SIMA WORKSHOP

Monday Workshop:	Lunch:
AM - 8:00 AM – 5:00 PM	12:00 Noon – 1:30 PM

Workshop Co-Chairs: Gabriel Jakobson, Altusys Corporation; Mieczyslaw M. Kokar, Northeastern University
Workshop Technical Program Co-Chairs: Lundy Lewis, Southern New Hampshire University; Christopher J. Matheus, Versatile Information Systems
Sponsored by: MILCOM

Date: October 17, 2005 (Monday)
Time: 8:00 – 5:00 pm
Location: Room 412

Session 1
Session Chair: Gabriel Jakobson, Altusys Corporation

Situation Management: State of the Field and Research Agenda
Gabriel Jakobson, Altusys Corp
Mieczyslaw M. Kokar, Northeastern University
Lundy Lewis, Southern New Hampshire University
Christopher J. Matheus, Versatile Information Systems, Inc.
John Buford, Altusys Corporation

Textual Retrieval and Analysis of Event Data
John Palmer, Austin Info Systems
Gary Raven, Austin Info Systems

Situation Management in Crisis Scenarios based on Self-Organizing Neural Mapping Technology
Lundy Lewis, Southern New Hampshire University
Richard Tango-Lowy, ars Cognita, Inc.

Automatic Event Recognition for Enhanced Situational Awareness in UAV Video
Robert Higgins, The Boeing Co

Maritime Situation Monitoring and Awareness Using Neural Learning Mechanisms
Brad Rhodes, BAE Systems AIT
Neil Bomberger, BAE Systems AIT
Michael Seibert, BAE Systems AIT
Allen Waxman, BAE Systems AIT

Session 2
Session Chair: Lundy Lewis, Southern New Hampshire University

Protecting With Sensor Netwoks: Perimeters and Axes
Jeffrey V. Nickerson, Stevens Institute of Technology
Stephan Olariu, Old Dominion University

Biomimetic Models for Massively-Deployed Sensor Networks in Situation Management

K. H. Jones, NASA Langley Research Center
K. N. Lodding, NASA Langley Research Center
S. Olariu, Old Dominion University
L. Wilson, Old Dominion University
C. Xin, Norfolk State University

Target Tracking with Distributed Robotic Macrosensors

Brian Shucker, University of Colorado
John K. Bennett, University of Colorado

Combining multiple autonomous mobile sensor behaviours using local clustering

Rustam Stolkin, Stevens Institute of Technology
Jeffrey V. Nickerson, Stevens Institute of Technology

072 - SIMA Workshop (Continued)

Session 3
Session Chair: Ivan Kadar, Nortrop Grumman

Cognitive Situation Monitoring and Awareness of Grid Systems
Todd Carrico, Cougaar Software, Inc.
Filip Perich, Cougaar Software, Inc.
Jaisook Rho, Cougaar Software, Inc

Achieving Situation Awareness in a Cyber Environment
John J. Salerno, Air Force Research Laboratory
George Tadda, Air Force Research Laboratory
Douglas Boulware, Air Force Research Laboratory
Michael Hinman, Air Force Research Laboratory
Samuel Gorton, Skaion Corporation

Real-Time Multistage Attack Awareness Through Enhanced Intrusion Alert Clustering
Sunu Mathew, SUNY at Buffalo
Daniel Britt, SUNY at Buffalo
Richard Giomundo, SUNY at Buffalo
Shambhu Upadhyaya, SUNY at Buffalo
Moises Sudit, SUNY at Buffalo
Adam Stotz, SUNY at Buffalo

KSNet-Approach Application to Knowledge-Driven Evacuation Operation Management
Alexander Smirnov, St.Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences (SPIIRAS)
Michael Pashkin, St.Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences (SPIIRAS)
Tatiana Levashova, St.Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences (SPIIRAS)
Nikolai Chilov, St.Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences (SPIIRAS)

Effects Based Decision Support for Riot Control: Employing Influence Diagrams and Embedded Simulation
Robert Suzić, Swedish Defense Research Agency (FOI)
Klas Wallenius, Royal Institute of Technology

Session 4
Panel Chair: John Salerno, Air Force Research Laboratory, Rome Research Site

Panel Discussion: What are the Outstanding Research and Development Issues in Situation Management?
Panelists:
Christopher J. Matheus, Versatile Information Systems
Gabriel Jakobson, Altusys Corporation
Alexander Smirnov, St. Petersburg Institute for Information and Automation of the Russian Academy of Sciences (SPIIRAS)

Todd Caricco, Cougaar Software, Inc.

TUTORIALS PROGRAM

Monday Tutorials:	Tuesday and Wednesday Tutorials:
AM - 8:00 AM – 12:00 Noon	AM – No AM Schedule
PM – 1:30 PM – 5:30 PM	PM – 2:15 PM – 5:15 PM

Tutorial 1 (T1): "Commercial Wireless Networking: Creating a Tactical Internet Capability with Commercial Technology"

Date: October 17, 2005 (Monday)
Time: 8:00 – 12:00 pm
Location: Room 418

***Presented by*: Jack L. Burbank, Johns Hopkins University Applied Physics Laboratory**

Tutorial Abstract

This tutorial provides an overview of commercial wireless internetworking technologies within the context of the commercial domain, the potential roles in the evolving network-centric warfighting force, and the achievement of an Internet-like capability within the tactical military domain. Commercial wireless networking technologies have become increasingly popular over the past few years, and continue to impact the world socially and economically as the wireless Internet becomes more pervasive with rapidly increasing deployments across the world. This wireless outgrowth of the Internet has been fueled by the development of wireless technologies such as the nearly-ubiquitous IEEE 802.11 wireless local area network (WLAN) family of standards (also known as WiFi), broadband wireless access technologies such as the IEEE 802.16 standards family (also known as WiMax), and wireless personal area network (WPAN) technologies such as the IEEE 802.15 standards family (e.g. Bluetooth). Evolving cellular technologies (2.5G, 3G) provide an increasing capability support not only voice applications but also offer high-bandwidth data services and growing Internet accessibility across wide geographic areas. Furthermore, there has been an enormous amount of activity in the development of network- and higher-layer technologies to support mobility and wireless connectivity, such as Mobile Internet Protocol (MIP), and the continuing development of mobile ad-hoc network (MANET) routing protocols. With the development and envisioned deployment of IP Version 6 and its increased address space, along with the continually increasing capability of wireless networks, the envisioned proliferation of wireless network-capable devices is expected to be significant. Such proliferation will continue to push networking technologies that are highly capable, flexible, and scalable.

