

Office of the Secretary of the Army
101 Army Pentagon
Washington, DC 20310-0101

Office of the Secretary of the Air Force
1670 Air Force Pentagon
Washington, DC 20330-1670

JUN 7 2019

MEMORANDUM FOR SERVICE ACQUISITION EXECUTIVES AND PROGRAM EXECUTIVE OFFICERS

SUBJECT: Modular Open Systems Approaches for our Weapon Systems is a Warfighting Imperative

Victory in future conflict will in part be determined by our ability to rapidly share information across domains. Sharing information from machine to machine requires common standards.

For the past several years, each of the Services has been developing, demonstrating, and validating common data standards through a cooperative partnership with industry and academia. This work has resulted in the establishment of Open Mission Systems/Universal Command and Control Interface (OMS/UCI), Sensor Open Systems Architecture (SOSA), Future Airborne Capability Environment (FACE) and Vehicular Integration for C4ISR/EW Interoperability (VICTORY) among other standards.

We have reviewed the capabilities of these common standards. We determined the continued implementation of these standards, and further development of Modular Open Systems Approach (MOSA) standards in areas where we lack them is vital to our success. As such, MOSA supporting standards should be included in all requirements, programming and development activities for future weapon system modifications and new start development programs to the maximum extent possible.

In an effort to formalize our approach to MOSA, Service Acquisition Executives will publish specific implementation guidance for our acquisition programs. Additionally, Standardization Executives should continue standards development efforts where we have gaps. Lastly, requirements and programming functions will ensure MOSA is reflected in our requirements and programs to ensure our future weapon systems can communicate and share across domains.

Richard V. Spencer
Secretary of the Navy

Mark T. Esper
Secretary of the Army

Heather Wilson
Secretary of the Air Force

Modular Open Systems Approaches for our Weapon Systems is a Warfighting Imperative

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DEPARTMENT OF THE ARMY
PROGRAM EXECUTIVE OFFICE
INTELLIGENCE, ELECTRONIC WARFARE AND SENSORS
BUILDING 802, 888 SURVEILLANCE LOOP
ABERDEEN PROVING GROUND, MD 21005-1646

SFAE/IEW-EW 28 June 2019

MEMORANDUM FOR RECORD

SUBJECT: Utilization of the Electronic Warfare & Cyber C4ISR/EW Modular Open Suite of Standards (EW&C CMOSS)

1. References:

- a. Memorandum, "Modular Open Systems Approach (MOSA) – Tri-Service Memo," OSA, OSN, OSAF, dated 7 January 2019.
- b. Document, Project Manager Electronic Warfare & Cyber (PM EW&C), Technical Management Division (TMD), EW&C CMOSS definition, dated 24 June 2019

2. As the Chartered Materiel Developer for Army Electronic Warfare & Cyber Programs of Record as well as Delegated Milestone Decision Authority (MDA) for Operational Need statements: #16-21509, and #17-22579, I approve and direct the use of the EW&C CMOSS for use and integration of all future Project Manager Electronic Warfare & Cyber Systems where applicable.

KEVIN E. FINCH
Colonel, ACIFA
Project Manager, Electronic Warfare & Cyber

2 Encs
1. Tri-Service Memo, 7 JAN 19
2. EW&C CMOSS, 24 JUN 19

Utilization of Electronic Warfare & Cyber C4ISR/EW Modular Open Suite of Standards (EW&C CMOSS)

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Tri-Service

PM EW&C

WILLIAM M. (MAC) THORBERRY NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2021



Statement in support of CMOSS/HOST/SOSA

Sensor Open Systems Architecture and C4ISR Modular Open Suite of Standards Military Standards Initiative

The committee is encouraged by the military services supporting Modular Open Systems Architectures (MOSA) on all future programs and platform modernization efforts. For example, the Army's C4ISR Modular Open Suite of Standards (CMOSS), and the Air Force's Sensor Open Systems Architecture (SOSA) standards are significant advances.

