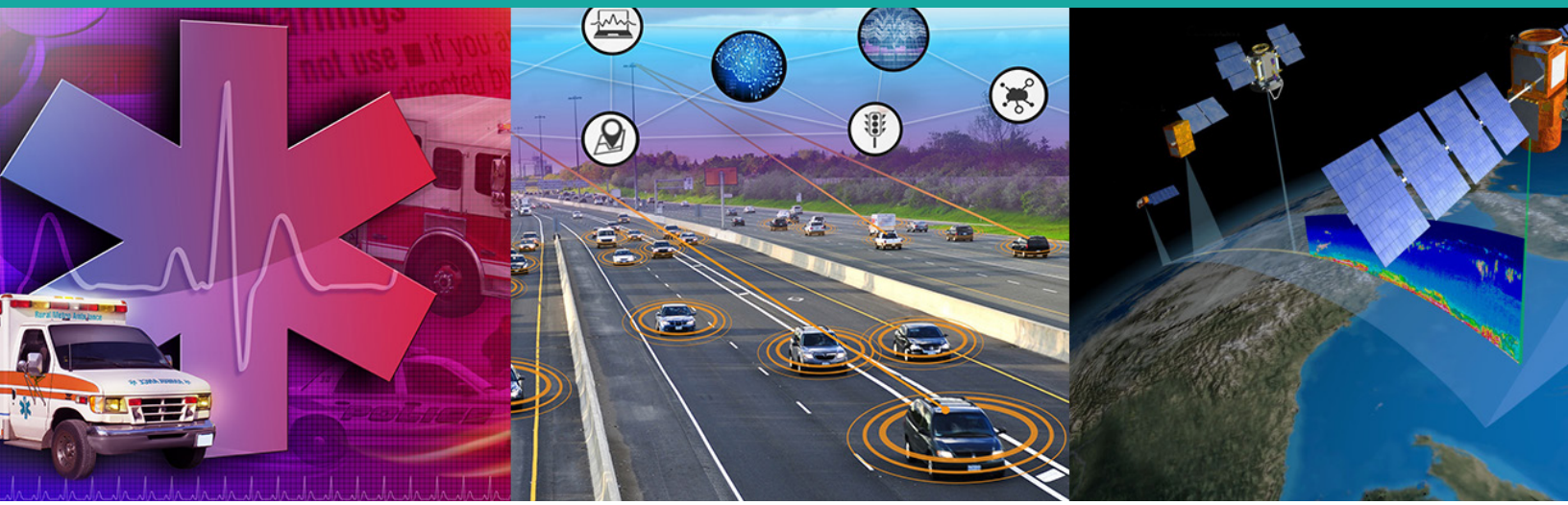
SECURE NETWORK COMMUNICATIONS (SNC) FOR SOFTWARE DEFINED RADIOS (SDR)



Introduction

The Object Management Group® (OMG®) Secure Network Communications (SNC) for Software Defined Radios (SDR) RFI updates the OMG Software Based Communications (SBC) standard, which is also known as the Software Communications Architecture (SCA) within the DoD. The SBC was approved in 2008 and is utilized throughout the DoD and the world. The update to the SBC standard will: allow for new technologies; apply current networking applications; provide for auto-code generation; and utilize OMG Systems Modeling Language™ (SysML®) specification.

SDRs provide wireless communication components whose transmit and receive characteristics are realized through specialized software running on programmable platforms. The benefit of allowing a single communications platform to be rapidly reconfigured for multiple, highly-diverse communication is to multiplex receive and transmission signals of different encodings on many frequencies (each combination is called a "Waveform" or "Wf"). Wfs allow for Voice, Video and/or Data (V2D) and SDRs to be used in fundamentally new ways for multiple domains (e.g. C4ISR, Internet of Things, Robotics, Space, etc.) to enable communicators, first responders or any stakeholder with a need for dynamic reconfigurable communications between hardware and software components to deliver V2D information. For information on OMG SBC visit **www.omg.org/intro/SCAV.pdf**.

Supporting several Wfs inside the same device eases bug fixing, enables field re-configurability, allows multiple data transmission standards to be supported simultaneously, and helps improve the security and integrity of communications. Any communication task can be realized instantaneously by uploading/downloading appropriate software that defines the necessary Wfs. This allows rapid reconfiguration and upgrades of Over-The-Air Reprogrammable (OTAR) deployed equipment and use of Smart Antennas.

Value Proposition

- **Modular Capability** provides for known effective system builds amongst SDR systems;
- Provides ready **Building Blocks** to reduce costs and quickly rebuild unique new assets;
- Allows **Reprogrammable Repeatable Products for Changing Requirements and Missions**;
- **Reduces Risks** by ensuring known quality, with valued expertise from a trusted advisor position;
- **Limits Risk Budget** through limiting unknown variances in cost, schedule and performance; and
- **Accelerates** business development with standards-based solutions.

OMG SNC Vision for SDR

The OMG creates standards for middleware that bridge together the components within complex software systems (exemplified by the publication of the **UML Profile for Software Radio [SDRP]**). The SDRP defines a standard framework for designing SDR elements, including a set of radio-domain-specific extensions to the Unified Modeling Language® (UML®), allowing widely-available, commercial UML modeling tools to be used in the process of designing SDR systems. The SDRP objective, and its referenced specifications, (e.g. Deployment and Configuration of Components and Lightweight Logging Services), is to support Wf interoperability and platform independence.