Concurrently, the military is undergoing a "transformation" to a network-centric warfare (NCW) paradigm. In the NCW paradigm, more importance is placed on the collection of, dissemination of, synthesis of, and action on information by lightweight, highly-mobile, highly-lethal forces. This represents a fundamental trade of armor for network connectivity, placing unprecedented importance on the network(s) supporting the force structure. This warfighting paradigm is predicated upon the presence of a robust, highly-capable, highly-interoperable, readily deployable and manageable, and secure networking capability to provide ubiquitous “anytime, anywhere, to anyone” communications. The composite of these networks will constitute the emerging Global Information Grid (GIG), a world-wide IP-based DoD network that is intended to remove communications as a constraint to the warfighter and his warfighting tactics.

There is a growing interest within the DoD community to leverage commercial Internet and wireless networking technologies in order to achieve this desired network-centric capability. This is understandable given the commercial Internet possesses many of the characteristics desired in the military counterpart. Subsequently, there continues to be an increasing number of military networks that are at least partly-based upon commercial wireless technologies and practices. However, these commercial technologies were not designed to meet military requirements, and as a result they may not perform well for all applications. If improperly applied within the military domain, they could represent a regression of capability. In fact, commercial technologies are often defined to meet rigidly-defined performance goals and a narrow set of use cases. These constraints often result in poor performance when the network technologies are applied outside of the original scope, even within the commercial domain. Thus, it is important that the military communications community understand these technologies from a variety of perspectives. This includes becoming familiar with the technologies themselves, knowledge of what they are and are not designed for, how they are used within the commercial domain, and the relationships between these various technologies. Such an understanding enables the military community to identify gaps between technology and military needs, identify potential shortcomings that may induce operational constraints, and work to design military-specific augmentations as necessary to bridge these gaps and maintain a technological edge against potential adversaries who also have access to these same commercial technologies. Conversely, it is also important for the military community to have intimate familiarity with these technologies because those are the technologies adversaries are likely to possess.

The goal of this tutorial is to provide an introduction to many of the wireless network technologies that are used within the commercial domain. This tutorial would provide attendees technical knowledge on pervasive wireless networking techniques and issues unique to the wireless domain. This tutorial will focus upon standardized commercial technologies, while refraining from presenting academic proposals from literature (there are too many technology proposals within the literature to realistically cover, even at a high-level, in a single tutorial session). Introductory material would be provided to identify key differences between wired and wireless domains, and highlight the key problematic areas in wireless internetworking.

Tutorial Presenter

The proposed tutorial will be conducted by Mr. Jack L. Burbank of The Johns Hopkins University Applied Physics Laboratory (JHU/APL). Mr. Burbank leads the Theory and Analysis section within the Network Engineering group of JHU/APL. Mr. Burbank is an expert in the area of wireless networking, and has been focused on the application of commercial wireless networking technologies to the military context. Mr. Burbank's background is in communications theory, wireless networking, IP internetworking, satellite communications, communications vulnerability analysis, and computer simulation of communications systems. Mr. Burbank leads a team of network engineers at JHU/APL that regularly attends and participates within the Internet Engineering Task Force (IETF) and also closely follows activities within the IEEE 802 standards organization. Mr. Burbank's research interests include mobile ad-hoc networking, wireless MAC design, and cross-layer design. Mr. Burbank's current work projects include research into adaptive augmentation of the 802.11 MAC to improve scalability and efficiency while maintaining backwards compatibility, analysis and development of concepts for Naval MANET sensor networks, DoD analysis of commercial MANET routing protocols, and the application of commercial wireless broadband technology in the design of a United States coastal area network capability. Mr. Burbank has published numerous technical papers and reports on topics of wireless networking (both terrestrial-based and space-based) (see reference list for a partial list), and holds a provisional patent for a novel commercial WLAN testbed concept developed while studying the inclusion of very high-speed mobile stations (in excess of Mach 4) within an 802.11-based WLAN. Mr. Burbank is a professor of networking and telecommunications in The Johns Hopkins University Part-Time Engineering Program.

Tutorial 2 and 7 (T2 and T7): "Next Generation Operations and Service Level Management"

Date: October 17, 2005 (Monday)
Time: AM T2 - 8:00 – 12:00 pm and PM T7- 1:30 – 5:30 pm
Location: T2 - Room 417 / T7- Room 416

***Presented by*: Gerry Theret and Anil Verma, Lucent Technologies**

As the service provider paradigm shifts from network and technology-centric to service and customer-centric, the end-user of the future will demand more control of their services (e.g., customer network management and self-service provisioning) and consistently high quality services, driven by customer-centric Service Level Agreements (SLAs). In addition, as service providers evolve from several distinct networks delivering services over different technologies to a single IP-based network, the network/services management architecture will need to evolve as well. The addition of a variety of application and content servers that support new services will require the adoption of a service management paradigm to complement the more traditional NOC management processes. Service providers will need to examine their existing systems and operations processes to align with this evolved network, services and applications environment. Taking advantage of relevant standards, like NGOSS and ITIL, can ensure consistent coverage of network/services management needs in the Fulfillment, Assurance, Usage, CRM, and Resource Management areas in terms of systems and processes. In addition, employing standards across the various technology and service domains encourages a common vocabulary that will ease the evolution to a common IP-based network.

This session provides background on the TeleManagement Forum's New Generation Operations Systems and Software (NGOSS). NGOSS is a comprehensive, integrated framework for analyzing, designing, developing, implementing, procuring and deploying operational and mission supporting systems. This session will also provide an overview of the first step of an NGOSS undertaking, covering the process assessment and design phase and the development of an end-to-end Service Level Management structure that is compliant with the Information Technology Infrastructure Library (ITIL) model.

The session is intended to provide an introduction to Next Generation Operations Management processes, metrics, tools and approaches. This tutorial will familiarize the participant with the program/service goals, methodologies, delivery capabilities and recent experiences.

