Introduction

Software Defined Radios (SDR) use wireless communication components whose transmit and receive characteristics are realized through specialized software (SW) running on programmable platforms, versus specialized hardware components. This approach has the great benefit of allowing a single SDR platform to be rapidly reconfigured for multiple, highly diverse communication purposes—or even to multiplex the transmissions and receptions of multiple different signals using multiple encodings on multiple frequencies (each combination is called a "waveform (Wf)" in SDR parlance)—and for voice, video and/or data (V V&D).

Within the SDR physical hardware limits, virtually any communication task can be realized instantaneously by uploading/downloading appropriate SW that defines the necessary Wf(s). This allows rapid reconfiguration and upgrades of deployed equipment Over-The-Air Reprogrammability (OTAR) and use of Smart Antennas.

SDR is not just another way to build radios with the same functions, but instead allows systems to be used in fundamentally new ways for domains, e.g. C4ISR, Robotics, Internet of Things, or virtually any domain with a need for dynamic reconfiguration and communication between hardware or software originated components. Supporting several waveforms inside the same device eases bug fixing, enables re-configurability in the field, allows multiple data transmission standards to be supported simultaneously, and helps improve the security and integrity of communication.

OMG Standard for Software Defined Radio

The Object Management Group® (OMG®) has a long history of creating standards for middleware, the software that serves as the glue that cements together the components within complex SW systems. The organization is also the home of an extensive family of standards for creating design models for all forms of SW-based systems, with the Unified Modeling Language™ (UML®) being internationally recognized as the pre-eminent general-purpose software modeling standard. Building on this solid foundation of relevant expertise, OMG has played a leading role in the creation of open standards for SDR, exemplified by the publication of the UML Profile for SWRadio, which encapsulates the expertise of dozen of companies with wide experience in this domain, and runs to over 400 pages.

Value Proposition

Using subsystems that comply with SDR standards has several potential benefits:

• Provide **Modular Capability** for known effective system builds among SDR systems;
• Provide ready **Building Blocks** that improve portability, reduce costs, promote quick rebuild and avoid vendor lock-in;
• Allow **Reprogrammable Repeatable Products for Changing Requirements and Missions**;
• **Reduce Risks** with standard-compliant solutions from trusted advisors with expertise in the domain;
• Limit **Risk Budget** through eliminating unknown variances in cost, schedule and performance; and
• **Accelerate** business development with standards-based solutions.

109 Highland Ave, Needham, MA 02494 USA • Phone: +1 781-444-0404 • Fax: +1 781-444-0320;
Evening Star Building, Regis Group Office #358 • 1101 Pennsylvania Ave., Washington, D.C. 20004 USA • Phone: +1 703-231-6335

G1010716

The UML Profile for Software Radio defines a standard framework for designing SDR elements, including a set of radio-domain-specific extensions to UML, allowing widely available, commercial UML modeling tools to be used in the process of designing SDR systems. The objective of the UML Profile for SWRadio (and its referenced specifications) is to support waveform interoperability and platform independence. The specification supports the creation of SDR components, allowing engineers to design libraries of re-usable SDR core assets, then rapidly specify and construct SDR systems that combine those assets in different configurations to create multiple SDR systems and Wfs for different applications.

This specification is organized into 5 areas:

• **COMMUNICATION CHANNEL & EQUIPMENT SPECIFICATION.** This volume defines the UML Profile for Communication Channels; a domain-specific language for defining hardware platform & channels on which higher-level SDR programs run. It also includes the Communication Channel Facilities Platform Independent Model — a definition, written in terms of the Communication channel DSL, of interfaces for converting digitized signals and propagating RF waves, as well as standard interfaces for managing the radio domain & channels within a radio.

• **COMPONENT DOCUMENT TYPE DEFINITIONS SPECIFICATION.** This volume provides a standard XML™ Document Type Definition that allows engineers to specify how reusable SDR components are deployed onto reconfigurable platforms.

• **COMPONENT FRAMEWORK SPECIFICATION.** This volume defines the UML Profile for Component Framework; another domain-specific language, for describing component frameworks for SDR applications and infrastructure.

• **COMMON & DATA LINK LAYER FACILITIES SPECIFICATION.** This volume specifies a Platform Independent Model (PIM) of common, low-level services that an SDR platform may provide, such as logging, naming and event services, as well as waveform-related data and control functions. As the name implies, 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.

• **POSIX PROFILES SPECIFICATION.** The final volume defines two lightweight subsets of the POSIX APIs that other parts of the specification use to communicate with the underlying operating system embedded with a SWRadio. 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 environments with more limited computing support, such as digital signal processors and processor cores within a field programmable gate array.

Want to learn more?

We are happy to discuss how OMG membership will benefit your organization! Please 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. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. OMG's modeling standards enable powerful visual design, execution and maintenance of software and other processes. Visit **www.omg.org** for more information.

OBJECT MANAGEMENT GROUP ®