

*Management of Integrated End-to-end Communications and
Services*

2006 IEEE/IFIP Network Operations & Management Symposium



Advance Program



NOMS 2006

<http://www.noms2006.org>

**April 3-7, 2006
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Vancouver, Canada**

Sponsored by IEEE Communications Society and IFIP WG 6.6

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Message from the General Chair



You are cordially invited to join us at the 10th IEEE/IFIP International Symposium on Network Operations and Management (NOMS 2006), sponsored by the IEEE Communications Society and IFIP Working Group 6.6, and enjoy the premier conference in our profession. The evolution of a worldwide information infrastructure based on the Internet is leading to federated systems with multiple domains of authority, decentralized control, integrated voice, data and video services, and the convergence of fixed and mobile networks. In this context, the requirements for maintaining end-to-end performance, reliability, and security necessitate new management paradigms. The symposium theme, "*Management of Integrated End-to-end Communications and Services*", tries to capture some of these trends, emphasizing on one hand that management must encompass not only the underlying communications infrastructure but the services and business functions as well, and on the other hand that management must be effective end-to-end in a multi-service, multi-domain and multi-technology environment. NOMS 2006 will give you opportunities found nowhere else to discuss, exchange, and share ideas with professionals from various fields and regions in the world in this politically, economically and technologically challenging environment.

The five days of NOMS 2006 in Vancouver, Canada feature an outstanding program and an exciting venue. With top-level keynote speakers and distinguished experts, NOMS 2006 offers keynote sessions with visionary speeches, insights and suggestions, as well as panel sessions that identify and clarify technological trends. The technical program consists of 53 papers that are distributed over 14 technical sessions. The papers in this collection present a comprehensive view of the current state of management technology, emerging issues and directions for future work. In addition there are two extensive poster sessions including 61 presentations that provide the opportunity for interactive discussions between authors and attendees. Five application sessions will also be included that focus on practical research, development, and experiences with management solutions. Rounding out the NOMS experience will be eight tutorials by subject matter experts, and five workshops that address specific major areas of current interest.

Vancouver, the largest metropolitan centre in western Canada and third largest in the country, the host City of the 2010 Olympic Winter Games, the 2006 United Nations World Urban Forum, the 2007 Memorial Cup, and some games for the 2007 FIFA U20 World Cup, certainly has plenty to offer the visitor. Vancouver is home to one of North America's largest urban parks and has easy access to the Pacific Ocean and the mountains of the Pacific Coast Range. The breathtaking views of the city and its environment have made it renowned for its beauty.

Come join us at NOMS 2006 for an extraordinary experience and enjoy Vancouver's world-class ski resorts, numerous beaches, parks, waterfronts, mountain backdrops, and Vancouver's cultural and multi-ethnic character.

A stylized handwritten signature in black ink, appearing to read 'Raouf'.

Raouf Boutaba

NOMS 2006 General Chair

Message from the Technical Program Co-Chairs



Welcome to the 2006 edition of the IEEE/IFIP Network Operations and Management Symposium (NOMS 2006)! Today's IT environments are multi-service and multi-domain with heterogeneous technologies, service offerings, management strategies, and business models. Thus, NOMS 2006 focuses on integrated management that encompasses provisioning, operations, and maintenance. This broad scope also calls for an integrated approach to dependability, resilience, Quality-of-Service (QoS), mobility management, and service billing. Accordingly, this year the theme of the symposium is "Management of Integrated End-to-end Communications and Services".

There is much interest in this theme, as evidenced by the large number and high quality of the papers submitted. NOMS 2006 received a total of 186 submissions from 38 countries. Of these, the Technical Program Committee (TPC) accepted 53 papers for 14 technical sessions, which corresponds to an acceptance rate of 28.5%. Each paper was reviewed by a minimum of three TPC members or their delegates. The papers and reviews were discussed at last October's TPC meeting in Barcelona, Spain, where the final paper selection took place.

The result of this process is an exceptional technical program consisting of 14 sessions in 2 tracks that present the latest research results on topics in the areas of: charging and accounting, measurements and QoS, information extraction and visualization, traffic engineering and optimization, wireless and mobility management, reliability and robust management, security management, business integrated management, server provisioning, overlay management, policy management, application management and self-management, middleware management, and performance management. The technical program is complemented by a third track consisting of five panel sessions that provide a broad forum for attendee participation, and five application sessions that focus on practical lessons learned by the user and vendor communities. In addition to these tracks, there is an impressive selection of technical posters, tutorials, keynotes, and workshops on emerging topics in management.

We want to thank the many people without whose active help the symposium would not have been possible – the authors of submitted manuscripts, the highly experienced and lively TPC and many additional reviewers, our fellow members of the Organizing Committee, the chairs for panels, posters, application sessions, tutorials, keynotes, and the session chairs who ensured that accepted papers addressed the concerns that were raised during the reviews. Finally, thanks to the publication co-chairs who did a tremendous job in preparing the proceedings and handling innumerable publication-related issues.

We are confident that you will find NOMS 2006 both exciting and stimulating. Once again, welcome to NOMS 2006!

Joseph L. Hellerstein and Burkhard Stiller

NOMS 2006 TPC Co-chairs



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Keynotes

Tuesday, Keynote 1: Henning Schulzrinne ([Columbia University](#))

Professor and Chair in the [Dept. of Computer Science](#); also with the [Dept. of Electrical Engineering at Columbia University](#) ([Contact Info](#))



Prof. Henning Schulzrinne received his undergraduate degree in economics and electrical engineering from the Darmstadt University of Technology, Germany, his MSEE degree as a Fulbright scholar from the University of Cincinnati, Ohio and his Ph.D. degree from the University of Massachusetts in Amherst, Massachusetts. He was a member of technical staff at AT&T Bell Laboratories, Murray Hill and an associate department head at GMD-Fokus (Berlin), before joining the Computer Science and Electrical Engineering departments at Columbia University, New York. He is currently chair of the Department of Computer Science.

He is a division editor of the "Journal of Communications and Networks", and an editor of the "IEEE/ACM Transactions on Networking" and the "Surveys & Tutorials" and former editor of the "IEEE Internet Computing Magazine" and "IEEE Transactions on Image Processing". He has been a member of the Board of Governors of the IEEE Communications Society and the ACM SIGCOMM Executive Committee, former chair of the IEEE

Communications Society Technical Committees on Computer Communications and the Internet and has been technical program chair of Global Internet, Infocom, NOSSDAV and IPtel and is General Chair of ACM Multimedia 2004. He also was a member of the IAB (Internet Architecture Board).

Protocols co-developed by him are now Internet standards, used by almost all Internet telephony and multimedia applications. His research interests include Internet multimedia systems, quality of service, and performance evaluation.

He serves as Chief Scientist for SIPquest Inc. and as former Chief Scientific Advisor for Ubiquity Software Corporation. He is a Fellow of the IEEE, has received the New York City Mayor's Award for Excellence in Science and Technology, the VON Pioneer Award.

Tuesday, Keynote 2: Chuck Kalmanek ([AT&T](#))

Vice President of Internet and Network Systems Research in [AT&T Labs](#)



Charles R. Kalmanek is Vice President of Internet and Network Systems Research in AT&T Labs. In this role, Chuck is responsible for AT&T's research program in IP network and performance management; optical transmission and networking; wireless systems and alternative access technologies; network information mining; and innovative IP-based services. Research areas in Chuck's lab include IP traffic monitoring and analysis, network survivability tools, IP control plane monitoring, wireless access technologies, emerging VoIP and VPN technologies, and photonic networking.

Chuck joined AT&T Bell Labs in 1980 -- he has extensive experience in network architecture, protocols and distributed systems. Chuck's research background spans IP network management, access network architectures,

wireless networks, voice over IP, multimedia streaming, content distribution networks, storage networks, as well as packet switch and host interface design.

Chuck received his undergraduate degree from Cornell University, and M.S. degrees in Electrical Engineering and Computer Science from Columbia University and New York University respectively. Chuck is a recipient of AT&T's Strategic Patent and Strategic Standards Awards.

Wednesday, Keynote 1: Clifford B. Meltzer ([Cisco Systems](#))

Senior Vice President, Network Management Technology Group, [Cisco Systems, Inc.](#)



Cliff Meltzer returned to Cisco Systems in October 2003 to lead the Network Management Technology Group. He provides guidance, business strategy, and product development strategy for all of Cisco's Network Management products.

Cliff became CEO and President of Digital Fountain in December 1999, bringing with him a broad range of technical and business experience in the networking, computing, and software industries.

In 1999, Cliff was an Entrepreneur in Residence at Redpoint Ventures in Menlo Park. Prior to that, Cliff spent seven years at Cisco Systems, Inc. At Cisco, Cliff was Senior Vice President of the IOS Technologies Division, where he had overall responsibility for guiding the strategy and the development of software across the company. His previous executive positions at Cisco were Vice President and General Manager of the

Internet Service Provider Business Unit and Vice President and General Manager of the InterWorks Business Unit, where he guided the company's strategy and product development in the SNA migration market space.

Before joining Cisco, Cliff spent 16 years with IBM; the last 10 years of that stint were at IBM's T.J. Watson Research Center, Yorktown Heights, New York, where he did research and product development on high-performance mainframe internetworking.

During his first two years of college, Cliff attended The Julliard School of Music, where he studied classical piano. He subsequently transferred to the University of Rochester, from which he holds a B.A. degree in mathematics and an M.S. degree in computer science.

Wednesday, Keynote 2: Craig Farrell ([Micromuse](#))

Chief Technology Officer, Micromuse



Dr. Craig Farrell joined Micromuse as Chief Technology Officer effective August 20, 2003. Prior to this, he served as CEO, President, and Chief Technology Officer of NETWORK HARMONi (formerly NDG Software). NETWORK HARMONi evolved from NDG Software, a software utility company that Craig helped to found. Prior to forming NDG Software, he was on the faculty of the Department of Computer Science at Curtin University in Perth, Australia, and was also an adjunct fellow at the Australian Telecommunications Research Institute (ATRI). His research interests have included computer communications, network management and operating systems. Craig currently has several patents pending and his other publications include Internet RFCs and numerous journal and conference papers. From 1985 to 1989 he worked for AT&T as a systems engineer

responsible for Unix systems development and support in the Asia Pacific Region. He holds a BSc (Hons) in Computer Science from the University of Western Australia and a Ph.D. Computer Science from Curtin University.

Thursday, Keynote 1: Adam Drobot ([Telcordia Technologies](#))

President - Applied Research/Government & Public Sector, Telcordia Technologies, One Telcordia Drive, Piscataway, NJ 08854, Tel. 732 699-3133



Cornell University, Ithaca, NY, B.S. 1968 (Engineering Physics)

University of Texas, Austin, TX, PhD. 1975, (Plasma Physics)

As president of Telcordia's Government & Public Sector Business Unit and Applied Research Dr. Drobot is responsible for planning and implementing Systems Engineering solutions that are applicable to Federal, State and Local government problems. These solutions span telecommunications and IT areas, including networking and operations for traditional as well as evolving IP and converged general purpose and mission-specific networks. Areas of expertise include Security and Information Assurance as well as Business Process Outsourcing. Formed in mid-2005, the GPS unit is the single focal point that concentrates all Telcordia resources

to accelerate Telcordia's growth in the government space.

Dr. Drobot also serves as head of Telcordia's Applied Research group. Applied Research consists of over 250 researchers involved in many aspects of Internet, broadband and information networking, and software technologies. Telcordia Applied Research is renowned for its research and development which led to: ADSL, AIN, ATM, ISDN, Frame Relay, PCS, SMDS, SONET, video-on-demand, and Internet telephony.

Prior to Telcordia, Dr. Drobot managed the Advanced Technology Group at Science Applications International Corporation, a \$7B Fortune 250 firm. He also served as the Senior Vice President for Science and Technology in his 26 years at SAIC.

Dr. Drobot's main research interest is the development of multidisciplinary, computationally-based tools for life cycle support of complex products. He has been the principal or key participant in the development of several large, scientific code systems, including MASK, ARGUS, and DRAG-AF. He has also published over 100 journal articles, is a frequent contributor to the literature and conference presentations and holds twelve patents. Dr. Drobot is a member of the American Physical Society, the American Institute of Aeronautics and Astronautics, the American Association for the Advancement of Science, Sigma Phi Sigma, and Phi Kappa Phi.