The committee appreciates the efforts to increase capabilities, speed development, speed technology refresh, lower costs for the Government, and increase competition in the industry. The committee is aware of marked progress made by the Army's PEO (Program Executive Office) C3T (Command, Control, and Communications-Tactical), PEO IEW&S (Intelligence, Electronic Warfare and Sensors), and Network-CFT (Cross-Functional Team). The committee commends such forward thinking and movement to unify around these standards.

Furthermore, the committee recommends that CMOSS and SOSA military electronics standards be more tightly connected to use the same hardware pinout standards and, more importantly, the same software data transport protocols, such as the Modular Open RF Architecture (MORA), to further solidify a common Department of Defense-wide technical approach to create an open systems architecture standard by which small businesses and large primes can compete. To achieve a more effective economy

of scale, the CMOSS and SOSA standards must both be a unified hardware and software ecosystem. The committee believes CMOSS is more established at this time and should lead.

Finally, the committee believes the military services should begin to combine missions to enable CMOSS and SOSA for multi-mission tactical communications, EW (electronic warfare), SIGINT (signals intelligence), and battlefield computing in one system. Such an effort will reduce the SWaP (size, weight, and power) on various platforms for the military electronics, and unify the industry around common military hardware, as well as software, standards.

The committee looks forward to further efforts by the Department of Defense to standardize procurement of modular cards and software according to the CMOSS and/or SOSA standards, for all future modernization and new weapons systems. These efforts will increase competition rather than have the classical single vendors drive their proprietary solutions which will cost the Government much higher modernization costs and decrease innovation.

<https://www.congress.gov/116/crpt/hrpt442/CRPT-116hrpt442.pdf>





ON-GOING CMOSS EFFORTS



- **Programs of Record**

- Product Lead Electronic Attack (PdL EA) Multi-Function Electronic Warfare Air Large (MFEW-AL) Electronic Attack / Electronic Warfare Support pod on a Gray Eagle unmanned aircraft system
- Product Manager Information Warfare (PdM IW) Tactical Cyber Equipment - CMOSS Chassis (TCE-CC) Manpack chassis and Bionic Commando Cyber-Electromagnetic Activities (CEMA) card
- Product Manager Terrestrial Spectrum Warfare (PdM TSW) Terrestrial Layer System (TLS) SIGINT, EW, and Cyber-enabling integrated solution

- **Requirements**

- CMOSS Mounted Form Factor (CMFF) Abbreviated – Capability Development Document (A-CDD) for a CMOSS chassis including cards for PNT, Mission Command, Communications, and EW

- **Prototype Efforts**

- TSM and USRP radio cards
- CMOSS-capable cryptographic subsystem (CSS) via RESCUE
- Proof of concept of JBC-P/MMC hosted on a single board computer (SBC)
- Multiple CMOSS-based Mounted Assured PNT System (MAPS) prototypes
- CMOSS-based Tactical SIGINT (TSIG) system integrated into Stryker platform
- Small Business Innovation Research (SBIR) efforts for Radioheads and SDR cards
- Digital / analog Radiohead prototyping



SOSA CONSORTIUM MEMBERS & CMOSS RELATIONSHIP



SOSA™ Sponsors

- Air Force Life Cycle Management Center
- U.S. Space Command
- Collins Aerospace
- Joint Tactical Networking Center
- Lockheed Martin
- NAVAIR
- U.S. Army CCDC C5ISR Center
- U.S. Army PEO Aviation
- U.S. Army Project Manager Electronic Warfare and Cyber

SOSA™ Principals

- BAE Systems, Inc.
- Elbit Systems of America
- FLIR Systems, Inc.
- GE Aviation Systems
- General Dynamics
- Intel
- L3Harris
- Mercury Systems
- Northrop Grumman
- Physical Optics Corporation
- Raytheon
- Sierra Nevada Corporation
- SRC Inc.