Outline

New Generation OSS

- Telecommunications and IT Management Needs
- Background
- NGOSS Structure
  - Processes
  - Principles
  - Architecture
  - Methodology
- Benefits

Operations Analysis and Optimization

- Mission Challenges
- Operations Analysis & Optimization Overview and Framework
- Benefits

Service Level Management and SLA Design & Implementation

- Development Process and Methodology
- Service Level Formalization Process
- SLM Lifecycle Management
- Deliverables and Benefits
- Delivery Experience

Tutorial 3 and 5 (T3 and T5): "Overview of Internet Protocols and IPv6 Extensions"

Date: October 17, 2005 (Monday)
Time: AM T3 - 8:00 – 12:00 pm and PM T5 - 1:30 – 5:30 pm
Location: T3 - Room 419 / T5- Room 417

***Presented by*: John Amoss and Adrian R. Hartman Lucent Technologies**

This session provides background on the benefits and issues surrounding the migration of the Global Internet Protocol to IPv6. The tutorial will familiarize the participant with the principles and operation of the current Internet protocols and extensions to these protocols including IPv6. The session is intended to provide both an introduction to the TCP/IP protocol suite and a view of up-to-date extensions of the suite. It will also review key transition mechanisms and options for allowing networks to progressively migrate to IPv6 while co-existing and interoperating with the legacy IPv4 networks. The course will address the following topics.

- The layered functional network approach is reviewed and both the Open Systems Interconnection (OSI) and the Transmission Control Protocol/Internet Protocol (TCP/IP) models are presented.

- Major functions performed within the TCP and IP levels will be addressed and the protocols associated with these layers will be reviewed in detail.

- IPv4 will migrate to IPv6, which will extend the addressing capabilities and add other features to the IP protocol. An overview of IPv6 will be presented along with its major features and transition strategies.

Outline

- Introduction to Protocol Architectures (OSI and TCP/IP)
    - Layering, layer functions and primitives
- Subnetworks and the TCP/IP Model
- IPv4 - Overview and Issues
- TCP - Overview
- Enter IPv6
    - Objectives and Features
    - Protocol, Addressing, Management, Security, Other goodies
- Transition Strategies
- Benefits and Issues in Global IP Network Migration to IPv6
    - DoD Policies
    - What Vendors are saying

Tutorial 4 (T4): “Intermittently Connected Mobile Ad Hoc Networks”

Date: October 17, 2005 (Monday)
Time: 1:30 – 5:30 pm
Location: Room 418

Presented by Dr. Zhensheng Zhang, San Diego Research Center.

Introduction

In modern battlefields, nodes in communications networks are constantly in motion and/or operate on limited power. When nodes are in motion, links can be obstructed by intervening objects. When nodes must conserve power, links are shut down. These result in intermittent connectivity. When no path exists between source and destination, network partition occurs. Examples of an intermittently connected network (ICN) are: a). An inter-planet satellite communication network where satellites and ground nodes may only communicate with each other several times a day, b). A sensor network where sensors are not powerful enough to send data to a collecting server or are scheduled to be wake/sleep periodically, c). A military ad hoc network where nodes (e.g. tanks, airplanes, soldiers) may move randomly and are subject to being destroyed.

Applications in ICNs must tolerate delays beyond conventional IP forwarding delays and these networks are referred to as delay/disruption tolerant networks (DTN). There are many different terminologies for ICN or DTN used in the literature as such eventual connectivity, space-time routing, partially connected, transient connection, opportunistic networking, and end-to-end communication.

The characteristics of DTNs are very different from those of the traditional Internet in that the latter have some well-known assumptions: 1) continuous connectivity, 2) very low packet loss rate, and 3) reasonably low propagation delay. DTNs do not satisfy all of the assumptions, and sometimes none. In consequence, the existing protocols will not be able to handle the data transmission in DTNs. In DTNs, end-to-end communication using TCP/IP protocol does not work as packets that cannot be forwarded immediately are usually dropped. If packet dropping is too severe, TCP eventually ends the session. UDP provides no reliability service and cannot “hold and forward”. New protocols and algorithms need to be developed. Within the overall category of DTN, there are several different types of DTN due to their different characteristics. For instance, the satellite trajectories in example a) are predictable while the movement of a solider or tank in example c) may be random. Therefore, for different types of DTNs, different solutions may need to be proposed. Generally speaking, DTN routing proposed in the IRTF DTN working group is separate from the underlying "region local" routing and is above the transport' layers. However, there are some network technologies which do not really have a well-defined transport layer (e.g. sensor networks). In this case, a layer-agnostic approach is more appropriate. For example, even though the local regional network is connected, it might not be optimal to always route the packets to gateways (border nodes of the local network), as those gateways may move out of the network soon. It might therefore be better to wait for some time at some local nodes which may have a better chance to reach the destination.

Recently, researchers have proposed different solutions for different types of DTNs. In this tutorial, we provide an overview the current state of art of DTNs. We categorize these protocols into different classes, shown in Figure 1. About 40 protocols/papers will be discussed in details and 20 of them will be compared based on complexity such as buffer required, whether neighbor information exchange is needed, whether the computation of the link forwarding probability is needed, and whether location service is needed. Experimental studies, methods of estimating link forward probabilities and data dissemination (applications) in intermittently connected networks will be discussed. Open research issues in this area will be pointed out as well.

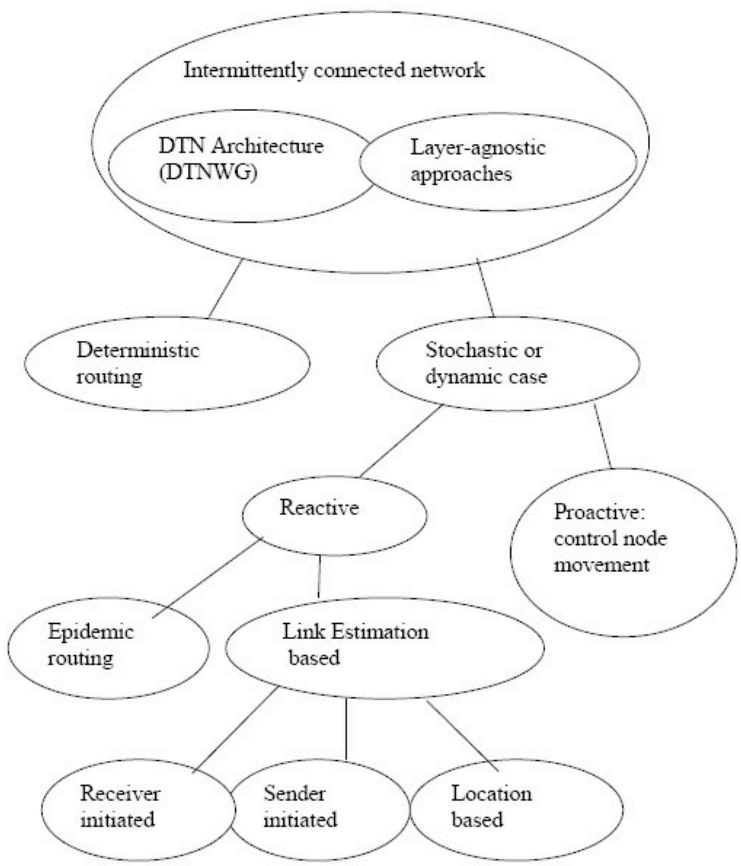

FIGURE 1, PROTOCOLS CLASSIFICATION

Intended Audience:

Researchers, system engineers, network architects, and protocol implementers from government, academia or industry interested in intermittently connected ad hoc networks and delay tolerance networks (sensor networks, epidemically-routed networks, inter-plenary, space-satellite networks, battlefield ad-hoc networks, etc.) and how to interconnect them.