Thursday, Keynote 2: Randy H. Katz ([University of California at Berkeley](#))

Professor Randy H. Katz, Electrical Engineering and Computer Science Department, University of California, Berkeley



Randy Howard Katz received his undergraduate degree from Cornell University, and his M.S. and Ph.D. degrees from the University of California, Berkeley. He joined the Berkeley faculty in 1983, where since 1996 he has been the United Microelectronics Corporation Distinguished Professor in Electrical Engineering and Computer Science. He is a Fellow of the ACM and the IEEE, and a member of the National Academy of Engineering and the American Academy of Arts and Sciences. He has published over 250 refereed technical papers, book chapters, and books. He has supervised 43 M.S. theses and 31 Ph.D. dissertations. His recognitions include thirteen best paper awards, three best presentation awards, the Outstanding Alumni Award of the Computer Science Division, the CRA Outstanding Service Award, the Berkeley Distinguished Teaching Award, the Air Force Exceptional Civilian Service Decoration, the IEEE Reynolds Johnson Information Storage Award, the ASEE Frederic E. Terman Award, and the ACM Karl V. Karlstrom

Outstanding Educator Award. In the late 1980s, with colleagues at Berkeley, he developed Redundant Arrays of Inexpensive Disks (RAID), a \$15 billion per year industry sector. While on leave for government service in 1993-1994, he established whitehouse.gov and connected the White House to the Internet. His current research interests are Reliable, Adaptive Distributed Systems supported by new services deployed inside the network.

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Our disciplines are varied, including computer science, mathematics, chemistry, psychology, biology, physics, and many others. We welcome an environment of intellectual and cultural diversity. <http://www.research.ibm.com/>



NOMS 2006 Program at a Glance

Monday, 3 April 2006

08:30 - 12:00	Workshop 1 (Meeting Room 11) End-to-end monitoring techniques and services (E2EMON)	Workshop 2 (Meeting Room 13) Feedback Control Implementation and Design in Computing Systems and Networks (FeBID)	Workshop 3 (Meeting Room 14) VoIP Management and Security (VoIP MaSe)	Tutorial 1 (Meeting Room 7) Theory and Practice of Configuration Management in decentralized Systems <i>M. Burgess</i>	Tutorial 2 (Meeting Room 6) Network Security Policies: Verification, Optimization and Testing <i>E. Al-Shaer</i>
12:00 - 13:30	LUNCH (Ballroom A)				
13:30 - 17:00	Workshop 1 (Meeting Room 11) End-to-end monitoring techniques and services (E2EMON)	Workshop 2 (Meeting Room 13) Feedback Control Implementation and Design in Computing Systems and Networks (FeBID)	Workshop 3 (Meeting Room 14) VoIP Management and Security (VoIP MaSe)	Tutorial 3 (Meeting Room 7) Managing IT Resources using Web Services: A Tutorial on the Web Services Distributed Management Standard from the Ground up <i>H. Kreger</i>	Tutorial 4 (Meeting Room 6) Beyond Device Management: Route Analytics for Management of Dynamic Routing in IP Networks <i>C. Alaettinoglu</i>
19:00 - 21:00	WELCOME RECEPTION (Meeting Room 1)				

Tuesday, 4 April 2006

08:30 - 10:15	WELCOME ADDRESS & KEYNOTE 1: Henning Schulzrinne (Columbia University) : Managing the New Internet & KEYNOTE 2: Chuck Kalmanek (AT&T) : Unlocking Systems and Data: The Key to Network Management Innovation (Meeting Room 1)			Exhibitions
10:15 - 10:30	BREAK (Foyer - South)			
10:30 - 12:10	TS1 (Meeting Room 2): Charging and Accounting	TS2 (Meeting Room 3): Business Integrated Management	AppSess 1 (Meeting Room 1): Business Cases & Standards	
12:10 - 13:30	LUNCH (Ballroom A)			
13:30 - 15:10	TS3 (Meeting Room 2): Measurements and QoS	TS4 (Meeting Room 3): Server Provisioning	PS1 (Meeting Room 1): Where is SOA taking us in OSS design? (Dave Milham)	
15:10 - 15:40	BREAK (Foyer - South)			
15:40 - 17:20	TS5 (Meeting Room 2): Information Extraction and Visualization	TS6 (Meeting Room 3): Overlay Management	AppSess 2 (Meeting Room 1): NGOSS, OSS, P2P, and QoS	
17:20 - 18:30	POSTER SESSION 1 (Foyer - South)			
19:00 - 22:00	Optional Social Event			

Note: TS - Technical Session, AppSess - Application Session, PS - Panel Session

Wednesday, 5 April 2006

08:45 - 10:15	KEYNOTE 1: Clifford B. Meltzer (Cisco Systems) : Managing the Intelligent Network & KEYNOTE 2: Craig Farrell (Micromuse) : The Converging Worlds of Network Management and Security Information Management (Meeting Room 1)		
10:15 - 10:30	BREAK (Foyer - South)		
10:30 - 12:10	TS7 (Meeting Room 2): Traffic Engineering and Optimization	TS8 (Meeting Room 3): Policy Management	PS2 (Meeting Room 1): Self-Management: Separating facts from fiction (Rolf Stadler)
12:10 - 13:30	LUNCH (Ballroom A)		
13:30 - 15:10	TS9 (Meeting Room 2): Wireless and Mobility Management	TS10 (Meeting Room 3): Application Management and Self-management	AppSess 3 (Meeting Room 1): Mobility and Wireless
15:10 - 15:40	BREAK (Foyer - South)		
15:40 - 17:20	TS11 (Meeting Room 2): Reliability and Robust Management	TS12 (Meeting Room 3): Middleware Management	PS3 (Meeting Room 1): Direction of Open Source for OSS implementation (Alpna Doshi)
17:20 - 18:30	POSTER SESSION 2 (Foyer - South)		
19:00 - 21:30	SYMPOSIUM BANQUET (Ballroom A)		

Exhibitions

Thursday, 6 April 2006

08:45 - 10:15	KEYNOTE 1: Adam Drobot (Telcordia Technologies) : Total Lifecycle Management of Converged Communications and Services & KEYNOTE 2: Randy H. Katz (University of California at Berkeley) : Quality of Service versus Any Service at All (Meeting Room 1)		
10:15 - 10:30	BREAK (Foyer - South)		
10:30 - 12:10	TS13 (Meeting Room 2): Security Management	AppSess 4 (Meeting Room 3): Policy, Design, and Web-Based Management	PS4 (Meeting Room 1) : Management Metrics - How do we know that Management is working? (Alexander Keller)
12:10 - 13:30	LUNCH (Ballroom A)		
13:30 - 15:10	TS14 (Meeting Room 2): Performance Management	AppSess 5 (Meeting Room 3): Grids and Performance	PS5 (Meeting Room 1) : Does the world still need generic management protocols? (Mark Ammar Rayes)
15:10 - 15:40	BREAK (Foyer - South)		
15:40 - 17:40	Distinguished Experts Panel : VoIP management - Does the emperor have any clothes on Plenary and Closing Remarks (Meeting Room 1)		

Exhibitions

Friday, 7 April 2006

08:30 - 12:00	Workshop 4 (Meeting Room 13) Business Driven IT Management (BDIM)	Workshop 5 (Meeting Room 11) Broadband Convergence Networks (BcN)	Tutorial 5 (Meeting Room 6) Efficient Network and Traffic Monitoring <i>D. Raz</i>	Tutorial 6 (Meeting Room 7) Autonomic Systems and Networks -Theory and Practice <i>J. Strassner, J. Kephart</i>
12:00 - 13:30	LUNCH (Ballroom A)			
13:30 - 17:00	Workshop 4 (Meeting Room 13) Business Driven IT Management (BDIM)	Workshop 5 (Meeting Room 11) Broadband Convergence Networks (BcN)	Tutorial 7 (Meeting Room 7) Traffic Engineering and QoS Management for IP-based NGNs <i>G. Pavlou</i>	Tutorial 8 (Meeting Room 6) Introduction to NGN Functional Architecture <i>N. Morita</i>

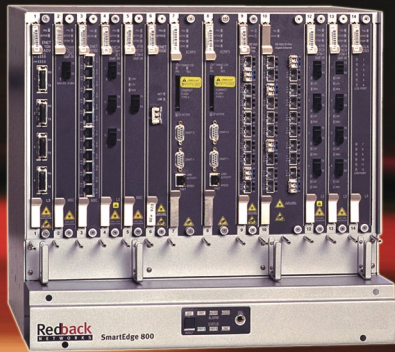
Note: TS - Technical Session, AppSess - Application Session, PS - Panel Session

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Tutorials

Tutorial 1: Theory and Practice of Configuration Management in decentralized Systems

Prof. Mark Burgess, University College Oslo, Oslo, Norway

Abstract

What is configuration management? Often at NOMS we think only of network management - i.e. the management of network devices like routers and switches. Host management, on the other hand, has been studied more in the Unix community. Increasingly we are seeing these two worlds converge, as network devices run embedded GNU/Linux or Free BSD operating systems. So what are the differences? One difference is the file abstraction - host operating systems have files and databases that contain configuration data. What are the technologies for managing these? Should they be centralized?

Autonomy is a central concept in modern computing technology. Increasingly computers are being managed by their owners rather than by centralized authorities. In the early 1990's the author developed the automation system cfengine for configuring and maintaining Unix-like operating systems, based on an arbitrary model of either centralized or decentralized control. It was based on the idea of voluntary cooperation - a topic which is now centre stage in autonomic and pervasive computing. cfengine was conceived to be able to run on any device, no matter how large or small. Moreover, it started a field of research into configuration management at the USENIX configuration management workshops and was the proof-of-principle for several key results. Today cfengine is used on an estimated million computers around the world, both in large and small companies.

Cfengine is a tool for setting up and maintaining a configuration across a network of hosts. It embodies a very high level declarative language, much higher-level than scripting languages, together with an autonomous, smart agent and machine-learning monitors. The idea behind cfengine is to create a single "policy" or configuration specification that describes the setup of as many or as few hosts in a network, without sacrificing their autonomy. Cfengine runs on each host and makes sure that it is in a policy-conformant state; if necessary, any deviations from policy rules are fixed automatically. Unlike tools such as rdist, cfengine does not require hosts to open themselves to any central authority, nor to subscribe to a fixed image of files. It is a modern tool, supporting state-of-the-art encryption and IPv6 transport, that can handle distribution and customization of system resources in huge networks (tens of thousands of hosts).

Who should attend?

Network and System administrators with a minimal knowledge of a scripting language, who wish to understand and perhaps start using cfengine to automate the maintenance and security of their systems. UNIX administrators will be most at home in this tutorial, but cfengine can also be used on Windows 2000 and above. Network administrators who are interested in the principles of configuration management, beyond SNMP, will find a frank discussion about the future of the subject and will have the opportunity to participate in the design of cfengine 3 - the next generation of host-device management.

Outline

The tutorial focuses on the general principles of configuration management and uses cfengine as an example which integrates the state of the art research. The list of topics follows the following plan:

- What is configuration management?
- What is a policy?
- States and data models
- Patterns and anomalies - configuration or behaviour issues
- The Chomsky hierarchy of languages
- The basic principles of configuration management and cfengine
- Autonomy or centralization?
- Syntax and Semantics - is XML important?
- The components of cfengine and how they are used
- What does a host policy look like?
- Promise theory as a modelling tool
- The basic cfengine operations and semantics
- Convergence
- Editfiles - an example sub-language
- The overlapping-set model for classes
- Operator ordering: When does it matter?
- What kind of network models can we use?
- Trust and security model
- Peer model utilities
- Host monitoring and integrating feedback
- cfenvd and cyclic time
- Interfacing to tcpdump
- Understanding cfenvgraph output
- Future developments and discussion

We end with a discussion of where cfengine is going, and how it can be extended to encompass configuration management, integrating switches and routers with host configuration in data centres.

Biography of the Instructor

Mark Burgess is Professor of Network and System Administration at Oslo University College, Norway. He is the author of the configuration management system cfengine and of several books and many papers on the topic. Professor Burgess is a frequent, popular speaker at conferences on system administration.

Tutorial 2: Network Security Policies: Verification, Optimization and Testing

Prof. Ehab Al-Shaer, DePaul University, Chicago, IL, USA

Abstract

The importance of network security has been significantly increasing in the past few years. However, the increasing complexity of managing security policies particularly in enterprise networks poses real challenge for efficient security solutions. Network security perimeters such as Firewalls, IPSec gateways, Intrusion Detection and Prevention Systems operate based on locally configured policies. Yet these policies are not necessarily autonomous and might interact between each other to construct a global network security policy. Due to manual, distributed and uncoordinated configuration of security policies, rules conflicts and policy inconsistency are created, causing serious network security vulnerabilities. In addition, enterprise networks continuously grow in size and complexity, which makes policy modification, inspection and evaluation nightmare. Addressing these issues is a key requirement for obtaining provable security and seamless policy configuration. In addition, with growth in network speed and size, the need to optimize the security policy to cope with the traffic rate and attacks is significantly increasing. The constant evolution of policy syntax and semantics make the functional testing of these devices for vulnerability penetration is a difficult task.