SOSA™ Associates

- Abaco Systems
- Acromag, Inc.
- Aegis Power Systems
- Aitech Defense Systems, Inc.
- Ampro ADLINK Technology, Inc.
- Anduril Industries, Inc.
- Annapolis Micro Systems, Inc.
- Behlman Electronics, Inc.
- Bliley Technologies
- CACI International, Inc.
- Cobham Advanced Electronic Solutions Inc.
- Concurrent Technologies
- CoreAVI
- COTSWORKS, LLC
- CRFS, Inc.
- Critical Frequency Design
- Crossfield Technology
- Curtiss-Wright Defense Solutions
- Dawn VME Products
- Delta Information Systems
- DornerWorks
- DRS Signal Solutions
- DRTI
- EIZO Rugged Solutions, Inc.
- Elma Electronic Inc.
- Epiq Solutions
- FEI-Elcom Tech, Inc.
- Freedom Power Systems, Inc.
- Georgia Tech Research Institute
- GORE
- Great River Technology, Inc.
- Herrick Technology Laboratories, Inc.
- Interface Concept Inc.
- iRF Solutions
- Jovian Software Consulting LLC
- KEYW Corporation
- Kontron America
- LCR Embedded Systems, Inc.
- Lead Dog Technologies, LLC
- Leidos
- LGS Innovations
- Mellanox Federal Systems
- Meritec
- Micro Focus (US), Inc.
- Midwest Microwave Solutions Inc
- Milpower Source
- Motorola Solutions
- New Wave Design and Verification, LLC
- North Atlantic Industries, Inc.
- OAR Corporation
- Orion Technologies, LLC
- Orolia Defense & Security, LLC
- Pacific Star Communications, Inc.
- PCI Systems Inc.
- Pentek, Inc.
- Perspecta Labs Inc.
- QRC Technologies, LLC
- RADA Technologies, LLC (RADA USA)
- Rantec Power Systems, Inc.
- Real-Time Innovations
- Reflex Photonics Corp.
- Riverside Research
- RTD Embedded Technologies, Inc.
- Samtec
- Selex Galileo Inc.
- SimVentions
- Skayl LLC
- SMART Embedded Computing, Inc.
- Southwest Research Institute
- Spectranetix, Inc.
- SR Technologies, Inc.
- Star Lab Corp
- SV Microwave
- TE Connectivity
- Telephonics
- Tucson Embedded Systems
- University of Dayton Research Institute
- VITA
- VTS, Inc.
- Wolf Advanced Technology Inc.



SOSA™ Consortium - Brings together DoD, industry, and academia under a *rigorous consensus based approach* for standards development. SOSA Leverages CMOSS development. The consortium has 100 members. US Army CMOSS developers serve in many key roles within the consortium.



CMOSS - Standards developed and maintained by the US Army to support Army procurements which *respond to program office* schedules and needs. We strive to maintain alignment between CMOSS and the SOSA™ Technical Standard.

The SOSA Standard represents both governmental and industry organizations over 100 members



HOST Overview

- Hardware Open Systems Technologies (HOST) is a standards framework that applies open architectures to high-performance embedded computing.
- These standards support a Modular Open Systems Approach (MOSA) to implementing systems based on Commercial-Off-the-Shelf (COTS) components for embedded computing on U.S. Defense Platform Open Systems.
- With standardized interfaces, HOST provides the interchangeability of newer technologies and promotes the reuse of hardware designs for existing and future platforms



The HOST Standard

TIER I: CORE TENETS (Single Document)

Preserve HOST “openness” by establishing universal requirements that apply to all HOST components regardless of core technology

TIER II: CORE TECHNOLOGIES (Document for each core technology chosen)

Define platform agnostic technical requirements for core technologies (Examples are OpenVPX, PC104 and VME)

TIER III: COMPONENT SPECIFICATIONS (Many Documents)

These are component level documents that will guide H/W development to facilitate modular components, Tier III reuse, and upgradeability

WWW.host-oa.com

NAVAIR Public Release 2015-646 & 2015-647
Distribution Statement A – “Approved for public release; distribution is unlimited”