Why the topic is interesting and timely

Wireless, mobile ad hoc networks will become an important part in modern battlefields and DTNs are resultant emerging area. Even though there have been several tutorials on DTNs in previous conferences, these tutorials mainly focused on the architecture proposed by the IRTF DTNWG, which is above the transport layer. Recently, many layer-agnostic protocols have been proposed (which are different from those proposed by the IRTF DTN WG) and have never been covered by any previous tutorial. It is the first tutorial that MANET is considered from the intermittent connectivity aspect, and focuses on military applications. Furthermore, IEEE Milcom is the right conference. It is therefore timely to review these layer-agnostic protocols in details and categorize them into different classes so that efficient algorithms and new improvements can be developed.

Presenter's Short Bio

Dr. Zhensheng Zhang has over fifteen years experience in design and analysis of network architecture, protocols and control algorithms, with very strong backgrounds in performance analysis, modeling and simulation of the communication networks. Recent work includes the following:

- *San Diego Research Center,* Principal Investigator
  - DARPA " Mobile, Wireless (ad hoc) networks using Smart antennas" project, responsible for directional transmission/receive algorithms design and implementation
  - Various DOD sponsored projects: DTN, MIMO and ad hoc networks
- *Microsoft Research Asia*: Research in wireless networks, including DTN, MAC and Network layer QoS, resource allocation, admission control in IEEE 802.11; and in peer to peer networks.
- *Bell Laboratories,* Lucent Technologies: Research in 3G wireless networks; designed a core network architecture based on Lucent's SoftSwitch platform for BT's seamless 3G wireless network; engineer for the NTT DoCoMo 3G WCDMA network projects; Investigated issues in IP/PPP Over SONET, IP over ATM/SONET and IP over DWDM; researched different optical IP networking architectures, including overlay networking, service layer networking with MPLS and transport layer networking, protection and restoration schemes, while considering

design/economic analysis and survivability issues; proposed schemes to determine the best primary and restoration routes for each given wavelength demand to maximize network capacity while minimizing network cost through simulation

- *Columbia University*, Research Scientist: Conducted research in B-ISDN/ATM networks, including ATM switch and networks architecture design, performance modeling, bandwidth allocation, congestion control, admission control, network management, buffer management, routing, traffic analysis and priority scheduling for integrated services and multimedia communications.

Tutorial 6 (T6): "Technical Overview of JTRS Software Communications Architecture"

Date: October 17, 2005 (Monday)
Time: 1:30 – 5:30 pm
Location: Room 419

***Presented by*: Ms. Neli Hayes, The Boeing Company**

TECHNICAL OVERVIEW OF THE JOINT TACTICAL RADIO SYSTEM (JTRS) SOFTWARE COMMUNICATIONS ARCHITECTURE (SCA) SPECIFICATION

The Joint Tactical Radio System (JTRS) Software Communications Architecture (SCA) specification is the established standard for interoperability and portability of distributed, embedded, object-oriented, language-independent and platform-independent components in software-based communications systems, with numerous existing military and commercial implementations.

As well as being the core standard for all Department of Defense (DoD) software-based communications 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 specification forms the corner-stone basis that inspires many of today's emerging commercial and international standards such as the Object Management Group (OMG)'s Platform-Independent Model and Platform-Specific Model for Software Radio Components and the OMG Deployment and Configuration Specification.

The SCA specification relies on the use of open and evolving commercial standar ds 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 communications system, including commercial software radios, applications in the automotive industry, etc.

This 3-hour overview provides a solid technical foundation of the SCA specification core architecture rule set including the Core Framwork (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.

TECHNICAL OVERVIEW OBJECTIVES

Introduce the SCA specification, supplements, accompanying documents, availa ble formal training, and emerging SCA-based/inspired standards

Provide a comprehensive overview of the SCA core architecture rule set

Depict example sequences of how the SCA interacts with SCA-compliant application components

Introduce SCA’s CORBA IDL modules

TECHNICAL OVERVIEW DETAILED OUTLINE

SCA Specifications

SCA Specifications
SCA Supporting Documents & Formal Training
Emerging SCA-Based/Inspired Standards

Software Architecture Overview

What does the SCA Enable for Communication Systems?

How does the SCA Enable Such Things?

- SCA Layering
- SCA Application Instantiation
- SCA Operating Environment
- SCA Core Framework and Domain Profile
- SCA Operating Environment Mandates

SCA Partitioning Birds Eye View

SCA Partitioning Detailed View

SCA Partitioning Major Divisions (Infrastructure & Application Layers)

Infrastructure Layer

- o Bus Layer
- o Network & Serial Interface Services
- o Operating System Layer
- o CORBA Middleware
- o Core Framework (CF)

Application Layer

- o CORBA-Capable Components
- o Adapters Allowing Use of Non-CORBA-Capable Components

SCA Partitioning Benefits

Software Architecture Infrastructure Layer

Operating Environment (OE)

Operating System & CORBA Middleware

- o Core Framework (CF)
  - .Base Application Interfaces
  - .Framework Control Interfaces
    - Base Device Interfaces
    - Node Component Deployment & Removal Interface
    - Domain Component Deployment & Removal Interface
    - Application Installation/Un-installation Interface
    - Application Creation Interface
    - Application Configuration/Control/Termination Interface
  - File Service Interfaces
- o Domain Profile – Component Packaging & Deployment

How the CF Interacts with Application Components

Node Startup

- o DeviceManager Startup
  - Creation of persistent devices and services
  - Deployment of persistent devices and services to the CF domain

Application Installation

Application Instantiation

o Creation of a Single Application Component
o Connecting Application Components Together

Invoking Operations on a Single Application Component

Application Tear-Down

SCA IDL Modules

References

Tutorial 8 (T8): "Homeland Security: New Approaches to Providing Network Security and Interoperability"

Date: October 18, 2005 (Tuesday)
Time: 2:15 – 5:15 pm
Location: Room 418

Moderated by: **Dr. Rati C. Thanawala, Vice President, Network Planning and Standards, Bell Laboratories, Lucent Technologies.**

This tutorial focuses on innovative approaches – new technologies and systems, new methodologies, emerging standards, and state-of-the-art solutions to meet the needs of communications networks for Homeland Security. Find out how the public and private sectors are working together to develop methods to tackle cyber security and protect the communications infrastructure to improve homeland security. Innovations in wireless technologies are creating new solutions to hard problems. Interoperability challenges in Public Safety Networks are being addressed. In addition, a wide array of DoD solutions are now making their way into networks supporting Homeland Security. The scope of the session spans the range – from requirements, to identification of technologies and solutions, to the process being used to ensure the transition of technology to the Civil Sector.