This tutorial is divided into three parts. In the first part, we will present techniques to automatically verify and correct firewall and IPSec/VPN policies in large-scale enterprise networks. In the second part, we will discuss techniques to enhance and optimize the policy structure and rule ordering in order to reduce packet matching and improve significantly firewall and IPSec performance. In the third part, we will present techniques that can be used by users, service provider as well as vendors to test their security devices efficiently and accurately.

Outline

Devastating attacks overview
Overview of firewall and IPSec operation and architectures

1. Security Policy Verification
 - a. Classification of intra- and inter-policy conflicts in firewalls
 - b. Classification of intra- and inter-policy conflicts in IPSec
 - c. Policy modeling and verification using formal methods
 - d. Conflicts discovery and resolution security policy conflicts
 - e. Automated policy management: editing, distribution, optimization
 - f. Policy management of multi-vendor security solution
 - g. Policy translation: from high-to-low level and vice versa
2. Security Policy Optimization
 - a. Performance problems with security policies
 - b. Overview of algorithmic-based optimization techniques
 - c. Overview of statistical-based optimization techniques
 - d. Autonomic optimization of security policies
 - e. Evaluation
3. Security Policy Testing
 - a. Policy evaluation
 - b. Exhaustive vs. Random testing
 - c. Intelligent testing
 - d. Benchmarking

Who should attend?

This tutorial will discuss timely and important issues in academic as well industrial research. Students, academic researchers, industrial researchers and developers, security system architects and practitioners are all target audience for this tutorial and they will directly benefit from attending this tutorial.

Biography of the Instructor

Ehab Al-Shaer is an Associate Professor and the Director of the Multimedia Networking Research Lab (MNLAB) in the School of Computer Science, Telecommunications and Information System at DePaul University. His primary research areas are Network Security, Internet monitoring, and multimedia networks.

Prof. Al Shaer published many refereed journal and conference publications. He also was a Co-Editor of number of books in Management of Multimedia on the Internet and End-to-End Monitoring. Prof. Al-Shaer was Guest Editor for number of journals. He also served as conference Chair, TPC Co-chair, invited speaker, panelist, tutorial presenter and TPC member in many IEEE and ACM conferences including INFOCOM, ICNP, IM/NOMS, ICDCS, CCNC, MMNS and E2EMON. He was invited speaker in many academic and industrial panel in the area of network security policy management. His current research is funded by NSF and Cisco systems, Intel and Sun Microsystems.

Tutorial 3: Managing IT Resources using Web Services: A Tutorial on the Web Services Distributed Management Standard from the Ground up

Ms. Heather M. Kreger, Senior Technical Staff Member, IBM Corporation, Research Triangle Park, NC, USA

Abstract

The industry has been wrestling with the complexity of managing business systems for years. The challenge stems from the variety of application and IT resource providers that enterprises use to build their business systems. A range of management systems co-exist to manage the breadth of resources.

The management industry and customers have an opportunity to take advantage of the industry trend towards using Web services for business integration and moving to Service oriented architectures for business. It is now possible to garner these same advantages seen in business for management. Building manageable resources and management systems on a Web services foundation is going to cause a profound shift in how enterprises and vendors manage their IT resources in the future. Embracing this shift is going to create more flexible IT infrastructures, better integration of business and IT objectives, and greater end to end management of both IT infrastructures and business processes.

This presentation provides a bottoms-up tutorial of Web Services Distributed Management (WSDM), the new OASIS Standard that provides the first step in solving this classic management integration problem. The session will begin with an overview of the Management Roadmap architecture and WSDM's place in that architecture relative to other industry standards and initiatives. The technical tutorial will begin with an introduction on WSDL and WS-Addressing, specifications on which WSDM depends. The presenters will build on this with an overview of the Web Services for Resource Framework (WSRF) and Web Services Notification (WSN) OASIS specifications and discuss how they are used by WSDM. Finally, the session will explore WSDM components, Management Using WS (MUWS) and WSDM Management Of Web Services (MOWS). MUWS defines how to represent and access the manageability interfaces of any IT resource as Web services. MOWS defines how to manage Web Services as resources and how to describe and access that manageability using MUWS. Concrete customer issues solved by WSDM will also be highlighted as well as how CIM modeled resources can be accessed using WSDM.

Biography of the Instructor

Heather Kreger is the IBM lead architect for Web Services and Management in the Emerging Technologies area. She is currently co-lead of the OASIS Web Services Distributed Management Technical Committee, member of several related DMTF Work Groups, as well as IBM's representative to the W3C Web Services Architecture Working Group. Heather was co-lead of JSR109 that specifies web services deployment in

Outline

1. Introduction to WSDM
2. Positioning in the Industry: The Web Services Management Roadmap
3. Foundation Specifications:
 - a. XML, SOAP, and WSDL
 - b. WS-Addressing
 - c. WS-Resource Framework
 - d. WS-Notification
4. WSDM Management Using Web Services
 - a. Manageability Capabilities
5. Standard (Identity, Description, Correllatable Properties, Metrics, Configuration, Operational Status, State)
 - a. Custom
 - b. Relationship
 - c. Event Format (WEF)
 - d. Resource Discovery
 - e. Creating the Manageable Resource example
 - f. Using the Manageable Resource example
6. WSDM Management Of Web Services
 - a. Application of standard capabilities
 - b. Custom capabilities for Web services
 - c. Message status tracking
 - d. A manageable Web service example
7. Outlook
8. Summary

Who should attend?

This session will appeal to attendees who are programmers using Web services involved in making those systems manageable, systems administrators, company strategists and architects who are responsible for managing disparate systems in geographically diverse corporations. This session does assume that the attendees have working knowledge of XML, WSDL and Web Services concepts.

J2EE environments and a contributor to the Java Management Extensions (JMX) specification, Heather is also the author of: numerous articles on Web services and management in the IBM Systems Journal, Communications of ACM, Web Services Journal; public technical work includes the "Web Services Conceptual Architecture", "WS-Manageability"; and her own book "Java and JMX, Building Manageable Systems".

Tutorial 4: Beyond Device Management: Route Analytics for Management of Dynamic Routing in IP Networks

Dr. Cengiz Alaettinoglu, Fellow, Packet Design, Inc., Palo Alto, CA, USA

Abstract

Network management has traditionally been carried out using SNMP polling, in some cases augmented by codebook-based correlation. But periodic polling falls far short of capturing the complex and dynamic layer 3 operations of IP networks. In particular, the routing dynamics of IP networks often lead to unpredictable and intermittent behaviors that leave network managers unable to explain what happened or why.

This tutorial introduces an emerging technology called route analytics, which addresses the most difficult management problems in IP networks. Specifically, the tutorial will demonstrate how route analytics can be used to manage routing protocols and the dynamic IP network topology to increase service predictability and availability.

Who should attend?

Attendees should have a solid understanding of IP networking and routing, including routing protocol functionality. This session will be particularly useful for those who have experience in managing IP routing in a large network.

Biography of the Instructor

Cengiz Alaettinoglu is a fellow at Packet Design, Inc. Currently he is working on scaling and convergence properties of both inter-domain and intra-domain routing protocols. He was previously at the USC Information Sciences Institute, where he worked on the Routing Arbiter project. He co-chaired the IETF Routing Policy System Working Group to define the Routing Policy Specification Language and the protocols to enable a distributed, secure routing policy system. Alaettinoglu received a B.S. degree in computer engineering in 1988 from the Middle East Technical University, Ankara, Turkey; and M.S. and Ph.D. degrees in computer science in 1991 and 1994 from the University of Maryland at College Park. He was a Research Assistant Professor at the University of Southern California, where he taught graduate and undergraduate classes on operating systems and networking from 1994 to 2000. He has given numerous talks at NANOG, IETF, RIPE and APNIC meetings, as well as at ACM and IEEE conferences and workshops.

Outline

1. Why network-layer management is needed in IP networks
 - a. IP's "cloud" architecture provides resiliency but not visibility and predictability
 - b. IP networks are highly dynamic; problems leave no audit trail
 - c. Traditional layer 2 management is device-oriented, has no knowledge of routes, cannot detect such layer 3 problems as route flaps, router misconfigurations
2. How route analytics works: managing logical vs. physical elements
 - a. Separation of routing control plane from data forwarding path
 - b. Listening to and participating in routing protocol exchanges (passive peering)
 - c. Computing a real-time, network-wide routing map
 - d. Monitoring/displaying routing topology changes as they happen
 - e. Correlating routing events with other information (e.g., performance data) to reveal underlying causes and effects
 - f. Recording and analyzing historical routing events and trends
 - g. Simulating "what-if" scenarios for network planning
3. Route analytics for Interior Gateway Protocols
 - a. Link-state protocols: OSPF, IS-IS
 - Diagnosing historical problems
 - Metric modeling on as-built networks without touching the "live" network
 - b. Distance-vector protocol: Cisco EIGRP
 - Preventing and resolving stuck-in-active issues on EIGRP routers
4. Route analytics for the BGP protocol
 - a. BGP management challenges
 - Most "chatty" of all protocols, BGP can produce millions of routing events after a peering loss
 - b. BGP root-cause analysis
 - BGP RIB (routing information base) visualization
 - Dynamic real-time analysis of millions of BGP events
5. Route analytics for MPLS VPNs
 - a. Layer 3 MPLS VPN management challenges
 - Ensuring reachability, privacy when supporting overlapping private customer address spaces
 - Maintaining up-to-date VPN routing information
 - Optimizing backbone and edge router resources
 - b. New technology based on IETF RFC 2547bis standard provides VPN infrastructure visibility
 - VPNs are overlaid on layer 3 topology map
 - VPNs viewable on customer-by-customer basis
 - ISPs can monitor connectivity, audit security, ensure SLA compliance for individual VPNs
6. Practical examples of route analytics in enterprise, educational and service provider networks
7. Q&A

Tutorial 5: Efficient Network and Traffic Monitoring

Prof. Danny Raz, The Technion, Haifa, Israel

Abstract

Offering reliable novel services in modern heterogeneous networks is a key challenge and the main prospective income source for many network operators and providers. Providing reliable future services in a cost effective scalable manner requires efficient use of networking and computation resources. This can be done by making the network more self-enabled, i.e. making it capable of making distributed local decisions regarding the utilization of the available resource. However, such decisions must be correlated in order to achieve a global overall goal (maximum utilization or maximum profit, for example).

A key building block for all such systems is the ability to monitor the network parameters and the relevant traffic, and to infer from these measurements the relevant information needed in each one of the local decision points. Due to the heterogenous nature of modern networks and to the very high amount of traffic, even monitoring a local location introduces significant difficulties. It is much more challenging to decide what type of traffic or network information should be collected at each network segment in order to acquire the needed global information without investing too much effort in the monitoring process or its management. In fact, efficient network and traffic monitoring may become a very significant ingredient in the ability to provide modern network services in a cost effective way.

This Tutorial deals with practical and efficient techniques to retrieve information from modern network devices. We start by examining the SNMP suit and the various methods to collect information from possibly large MIB tables. Then we develop a framework for quantifying resource (bandwidth and CPU) utilization in distributed network management. To demonstrate the practical impact of this framework, advanced techniques for efficient reactive traffic monitoring, efficient QoS parameter monitoring, and multimedia application monitoring, together with empirical results showing the overhead reduction will be presented. The tutorial continues with an example for a reliable, efficiency aware monitoring system that combines the above techniques with the SNMP framework, and time allowing a novel technique for efficient statistical monitoring.

Who should attend?

R&D personnel interested in improving the efficiency and reducing the overhead of network monitoring solutions, and research and academic people interested in both challenging and practical problems related to the efficient utilization of network resources with respect to network monitoring.

Biography of the Instructor

Prof. Raz received his doctoral degree from the Weizmann Institute of Science, Israel, in 1996. From September 1995 until September 1997 he was a postdoctoral fellow at the International Computer Science Institute, (ICSI) Berkeley, CA, and a visiting lecture at the University of California, Berkeley. From October 1997 until October 2001 he was with the Networking Research Laboratory at Bell Labs, Lucent Technologies. In October 2000 Danny Raz joined the faculty of the Computer Science Department at the Technion in Israel.

His primary research interest is the theory and application of management related problems in IP networks.

