OMG's Software-Based Communications Workshop
From Mobile to Agile Communications

Workshop Program

MONDAY – September 13, 2004

TUTORIAL TRACKS

0830 - 1230   ***Overview of the Software Communications Architecture (SCA)***
Track 1   Neli Hayes, Principal Software Architect, The Boeing Company

The Software Communications Architecture is the established standard for interoperability and portability of distributed, embedded, object-oriented, language-independent and platform-independent components in software-based communication systems, with numerous existing military and commercial implementations. As well as being the core standard for all DoD software-based communication programs involved with Network Centric Operations (NCO) and Network Centric Warfare (NCW) such as the Joint Tactical Radio System (JTRS) Clusters and Future Combat Systems (FCS), the SCA forms the corner-stone basis that inspires many of today's emerging commercial and international standards such as the OMG Platform-Independent Model and Platform-Specific Model for Software Radio Components and the Deployment and Configuration Specification. The SCA relies on the use of open and evolving commercial standards such as CORBA, CORBAServices, Lightweight Services, CORBA Component Model, and POSIX, to promote the development of communications systems that are software-controlled and reprogrammable, modular and scalable, exploit COTS technology, and allow simplified applications engineering and rapid deployment of system improvements. As such, the SCA can form the component interoperability and portability basis in any software-based communication system, including commercial software radios, applications in the automotive industry, etc. This overview provides a solid technical foundation of the SCA core architecture rule set including the Core Framework (CF) and the Domain Profile. The CF is the SCA essential "core" set of open software interfaces and profiles that provide for deployment, management, interconnection, and intercommunication of software application components in distributed embedded systems. The Domain Profile depicts the packaging and deployment of SCA-compliant hardware device and software component implementations into the CF domain through describing these components, their properties, and interconnections.

0830 - 1230   ***Use of Real-time CORBA with Specific Applicability to the Signal***
Track 2   ***Processing Sub-systems (SPS) of a Generic Software Defined Radio***
                        Device (Part 1)
                        Shahzad Aslam-Mir, Chief Technology Officer, PrismTech
                        Mark Glenn, Consultant, PrismTech

This tutorial will present: Real-time CORBA 1.0 and 1.2 (nee 2.0) specifications for static fixed, and dynamically scheduled systems. It will then illustrate the coupling of these real-time specifications with the custom novel transports and how this combination enables the use of CORBA 'in' the signal processing chain of a soft-radio device. Examples of applicability to a generic soft-radio architecture (non-SCA) will be given. The session will serve to educate on the use of real-time CORBA's rich execution models and mechanisms pertinent to allowing for the deterministic execution of peer-2-peer CORBA relationships in a radio. A session on the anatomy of the GIOP protocol, and guidance on creating compact, low footprint, yet deterministic, high performance IDL will be given. In addition a breakdown of how IDL features are mapped into on the wire GIOP traffic will be delivered to give attendees an idea of those features of IDL types that give rise to latency, jitter and general non-determinism will be presented. An example will be presented of a generic soft-radio modeled in CORBA-IDL and with specific emphasis on how key work-horse container platforms of an SPS such as DSPs and FPGA can be assimilated into such an architecture for the future will be highlighted.

1030 - 1045   Morning Refreshments

1230 - 1315   Lunch

1330 – 1730   ***Effective Component and Application Development using the***
Track 1   ***Software Communications Architecture***
               Dominick Paniscotti, BAE Systems

The Software Communications Architecture (SCA) and Joint Tactical Radio System (JTRS) technologies have become ubiquitous throughout the US military communications domain. Entire sectors of the US armed forces' communications systems are being redesigned in support of these two technologies. This tutorial will cover basic SCA concepts and terminology as well as discussion of how some of the key terms have evolved during the maturation of this specification. This will clarify important terms that have become overloaded within the SCA community as well as with other technology domains. We will discuss the core responsibilities of the SCA Core Framework - component and waveform development. As part of this, the most effective patterns, principles and practices for developing SCA components will be covered. This section will include:
- How to use CORBA most effectively in SCA systems
- Which architectural, structural and behavioral patterns apply to SCA component development as well as which patterns
  can and should be used together
- How to leverage generic programming techniques in component development
- What techniques to use to maximize portability and correctness of waveforms
The tutorial will also include a live demonstration of an SCA compliant waveform running on two iPAQs.