We will have 4 presentations in this session:

1. Deploying Security Technologies and Systems: Kathleen M. Flood, MITRE
2. A Standardized Framework for End-to-End Security in Communications Networks: Andrew McGee, Bell Labs, Lucent Technologies
3. Wireless Technology Innovations and Public Safety Networks: Dr. Ken Budka,

Bell Labs, Lucent Technologies
4. Application of DoD Technologies to Homeland Security: Dr. James Soos, RDECOM Homeland Security Science Advisor

The session will be introduced by Dr. Rati Thanawala, Vice President, Network Planning, Performance, and Economic Analysis, Lucent Technologies, and closed with a moderated Q&A session on the gaps in the current approaches that need to be addressed with greater focus and priority.

Presenters Bio:

Dr. Rati Thanawala is Network Planning, Performance, and Economic Analysis Vice President at Bell Laboratories, Lucent Technologies. Her organization of Bell Labs scientists and engineers works with operators in the communications industry worldwide, and the U.S. Government, supporting advanced technology planning for evolution to Next Generation Networks. The work includes end-to-end architecture, technology selection, network modeling and network design, performance/reliability and operations systems engineering, and business cases for customers and product managers evaluating product and network evolution scenarios. Rati is also a member of the Homeland Security Standards Panel created by the Department of Homeland Security in cooperation with the American National Standards Institute to align the cutting-edge efforts of the standards community with urgent national priorities of homeland security.

Rati joined Bell Labs in 1977 as a Member of Technical Staff, she holds a BS in Mathematics from Lucknow University, India and a Masters and Ph.D. in Computer Science from Yale University. She attended the Program for Management Development at Harvard University. Rati represents the U. S. on the International Scientific Committee for Networks, which supports the advancement of the network planning discipline worldwide through contributions from research and industry organizations.

Kathleen M. Flood is a Lead Information Security Engineer with the MITRE Corporation, where she delivers security analysis and engineering support to Tactical Army Security and Homeland Security projects. She has over 20 years of information technology experience during which she has provided her expertise in the areas of software, network, and security engineering to a wide range of defense contractors, government agencies, and Fortune 100 commercial customers. Kathleen earned a B.S. in Computer Science from New York Institute of Technology.

Andrew R. McGee is a Distinguished Member of Technical Staff in the Advanced

Network Planning Department at Bell Labs in Holmdel, NJ. Mr. McGee has 20+ years of data communications experience and is currently responsible for the development and analysis of Advanced Security Architectures and Security Services for Next Generation Networks. Mr. McGee's research interests include data network architectures and virtual private networking technologies, and he holds a patent in the area of data networking. Mr. McGee received a B.S. degree from Michigan State University in East Lansing, and an M.S. degree from Rutgers University in New Jersey, both in Computer Science.

Dr. Kenneth C. Budka is a Technical Manager at Lucent Technologies' Bell Labs in Holmdel, New Jersey working on applying commercial 3rd Generation wireless technologies to enhance public safety and homeland security. Dr. Budka's work in wireless communications systems with the introduction of Cellular Digital Packet Data, one of the first commercial wireless data services used by first responders. Since then, Dr. Budka has worked on a wide spectrum of problems arising in cellular voice and data systems. He has developed techniques to enhance the capacity and performance of commercial wireless systems including design of resource allocation, link adaptation, power control algorithms and control features for mobile voice and data network products - cdma2000, GSM, GPRS, EGPRS, and CDPD.

Dr. Budka received the B.S.E.E. degree *summa cum laude* from Union College, Schenectady, New York and the M.S. and Ph.D. degrees in Engineering Science from Harvard University, Cambridge, Massachusetts. He holds six patents with 16 pending, and is a Senior Member of the IEEE.

Dr. James E. Soos is a RDECOM HLS Science Advisor, he has broad responsibilities with respect to transfer of HLS relevant technologies. His functions include working with representatives of private companies, academia and state or local governments to solve technically challenging HLS problems to include Cooperative Research and Development Agreements, Educational Partnerships, and the development of appropriate consortia and regional alliances.

As Director, Information Systems Integration Office (ISIO), Dr. Soos managed the functions of the Special Project Office for digitization, as well as coordinating Digital Integration Lab (DIL) projects and projects conducted within the new RDEC Integration Facility. ISIO functions are closely associated with the Army Systems Engineering Office (ASEO) to ensure that Force XXI and Army 2010 elements are fully interoperable and compliant with the JTA-A.

He was a Chief, Special Projects Office for Battlefield Digitization, an Associate Director for Command and Control, and Deputy Director for Information Management for the Center for C3 Systems. Dr. Soos holds a Bachelor and Master degrees from Rutgers University and is an Honors graduate with a Doctorate from Temple University.

Tutorial 9 (T9): "Policy-Based Network Management"

Date: October 18, 2005 (Tuesday)
Time: 2:15 – 5:15 pm
Location: Room 417

Presented by: **Dr. Ritu Chadha, Telcordia Technologies**

ABSTRACT

Current network management systems lack the ability to state long-term, network-wide configuration objectives, and have them automatically realized in the network. A policy-based network management system allows the network operator to enter objectives as

policies into the management system, and ensures automatic enforcement of these policies so that no further manual action is required on the part of the network operator.