Outline

1. Introduction
 - a. Overview: The problems, the technologies, possible solutions.
 - b. Network Monitoring: from reactive real time to statistical monitoring.
 - c. Overview of the tutorial: Timing and keywords.
2. The SNMP framework
 - a. A short review.
 - b. Accessing large tables.
 - c. Hierarchical structures and the M2M MIB.
 - d. IETF Distributed Management and scripts MIB.
 - e. Possible drawbacks.
3. Network Monitoring and Control
 - a. Why do we need monitoring?
 - b. The cost of monitoring.
 - c. Centralized or distributed?
 - d. Event driven vs. polling.
 - e. Reactive monitoring.
 - f. Statistical monitoring.
 - g. Controlling network behavior.
4. Retrieving information from a large set of SNMP enabled network devices
 - a. To SNMP or not to SNMP?
 - b. Efficient MIB table retrieving.
 - c. TCP Vs. UDP.
 - d. Using TCP retrieval in the current SNMP framework.
 - e. Algorithmic aspects of mass data retrieval.
5. Efficient Reactive Traffic Monitoring
 - a. An abstract model.
 - b. Monitoring cost.
 - c. Rigorous definition of the monitoring problem.
 - d. The existence of optimal monitoring algorithms.
 - e. The practical problem of monitoring.
 - f. Different types of monitoring algorithms for different types of monitored data.
 - g. Experimental results.
6. Monitoring of QoS parameters in the DiffServ framework
 - a. Background: Differentiated services in the IP framework.
 - b. The Bandwidth Broker and the need for QoS monitoring.
 - c. Comparing reactive and passive monitoring techniques.
 - d. Polling Vs. probing
 - e. Optimal reactive monitoring.
7. Monitoring Multimedia applications
 - a. Multimedia formats.
 - b. What is so special about multimedia application?
 - c. Multicasting scalability.
8. Building a light-weight reliable efficient monitoring system
 - a. The three tier architecture.
 - b. Using group communication.
 - c. Achieving reliability.
 - d. Experimental results.
9. Statistical monitoring
 - a. Why do we need statistical monitoring?
 - b. Properties and requirements from statistical monitoring.
 - c. Efficient statistical monitoring and the traveling miser problem.
10. Summary and conclusions
 - a. Resources.
 - b. Lessons learned.
 - c. Open problems.

Prof. Raz has been engaged in network management research in the last seven years. His main contributions are in the field of efficient network management and the use of active and programmable networks in network management. Prof. Raz gave talks and tutorials on this subject in many international conferences, he was the general chair of OpenArch 2000, a program committee member in many of the leading conferences both in the general field of networking (INFOCOM 2002, 2003), network management (IM and NOMS 2001-2006, DSOM 2003-2005), and active and programmable networks (IWAN, OpenArch). He is an editor in the Journal for Communication Networks (JCS) and edited a special issue in JSAC.

Tutorial 6: Autonomic Systems and Networks -Theory and Practice

Dr. John Strassner, Fellow, Motorola Research Labs, Schaumburg, IL USA

Dr. Jeffrey O. Kephart, Research Staff Member, IBM T.J. Watson Research Center, Yorktown Heights, NY USA

Abstract

The increasing complexity of computing systems is beginning to overwhelm the capabilities of software developers and system administrators to design, evaluate, integrate, and manage these systems. Major software and system vendors such as IBM, HP and Microsoft have concluded that the only viable long-term solution is to create computer systems that manage themselves—a vision that is often referred to as autonomic computing.

In the last few years, interest in autonomic computing has burgeoned within academia and industry. In 2005, there were at least 15 conferences and workshops devoted to the subject, and new ones are being established for 2006. Many companies such as IBM, Motorola, Intel, HP and Microsoft and several start-ups are actively pursuing research and development efforts in autonomic computing. Such widespread interest is fortunate, because autonomic computing is a broad topic, one that requires contributions from many people in a broad array of fields over a long period of time to reach full fruition.

Naturally, systems and network management is one important domain that lies within the purview of autonomic computing. This tutorial, an outline for which appears below, represents an effort to reach out to the community served by the NOMS conference, and give NOMS attendees a reasonably deep understanding of the motivation for autonomic computing, what it is, and how it is likely to affect systems and network management over the course of the foreseeable future. Participants will emerge with a good understanding of the architectural principles and technologies that contribute to autonomic computing, as well as a sense of the role that emerging standards will play. They will learn about how state-of-the-art AI technologies are being applied to and developed for future autonomic systems and networks. One of the most important elements of the tutorial will be the use cases and scenarios that are used for illustration throughout. Finally, participants will hear about research challenges and some early progress towards them by researchers in industry and academia.

Who should attend?

Anyone who has heard of autonomic computing, and is curious to learn more about its theoretical and practical aspects. No special expertise is required, beyond that expected of typical NOMS attendees.

Biography of the Instructors

John Strassner is Fellow and Director of Autonomic Computing at Motorola Research Labs where he is responsible for directing Motorola's efforts in autonomic computing, and in forging partnerships (especially with academia). Previously, John was the Chief Strategy Officer for Intelliden and a former Cisco Fellow. John invented DEN (Directory Enabled Networks) and DEN-ng as a new paradigm for managing and provisioning networks and networked applications. Currently, he is the chair of the TMF's NGOSS metamodel and policy working groups, and a co-chair of the TMF Shared Information and Data modeling work group, as well as being active in the ITU, OMG, and OASIS. He has also authored two books (Directory Enabled Networks and Policy Based Network Management).

Outline

1. Introduction and Motivation
 - a. The Looming Complexity Crisis
 - b. What is Autonomic Computing, and How Can it Help?
 - c. Illustrative Use Cases
 - Data Center Hosting Multiple Customer Applications with Service Level Agreements
 - Mapping Business Processes to IT Infrastructure: Deployment and Operation
 - Managing a VPN Multi-Service Network
2. Autonomic Computing Primer
 - a. Basic Architectural Principles
 - b. Broad Look at Relevant Technologies
 - c. Broad Look at Relevant Standards
3. Autonomic Networking Primer
4. A Closer Look at AC Architecture
 - a. The Role of Service-Oriented Architecture
 - b. Agent-Oriented Architecture
 - c. Additional Requirements for AC Systems and Networks
 - d. Autonomic Knowledge Management Architecture
 - Model-driven architecture and deployment
5. A Closer Look at AC Technology
 - a. Artificial Intelligence and Agents Technology
 - Machine learning, modeling and optimization
 - Knowledge-based reasoning
 - b. Policy-based Management
 - c. Knowledge Management (addresses harmonization of knowledge)
 - d. Change Management
 - Accommodating change in users, environmental conditions, business policies, etc.
6. Detailed Scenarios
 - a. Autonomic system scenarios
 - b. Autonomic network scenarios
7. The Future of Autonomic Computing
 - a. Research challenges
 - b. How AC architecture, technology, and standards might evolve
 - c. Future applications of AC
8. Summary and General Discussion
9. Useful References

Jeffrey O. Kephart manages the Agents and Emergent Phenomena group at the IBM Thomas J. Watson Research Center, and shares responsibility for IBM's Autonomic Computing research strategy and academic outreach. He and his group focus on the application of analogies from biology and economics to massively distributed computing systems, particularly in the domains of autonomic computing, e-commerce, antivirus, and anti-spam technology. Kephart's research efforts on digital immune systems and economic software agents have been publicized in publications such as The Wall Street Journal, The New York Times, Forbes, Wired, Harvard Business Review, IEEE Spectrum, and Scientific American. In 2004, he co-founded the International Conference on Autonomic Computing. Kephart received a BS from Princeton University and a PhD from Stanford University, both in electrical engineering.

Tutorial 7: Traffic Engineering and QoS Management for IP-based NGNs

Prof. George Pavlou, Centre for Communication Systems Research, University of Surrey

Abstract

Next Generation IP-based Networks will offer Quality of Service (QoS) guarantees by deploying technologies such as Differentiated Services (DiffServ) and Multi-Protocol Label Switching (MPLS) for traffic engineering and network-wide resource management. Despite the progress already made, a number of issues still exist regarding edge-to-edge intra-domain and inter-domain QoS provisioning and management. This tutorial will start by providing background on technologies such as DiffServ, MPLS and their potential combination for QoS support. It will subsequently introduce trends in Service Level Agreements (SLAs) and Service Level Specifications (SLSs) for the subscription to QoS-based services. It will then move to examine architectures and frameworks for the management and control of QoS-enabled networks, including the following aspects: approaches and algorithms for off-line traffic engineering and provisioning through explicit MPLS paths or through hop-by-hop IP routing; approaches for dynamic resource management to deal with traffic fluctuations outside the predicted envelope; a service management framework supporting a "resource provisioning cycle"; the derivation of expected traffic demand from subscribed SLSs and approaches for SLS invocation admission control; a monitoring architecture for scalable information collection supporting traffic engineering and service management; and realization issues given the current state-of-the-art of management protocols and monitoring support. The tutorial will also include coverage of emerging work towards inter-domain QoS provisioning, including aspects such as: an inter-domain business model; customer and peer provider SLSs; an architecture for the management and control of inter-domain services; inter-domain off-line traffic engineering; and QoS extensions to BGP for dynamic traffic engineering. Relevant industrial activities such as IPsphere will be also covered. In all these areas, recent research work will be presented, with pointers to bibliography and a specially tailored Web page with additional resources.

Who should attend?

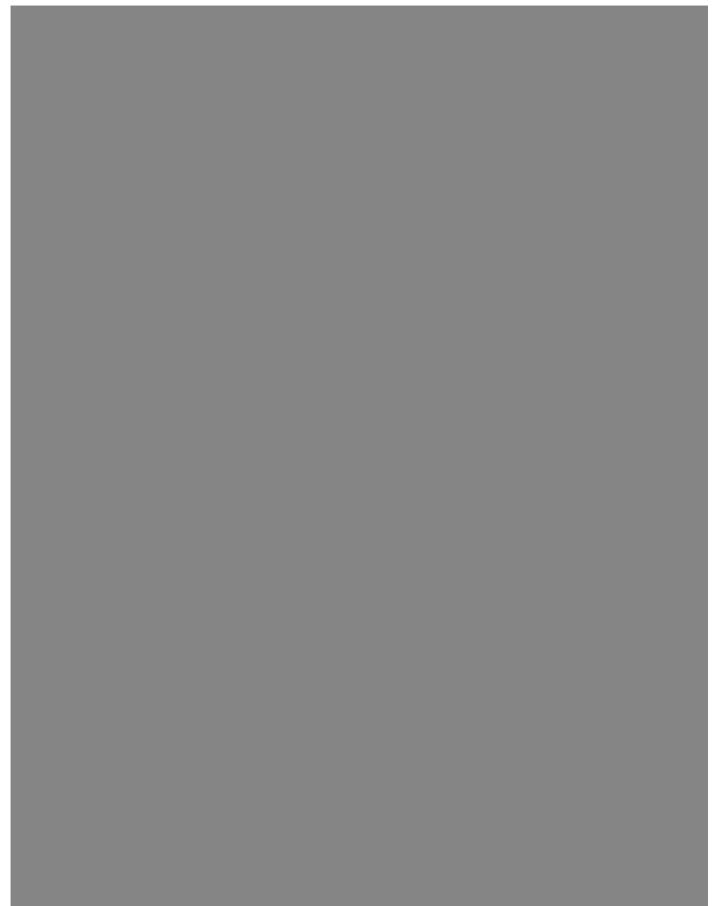
People who will benefit from this tutorial are network managers, development engineers and researchers involved in operational aspects, development and research towards IP-based Next Generation Networks (NGNs). Such networks will be the next generation ISP-operated terrestrial networks but also the core part of the 3rd generation and beyond All-IP mobile networks.

Biography of the Instructor

Prof. George Pavlou holds the Chair of Communication and Information Systems at the Center for Communication

Systems Research, Dept. of Electronics Engineering, University of Surrey, UK, where he leads the activities of the [Networks Research Group](#). He received a Diploma in Engineering from the National Technical University of Athens, Greece and MSc and PhD degrees in Computer Science from University College London, UK. His research interests encompass network and service management, network planning and dimensioning, traffic engineering, quality of service, mobile ad hoc networks, service engineering, multimedia service control and management, code mobility, programmable networks and communications middleware. He is the author or co-author of over 120 papers in fully refereed international conferences and journals and has contributed to 4 books. He has also contributed to standardization activities in ISO, ITU-T, TMF and IETF. He was the technical program co-chair of IEEE/IFIP Integrated Management 2001 and he is co-editor of the bi-annual IEEE Communications Network and Service Management series.

See also <http://www.ee.surrey.ac.uk/Personal/G.Pavlou/> for additional information and his publications in PDF.