1330 – 1730   ***Use of Real-time CORBA with Specific Applicability to the Signal***
Track 2   ***Processing Sub-systems (SPS) of a Generic Software Defined Radio***
               Device (Part 2)
               Shahzad Aslam-Mir, Chief Technology Officer, PrismTech
               Mark Glenn, Consultant, PrismTech

               (Continuation of Track 2 tutorial from the morning)

1330 – 1730   ***High Assurance Security And Safety for Software-based***
Track 3   ***Communications***
               Bill Beckwith, Chief Technology Officer, Objective Interface Systems, Inc.

Software-based communications offer highly flexible communications for both voice and data. However, these capabilities come with an increased responsibility for communication security. MILS (Multiple Independent Levels of Security/Safety) was developed to address the need for security in embedded real-time systems like software-defined radios. The MILS architecture classifies a system into three layers: • partitioning kernel (small, mathematically verified), • middleware layer (includes many O/S functions traditionally in the O/S kernel, as well as traditional middleware), and • application layer. In MILS, four foundational security policies are enforced by the partitioning kernel and middleware layer. Enforcement of these foundational security policies permits the application layer to implement application-specific security policies—such as Bell-LaPadula (BLP), Biba, Community of Interest, etc.—with confidence that the code that implements these policies can have the characteristics of a reference monitor: Non-bypassable, Evaluatable, Always invoked and Tamper-proof (NEAT). MILS is a stated requirement for JTRS systems. In addition, MILS is already targeted for adoption in a number of commercial systems. This half-day tutorial will describe security threats to software-defined radios, present the MILS architecture and describe how engineers can use MILS to create high assurance communication systems.

1500 - 1515   Afternoon Refreshments

TUESDAY – September 14, 2004

TUTORIAL TRACKS

0830 - 1200   *Deployment and Configuration of Component-based Distributed*
Track 1   *Applications*
Andreas Hoffmann, Fraunhofer FOKUS

This year, the OMG finalized the Deployment and Configuration of Component-based Distributed Applications (D+C) specification, and first implementations are becoming available. Inspired by concepts in the Software Communications Architecture (SCA), it defines a model for creating and packaging hierarchical, component-based applications, and interfaces for automatically deploying applications into heterogeneous distributed systems. Based on the annotation of software with meta-data in XML format, it allows the re-use of individual components as well as of assembly compositions, and addresses the challenge of modeling implementation requirements and their matching against hardware resources, to allow a fully automated deployment process to assign components to computing nodes. This tutorial presents a technical overview of the D+C specification. It addresses the full development to deployment cycle, including the modeling and packaging of component-based applications, the meta-data used for describing components, implementations, and assemblies, and the software entities that are involved in managing and deploying applications.

0830 - 1200   *Implementation of Smart Antenna using SDR*
Track 2   Jeffrey H. Reed and Raqibul Mostafa, Mobile and Portable Radio Research Group (MPRG)
Virginia Tech

Overview:
1. Introduction: Importance of Smart Antenna and Challenges for Implementing in a SDR
2. Block diagram representations and Algorithms
3. Implementation Issues: Hardware and Software
4. Some Case Studies: Examples on Practical Implementation of Smart Antenna System
5. Future Directions: Distributed MIMO, Hooks for use in 3G Systems and 802.11n standard

1000 - 1015   Morning Refreshments

1200 - 1245   Lunch

1255 – 1300   *Opening Remarks* – **Program Committee Chair**
Fred Waskiewicz, Object Management Group

1300 – 1330   *Opening Keynote* - **SDR and Cognitive Radio**
Dr. Joseph Mitola III, Special Assistant (Joint Special Projects)
National Security Agency & DARPA
Joint Projects in Trustworthy Cognitive Systems

1330 – 1530   **Session 1:** *SCA Implementation Architecture*
Chair: Kevin Richardson, The MITRE Corporation

The US Department of Defense (DoD) is upgrading its communication systems through a program called the Joint Tactical Radio Systems (JTRS). The Software Communications Architecture (SCA) is the underlying architecture framework that enables JTRS products to attain the program's objectives. Now at version 2.2.1, the core SCA concepts have matured and gained wide acceptance. An exciting development for the program is the fact that a wide range of organizations have been exploring approaches to expand the applicability of the specification.