Programs that have adopted HOST

- **Currently there are two programs that have adopted HOST, JSF (block IV upgrade) and MCA (T-45 program)**
- **Potential 3rd program is for test equipment using small form factor**
- **NAVAIR is developing an example system model of the UH-60V Cockpit Demonstrator. This model – in conjunction with accompanying process models – will provide a roadmap for designing HOST systems utilizing modern digital engineering practices.**

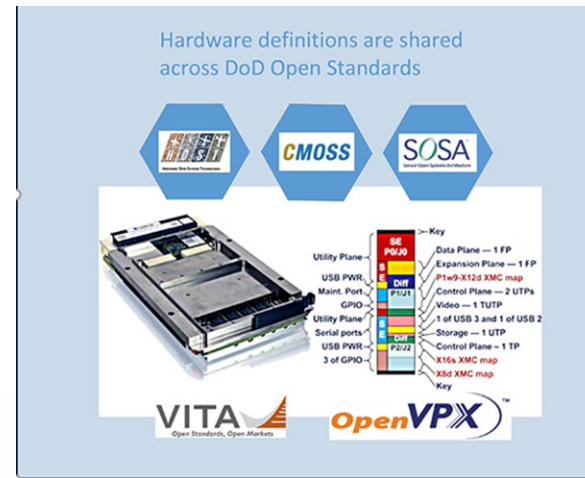
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HOST & SOSA Alignment

- The team responsible for the development of HOST are active members of the SOSA consortium. SOSA Technical standard refers to the intended use of HOST in SOSA systems, citing a corresponding ANSI/VITA standard.
- “SOSA hardware platform management leverages and builds upon the Hardware Open Systems Technology (HOST) 3.0 system management architecture and requirements which itself is highly leveraged from ANSI/VITA 46.11.”



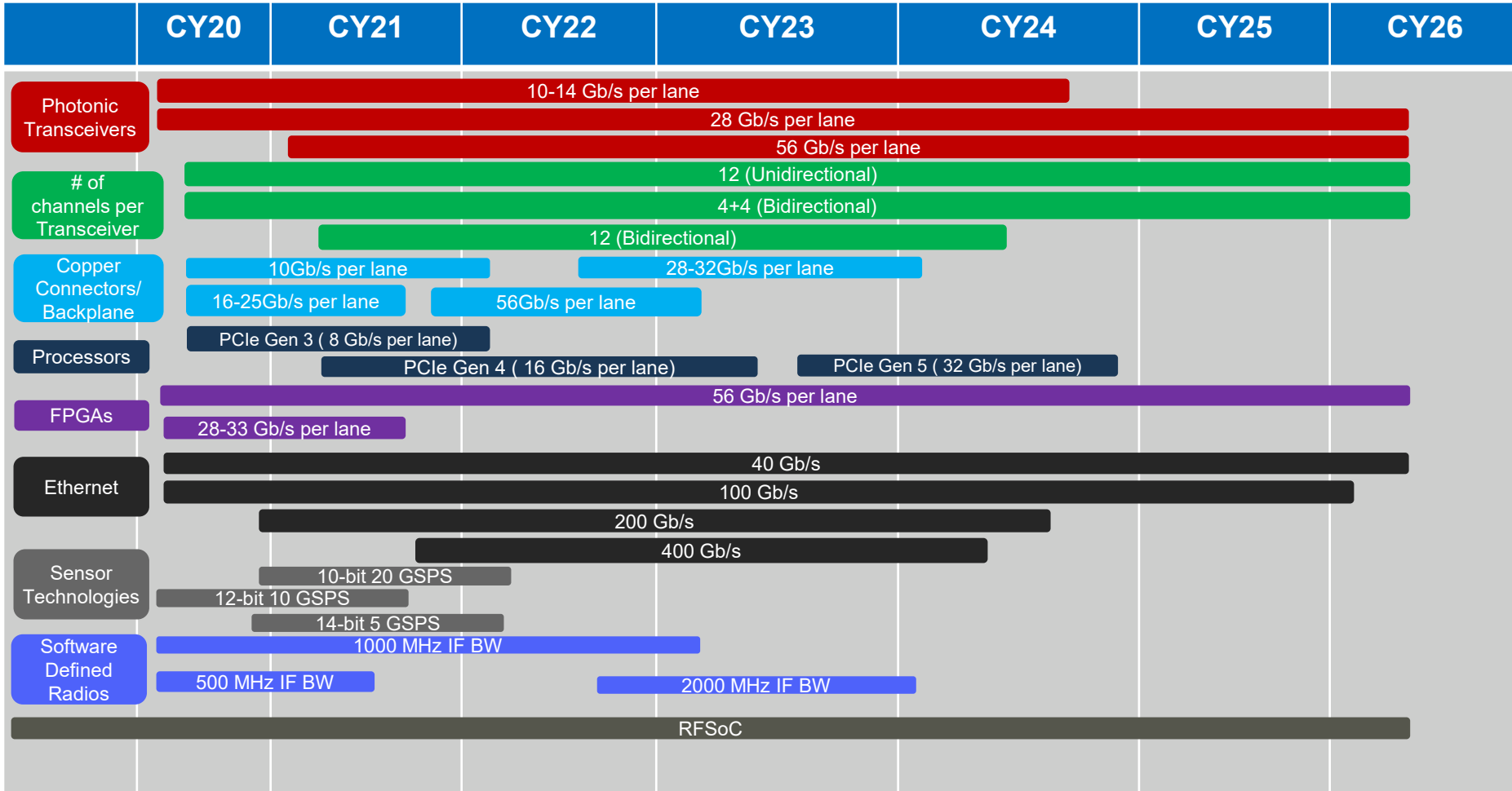
- HOST OpenVPX Tier 2 is at v4.0
 - Recent HOST EARS re-writes undertaken primarily to eliminate ambiguous language and use more consistent, repeatable language constructs