Tutorial 8: Introduction to NGN Functional Architecture

Mr. Naotaka Morita, Senior Research Engineer, NTT Service Integration Laboratories, Japan

Abstract

The Next Generation Network (NGN), which has been overly used as a commercial catch phrase for any new technology, is now showing actual importance for major network operators and service providers to replace existing telephone networks as well as to introduce a new revenue-creating converged service platform between fixed and mobile business. Having been triggered by major carriers in Europe, the NGN study was accelerated in 2003. The International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) answered the demand for new standards and established a special task force - the Focus Group for NGN (FGNGN). The FGNGN is going to finalize a series of foundational specifications by the end of 2005. The series contains the scope of the first set of the release, expected services, network capabilities, and functional architectures that characterize the NGN.

According to the general reference model that has already been specified in ITU-T Recommendations Y.2001 and Y.2011, which assumes decoupling of services and transport, NGN can be represented by multiple functional groups. One of the key implementations for session-based services, utilizing an IP multimedia subsystem (IMS), is introduced with enhanced features to meet both fixed and mobile network requirements. Another key component in the NGN is Resource and Admission Control Functions (RACF) providing end-to-end QOS. Along with these key components, the generic functional architecture shows the overall structure of the NGN and gives a clear guideline to design the associated signalling protocol as well as operation and management mechanisms.

Biography of the Instructor

Naotaka received his B.E. and M.E. degrees from Nagoya University, Aichi, Japan, in 1985 and 1987, respectively. In 1987, he joined the Research and Development Center of NTT Corporation, where he engaged in the research of ATM systems.

The proposed tutorial session offered by Mr. Morita, who is one of the technical leaders of the architecture working group in FGNGN, begins by describing the target NGN services whose main focuses are session-based telephony and multimedia communication. Then it moves on to the high-level architecture, which will be divided into several functional entities. They are session-related control functional entities that provide a roaming feature over the fixed network. On top of them, multiple application platforms are expected to provide a wide variety of services ranging from emulation of legacy IN services to new 3rd party applications. At the transport stratum, multiple gateway functions are identified to interwork with existing networks as well as to protect the NGN itself. Following those functional level explanations, typical interactions between the functional entities are shown. Network configuration examples are also mentioned. Session border controller and multiple access network configurations are candidate examples. These examples will help bridge the abstract functional descriptions in the ITU-T Recommendations to actual network configurations and equipment.

This comprehensive talk based on the latest documents from FGNGN will give the audience a realistic NGN picture and encourage detailed design of operation and management functions, which really need wider interests of contributors to accelerate the deployment of NGN and facilitate its management.

Who should attend?

Introductory to academia, service providers, network operators, and manufacturers

From 2000, he has been studying VoIP and Interactive Multimedia technology. From October 2004, he has been a Vice Chair of SG13 in the ITU-T. He is a co-leader of working group 2, the Functional Architecture and Mobility Group in FGNGN.

Technical Sessions

Tuesday, 4 April 2006

Technical Session 1: Charging and Accounting (Session Chair: Alexander Clemm)	
• <i>Peter Racz and Burkhard Stiller</i> , University of Zurich, SWITZERLAND	A Service Model and Architecture in Support of IP Service Accounting
• <i>Brendan Jennings and Paul Malone</i> , Waterford Institute of Technology, IRELAND	Flexible Charging for Multi-provider Composed Services using Federated Two-phase Rating Process
• <i>Steven Shelford, Eric G. Manning, Gholamali C. Shoja</i> , University of Victoria, CANADA	Framework for Quality of Service Control Through Pricing Mechanisms

Technical Session 2: Business Integrated Management (Session Chair: Aiko Pras)	
• <i>Aaron B Brown and Alexander Keller</i> , IBM Research, USA	A Best Practice Approach for Automating IT Management Processes
• <i>Claudio Bartolini, Mathias Salle, and David Trastour</i> , HP Corporation, USA	IT Service Management Driven by Business Objectives
• <i>John Keeney, David Lewis, Declan O'Sullivan, Antoine Roelens, Vincent Wade, Aidan Boran, and Ray Richardson</i> , Trinity College Dublin, IRELAND	Runtime Semantic Interoperability for Gathering Ontology-based Network Context

Technical Session 3: Measurements and QoS (Session Chair: Burkhard Stiller)	
• <i>Jonathan Paisley and Joseph Sventek</i> , University of Glasgow, UK	Real-time Detection of Grid Bulk Transfer Traffic
• <i>Svante Ekelin, Jan-Erik Mangs and Bob Melander</i> , Ericsson Research, SWEDEN • <i>Martin Nilsson</i> , Swedish Institute of Computer Science, SWEDEN • <i>Erik Hartikainen</i> , Linköping University, SWEDEN • <i>Andreas Johnsson, Mats Bjorkman</i> , Malardalen University, SWEDEN	Real-Time Measurement of End-to-End Available Bandwidth Using Kalman Filtering
• <i>R. Les Cottrell, Connie Logg, and Mahesh Chhaparia</i> , Stanford Linear Accelerator Center, USA • <i>Maxim Grigoriev</i> , Fermilab, USA • <i>Felipe Haro</i> , Universidad Catolica de Chile, CHILE • <i>Fawad Nazir</i> , NUST Institute of Information Technology, PAKISTAN • <i>Mark Sandford</i> , Loughborough University, UK	Evaluation of Techniques to Detect Significant Network Performance Problems using End-to-End Active Network Measurements
• <i>Sandra Tartarelli and Giorgio Nunzi</i> , NEC Europe, GERMANY	QoS Management and Congestion Control in Wireless Hotspots

Technical Session 4: Server Provisioning (Session Chair: Rolf Stadler)	
• <i>Xue Liu, Jin Heo, and Lui Sha</i> , University of Illinois, USA • <i>Xiaoyun Zhu</i> , Hewlett-Packard, USA	Adaptive Control of Multi-Tiered Web Applications Using Queueing Predictor
• <i>Wei Xu</i> , University of California at Berkeley, USA • <i>Xiaoyun Zhu, Sharad Singhal, Zhikui Wang</i> , Hewlett-Packard, USA	Predictive Control for Dynamic Resource Allocation in Enterprise Data Centers
• <i>Jerome Rolia, Ludmila Cherkasova, Clifford McCarthy</i> , Hewlett-Packard, USA	Configuring Workload Manager Control Parameters for Resource Pools
• <i>Yonghe Yan, Adel El-Atawy, and Ehab Al-Shaer</i> , DePaul University, USA	Fair Bandwidth Allocation Under User Capacity Constraints

Technical Session 5: Information Extraction and Visualization (Session Chair: Marcus Brunner)	
• <i>Jon Oberheide, Michael Goff, and Manish Karir</i> , Merit Network Inc., USA	Flamingo: Visualizing Internet Traffic
• <i>Arun Kumar and Vikas Agarwal</i> , IBM India Research Laboratory, INDIA	A Customizable Mediation Engine for Metrics Collection Aggregation and Composition
• <i>Dionysus Blazakis and John S. Baras</i> , University of Maryland, USA • <i>Manish Karir</i> , Merit Network Inc., USA	BGP::Inspect - Extracting Information from Raw BGP Data

Technical Session 6: Overlay Management (Session Chair: Bert Wijnen)	
<ul style="list-style-type: none"> • <i>Vasilios Darlagiannis, Oliver Heckmann, Nicholas Liebau, and Ralf Steinmetz</i>, Technische Universitat, GERMANY • <i>Andreas Mauthe</i>, Lancaster University, UK 	On Routing in a Two-Tier Overlay Network based on de Bruijn Digraphs
<ul style="list-style-type: none"> • <i>Reaz Ahmed and Raouf Boutaba</i>, University of Waterloo, CANADA 	Distributed Pattern Matching for P2P Systems
<ul style="list-style-type: none"> • <i>Andre Detsch, Luciano Paschoal Gaspar, Marinho Pilla Barcellos, Ricardo Nabinger Sanchez</i>, Universidade do Vale do Rio dos Sinos, BRAZIL 	Flexible Security Configuration & Deployment in Peer-to-Peer Applications
<ul style="list-style-type: none"> • <i>Mohamed El-Darieby</i>, University of Regina, CANADA • <i>Jerry Rolia</i>, Hewlett-Packard, USA 	Hierarchical Creation of Virtual Networks

Wednesday, 5 April 2006

Technical Session 7: Traffic Engineering and Optimization (Session Chair: Prosper Chemouil)	
<ul style="list-style-type: none"> • <i>Antoine B. Bagula and Hong F. Wang</i>, University of Stellenbosch, SOUTH AFRICA 	Traffic Engineering Next Generation IP Networks Using Gene Expression Programming
<ul style="list-style-type: none"> • <i>Mohammed H. Sqalli, Sadiq M. Sait, and Mohammed Aijaz Mohiuddin</i>, King Fahd University of Petroleum & Minerals, SAUDI ARABIA 	An Enhanced Estimator to Multi-objective OSPF Weight Setting Problem
<ul style="list-style-type: none"> • <i>Kin-Hon Ho, Michael Howarth, Ning Wang, George Pavlou, and Stelios Georgoulas</i>, University of Surrey, UK 	Joint Optimization of Intra- and Inter-Autonomous System Traffic Engineering
<ul style="list-style-type: none"> • <i>Maoke Chen, Xing Li, Yong Cui, and Ang Li</i>, Tsinghua University, CHINA 	Forwarding IPv4 Traffics in PURE IPv6 Backbone with Stateless Address Mapping

Technical Session 8: Policy Management (Session Chair: Seraphin Calo)	
<ul style="list-style-type: none"> • <i>Yacine M. Ghamri-Doudane</i>, LRSM / IIE, FRANCE • <i>Nazim Agoulmine</i>, LRSM / University of Evry, FRANCE • <i>Sidi-Mohammed Senouci</i>, France Telecom R&D, FRANCE 	P-SEAN: A Framework for Policy-Based Server Election in Ad hoc Networks
<ul style="list-style-type: none"> • <i>Nigel Sheridan-Smith, Tim O'Neill, and John Leaney</i>, University of Technology, AUSTRALIA • <i>Mark Hunter</i>, Alcatel, AUSTRALIA 	A Policy-Based Service Definition Language for Service Management
<ul style="list-style-type: none"> • <i>Marinos Charalambides, Paris Flegkas, George Pavlou, and Javier Rubio-Loyola</i>, University of Surrey, UK • <i>Aroscha K Bandara, Emil Lupu, Alessandra Russo, Morris Sloman, Naranker Dulay</i>, Imperial College London, UK 	Dynamic Policy Analysis and Conflict Resolution for DiffServ Quality of Service Management
<ul style="list-style-type: none"> • <i>Korosh Golnabi, Richard K. Min, and Latifur Khan</i>, The University of Texas at Dallas, USA • <i>Ehab Al-Shaer</i>, DePaul University, USA 	Analysis of Firewall Policy Rules Using Data Mining Techniques

Technical Session 9: Wireless and Mobility Management (Session Chair: Joe Hellerstein)	
<ul style="list-style-type: none"> • <i>Rami Langar</i>, GET-Telecom, FRANCE • <i>Samir Tohme</i>, PriSM Laboratory, FRANCE • <i>Nizar Bouabdallah</i>, INRIA, France 	An Approach for Mobility Modeling “ Towards an Efficient Mobility Management Support in Future Wireless Networks
<ul style="list-style-type: none"> • <i>Karoly Farkas, Florian Maurer, Lukas Ruf and Bernhard Plattner</i>, Swiss Federal Institute of Technology, Switzerland 	Dominating Set Based Support For Distributed Services in Mobile Ad Hoc Networks
<ul style="list-style-type: none"> • <i>Remi Badonnel, Radu State, and Olivier Festor</i>, LORIA-INRIA, FRANCE 	Probabilistic Management of Ad-Hoc Networks
<ul style="list-style-type: none"> • <i>Paolo Bellavista, Antonio Corradi, and Luca Foschini</i>, Universita di Bologna, ITALY 	Proactive Management of Distributed Buffers for Streaming Continuity in Wired-Wireless Integrated Networks