1330 – 1410   **Software Radio Interface Decomposition for Wireless Devices**
        D. J. Shyy, Lead Communications Engineer & Dawn Szelc, Lead Staff, MITRE

This presentation investigates optimal ways of decomposing software functions, services, and layers of a wireless device into different software defined radio components considering various factors such as commonality of services, ease of implementation, security, cost, performance, and network management. The design considerations of IEEE 802.11 thin access point (AP) Vs thick AP are used as an example. This decomposition will take advantage of the interfaces defined in the Object Management Group's (OMG) "Specification for Platform Independent Model (PIM) and Platform Specific Model (PSM) for Software Radio Components".

1410 – 1450   **The Significance of Object Middleware on Digital Signal Processors (DSPs) for Software-Defined Radio Developers**
        Shahzad Aslam-Mir, Chief Technology Officer PrismTech

This presentation describes some of the motivating factors behind new work which has produced a major middleware breakthrough by producing a "C" object request broker (ORB) for classes of DSP and low-cost microcontrollers. The presentation explains how a "DSP ORB" opens the door to achieving greater degrees of portability and interoperability for waveforms, other wireless applications and any SDR software platform or operating environment (SDR OE) over a wide range of radio hardware platforms. Finally, the presentation details some of the key criteria and qualities of the object middleware (ORB) that are needed to create an ideal SDR OE, i.e. a software platform for SDR applications that maximizes efficiency by requiring the minimum number of CPU instructions per kB of data marshaled.

1450 – 1530   **Developing a Complete Development and Operating Environment for SDR**
        Murray Conarty, Systems Engineer Defense Accounts, PrismTech

The SCA was created to facilitate portable and configurable waveform applications in a radio. Creating an SCA Operating Environment (OE) that achieves those goals and is itself portable and adaptable is a complex task and the focus of this presentation. The three pieces of an OE - a POSIX Operating System, CORBA Object Request Broker, and Core Framework (CF), each require architecting for adaptability. The key comes in seeing the OE as a unit instead of pieces. This presentation will present some unique OE characteristics that result from smoothing the boundaries between the three elements of the OE.

1530 – 1900   *Demonstration Area Open*

1530 – 1600   Afternoon Refreshments

1600 – 1800   Session 2: *Applying MDA to Software Defined Radio*
        Chair: Fred Waskiewicz, Director of Standards, Object Management Group

        Current specifications in the Software Defined Radio Domain lack clearly defined standard interfaces between functional components of waveform applications, device services and radio services, which seriously impact their portability. MDA offers a solution to this problem by abstracting the functionality of waveform applications from implementation details. Presentations within this session offer technical proof of that claim.

1600 – 1640   **The PIM and PSM for Software Radio Components Specification and the SCA**
        Jerry Bickle, Raytheon - Network Centric Systems & Kevin Richardson, The MITRE Corporation

The PIM and PSM for Software Radio Components Specification is in the process of standardization within the Object Management Group (OMG). The specification is currently in its finalization phase. The content of the specification originated from concepts expressed within the JTRS Software Communications Architecture (SCA). This briefing presents an overview of the PIM and PSM for Software radio specification, provides guidance on how to use the specification and compares this specification to the SCA.

1640 – 1720   **Waveform Implementation Aspects of the PIM and PSM for Software Radio Components Specification**
A. Tansu Demirbilek, Systems Engineer, Mercury Computer Systems, Inc.

In this presentation, we will present implementation design choices for the "PIM and PSM for SWRadio Components" specification, recently finalized and adopted by the OMG. A requirements study based on the real-time flow based programming perspective will be discussed. The design choices concentrate on two main areas: Possibilities of leveraging the waveform API definitions for large scale, distributed waveforms and different SWRadio infrastructure choices that the waveform components will be deployed on.