Another aspect that has not been adequately addressed by currently available commercial network management systems is the feedback loop between configuration and fault/performance management. Many fault and performance problems can be handled by network reconfiguration. For example, if a network link is severely congested, it may be possible to alleviate the problem by sharing the traffic load with another under-utilized link. This can be accomplished simply by appropriately reconfiguring the network. Today, this is done manually by experienced network operators who examine outputs from fault and performance management systems and decide on how to appropriately reconfigure the network. In order to reduce the cost of network operations, it is necessary to take the human out of the loop by creating a feedback loop between fault/performance monitoring systems and configuration systems, and by specifying policies that regulate how the system should be reconfigured in response to various network events. A management system using policy-based control can be used complete the feedback loop between network monitoring and network re-configuration. Since a coordinated response is required to deal with a variety of events being generated both within and from outside the network, there is a need to be able to specify and store policies about the appropriate responses to events in the management system. The management system must be able to automatically react to network events by performing actions described in such policies. These policies can be created ahead of time by the network planner; once they are created and stored as part of the management system, the latter can automatically enforce these policies. This takes the human out of the loop and allows nearly fully automated network management.

This tutorial will discuss the above management challenges by providing an in-depth discussion of policy-based network management. The audience will gain an understanding of how policy-based management can solve very real network management problems. The tutorial will cover the following topics:

- **Introduction to Policy-Based Management**: This section will provide an introduction to the IETF Policy Framework and will provide a description of the related policy information models.
- **Use of policy-based management for managing IP networks**: This section will provide a detailed overview of how policy-based management can be used for managing IP networks. The complexities of managing a large IP network pose some unique problems which can be addressed by the appropriate use of policies to describe high-level mission goals. These high-level policies are then automatically translated into the appropriate configuration commands that implement the required mission goals in the network. This part of the tutorial will describe an extensible architecture of a policy-based system that provides these capabilities.
- **Management issues for ad hoc networks**: This section will present an in-depth discussion of network management issues for ad hoc networks. The restrictions imposed on network management by the dynamic topology and low bandwidth, high loss environment that is typical of ad hoc networks will be described and policy-based solutions that address these restrictions will be presented.
- **Usage Scenarios**: In this section, a number of usage scenarios will be provided that describe practical examples of management issues that arise in ad hoc networks and show how these issues can be addressed by the use of the policy-based management framework introduced earlier in this tutorial.

Biography of speaker

Dr. Ritu Chadha is Chief Scientist and Director of the Policy Management research group in Applied Research at Telcordia Technologies, where she has been working since 1992. She is currently the program manager for the CERDEC DRAMA (Dynamic Re-Addressing and Management for the Army) project, which is a 5-year Science and Technology Objective (STO) focused on the design, prototyping, and field demonstration of a policy-based network management system for mobile ad hoc networks. She is also the Chief Engineer for Telcordia's Future Combat Systems (FCS) Network Management System subcontract with Northrop Grumman. Dr. Chadha is an active participant in standards bodies such as the IETF. She has presented tutorials and invited speeches at several industry conferences and has published over 30 refereed papers in journals and conferences. She has presented tutorials and invited speeches at several industry conferences. Dr. Chadha received her Ph.D. in Computer Science from the University of North Carolina at Chapel Hill in 1991. Her research interests include policy-based management, network and service management for IP-based networks, ad hoc networking, directory-based management systems, and automated reasoning.

Tutorial 10 (T10): "Cross-Layer Design for Applications-Specific Large-Scale Sensor Networks"

Date: October 18, 2005 (Tuesday)
Time: 2:15 – 5:15 pm
Location: Room 416

Presented by: **Dr. Lang Tong, Cornell University, and Dr. Qing Zhao, University of California**

Motivation Contemporary network science focuses primarily on the general, not the application specific. It is then only natural that the prevailing approach to networking is a modular and layered approach, not an integrated approach. For example, the role of signal processing has been relegated to the two ends of the protocol stack: establishing and maintaining links at the physical layer and encoding and representing source information at the application layer. Such a layered strategy is one of the reasons that has led to the phenomenal success of the Internet and the cellular network.

In this tutorial, we offer viewpoints that classical methodologies developed for general purpose data networks, ad hoc or cellular, are not adequate for application-specific sensor networks; what has been fundamental to the success of the Internet – the layered architecture and design – may in fact be a hindrance to efficiency for application-specific networks.

Take, for example, a large-scale sensor network with thousands of nodes randomly deployed for environmental monitoring. The fact that the entire network collectively performs certain tasks, many of which are signal processing in nature, makes it difficult, both conceptually and in practice, to follow a layered design paradigm. For such applications, signal processing is woven in all aspects of network design, from sensing to transmission, from medium access that governs information retrieval to distributed processing; given constraints on battery power, even the hardware implementations of the algorithms become critical.

Theme and Topic This tutorial provides perspectives on different aspects of cross-layer design for large sensor networks: ranging from PHY-MAC interaction, data-centric medium access, opportunistic transmission, joint MAC-routing design, to network monitoring and maintenance. The underlying theme is to discuss how a principled integrated design can lead to more efficient and fair use of limited resources, to demonstrated that capturing dependencies among network layers, predominantly the PHY-MAC-NET layers, offers design choices leading to improved performance.

It is our hope that this tutorial will serve as an initial reference, a brief stop in a tour filled with promises as well as unknowns. To many researchers, cross-layer design means more than clever choices of interfaces between two adjacent layers of the open systems interconnection (OSI) architecture or simple layer compaction. For emerging applications such as large sensor networks, cross-layer design may imply a redefinition of layers and reorganization of the network architecture.

While we recognize that cross-layer design emerges as a promising methodology especially for noncellular networks, we are also mindful of the clear tension between modularity or form and function and that unbridled integration could lead to complicated designs. Integrated design could easily lead to unintended consequences; it could lead to oscillatory behavior and instability as coupled layers continually adapt to changes in each other's parameters. However, given the challenges of enormous network size, stringent energy constraint, difficult channel conditions, and variable data modalities, a cross-layer approach to wireless sensor networks deserves attention and effort.

Biographic Sketch of the Speakers

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Education: Professor Tong received the B.E. degree from Tsinghua University, Beijing, China, in 1985, and M.S. and Ph.D. degrees in electrical engineering in 1987 and 1990, respectively, from the University of Notre Dame, Notre Dame, ndiana. He was a Postdoctoral Research A±liate at the Information Systems Laboratory, Stanford University in 1991.

Appointments: Since 1998, Prof. Tong has been with the School of Electrical and Computer Engineering, Cornell University, where he is now a Professor. Prior to his joining Cornell, he was on faculty at the University of Connecticut at Storrs and the West Virginia University. He also held short-term visiting position at Stanford University and was the 2001 Cor Wit Professor at Delft University of Technology.

Honors and Awards Professor Tong is a Fellow of IEEE. He received 1993 Outstanding Young Author Award from the IEEE Circuits and Systems Society, and the 2004 IEEE Signal Processing Best Paper Award (with M. Dong). He also received the 1996 ONR Young Investigator Award.

