

# Military & Aerospace Electronics Third Annual SOSA™ Webinar

## Presenters

- **Jason Dirner**, Architecture Team Lead, Intel Technology and Architecture Branch, U.S. Army Combat Capabilities Development Command C5ISR Center, Intelligence and Information Warfare Directorate (I2WD)
- **Dr. Ilya Lipkin**, Technical Expert for Open Architectures, Air Force Life Cycle Management Center (AFLCMC)/EN SOSA, USAF
- **Christopher Schnelle**, PMP, Principal Research Engineer, Head, Open Hardware Systems Branch, Georgia Tech Research Institute

Moderator: **John Keller**, Editor-in-Chief, Military & Aerospace Electronics

## Overview

In September 2021, the SOSA Consortium finalized the Sensor Open Systems Architecture (SOSA) 1.0 standard to standardize military-embedded equipment in the radio frequency (RF) and digital signal processing (DSP) domains. This group is now targeting Spring 2022 for release of the SOSA 1.0 conformance program and a SOSA 2.0 snapshot. Embedded computing suppliers and systems integrators worldwide will use these resources to guide product design and business development activities. To date, vendor participation in the SOSA standard has been strong. Many stakeholders appreciate that SOSA leverages existing standards to the maximum extent possible.

## Context

John Keller led a roundtable discussion with an expert panel to explore the military's progress with SOSA and other open standards initiatives such as CMOSS (Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, Reconnaissance/Electronic Warfare Modular Open Suite of Standards) and HOST (Hardware Open Systems Technologies). The panelists shared what the SOSA 1.0 Standard means for embedded computing suppliers and their customers.

## Key Takeaways

**The SOSA 1.0 standard assures vendors that their products will have long-term market relevance.**

The SOSA 1.0 standard was officially released in late September 2021 and can be downloaded for free from the [Open Group's website](#). This standard gives vendors greater assurance that their products will have long-term marketability. The U.S. Army, Air Force, and Navy are aligning around SOSA 1.0, so vendors will be able to sell the same products across many programs.

Over 100 vendors are members of the [SOSA Consortium](#). By providing information about technology trends and commercial drivers, this group is helping the SOSA standard remain in tune with industry issues and priorities.

The panelists shared additional information about the future of the SOSA standard and implications for embedded computing suppliers and systems integrators:

- **SOSA 1.0 conformance program.** The SOSA Consortium expects to release a conformance program in the Spring 2022 timeframe. Once the program is finalized, vendors will have an opportunity to submit products for conformance testing and validation. If the products pass, they will receive a SOSA "sticker." SOSA conformance is expected to be a market differentiator for vendors.
- **SOSA aligned vs. conformant vs. compliant products.** SOSA aligned products follow SOSA 1.0 guidelines, but they have not been tested for conformance. In contrast, SOSA conformant products have been fully tested for interoperability, interchangeability, and pluggability. Once the SOSA conformance program is released, programs of record will determine whether they will require SOSA conformant or aligned products. Aligned products carry greater risk than conformant ones.



Dr. Lipkin also made the distinction between SOSA compliant and conformant products. A product may be deemed compliant if it meets only one SOSA requirement. A conformant product, however, meets all SOSA requirements. While compliance is easier to implement, SOSA conformance guarantees interoperability and eliminates risk for programs of record.

- Updated versions of the SOSA standard. New versions of the SOSA standard are expected on an annual basis. The SOSA Consortium uses an agile process for the standard development. It expects to release a “snapshot” in the March 2022 timeframe which will give industry a preview of what is coming in 2.0. With this information, vendors will be able to experiment, prototype, and provide comments.
- Expected lifetime for the SOSA standard. SOSA is anticipated to be a 10-year standard. The SOSA Consortium is always focusing on what is coming next, while ensuring as much backward compatibility as possible for what has already been released.

“SOSA 1.0 will be relevant for 10 years of commercial-wide availability. That said, the pace of technology is very fast. We will always stay relevant because we will work with what comes next, while ensuring maximum backward compatibility with what we’re releasing now.”