1720 – 1800   **UML Profile for SDR Hardware/Software Adequacy Verification**
Guy Gogniat, Samuel Rouxel & Jean-Philippe Diguet - Lester, Université de Bretagne Sud;
Nicolas Bulteau – Softeam; Christophe Moy - Mitsubishi Electric ITE;
Jean-Etienne Goubard, & Antoine Delautre - Thales Communications

This presentation is from the A3S consortium, funded by the RNRT (French Network of Research and Technology of the Ministry of Industry). A3S aims at performing at design phase non-functional coherence verification of software radio architecture specifications and application requirements with UML based models. The interest of the A3S profile resides in its reusability, which ensures that all software radio systems designed using the elements of this profile can be verified by our verification engines. The sharing of such a profile can contribute to promote UML design use at a large scale in the Software Radio domain, strengthened by the fact that it relies on OMG standard profiles that guarantees its timelessness.

1800 – 1900   ***Demonstration Area Reception***   *hosted by*

WEDNESDAY, September 15, 2004

0900 – 1200   **Session 3:** ***Standardizing the SBC Environment***
Chair: Fred Waskiewicz, Director of Standards, Object Management Group

Standardizing IT for software-based communications stabilizes its environment, reduces development costs, and ensures the goals of interoperability between and portability across radio platforms. The four presentations within this session highlight how specifications from the OMG and DoD are achieving these goals.

0900 – 0930   **Applicability of OMG Standards to the Software Radio Community**
Murray Conarty, Systems Engineer Defense Accounts, PrismTech

Both defense and commercial software radio standards have some kind of alignment with OMG Specifications. The JTRS SCA references several existing formal OMG documents and originated from early drafts of the CORBA Component Model (CCM). Emerging commercial initiatives also involve open interfaces and standards where OMG Specifications can play a major role. This presentation will examine the evolution of the SCA and its corresponding OMG Specifications to understand whether the documents have diverged and whether new versions of the OMG documents should be considered in the SCA. The presentation will also compare the language and goals of commercial initiatives to suggest where existing OMG Specifications could apply.

0930 – 1000   **Supporting SCA Applications in a Lightweight CCM Environment**
Frank Pilhofer, Mercury Computer Systems

This presentation discusses how existing SCA waveform implementations can be migrated towards a future SCA specification that leverages existing commercial applications such as Lightweight CCM and Deployment and Configuration of Component-based Distributed Applications (D+C), and corresponding off-the-shelf software. Solutions are presented to allow existing SCA-based applications to run, unmodified, in a Lightweight CCM-based, D+C compliant embedded system. This process promises to protect investments into existing waveforms while moving forward.

1000 – 1030　　**Support for Specialized Hardware Devices within the SCA Core Framework**
Geoff Holt, Technical Lead, Spectrum Signal Processing

A major objective of SCA is to ensure portability of waveforms across various radio platforms. However, since modem architectures from various hardware vendors may be fundamentally different from one another, a waveform application cannot regard the modem component as a single indivisible entity without sacrificing this objective. Extending the SCA Core Framework down to the hardware device level within the modem architecture therefore promotes code portability and reuse, and enables more optimal hardware deployment strategies. Some approaches for providing SCA support for heterogeneous modem architectures, which may include non-CORBA enabled devices and direct hardwired or switched fabric connections to support high-speed low-latency communications will be presented.

1000 - 1600　　*Demonstration Area Open*

1030 - 1100　　Morning Refreshments

1100 – 1130　　**Standardizing on a Set of Radio Set APIs to Ensure Waveform Portability**
Glenn Fogarty, Embedded Software Engineer, The Boeing Company

One of the goals of the DOD, is to minimize or effectively eliminate the cost of porting a waveform from one software radio platform to another. To achieve this goal, a standardized set of Radio APIs for Devices and Services must be provided by each radio platform. Within the OMG, the SW Radio Submission is one of the attempts at creating a standard set of APIs. The topics of this presentation include various APIs for Radio Devices, Services, Security Services, and extending this concept of standardization into the modem hardware.

1130 – 1200　　Session 3 Q&A - Discussion

1200 - 1245　　Lunch

1300 – 1330　　*Sponsor Presentation*
Commercial SDR and JTRS SDR: Same Objectives, Different Priorities
Steve Jennis, Sr.Vice President, Corporate Development, PrismTech

1330 – 1500　　**Session 4:** *Commercial SDR*
Chair: David K. Murotake, Ph.D., SCA Technica, Inc.

Various commercial communications services, including 3G and Beyond 3G (B3G) mobile terminals/networks and intelligent transportation systems (ITS) plan to employ software defined radio as an enabling technology. This session explores the issues of end to end reconfigurability (E2R) and the development of a software communications architecture (SCA) including core framework, middleware and operating environment for commercial wireless services and devices.