Synergistic Activities Prof. Tong was an elected member of the technical committee on signal processing for communication in the IEEE Signal Processing Society. He is an Associate Editor for the IEEE Trans. Signal Processing, and IEEE Signal Processing Letters, a co-editor (with G. Giannakis, P. Stoica, Y. Hua) of Signal Processing Advances in Wireless Communications and (with H. V. Poor) Signal Processing for Wireless Communications Systems. He was co-Guest Editor (with R. Liu) for the special issue in Blind Identi¯cation and Estimation of the IEEE Proceedings, and (with A. Swami) for the special issue on Cross Layer Design of Ad Hoc Networks in IEEE Signal Processing Magazine. He is a member of the Sensor Array and Multichannel technical committee of the IEEE Signal Processing Society. He served as a co-chair for the NSF/ONR workshop on Cross Layer Design in Adaptive Ad Hoc Networks in 2001, the NSF/ONR/ARL workshop on Future Challenges of Signal Processing and Communications in Wireless Networks in 2002 and the ONR/ARL Workshop on Sensor Networks in 2003.

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Education: Professor Zhao received the B.S. degree in 1994 from Sichuan University, Chengdu, China, the M.S. degree in 1997 from Fudan University, Shanghai, China, and the Ph.D. degree in 2001 from Cornell University, Ithaca, NY, all in Electrical Engineering.

Appointments: From 2001 to 2003, Professor Zhao was a communication system engineer with Aware, Inc., Bedford, MA. She returned to academe in 2003 as a postdoctoral research associate with the School of Electrical and Computer Engineering at Cornell University. In 2004, she joined the Department of Electrical and Computer Engineering at UC Davis where she is currently an assistant professor.

Honors and Awards Professor Zhao received the IEEE Signal Processing Society Young Author Best Paper Award in 2001.

Synergistic Activities Professor Zhao is the publication chair for the 2005 IEEE Workshop on Signal Processing Advances in Wireless Communications. She also serves as a TPC member for the 2005 International Conference on Communications, Circuits and Systems and the 2006 IEEE Radio and Wireless Symposium. She co-organized and co-chaired special sessions on the topics of sensor networks and energy constrained networking at ICASSP 2004, MILCOM 2004, ICASSP 2005, and MILCOM 2005. She was also the speaker for a tutorial on Signal Processing for Random Access in Wireless Networks: A Cross-Layer Approach at WCNC 2004.

Tutorial 11 (T11): "Nanotechnology for the Terabit Communications Network"

Date: October 18, 2005 (Tuesday)
Time: 2:15 – 5:15 pm
Location: Room 419

Presented by: **Dr. David Bishop, Lucent Technologies**

****Note: This tutorial is repeated again during the Wednesday Tutorials Session***

Nanotechnology is a developing field that is beginning to impact almost every area of science and technology. In areas as diverse as automotive, aeronautical, aerospace, entertainment, wireless communications, chemistry and lightwave systems, nanotechnology solutions are becoming the solution of choice for solving many problems. The ability to build devices that are small, cheap, fast and can be integrated with on chip electronics is proving to be crucial in many areas. Despite the significant promise in many other areas, one of the most important applications will be in the area of communications networks. In my talk I will discuss what the nanotechnology solutions are, how they are built and describe some of the many applications in using them to build a terabit communications network.

Tutorial 12 (T12): "Network Security: Traffic Analysis for Detecting Computer Intrusions and Viruses/Worms"

Date: October 19, 2005 (Wednesday)
Time: 2:15 – 5:15 pm

Location: Room 417

Presented by: **Dr. Thomas Chen, Southern Methodist University**

ABSTRACT

This half-day tutorial will give an overview of how traffic data is collected and analyzed to detect attacks directed against specific computer targets and large-scale virus/worm attacks (against the general Internet population). The tutorial is organized into two major parts. The first part deals with directed attacks that aim to compromise the security of specific computer targets. We describe the two basic steps in directed attacks: scanning for vulnerabilities and exploit attack. This is essential background to understand how attack traffic is different from normal traffic. Next, we describe how traffic data is monitored and collected from various points in the network, including sniffers, routers, firewalls, honeypots, and intrusion detection systems. We review methods to analyze the traffic data to detect signs of computer intrusions. The two basic approaches of misuse detection and anomaly detection are explained.

The second part of the tutorial deals with virus and worm attacks which are not directed at specific targets. They are undirected large-scale attacks with the goal of compromising as many computers as quickly as possible. Their self-replicating behavior and ability to carry malicious payloads make them a major threat to the entire Internet. We give an overview of how virus and worm programs work to replicate and spread themselves through a network. The limitations of current defenses (antivirus software, firewalls, intrusion detection systems, access control lists) are explained. Finally, we describe methods designed for early worm detection and warning.

Tutorial 13 (T13): "Nanotechnology for the Terabit Communications Network"

Date: October 19, 2005 (Wednesday)
Time: 2:15 – 5:15 pm
Location: Room 419

Presented by**: Dr. David Bishop, Lucent Technologies**

**Note: This tutorial is a repeat of the Nanotechnology Tutorial held during the Tuesday Session.*

ABSTRACT

Nanotechnology is a developing field that is beginning to impact almost every area of science and technology. In areas as diverse as automotive, aeronautical, aerospace, entertainment, wireless communications, chemistry and lightwave systems, nanotechnology solutions are becoming the solution of choice for solving many problems. The ability to build devices that are small, cheap, fast and can be integrated with on chip electronics is proving to be crucial in many areas. Despite the significant promise in many other areas, one of the most important applications will be in the area of communications networks. In my talk I will discuss what the nanotechnology solutions are, how they are built and describe some of the many applications in using them to build a terabit communications network.

Tutorial 14 (T14): "Satellite-Based IP Networks for Mission Critical Applications"

Date: October 19, 2005 (Wednesday)
Time: 2:15 – 5:15 pm
Location: Room 418

***Presented by*: Burt H. Liebowitz, Principal Engineer, The MITRE Corporation**

SUMMARY

Satellites provide a convenient way to create communication networks for hard-to-reach regions of the world. Satellites are particularly useful for military missions, in which Internet Protocols (IP) provide the basis for integrating voice, video and data into a single, cost-effective network. However there are issues. Satellite delay and bit errors can impact performance; there are choices regarding earth stations; satellite links must be integrated with terrestrial networks; space segment is expensive; security is a concern; quality of service must be provided. This three-hour tutorial will help participants understand the technology needed to resolve these issues.