Technical Session 10: Application Management and Self-management (Session Chair: Xiaoyun Zhu)	
<ul style="list-style-type: none"> • <i>Galen S. Swint, Gueyoung Jung, and Calton Pu</i>, Georgia Institute of Technology, USA • <i>Akhil Sahai</i>, Hewlett-Packard, USA 	Automated Staging for Built-to-Order Application Systems
<ul style="list-style-type: none"> • <i>Gunjan Khana</i>, Purdue University, USA • <i>Kirk Beaty, Gautam Kar and Andrzej Kochut</i>, IBM, USA 	Application Performance Management in Virtualized Server Environments
<ul style="list-style-type: none"> • <i>Panos Trimintzios, Michalis Polychronakis, Antonis Papadogiannakis, Michalis Foukarakis, and Evangelos P. Markatos</i>, Foundation for Research & Technology, GREECE • <i>Arne Øslebø</i>, UNINETT, NORWAY 	DiMAPI: An Application Programming Interface for Distributed Network Monitoring
<ul style="list-style-type: none"> • <i>Emmanuel Lavinal, Thierry Desprats, and Yves Raynaud</i>, Paul Sabatier University, FRANCE 	A generic multi-agent conceptual framework towards self-management
Technical Session 11: Reliability and Robust Management (Session Chair: Alexander Keller)	
<ul style="list-style-type: none"> • <i>A.E. Conway and B. Khasnabish</i>, Verizon, USA 	End-to-End Network Reliability Modeling of Enterprise VoIP Services
<ul style="list-style-type: none"> • <i>He Huang</i>, Nortel, USA • <i>Shyhtsun Felix Wu</i>, University of California at Davis, USA 	An Integrated Solution to Protect Link State Routing Against Faulty Intermediate Routers
<ul style="list-style-type: none"> • <i>Yan Hu, D. M. Chiu, and John C. S. Lui</i>, Chinese University of Hong Kong, CHINA 	Adaptive Flow Aggregation - A New Solution for Robust Flow Monitoring Under Security Attacks
<ul style="list-style-type: none"> • <i>Jai-Jin Lim and Kang G. Shin</i>, The University of Michigan, USA 	System Support for Management of Networked Low-Power Sensors
Technical Session 12: Middleware Management (Session Chair: Kurt Geihs)	
<ul style="list-style-type: none"> • <i>K. Ravindran and Jun Wu</i>, City University of New York, USA 	'dynamic protocol plug-in': a Middleware Provision for Enhancing Network Service Performance
<ul style="list-style-type: none"> • <i>Barbara Martini and Fabio Baroncelli</i>, Consorzio Nazionale Interuniversitario, ITALY • <i>Piero Castoldi</i>, Scuola Superiore Sant'Anna, ITALY 	On Information Modeling for the Management of Control Plane Functionality in Transport Networks
<ul style="list-style-type: none"> • <i>Manoj K Agarwal, Manish Gupta, Vijay Mann, and Narendran Sachindran</i>, IBM, INDIA • <i>Nikos Anerousis and Lily Mummert</i>, IBM, USA 	Problem Determination in Enterprise Middleware Systems Using Change Point Correlation of Time Series Data
<ul style="list-style-type: none"> • <i>Helcio Wagner da Silva and Luis Geraldo P. Meloni</i>, State University of Campinas, BRAZIL 	Utilization of the JINI Technology on Building of NMSs: From General Concepts to Prototypes Implemented

Thursday, 6 April 2006

Technical Session 13: Security Management (Session Chair: Ryutaro Kawamura)	
<ul style="list-style-type: none"> • <i>Rajarajan Sampath</i>, International University in Germany, GERMANY • <i>Jorn Altmann</i>, Seoul National University, SOUTH KOREA and International University in Germany, GERMANY 	UNIQuE: A User-Centric Framework for Network Identity Management
<ul style="list-style-type: none"> • <i>Xiapu Luo, Edmond W. W. Chan and Rocky K. C. Chang</i>, The Hong Kong Polytechnic University, CHINA 	Vanguard: A New Detection Scheme for a Class of TCP-Targeted Denial-of-Service Attacks
<ul style="list-style-type: none"> • <i>Matus Harvan and Jurgen Schonwalder</i>, International University Bremen, GERMANY 	Prefix- and Lexicographical-order-preserving IP Address Anonymization
<ul style="list-style-type: none"> • <i>Xiaoxin Shao, Shijin Kong, and Xing Li</i>, Tsinghua University, CHINA 	SANTT: Sharing Anonymized Network Traffic Traces Among Researchers
Technical Session 14: Performance Management (Session Chair: Carlos Westphall)	
<ul style="list-style-type: none"> • <i>Jan Coppens, Tim Wauters, Filip De Turck, Bart Dhoedt, and Piet Demeester</i>, Ghent University, BELGIUM 	Design and Performance of a Self-Organizing Adaptive Content Distribution Network
<ul style="list-style-type: none"> • <i>Weldson Queiroz de Lima, Rodrigo Sanger Alves, Ricardo Lemos Vianna, Maria Janilce Bosquioli Almeida, Liane Margarida Rockenbach Tarouco, Lisandro Zambenedetti Granville</i>, Federal University of Rio Grande do Sul, BRAZIL 	Evaluating the Performance of SNMP and Web Services Notifications
<ul style="list-style-type: none"> • <i>Bruno Abrahao, Virgilio Almeida, and Jussara Almeida</i>, Federal University of Minas Gerais, BRAZIL • <i>Alex Zhang, Dirk Beyer, and Fereydoon Safai</i>, Hewlett-Packard, USA 	Self-Adaptive SLA-Driven Capacity Management for Internet Services
<ul style="list-style-type: none"> • <i>Yoshihiro Otsuka, Tatsuyuki Kimura, Hideki Yaginuma, and Souhei Majima</i>, NTT Corporation, JAPAN 	Implementation and Evaluation of a Multi-Layered Network Management System for GMPLS Networks

Application Sessions

Tuesday, 4 April 2006

Application Session 1: Business Cases and Standards - Session Chair: Joseph Betser , The Aerospace Corporation, USA	
• <i>Richard Rabbat, Takeo Hamada</i> , Fujitsu Laboratories of America, USA	Revisiting Bandwidth-on-Demand: Enablers and Challengers of a Bandwidth Market
• <i>Bill Alderson</i> , NetQoS, USA	Application Response Time SLAs: Lessons Learned by a Major Outsourcer
• <i>Lina Ren, Yun Zhang Pei, Yi Bo Zhang, Chun Ying</i> , IBM China Research Lab, CHINA	Charging Validation for 3rd Party Value-Added Applications in Service Delivery Platform
• <i>Francesco Caruso</i> , Telcordia Technologies, USA • <i>Dave Milham</i> , BT, UK	Emerging industry standard for managing next generation transport networks: TMF MTOSI

Application Session 2: NGOSS, OSS, P2P, and QoS - Session Chair: Yoshiaki Kiriha , NEC, JAPAN	
• <i>C.R. Gallen, J. S. Reeve</i> , University of Southampton, UK	Using Open Source to Realise an NGOSS Proof of Concept
• <i>Haruo Oishi, Tatsuya Nakatani, Kenichi Tayama, Shiro Ogasawara, Tetsuya Yamamura</i> , NTT Corporation, JAPAN	OSS Architecture for Flexible and Efficient Process Control
• <i>Ray Carroll, Claire Fahy, Elyes Lehtihet, Sven van der Meer</i> , Waterford Institute of Technology, IRELAND • <i>Nektarios Georgalas</i> , BT Group, UK • <i>David Cleary</i> , Ericsson, IRELAND	Applying the P2P paradigm to management of large-scale distributed networks using a Model Driven Approach
• <i>Darlan Vivian, Eduardo Adilio Pelinson Alchieri, Carlos Becker Westphall</i> , Federal University of Santa Catarina, BRAZIL	Evaluation of metric of QoS in Ad Hoc networks with the use of Security Routing Protocols

Wednesday, 5 April 2006

Application Session 3: Mobility and Wireless - Session Chair: Jose Marcos Nogueira , UFMG, BRAZIL	
• <i>Chanakya Bandyopadhyay, Vijayasimman Rajasimman, Jey Veerasamy</i> , Samsung Telecommunications America, USA	Intelligent Resource Allocation in Wireless Networks through Self-Learning
• <i>Kari Rossi, Kim Molin</i> , Nokia, FINLAND	Software Components-Based Management of Cellular Transmission Networks
• <i>M. Hosein Fallah, Elias Aravantinos</i> , Stevens Institute of Technology, USA	Telecommunications Infrastructure Development: Challenges of Mobile Wireless Diffusion
• <i>J.M.Serrano, Javier Justo, Ricardo Marin, Joan Serrat</i> , Universidad Polit�cnica de Catalunya, SPAIN	CONTEXT Architecture As A Solution For Managing Pervasive Applications

Thursday, 6 April 2006

Application Session 4: Policy, Design, and Web-Based Management - Session Chair: Kohei Iseda , Fujitsu, JAPAN	
• <i>John Strassner, David Raymer</i> , Motorola, USA	Implementing Seamless Mobility using Policy-Based Management and Autonomic Computing Principles
• <i>Magnus Karlsson</i> , HP Labs, USA	Design Rules for Implementing Controllable Computer Services
• <i>Arne �sleb�</i> , UNINETT, NORWAY	Stager - A Web Based Application for Presenting Network Statistics
• <i>Inho Roh, Ilsoo Ahn</i> , Samsung, SOUTH KOREA	Common Type Enveloping/De-enveloping Mechanism (CTEM/CTDM) for Web-based Management

Application Session 5: Grids and Performance - Session Chair: John Strassner , Motorola, USA	
• <i>Brian Bentow, Jon Dodge, Aaron Homer, Christopher D. Moore, Robert M. Keller</i> , Harvey Mudd College, USA • <i>Matthew Presley, Robert Davis, Jorge Seidel, Craig Lee, Joseph Betser</i> , The Aerospace Corporation, USA	System Management for Grid-Enabling a Vibroacoustic Analysis Application
• <i>Tiago Fioreze, Ricardo Neisse, Aiko Pras</i> , University of Twente, THE NETHERLANDS • <i>Lisandro Granville, Maria Janilce Almeida</i> , Federal University of Rio Grande do Sul (UFRGS), BRAZIL	A Policy-Based Hierarchical Approach for Management of Grids and Networks
• <i>Giorgio Nunzi, Marcus Brunner, Simon Schuetz</i> , NEC Europe Ltd, GERMANY	Generic Monitoring and Intervention on Self-Configuring Networks
• <i>Sanjay Rungta, Alex Rentzis, Jeff Sedayao, Robert Adams, Paul Brett</i> , Intel Corporation, USA	Monitoring Internet Connectivity using PlanetLab

Poster Sessions

Session 1, Tuesday, 4 April 2006

• <i>Alfred Assaad, Dalia Fayek</i> , University of Guelph, Canada	General Hospitals Network Models for the support of E-Health Applications
• <i>Simon G. Brown, Frederick Yip</i> , University of New South Wales, Australia	Integrating Pattern Concepts & Network Security Architecture
• <i>Ardian N. Greca, Youming Li, Sungrae Cho</i> , Georgia Southern University, USA	Network Survivability Management System Design for Broadband Networks
• <i>Doan Huy Cuong, Dipnarayan Guha, Jun Kyun Choi</i> , Information and Communication University, Korea	Flow based Forwarding Scheme in Mobile Ipv6 Networks to Support for Realtime Services
• <i>K. Madani, M. Lohi, G. Terstyanszky</i> , University of Westminster, UK	ePerSpace: A Global Generic Network for Seamless Personalised Services
• <i>Fábio L. Verdi, R. Duarte, F. C. de Lacerda, Eleri Cardozo, Mauricio Magalhães, Edmundo Madeira</i> , State University of Campinas, Brazil	Provisioning and Management of Interdomain Connections in Optical Networks: A Service Oriented Architecture-based Approach
• <i>Uwe Walter, Martina Zitterbart</i> , University of Karlsruhe, Germany • <i>Joachim Charzinski</i> , Siemens AG, Germany	Flexible Strategy Configuration for efficient operation of a Next Generation Network
• <i>Gerhard Münz, Albert Antony, Georg Carle</i> , University of Tübingen, Germany • <i>Falko Dresslery</i> , University of Tübingen AND University of Erlangen-Nuremberg, Germany	Using Netconf for Conguring Monitoring Probes
• <i>Akira Uchiyama, Takaaki Umedu, Teruo Higashino</i> , Osaka University, Japan • <i>Keiichi Yasumoto</i> , Nara Institute of Science and Technology, Japan	Efficient and Robust Distributed Network Monitoring using Dynamic Group Formation
• <i>Fabio Ricciato</i> , Telecommunications Research Center Vienna, Austria • <i>Wolfgang Fleischer</i> , Mobilkom Austria, Austria	Bottleneck Detection via Aggregate Rate Analysis: A Real Case in a 3G Network
• <i>Nalan Gülpinar, Peter Harrison, Berç Rustem</i> , Imperial College London, UK • <i>Louis-Francois Pau</i> , Erasmus University, Netherlands	Performance Optimization of Mean Response Time in a Tandem M/G/1 Router Network with Batch Arrivals
• <i>Filipe Marques, Jacques Sauvé, Antônio Moura</i> , Universidade Federal de Campina Grande, Brazil	Business-Oriented Capacity Planning of IT Infrastructure to Handle Load Surges
• <i>R. Brennan, G. O'Gorman</i> , Ericsson, Ireland • <i>C. Doherty, N. Hurley</i> , University College Dublin, Ireland • <i>C. McArdl</i> , DCU, Ireland	Autonomic Replication of Management Data Evaluation of a Market-based Approach
• <i>Artur Andrzejak</i> , Zuse-Institute Berlin, Germany • <i>Patricio Domingues</i> , Polytechnic Institute of Leiria, Portugal • <i>Luis Silva</i> , University of Coimbra, Portugal	Predicting Machine Availabilities in Desktop Pools
• <i>Franco Tommasi, Simone Molendini, Andrea Tricco</i> , University of Lecce, Italy	Network Management via Satellite
• <i>Vladimir Tasic</i> , Lakehead University, Canada • <i>Hanan Lutfiyya, Yazhe Tang</i> , University of Western Ontario, Canada	A Management Infrastructure for Mobile/Embedded XML Web Services
• <i>Rajesh P, Ranjiith S, Soumya P R, Karthik V, Datthathreya S</i> , Cisco Systems Inc., India	Network management system using web services and service oriented architecture - A case study
• <i>Yi Yuan, Hoong Kee Ng</i> , National University of Singapore, Singapore	DATCONS: Protecting Web-Based QoS from DDoS Attacks
• <i>Frederick Yip, Alfred Ka Yiu Wong, Pradeep Ray, Nandan Paramesh</i> , University of New South Wales, Australia	Corporate Security Compliance in a Heterogeneous Environment
• <i>Han-Seung Koo, O-Hyung Kwon</i> , Electronics & Telecommunications Research Institute, Korea • <i>Sung-Woong Ra</i> , Chungnam National University, Korea	An Active Entitlement Key Management for Conditional Access System on Digital TV Broadcasting Network
• <i>Sunghyuck Hong, Noe Lopez-Benitez</i> , Texas Tech University, USA	Enhanced Group Key Generation Algorithm