1330 – 1400　　**Reconfiguration Metamodel**
Dr. Nancy Alonistioti, Christos Anagnostopoulos & Gerasimos Stamatelatos, University of Athens

In the framework of the European IST-E2R (End-to-end reconfigurability) project, end-to-end reconfiguration management aspects are addressed. We envisage a reconfiguration management metamodel that describes any association among reconfiguration related issues. We also introduce the way reconfigurability manipulates the notion of policy. Reconfiguration and Service Provision Mechanisms tend to retrieve contextual information from sensor-based network elements, user centric profiles, service oriented descriptions and any adaptive equipment residing in reconfigurable mobile computing environment.

1400 – 1430　　**Applicability of the SCA to Commercial SDR Implementations**
Dr. Shahzad Aslam-Mir, Chief Technology Officer, PrismTech

The Joint Tactical Radio System (JTRS) Joint Program Office (JPO) has had a long-held goal of fostering commercial adoption of the Software Communications Architecture (SCA) specification. This presentation will examine the emerging market for commercial SDRimplementations and how the SCA can be applied to them.

1430 – 1500　　Session 4 Q&A - Discussion

1500 – 1530   Afternoon Refreshments

1530 – 1730   **Session 5:** *Models and Modeling for Software Defined Radio*
              Chair: Bill Beckwith, Chief Technology Officer, Objective Interface Systems, Inc.

              Software Defined Radio benefits from the standardized building blocks realized via the Software
              Communications Architecture (SCA). This session pertains to modeling and resultant models of SDR and the
              SCA.

1530-1610   **M&S of the Co-development for Test Waveform and JTRS Architecture**
              Long V. Ho, Software Engineer, The Boeing Company

This presentation describes the M&S of the co-development for Test Waveform and JTRS architecture. The approach to
M&S as a set of software component models that built based on the Software Communication Architecture (SCA)
building blocks mapped onto a set of hardware resource models that built based on the JTRS architecture. This M&S
approach enables system architect, designer, and integration engineers to examine flexibility and analyze performance of
the system under development. A demonstration shows the ability to modeling and simulates a real world system and the
complex interactions that arise in distributed computing systems.

1610 – 1650   **The Problems and Promise of UML 2.0 Structures for SCA**
              John Hogg, COO, Zeligsoft

The SCA (Software Communications Architecture) standard makes use of the ports of UML 2.0. Does the SCA fully
support other UML 2.0 structure concepts? Unfortunately, no—and this will be increasingly problematic as SCA
applications grow in complexity and demands for reuse increase. This presentation starts with an overview of UML 2.0
structures and the role modeling concepts on which they are based. It contrasts these ideas with SCA 2.2 and the SCA
approach to composition, and shows that there are problems with SCA scalability and reusability. It then outlines how
SCA can evolve to overcome these problems—and how to work around them until this evolution occurs.

1650 – 1730   **SWRadio Concepts for Signal Processing Environments**
              Jerry Bickle, Engineering Fellow & Jimmie Marks, Principal Software Engineer, Raytheon NCS

This presentation focuses on applying the SWRADIO UML Profile and Facilities to a non-CORBA environment such as
Digital Signal Processor (DSP) to promote waveform portability. These concepts include ResourceComponent,
ResourceAdaptor, Common Layer Facilities, and POSIX profile as defined in the PIM and PSM Software Radio
Components specification. The presentation describes the transformation of the ResourceComponent and Common
Layer Facilities into C functions, ResourceAdaptor behavior, the modem device behavior (Executable Device), and
definition of a DSP POSIX profile.

1745 - 1945   *Workshop Reception* *hosted by*

THURSDAY, September 16, 2004

0830 - 1030   **Session 6:** *Security*
                     Chair: Dominick Paniscotti, BAE Systems

                     Any and all SBC systems are candidate targets for malicious attacks and security breaches. Prevention includes designing secure communications over multiple networks with varying security classifications and protecting system architecture as well as data. This session will examine attack methods and propose solutions for high assurance architectures and middleware that protect security-critical data.

0830 – 0900   **System Threat Analysis Case Study for Software Based Communications.**
                     David K. Murotake, Ph.D., President, SCA Technica, Inc.