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Commercial HW Roadmap



- Current Connector Interface Standard has been around for a long time
 - Evolutionary signaling rate and ruggedness improvements over time
- Through SOSA activities it became apparent we need a new more capable connector that will provide MORE:
 - Contacts – copper digital, coax for RF (Radio Frequency), optical
 - Bandwidth
 - Interoperability
 - Room to grow
- Is the time right for optical backplanes?
 - Optical for high-bandwidth data transfers with other signals over copper

The Challenge!

Develop Next Generation VITA Connectors in 4 years or less

TSOA-ID Invitation to Participate in 2021 Virtual PlugFest



The SOSA™ TSOA-ID “Virtual” PlugFest 2.0 is being held at Dayton, OH. Allow companies to showcase:

- Plug-In Circuit Card Assemblies (CCAs)
- Chassis
- Power supplies
- SBC's
- SDR's
- Networking
- Storage
- Encryptions
- Radio Heads
- Electrical/Mechanical connectors
- Or any other part of SOSA capabilities that are aligned with SOSA Snapshot v2/Snapshot v3 or upcoming release of V1.0
- Basic Integration of HW and SW stack

Date: Tentatively Scheduled for Second Week of March 2021

Vendors interested in Participation need to register and contact: Garrett Sargent, Ph.D. 937-768-9665, garrett.sargent@psoassolutions.com and John Topping 937-431-4447, john.m.topping@leidos.com

Due to COVID-19 concerns, this event will be held “virtually”

- **Quarterly Member Newsletter**
 - Showcases standards updates and member activities
- **SOSA Website** - <https://www.opengroup.org/sosa>
 - Member news releases and articles, events and webinars
 - Marketing guidelines
 - Consortium and technical standards resources
- **Events**
 - FACE™ and SOSA™ TIM & Expo March 23rd <https://www.expotim2021.com>
 - Tri-Service Open Architecture Interop Demos (TSOA-ID)
 - Member ecosystem plugfests
 - Member industry panels & news conferences at key trade shows
- **BWG Outreach Leads:**
 - Valerie Andrew valerie.andrew@elma.com
 - Gina Peter gina@pentek.com