The specification supports the creation of SDR components, allowing engineers to design libraries of reusable core assets to rapidly specify and construct systems that combine those assets in different configurations.

This SDRP is organized into 5 areas:

(continue reading on the other side)

109 Highland Ave, Needham, MA 02494 USA • Phone: +1 781-444-0404 • Fax: +1 781-444-0320;
Evening Star Building, Regis Group Office #6627 • 1101 Pennsylvania Ave., Washington, D.C., 20004 • Phone: +1 703-231-6335

SECURE NETWORK COMMUNICATIONS (SNC) FOR SOFTWARE DEFINED RADIOS (SDR) RFI

COMMUNICATION CHANNEL & EQUIPMENT SPECIFICATION	COMPONENT DOCUMENT TYPE DEFINITIONS SPECIFICATION	COMPONENT FRAMEWORK SPECIFICATION	COMMON & DATA LINK LAYER FACILITIES SPECIFICATION	POSIX PROFILES SPECIFICATION
A UML Profile for Communication Channels; a Domain-Specific Language for defining hardware platform and channels on which higher-level SDR programs run. It includes a Communication Channel Facilities Platform Independent Model defining interfaces for converting digitized signals and propagating RF waves, and standard interfaces for managing the radio domain and channels within a radio.	A standard XML Document Type Definition that allows engineers to specify how reusable SDR components are deployed onto re-configurable platforms.	A UML Profile for Component Framework; another Domain-Specific Language, for describing component frameworks for SDR applications and infrastructure.	A Platform Independent Model (PIM) of common, low-level services that an SDR platform may provide, such as logging, naming and event services, and waveform-related data & control functions. The use of PIMs allows these functions of a Software Radio to be specified independently of the underlying implementation technology, allowing service migration to new platforms as hardware technology evolves.	Defines two lightweight subsets of the POSIX APIs to communicate within a software radio. These subsets are based on Standardized Application Environment Profile (AEP) - POSIX® Realtime Application Support IEEE 1003.13-2003. An AEP is provided for use with General Purpose Processors, while a smaller Lightweight AEP is targeted towards limited computing environments e.g. Digital Signal Processors and Field Programmable Gate Arrays.

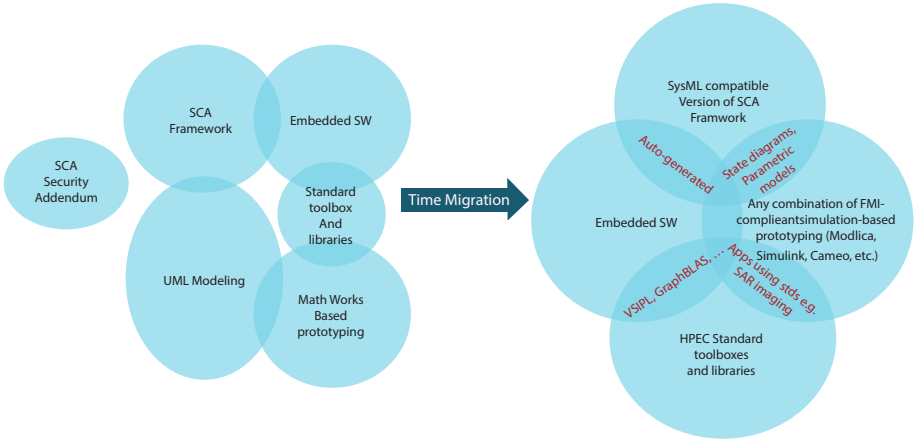
The SNC RFI can be found at: https://www.omg.org/cgi-bin/doc.cgi?mars/2017-9-29.

The RFI purpose is to:

1. Continue to refactor sections of standards interest from the Software Communications Architecture (SCA), and other related standards, by extending SDRP or develop new specifications.
2. Apply SNC specifications to new domains.
3. Update the SDRP to include technologies of interest and applicability, reusing new specifications e.g. the ones coming out of the OMG HPEC (e.g. Vector, Signal, and Image Processing Library [VSIPL], Graph-based Basic Linear Algebra Subprograms (GRAPHBLAS), etc.) group and considering the new SCA adopted changes.
4. Complete the standardization of desired SCA portions e.g. the SCA networking, non-overlapping, and domain independent portions of SCA Security Supplement standard specifications.
5. Take advantage of parametric OMG Systems Modeling Language (SysML) models so that they can enhance current tools, e.g. SCA Frameworks and MathWorks tools, while improving the formalism associated with the SDRP base set of specifications.

Schematic of Proposed Work:

A highly effective Integration Systems Engineering Model – Lower Cost, Higher Quality, Reduce Delivery Times



Next Step

We are happy to discuss how OMG membership will benefit your organization! Please feel free to explore our website at **www.omg.org** and when you are ready, please contact **bd-team@omg.org** or call + **1-703-231-6335** to get started.

About OMG

The Object Management Group (OMG) is an international, open membership, not-for-profit computer industry standards consortium with representation from government, industry and academia. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. OMG modelling standards enable powerful visual design, execution and maintenance of software and other processes. Visit www.omg.org for more information.

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