While software based communications technology will be a "seductive" technology enabler for future communications, its software reconfigurability makes the terminals, and networks, susceptible to blended attacks by both wireless and Internet hackers. We use an example of a software defined radio implementing the popular IEEE 802.11 WIFI as a case study of security threats against Software Based Communications systems. We examine the blended attack methods used by hackers to attack and exploit mobile terminals and access points as an example of security threats to SBC terminals and networks. We discover the security is not only about protecting data or software downloads – in SBC's we must protect the very integrity of the hardware and software architecture of the SBC based terminal and network. We conclude by proposing requirements and architectures for high assurance SBC's.

0900 – 0930   **The Challenge in Developing a SCA Compliant Security Architecture that meets Government Security Certification Requirements**
                     Ron Bunnell, Senior System Engineer, Boeing Company
                     John Trinidad, Senior Systems Engineer, Harris RF Communications

The Joint Tactical Radio (JTRS) will provide the military communicator with a new level of flexibility and capability in the tactical communications. The JTRS Program is responsible for developing a secure communication architecture that provides simultaneously and secure communications on multiple, independent radio nets operating at different classification levels within a single radio. This paper addresses some of the challenges of designing such as system. Factors addressed include: conflicting security requirements between the Government Security requirements for JTRS Cluster One and the SCA Security Supplement, operation in a CORBA environment and issues relating to security.

0930 – 1000   **The MILS Partitioning Communication System + RT CORBA = Secure Communications for SBC Systems**
                     Jeff Chilton & Kevin Buesing, Objective Interface Systems, Inc.

The MILS Partitioning Communication System (PCS) is a communications sub-system capable of maintaining the separation of security-critical data in transit between the nodes of a distributed, real-time system. The PCS is intended to fill the role of communications middleware in the MILS architecture and form the basis for real-time MILS CORBA.

1000 – 1030   Session 6 Q&A - Discussion

1030 - 1045   Morning Refreshments

1045 – 1145   **Panel -** *Portability in Software Based Communications*
                     Moderator: Francis Bordeleau, CEO, Zeligsoft, Inc.

                     Portability constitutes a key concern for SBC system development. Different bodies have approached this problem from various perspectives: e.g., model portability; application portability; and waveform portability. This panel of experts will address the portability problem from these different perspectives with the goal of providing a better understanding of issues and potential solutions.

                 Panelists: Shahzad Aslam-Mir, Chief Technology Officer PrismTech
                                  Phil Eyermann, Staff Scientist, ITT Aerospace/Communications Division
                                  John Hanrahan, Technical Director, Boeing
                                  James E. Kulp, Consulting SW Architect, Mercury Computer Systems
                                  Dominick Paniscotti, Sr. MTS, BAE Systems-CNI Division

1145 - 1300   Lunch *Keynote* **- The Future of Software Radio**
Dr. Jeffrey H. Reed
Mobile and Portable Radio Research Group (MPRG)
Virginia Tech

1315 - 1515   **Session 7:** *High Capacity*
Chair: Mark Scoville, Staff Engineer, L-3 Communications

In this session, results of two efforts will be presented that address SCA-based development above 2GHz: 1) beyond line of sight SATCOM for a MILSATCOM Waveform, and 2) multi-band SATCOM terminal supporting dynamic network routing. Additionally, developing real-time small footprint CORBA ORB on a DSP will be discussed recognizing the impact of middleware in this context.

1315 – 1345   **SCA for Above 2 GHz Waveforms**
Gregg Lind, Rockwell Collins

Rockwell Collins has demonstrated an above 2 GHz beyond line of sight SATCOM radio that implements the Software Communication Architecture (SCA) for a MILSATCOM Waveform. The demonstration system was used to verify the capability to implement MILSTAR waveforms using the SCA. The project included the use of COTS POSIX compliant operating system and open source ORB to enhance the porting of a complex waveform. The system was used as a proof of concept demonstration for the MILSTAR waveform Low Data Rate (LDR). This presentation discusses the design and integration, and lessons learned from the project.