• <i>P J Sandford, D J Parish, J M Sandford</i> , Loughborough University, UK	Detecting security threats in the network core using Data Mining techniques
• <i>Paulo Fernando da Silva, Carlos Becker Westphall</i> , Federal University of Santa Catarina, Brazil	An Intrusion Answer Model Compatible with the Alerts IDWG Model
• <i>Amitava Biswas, Purnendu Sinha</i> , Concordia University, Canada	On improving performance of Network Intrusion Detection Systems by efficient packet capturing
• <i>Alexandre Schulter, Fabio Navarro, Fernando Koch, Carlos Becker Westphall</i> , Federal University of Santa Catarina, Brazil	Towards Grid-based Intrusion Detection
• <i>Fabio Navarro, Alexandre Schulter, Fernando Koch, Marcos Assunção, Carlos B. Westphall</i> , Federal University of Santa Catarina, Brazil	Towards a Middleware for Mobile Grids
• <i>Gabi Dreö Rodosek</i> , University of Federal Armed Forces Munich, Germany • <i>Heinz-Gerd Hegering</i> , Leibniz Supercomputing Center, Germany • <i>Burkhard Stiller</i> , Universität Zürich and ETH Zürich, Switzerland	Dynamic Virtual Organizations as Enablers for Managed Invisible Grids
• <i>Nasser B., Barrere F., Benzekri A., Laborde R., Kamel M.</i> , University of Paul Sabatier, France	Automated Creation of Inter-organizational Grid Virtual Organizations
• <i>Frank Chiang, Robin Braun</i> , University of Technology Sydney, Australia	A Nature Inspired Multi-Agent Framework for Autonomic Service Management in Pervasive Computing Environments
• <i>Marcelo Perazolo</i> , IBM Corporation, USA	A Symptoms Extraction Method for Self-Management based on Decomposition of Disturbances
• <i>Zakaria Benahmed Daho, Noemie Simoni</i> , Ecole Nationale Supérieure des Télécommunications, France	Towards Dynamic Virtual Private Service Networks: Design and Self-Management

Session 2, Wednesday, 5 April 2006

• <i>Shiva Shankar</i> , Cisco Systems, Inc., India • <i>Ottalingam Satyanarayanan</i> , Cisco Systems, Inc., USA	An Automated System for Analyzing Impact of Faults in IP Telephony Networks
• <i>V. Cridlig, H. Abdelnur, R. State, O. Festor</i> , LORIA - INRIA Lorraine, France	A VoIP Security Management Architecture
• <i>Fabício A. Silva, Thais Regina M. Braga, Linnyer B. Ruiz, José Marcos S. Nogueira, Antonio A. F. Loureiro</i> , Federal University of Minas Gerais, Brazil	A Comparative Study of Distributed Self-management Approaches for Wireless Sensor Networks
• <i>Adbelnasser Ouda, Hanan Lutfiyya, Michael Bauer</i> , The University of Western Ontario, Canada	Towards Automating the Adaptation of Management Systems to Changes in Policies
• <i>Javier Rubio-Loyola, Joan Serrat</i> , Universitat Politècnica de Catalunya, Spain • <i>Marinos Charalambides, Paris Flegkas, George Pavlou</i> , University of Surrey, UK	GOREMOCH: A Distributed Goal-oriented Policy Refinement Environment
• <i>Bradley Simmons, Hanan Lutfiyya</i> , University of Western Ontario, Canada • <i>Mircea Avram, Paul Chen</i> , IBM Toronto Software Laboratory, Canada	A Policy-Based Framework for Managing Data Centers
• <i>Kyung-Jin Lee</i> , Cheju National University, South Korea • <i>Hanan Lutfiyya</i> , University of Western Ontario, Canada • <i>Wang-Cheol Song</i> , Cheju National University, South Korea	Management of PDP/PEP for PBNM in MANETs
• <i>Thiago Pereira, Andre Beller, Edgard Jamhour, Mauro Fonseca</i> , Pontifical Catholic University of Paraná, Brazil	QoS Management on Mobile IP Networks using COPS-PR
• <i>José Ángel Irastorza, Ramón Agüero, Verónica Gutiérrez, Luis Muñoz</i> , University of Cantabria, Spain	Beyond Management in Ad Hoc, Heterogeneous WPAN Environments: an Experimental Approach
• <i>Venkatesan Balakrishnan, Vijay Varadharajan, Udaya Kiran Tupakula</i> , Macquarie University, Australia	Fellowship: Defense against Flooding and Packet Drop Attacks in MANET
• <i>Ravi Chandra Paruchuri, Prathima Agrawal</i> , Auburn University, USA	Interference Study of 802.11b Networks for Proactive Performance Management
• <i>Devinder Singh, Simon Hoh, Andy L.Y. Low, Fang Liang Lim, See Leng Ng, Jo Lynn Tan</i> , British Telecommunications Plc, Asian Research Center	Qualitative Study of Intelligent Access Point Handover in WLAN Systems

<ul style="list-style-type: none"> • <i>Olga Ormond, John Murphy</i>, University College Dublin, Ireland • <i>Gabriel-Miro Muntean</i>, Dublin City University, Ireland 	Economic Model for Cost Effective Network Selection Strategy in Service Oriented Heterogeneous Wireless Network Environment
<ul style="list-style-type: none"> • <i>Idir Fodil</i>, France Telecom, France 	TISPAN NGN Management Overview: Towards an architecture for Managing Converging Mobile and Fixed Networks
<ul style="list-style-type: none"> • <i>Jeong-Hyun Park, Jong-Heung Park</i>, Electronics and Telecommunications Research Institute, Korea 	Interworking between GPRS AND ISP for Wireless Internet Service of Mobile ISP Subscriber
<ul style="list-style-type: none"> • <i>Namje Park, Jooyoung Lee, Howon Kim, Kyoil Chung, Sungwon Sohn</i>, Electronics and Telecommunications Research Institute, Korea 	A Layered Approach to Design of Light-Weight Middleware Systems for Mobile RFID Security
<ul style="list-style-type: none"> • <i>Jun Wang, Victor C. M. Leung</i>, University of British Columbia, Canada 	Incentive Engineering at Congested Wireless Access Points Using an Integrated Multiple Time Scale Control Mechanism
<ul style="list-style-type: none"> • <i>Lijun Wang, Dalia Fayek, Thushyanth Sivananthan</i>, University of Guelph, Canada 	A Bandwidth Bargain Model based on Adaptive Weighted Fair Queueing
<ul style="list-style-type: none"> • <i>Hiroshi Yamada</i>, University of Electro-Communications, Japan • <i>Kenji Kono</i>, Keio University, Japan 	User-level disk-bandwidth control for resource-borrowing network applications
<ul style="list-style-type: none"> • <i>Glynn Rogers, Jonathan Chan, Darwin Agahari</i>, CSIRO ICT Centre, Australia 	Rate Control of Elastic Traffic with QoS Guarantees: a Stability Analysis & Experimental Implementation
<ul style="list-style-type: none"> • <i>Yoon G. Kim</i>, Virginia State University, USA • <i>Afshin Shiravi, Paul S. Min</i>, Washington University in St. Louis, USA 	Congestion Prediction of Self-Similar Network through Parameter Estimation
<ul style="list-style-type: none"> • <i>Dietmar Toelle, Rudi Knorr</i>, Fraunhofer Institute for Communication Systems ESK, Germany 	Congestion Control for Carrier Ethernet Using Network Potentials
<ul style="list-style-type: none"> • <i>Bela Berde</i>, Alcatel Research & Innovation, France • <i>Dimitri Papadimitriou</i>, Alcatel Bell, Belgium • <i>Monika Jäger</i>, T-Systems, Germany 	Traffic Engineering Element for GMPLS Networks
<ul style="list-style-type: none"> • <i>Daniel W. Hong, Woo-Sung Kim</i>, Korea Telecom, Korea • <i>Choong Seon Hong</i>, Kyung Hee University, Korea 	A Segment-based Protection Scheme for MPLS Network Survivability
<ul style="list-style-type: none"> • <i>Sung-Gi Choi, Dong-Oh Kang, Jeun-Woo Lee</i>, Electronics and Telecommunications Research Institute, Korea 	An UPnP based Media Distribution System supporting QoS in a Converged Home Network
<ul style="list-style-type: none"> • <i>Aparna Gupta, Lingyi Zhang</i>, Rensselaer Polytechnic Institute, USA 	Pricing Loss Guarantees for End-to-end Services on Overlay Networks
<ul style="list-style-type: none"> • <i>James Z. Wang, Matti Vanninen</i>, Clemson University, USA 	Self-Configuration Protocols for Small-Scale P2P Networks
<ul style="list-style-type: none"> • <i>Martin Zach</i>, Siemens AG, Austria • <i>Claire Fahy, Ray Carroll, Elyes Lehtihel</i>, Waterford Institute of Technology, Ireland • <i>Daryl Parker</i>, Ericsson R&D Ireland, Ireland • <i>Nektarios Georgalas</i>, BT Group, UK • <i>Johan Nielsen</i>, Ericsson Research, Sweden • <i>Ricardo Marin, Joan Serrat</i>, Universitat Politècnica de Catalunya, Spain 	Towards a framework for network management applications based on peer-to-peer paradigms
<ul style="list-style-type: none"> • <i>Karl Quinn, Austin Kenny, Kevin Feeney, David Lewis, Declan O'Sullivan, Vincent P. Wade</i>, Trinity College Dublin, Ireland 	A Framework for the Decentralisation and Management of Collaborative Applications in Ubiquitous Computing Environments
<ul style="list-style-type: none"> • <i>A. Snow, K. Chatanyam, G. Weckman, P. Campbell</i>, Ohio University, USA 	Power Related Network Outages: Impact, Triggering Events, And Root Causes

Panel Sessions

Panel 1: Where is SOA taking us in OSS design?

Chair: *Dave Milham*, BT Group, UK

Next Generation Networks are the basis of converged IT and telecom services. Realising the vision of a flexible service based economy needs agreements to be forged between the IT and the telecoms industry to create a converge infrastructure for applications, management and services. Service Oriented Architecture is creating great interest in both the IT and telecoms industry. Will this be the long sort after solution to the persistent problems of OSS integration costs and application inflexibility? Drawn from across the IT and telecom industry the speakers assess the benefits of SoA and whether they will be the answer to the SOS from the OSS industry.

Panelists:

- Francesco Caruso, Telcordia
- Martin Huddleston, QiNetiq
- Philippe Lalande, Sun Microsystems
- John Strassner, Motorola
- Kevin Twadus, IBM

Panel 2: Self-Management: Separating facts from fiction

Chair: *Prof. Rolf Stadler*, KTH Royal Institute of Technology, Sweden

The initial hype about hot new products that will change the way we think about management is over. It is time to ask whether autonomic principles will have a significant impact on managing networked systems. The panel will provide a fresh assessment of technology, research and business aspects regarding autonomic management/self-management, and it will discuss directions and implications of the approach. Questions to be raised include: In which settings can self-management achieve a reduction in operational costs? Do customers and administrators really want and trust self-managed systems? To which extent are services that are built on p2p technology inherently self-managed?