—Dr. Ilya Lipkin, Air Force Life Cycle Management Center

### **With the exception of some appendices, the SOSA standard and interfaces are not ITAR controlled.**

Anyone in the world can download the SOSA 1.0 standard and the interfaces defined within it. Since the standard was released under Distribution Statement A, most of the standard is not International Traffic in Arms Regulations (ITAR) controlled and foreign partners can access all the relevant materials.

It is important to note, however, that the SOSA standard development process is restricted under ITAR. As a result, the decisions behind SOSA design choices will never be released outside the United States. In addition, some criteria have been walled off in SOSA technical standard appendices that are classified as ITAR Distribution C, D, or above.

### **The SOSA Consortium’s approach to standard development has led to strong vendor support.**

To date, vendor support has been strong for the SOSA 1.0 standard. The panelists offered several reasons for this:

- SOSA isn’t OEM specific. Many open standards prior to today’s modular open systems approach (MOSA) standards got a bad name because they were OEM specific. With SOSA, everyone in the vendor community is pulling in the same direction.
- SOSA’s mission, vision, and goal is to leverage existing standards. The SOSA Consortium collaborates with standards bodies, rather than competing with them. Input is always welcome from integrators, board developers, prime contractors, and end users. There is representation from silicon all the way to the ship, ground vehicle, or aircraft.
- SOSA is a common open standard. The SOSA Consortium has achieved commonality which will enable the economies of scale, portability, and reuse that the U.S. Department of Defense wants.

“There’s a big difference between an open standard and a common open standard. The SOSA Consortium has achieved commonality and that will enable the economies of scale, portability, and reuse that the Department of Defense wants.”

— Jason Dirner, U.S. Army Combat Capabilities Development Command C5ISR Center,  
Intelligence and Information Warfare Directorate (I2WD)

### **The government is using multiple contracting approaches for SOSA.**

Since a SOSA conformance program doesn’t yet exist, government contracts currently focus on SOSA aligned products. Once the conformance program is finalized, SOSA conformance will most likely be added to contracts. However, that decision will depend on the program of record’s acquisition strategy and the risks they are willing to take.

The panelists made three additional observations related to SOSA and government contracts:

1. Although recent RFPs haven’t required SOSA, some have asked vendors about their modular open systems approach.
2. CMOSS can be viewed as an implementation architecture for the SOSA reference architecture. In certain procurements, the Army explicitly requires CMOSS.
3. Some programs of record use release specs in their RFPs. Vendors must provide an open architecture solution as one of the source selection criteria, but SOSA isn’t called out specifically. To score more points, vendors must provide the right open standard solution.



Looking ahead, the SOSA Consortium plans to publish a business guide which will include contractual language.

"SOSA conformance requires work, but in the long run it will reduce surprises during the development process. That will lower development costs and overall life cycle costs, especially for newer electronic modules or plugin cards."

– Christopher Schnelle, Georgia Tech Research Institute

### **SOSA aligns and interacts with many existing technical standards.**

One of SOSA's overarching goals is to align with existing technical standards to the maximum extent possible. For example:

- SOSA directly adopts and references several CMOSS standards. CMOSS, SOSA, and HOST all use the same open VPX plugin card profiles. SOSA is looking to adopt some of the Army's Vehicular Integration for C4ISR/EW Interoperability (VICTORY) component types in the future. The intent is to collapse CMOSS and SOSA whenever possible.
- The Future Airborne Capability Environment (FACE) is the baseline for SOSA software frameworks. SOSA was incubated by FACE and the SOSA technical standard leverages FACE. For example, SOSA speaks to the software constructs of Kubernetes and Docker, how they work with FACE, and what they mean for sensor systems running on embedded processors.
- SOSA is aligning with VITA as much as possible. SOSA is using the VMEbus International Trade Association (VITA) standards to the maximum extent possible. One reason that SOSA was started was to share information about why certain technical decisions were made. For security reasons, this is not possible with VITA, since it is an international standards body. SOSA plans, however, to push as much into VITA as is appropriate.