1345 – 1415   **Above 2 GHZ Common Communication System Architecture**
Eric M. Johnson - Principal Systems Engineer, Fred Cox - Sr. SW Development Manager,
Dave Hendry - Engineering Fellow, George Vachula - Sr. Engineering Fellow,
Nick Bachovchin - Engineering Fellow, Raytheon

This presentation presents a generic Communication System Architecture for a multi-band SATCOM terminal that is capable of operating at high data rates and that allows enhancement to support a dynamic network routing capability. A functional decomposition is suggested that provides maximum reuse of SCA compliant components.

1415 – 1445   **Optimizing CORBA to Meet SDR Requirements**
Andrew Foster, Product Manager, PrismTech Corporation

This presentation will review the principles used to develop a real-time, very small footprint CORBA ORB on a DSP. Techniques will be offered that have resulted in significant footprint reduction and performance gains previously unseen in a CORBA ORB.

1445 – 1515   Session 7 Q&A & Discussion

1515 – 1530   Afternoon Refreshments

1530 - 1730   **Session 8:** *SBC Case Studies and Experience Reports*
Chair: Andrew Foster, Product Manager, PrismTech Corporation

This session will focus on real-world experiences of designing, building and deploying SBC systems. In order to share these experiences with the audience, speakers in this session will use relevant case studies and reports from work in this area in order to illustrate the key issues that must be considered when developing systems of this type.

1530 – 1610   **Extension of Lightweight-CCM Model for Real-time Application on a UMTS Case-study**
V. Seignole & V. Watine, THALES/Alice Pilot Programme - S. Robert, A. Radermacher, F. Terrier,
CEA/LIST, France

OMG's Lightweight CCM specification is appealing for the construction of embedded systems; however, certain limitations exist which constrain its use in specifying QoS features and interactions in real-time systems. This report offers a proposed solution: introducing the connector concept to CCM. Implementation details are discussed along with evaluation of these extensions by designing and simulating a communication software application. The report provides

proof that the use of connectors facilitates the specification / configuration and realization of interactions mechanisms, while emphasizing real-time constraints and their handling at the framework level.

1610 – 1650   **Experience Report on Developing a Software Communications Architecture (SCA) Core Framework (CF) and Developer Kit(DK)**
Dominick Paniscotti, Sr. Member of Staff, BAE SYSTEMS

BAE SYSTEMS has designed, implemented, deployed and fielded a fully functional SCA Core Framework and developed a corresponding SCA Component Developer's kit. This presentation will cover the experiences developing both of these, including: performance characteristics of the Core Framework; the role Core Framework actually plays in an SCA system; techniques employed to ensure minimal change when moving form one ORB to another; principles of framework design applicable to the SCA CF; aspects of CORBA that can be abstracted away from component developers; what is entailed in undergoing JTEL testing; some of the myths of SCA CF and component development; and the key patterns for SCA component development.

1650 – 1730   **Efforts to Implement an SCA Compliant Wideband MILSATCOM Waveform.**
Mike Ubnoske, Sr. Principal SW Systems Engineer, Dan Boschen, Principal Communication Engineer, Paul Winkler, Lead SW Systems Engineer, MITRE Corp

One of the largest challenges to the MILSATCOM terminal community is the implementation of high bandwidth waveforms. The JTRS Software Communications Architecture (SCA) was designed primarily for radios operating below 2GHz where most processing could be performed in General Purpose Processors. Higher bandwidth waveforms require Field Programmable Gate Arrays (FPGAs) and Digital Signal Processor (DSP) implementations to sustain the high speed processing and data rates. We will present the results of laboratory investigations and experiments into the challenges of implementing SCA-compliant high bandwidth waveforms, particularly as relates to the changes introduced by SCA Version 3.0 for FPGA and DSP implementations.

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Program Committee

Sam Aslam-Mir, PrismTech

Bill Beckwith, Objective Interface Systems

Jerry Bickle, Raytheon

Francis Bordeleau, Zeligsoft

David Haverkamp, Rockwell-Collins

Neli Hayes, Boeing

Vince Kovarik, Harris

Francois-Xavier Lebas, THALES

Kevin Loughry, OMG

Al Margulies, SDR Forum

Dominick Paniscotti, BAE Systems

Kevin Richardson, MITRE

Andy Scheurer, Northrop Grumman

Mark Scoville, L-3 Communications

Jeff Smith, Mercury Systems

Fred Waskiewicz, OMG (PC Chair)