WHO SHOULD ATTEND

Engineers and managers who wish to gain a better understanding of how to specify and deploy satellite-based, IP networks in mission-critical environments.

COURSE OUTLINE

Hybrid Satellite and Terrestrial networks

Overview of end to end networks incorporating satellites, wide area networks (WAN) such as the GIG, local area networks (LAN), and mobile networks. Introduction to:

- **Communication Satellite Technology:** LEOs, MEOs and GEOs. Converting bandwidth (Megahertz) to data channels (bits per second). Satellite coverage area, frequency bands, impact of rain.
- **Packet-Based Data Networking:** Seven-Layer Model (ISO). Layer 2 Networks such as Frame Relay, ATM, Aloha, Digital Video Broadcasting (DVB), and Ethernet.

The Internet and its Protocols

Higher layer networks using IP protocols. Routing between and within networks. Use of the Transmission Control Protocol (TCP) for reliable file transfer. Impact of bit errors and propagation delay on TCP-based applications. User Datagram Protocol (UDP) for IP multicasting, voice transmission (VOIP) and video streams. Introduction to Intranets, which are private networks that use IP protocols.

Satellite Data Networking Architectures

Ground station architectures for data networking. Shared outbound carriers incorporating Frame Relay, DVB. Dynamically shared return channels: SCPC DAMA, TDMA/DAMA. Full mesh network technology, impact of mobile terminals.
Quality of Service (QoS) Issues in Intranets
Definition of quality factors for streams and files. Performance of voice and video in IP networks. Methods for improving QoS in Intranets, including differentiated services, caching and TCP protocol enhancement. Security issues and their impact on QoS.

Examples of Mission-Critical Systems

A View of the Future

Next generation military and commercial satellites. Impact of on-board processing. What's ahead in low -cost ground station technology.

INSTRUCTOR

Burt H. Liebowitz is Principal Network Engineer at the MITRE Corporation, McLean, Virginia, specializing in the analysis of satellite services. He has more than 30 years experience in computer networking, the last seven of which have focused on Internet-over-satellite services. He was President of NetSat Express Inc., a leading provider of such services and before that was CTO for Loral Orion, responsible for Internet-over-satellite access products. Mr. Liebowitz has authored two books on distributed processing and numerous articles on computing and communications systems and has lectured extensively on satellite networking. He holds three patents for a satellite-based data networking systems. Mr. Liebowitz has B.E.E. and M.S. in Mathematics degrees from Rensselaer Polytechnic Institute, and an M.S.E.E. from Polytechnic Institute of Brooklyn.

Tutorial 15 (T15): "Introduction to Cognitive Information Fusion and Operational Situation Management"

Date: October 19, 2005 (Wednesday)
Time: 2:15 – 5:15 pm
Location: Room 416

***Presented by*: Dr. Gabriel Jakobson, Altusys Corporation**

Abstract

According to modern US defense doctrine, the future war is characterized by high mobility of troops and weapon systems, increasing operational tempo, and very often by unpredictable operational situations. As a result of that the military commanders require effective battlespace situation awareness. Further, they need battle management decision awareness, including the command options that they have in order to complete a mission in a particular situation.

As a rule, the management of battlespace operational situations often involves a large number of dynamic objects that change their states in time and space, and engage each other into fairly complex spatio-temporal relations. From the management viewpoint it is important to fuse information from multiple information sources, understand operational situations, recognize emerging trends and potential threats, and undertake actions that lead to predefined goal situations.

The focus of this tutorial is on methods of cognitive information fusion and operational situation awareness applied to the tasks of management of dynamic networks and systems. In recent years several important types of dynamic networks and systems have been introduced for industrial and defense applications, including mobile ad hoc networks, wireless sensor networks; mobile emergency, rescue, and disaster relief networks; and defense battlefield networks. Important new factors are associated with the modeling and operational support of those networks, including high mobility of the nodes, often low-granularity of nodes and large-scale distribution of them, unpredictable changes in the system topology, changes in the functional role and authority of the nodes, and increased sophistication in interaction between the nodes.

Modeling and management of the dynamic systems mentioned above requires significant advancement in the methods widely used for traditional telecommunication and enterprise networks. This tutorial gives a brief overview of the type of the dynamic networks and systems, their management requirements, and presents the technological solutions to support cognitive information fusion and operational situation awareness. This is an introductory tutorial, however several novel management models and technological solutions will be described in sufficient depth to lead the students to practical engineering methods and tools.

The first section of the tutorial gives introductory notions of cognitive information fusion and operational situation management. The second section illustrates the dynamic systems and their real-time operations management discussing traditional telecom and enterprise networks, mobile ad hoc networks, wireless sensor networks, and defense tactical networks. The third section introduces the basic elements of the formal framework of events, situations, situation awareness, decision awareness and ontology for situation management. The fourth section gives examples of situation awareness, including battlespace situation awareness and threat analysis, network surveillance and fault management, and enterprise intrusion detection. The fifth section describes the core technologies of building situation aware systems, including cognitive information fusion, real-time event correlation, case-based reasoning, ontology-based situation management, and system topology modeling. The sixth section presents the architecture and design of situation management systems based on distributed agents. The last two sections discuss some advanced topics of situation management and outline future research and development directions.

Instructor's Biography

Dr. Gabriel Jakobson is the Chief Scientist at Altusys Corp., a consulting firm in advanced IT technologies for telecommunication, enterprise network, homeland security, and defense applications. During his more than 20 years tenure at Verizon (formerly GTE) he had increasing responsibilities of leading advanced information technology and telecommunication network operations support programs. Prior to that he was Senior

Research Scientist at the Institute of Cybernetics, Tallinn, Estonia, and Professor of Computer Science at Tallinn Technical University, Estonia.

Dr. Jakobson has authored or co-authored more than 70 technical publications and has awarded 2 US patents on innovative real-time event correlation methods. He has given invited presentations in different organizations like Bell Laboratories, Royal Technical University, Stockholm, Sweden; NRC, NOKIA, Tampere, Finland; Italian Telecom Laboratory, Turin, Italy.

He received his BS and MS degrees in Electrical Engineering from the Tallinn Technical University, Estonia, and Ph.D. in Computer Science from the Institute of Cybernetics, Estonia. As IEEE Senior Member Dr Jakobson has served in the organizing committees of numerous US and international conferences. He is the co-chair of the workshop SIMA 2005 on situation management to be held in-conjunction with MILCOM 2005, General Chair of EntNet @ SUPERCOMM 2005, and chair of the panel on Semantic Models of Cognitive Information Fusion and Situation Management at KIMAS 2005.