In addition, SOSA recently signed an alignment agreement with the Wireless Innovation Forum for SCA and has kicked off standards alignment activity with VICTORY. Dr. Lipkin noted that SOSA is not tied into the Air Force Research Laboratory's Weapon Open System Architecture (WOSA).

### **As vendors begin to work with SOSA 1.0, they must be aware of various hardware-related considerations.**

The panelists addressed several technical questions related to SOSA:

- 14-pin SMPM (sub-miniature, push-on, micro) blocks. The SOSA 1.0 technical standard allows for 14-position SMPM connectors. To accompany the technical standard, the SOSA Consortium is creating a reference implementation guide. This includes a decision tree that outlines which connectors to use based on various requirements. The decision tree starts with the 14-position connector and deviates when necessary. In addition, the Army has its own CMOSS requirements document to accompany the SOSA technical standard. This calls out and requires the 14-position connector.
- Mezzanine cards and XMC connectors. SOSA has not standardized on a mezzanine card and XMC connector and doesn't have plans to do so. The SOSA standard stops at the plugin card. How the plugin card is implemented with the mezzanine card and the XMC connector is at the vendor's discretion.
- PCIe Gen4 speeds. SOSA is currently running at Gen4 speeds and the Air Force is not interested in anything less than 100 Gb PCIe Gen4. Gen4 backplanes that are compatible with 100Gb/s Ethernet have already been demonstrated and built into systems today.
- Backplane profiles. Many VITA 65 plugin card profiles make heavy use of user-defined pins which are a barrier to interoperability. To support the goal of reusing the same card in as many places as possible, SOSA has selected a limited number of VITA 65 plugin card profiles without user-defined pins.



## Biographies

### **Jason Dirner, Architecture Team Lead, Intel Technology and Architecture Branch, U.S. Army Combat Capabilities Development Command C5ISR Center, Intelligence and Information Warfare Directorate (I2WD)**

Mr. Dirner is the architecture team lead for the Intel Technology and Architecture Branch within the U.S. Army Combat Capabilities Development Command (CCDC) C5ISR Center Intelligence and Information Warfare Directorate (I2WD).

Mr. Dirner is involved in various open architecture activities and standards bodies, including the C4ISR/EW Modular Open Suite of Standards (CMOSS), Vehicular Integration for C4ISR/EW Interoperability (VICTORY), Modular Open RF Architecture (MORA), and Sensor Open System Architecture (SOSA).

Mr. Dirner has over 14 years of experience working for the U.S. Army as both a government civilian and contractor. He holds a Bachelor of Science and Master of Engineering in Electrical and Computer Engineering from Cornell University.

### **Dr. Ilya Lipkin, Air Force Life Cycle Management Center (AFLCMC)/EN SOSA, USAF**

Dr. Lipkin is a technical expert for open architectures at AFLCMC/EZ Home Office for the USAF. He has been working ISR/SOF for the last several years from Global Hawk, to MQ-1 and MQ-9 as well as SAR/hyperspectral data compression solutions. His past work has included development of trainer systems for the USAF, drive-by-wire fire control and OFP for U.S. Marine Corps Expeditionary Fighting Vehicle, as well as artificial intelligence, and CMMI level 5 initiatives. He holds a Master of Computer Engineering, Master of Business Administration, and PhD in Software Project Productivity Development.

### **Christopher Schnelle, PMP, Principal Research Engineer, Head, Open Hardware Systems Branch, Georgia Tech Research Institute**

Christopher Schnelle heads the Open Systems Development Branch at the Georgia Tech Research Institute (GTRI), where he leads the development of hardware-based modular open standards for both defense and industrial sponsors. He also leads the development of prototype systems that demonstrate these standards in operational environments.

Mr. Schnelle has over 30 years of experience designing, developing, and integrating a wide range of components and systems for use on military and commercial aircraft. Mr. Schnelle holds both a Bachelor of Science Degree in Electrical Engineering and a Master of Science Degree in Electrical Engineering from Purdue University. Additionally, Mr. Schnelle holds master's degrees in Telecommunications and Engineering Management from Southern Methodist University.



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