Panelists:

- Raouf Boutaba, University of Waterloo
- Joe Hellerstein, IBM Research
- Randy Katz, UC Berkeley
- Ralf Wolter, Cisco Systems

Panel 3: Direction of Open Source for OSS implementation

Chair: *Alpna Doshi*, Satyam, USA

The Open Source movement has touched almost every sphere of software technology that we know today. The OSS/BSS world also has seen significant application of Open Source software into their products. Major carriers and service providers are still wary of migrating to Open Source software for critical applications though most of them are involved with Open Source initiatives in one form or the other. For most carriers and service providers the top-of-the-mind issues are scalability, security and performance. Some key questions raised by them are,

- How does Open Source give / not give competitive

advantage?

- Is Open Source the best path to cheaper software?
- Are Open Source and collaborative development necessarily tied together?
- Is Open Source a way of reducing discontinuities that arise when conventional products leapfrog one another?
- What are the relative lifetime costs of Open Source and conventional software?
- Is it robust enough to handle my mission-critical applications?
- What about service support once I migrate to an open source platform?

Though Open Source software is much less expensive and tests have proven their efficacy, system integrators have not rushed headlong into the open software fray.

Most SI's, though excited about the Open Source revolution, are still waiting and watching where this initiative is headed. This panel discussion focuses on some of the key issues and advantages of Open Source platforms in business impacting applications such as OSS/BSS solutions. The panel also tries to determine the bearing of Open Source software in critical applications such as OSS/BSS solutions.

Panelists:

- Andrew Chambers, TMF
- Paul Grantham, Covad
- Philippe Lalande, Sun
- David Milham, BT
- David Reberry, CH2M

Panel 4: Management Metrics - How do we know that Management is working?

Chair: *Alexander Keller, Ph.D.*, IBM TJ Watson Research Center, USA

Over the last years, the Management community has witnessed a shift away from information models and protocols towards value-added management services that improve the configuration and fault management of a distributed system, or optimize its performance. However, whenever we try to articulate the value of Management, it turns out that we neither have the methodologies, nor the tools to help us assess where we as a discipline are on the maturity curve and how 'self-managing' the systems we build actually are. Metrics such as 'total cost of ownership' or 'number of servers per administrator' are often overly simplistic and essentially focus just on symptoms, not on the true factors that impact the value of management. It is therefore hard, if not impossible, to quantify the value that the investment in management technology actually yields actually yields, and there are no hard metrics available that facilitate the comparison between management systems from different vendors. The panel will address the following issues:

1. Can we measure automation and are we able to assess its value?
2. Is there a way to develop a 'Capability Maturity Model' for Management?
3. What would such a model look like?
4. What are the key performance indicators of Management?
5. What lessons can we learn from system benchmarks that have been developed over the last 15 years?

Will we ever see TPC-Management or SPECManagement

benchmark suites?

Panelists:

- Alexander Clemm, Ph.D., Senior Architect, Cisco Systems, Inc., USA
- Alva Couch, Ph.D., Professor, Tufts University, USA
- Hing Wing To, Ph.D., Senior Vice President of Product Delivery - Tivoli, IBM Software Group, USA
- Alan Yamamoto, Global Strategic Outsourcing Benchmarking Competency & Carnegie Mellon University Visiting Industrial Scholar Program Executive, Complex Engagement Services, IBM Global Services, USA

Panel 5: Does the world still need generic management protocols

Chair: *Mark Ammar Rayes, Ph.D., Cisco Systems, USA*

Existing management protocols include SNMP, TL-1, Syslog, CORBA, and XML-based protocols including IETF Netconf. While many protocols were initially intended to address specific functions, most have been extended into other areas in recent years. As a result, we often have competing protocols to address the same need, resulting in a confusing technology landscape. This panel will address:

- Do we need a single standard protocol to address the full FCAPS functions? If so, which is the right one? Or is having multiple standard protocols that complement each other preferable?
- XML is gaining a significant momentum in recent years. Should and can XML be used to replace the existing protocols (SNMP, Syslog, etc.)?
- Do we need a single information model? If so, which one? Or should standardization of information better be left out of the equation?
- What direction do standardization efforts need to take to enable further advances in the state of management in way that has measurable impact on the way networks and services are managed and deployed today?

Panelists:

- Ville Aikas, University of Washington
- George Pavlou, University of Surrey
- Aiko Pras, University of Twente
- Hector Trevino, Cisco Systems
- Sean J. Vaughan, University of Washington

Distinguished Experts Panel: VoIP Management - Does the Emperor have any clothes on?

Chair: Aiko Pras



Aiko Pras is an associate professor at the University of Twente, the Netherlands. His research interests include network management technologies, Web services, network measurements, and accounting. He has participated in many European and Dutch research projects, such as SURFnet6 RoN, M2C, WASP, and Internet NG. He currently is Research Leader in the European Network of Excellence on Next Generation Management (EMANICS). He has also contributed to research and standardization activities as a member of the Internet Research Task Force (IRTF) Network Management Research Group (NMRG). He has been TPC co-chair of several conferences, like IM 2005 and E2EMON, and serves as editor for the IEEE Communications Magazine series on Network and Service Management.

Panelist

Randy Burke



Randy Burke is the Senior Director for Comcast's Voice Technical Operations. He is responsible for managing Comcast's voice elements (soft switches, gateways, voicemail, etc), acceptance testing, improving the infrastructure & interoperability, deploying switch capacity, end to end troubleshooting, and defining/implementing service centric monitoring. In addition to supporting Comcast's Digital Voice Operations, he also manages Technical Operations for the digital phone offer (GR303, NIU, HDT, 5ESS/DMS).



Alex Gelman

Alexander D. Gelman holds ME and Ph.D. in Electrical Engineering, from the City University of New York. Since 1998 Alex is the Chief Scientist at Panasonic Digital Networking Laboratory in Princeton, NJ and San Jose, California managing projects in consumer communications and networking. During 1984-1998 Alex was with Bellcore, lately as Director, Residential Internet Access Architectures Research. Some of most prominent projects in Bellcore were related to multimedia communications and DSL applications. In 1989 Alex pioneered the concept and the architecture of the Digital Subscriber Line Access Multiplexor (DSLAM). Alex consulted

Bell Atlantic on early ADSL trial, architected Telia's DSL Multimedia, VOD, and Internet Access trial and the Telecom'95 World Wide Demo by TINA-C consortium. Alex holds some of the earliest DSL system patents, e.g. on xDSL-based Access Router. He has published in journals, conference proceedings and magazines, served as editor of magazines and journals, served on the Inaugural Steering Committee for IEEE Transactions on Multimedia, served on Organizing and program committees of several ComSoc conferences, initiated the IEEE Consumer Communications and Networking Conference (CCNC). Alex is a past Chair of the ComSoc Multimedia Technical Committee, served as ComSoc VP-Society Relations and VP-Membership Development. Presently Alex is ComSoc Director of Standards and serves on BoG of the IEEE Standards Association.

Magda Nassar, PhD



Magda is Director of VOIP Network and Service Planning Division in AT&T. She has responsibility for the design, development and implementation of multi-year development plans for VOIP network infrastructure and the establishment of the overall development for services over VoIP programs.

Magda has over 20 years of experience with AT&T in various roles of telecommunication systems engineering and network design. Magda Received her PhD in EE from Case Western Reserve University.

Amy Pendleton



Amy Pendleton is the Senior Advisor for Enterprise Network and Service Management for Nortel. She is responsible for setting strategic direction in infrastructure, application, and service management across Nortel's enterprise product portfolio, where her specific areas of focus are service performance management, provisioning/configuration, Service Oriented Architecture (SOA), and autonomic networking. Amy has contributed to a number of VoIP service quality management drafts in IETF.

Amy has 14 years of experience with Nortel in data communications, wireless architecture, and VoIP. Amy prides herself in being both an advisor and an implementor, which is becoming increasingly uncommon in large corporations today.

Henry Sinnreich



Henry Sinnreich is at present CTO at Pulver.Com where he works on upgrading the Pulver FWD Internet communication service. He was also a Distinguished Member of Engineering at MCI until April 2005, and contributed to the SIP based MCI Advantage flagship service design and worked on new features to extend the reach and appeal to customers of MCI Advantage. He has worked on Internet and web services since 1993 and has initiated multimedia and voice projects based on standards developed in the IETF, where he is an active contributor and author of several drafts. Henry is author of several books, such as "Internet Communications Using SIP" (2001) and "SIP Beyond VoIP" (2005). He is a founding member on the board of directors of the International SIP Forum based in Stockholm, Sweden, and received the award of Pioneer in Telephony at the June

2000 Voice On the NET conference, VON Europe 2000. Henry Sinnreich has been featured on the cover page of the VON Magazine as the 'Godfather of SIP'.

Workshops

Fourth IEEE/IFIP Workshop on End-to-End Monitoring Techniques and Services (E2EMON'06)

April 3, 2006, Vancouver, Canada, co-located with IEEE NOMS 2006, <http://www.mnlab.cs.depaul.edu/events/e2emon06/>

E2EMON'06 is the fourth workshop in a series focusing on advances in network monitoring technology. The workshop offers a unique opportunity for researchers in this area to exchange ideas and experiences on next-generation monitoring systems for emerging technologies such as Grid, overlay, p2p and Ad hoc networks, and end-to-end path measurements. E2EMON will be co-located with the 2006 IEEE/IFIP Network Operations & Management Symposium (NOMS'06), which is the major network management conference in the year 2006. The workshop provides an intimate setting for discussion and debate through panels and group work. Topics of interest to this workshop include:

- Monitoring overlay networks and P2P services
- Ad-hoc and sensor network monitoring
- Monitoring Grid & pervasive computing environment
- Path characteristics monitoring
- Large-scalable monitoring techniques
- Active and programmable monitoring
- Traffic monitoring and data mining

- Real-time monitoring
- Visualization of monitoring information
- High-speed network monitoring
- Multicast network/service monitoring
- Overlay monitoring services
- Monitoring of service level agreements
- Monitoring models, architectures and systems
- Monitoring platforms and Distributed and centralized monitoring prototypes
- Languages for packet and distributed monitoring

Workshop chairs

Ehab Al-Shaer	DePaul University	USA
Aiko Pras	University of Twente	The Netherlands
Nevil Brownlee	University of Auckland	New Zealand

First IEEE/IFIP Workshop Feedback Control Implementation and Design in Computing Systems and Networks (FeBID'06)

April 3, 2006, Vancouver, Canada, co-located with IEEE NOMS 2006, <http://www.controlofsystems.org/febid2006/>

The rapid development and pervasive deployment of information technology (IT) has created a need for formal approaches to enforce service and resource management policies. A central concern in this enforcement is the design and implementation of feedback control systems, such as TCP adaptation to network congestion and web server adaptation to flash crowds. Existing practice for the design of feedback control systems for IT largely relies on ad-hoc techniques. As a result, changes in workloads and/or configurations often result in poor quality of service (QoS) or even instabilities.

application of control theory to computing systems and networks. The workshop offers a unique opportunity for researchers in this area to exchange ideas and experiences on system considerations for applying control theory, applicable control theoretic techniques, and experiences in control system designs. The workshop will include a keynote speech, a panel, an invited session on major initiatives, as well as paper presentations and posters on recent research results on applying control theory to computing systems and networks.

Other areas of engineering (e.g., mechanical, electrical, aeronautic) design feedback control systems using methodologies based on control theory, a formal approach to designing feedback control systems. Indeed, in the past five years, there has been considerable success with applying control theory to analyzing and designing feedback control in IT systems. Areas addressed include: Internet services, web servers, database systems, and power management.

FeBID'06 is the first workshop to focus on advances in the

Workshop chairs

Joseph L. Hellerstein	IBM T.J. Watson Research Center	USA
Xiaoyun Zhu	HP Labs	USA
Tarek Abdelzaher	University of Illinois	USA

First IEEE Workshop on VoIP Management and Security: VoIP MaSe

April 3, 2006, Vancouver, Canada, co-located with IEEE NOMS 2006, <http://www.noms2006.org/content/workshop.html#voip>

The recent wave of VOIP deployment and its take-off as a pragmatic solution for cost effective communication alternative is challenged by major security and management requirements. VOIP networks are potential targets for multiple attack vectors - SPAM over Internet telephony, denial of service, call hijacking, and fraudulent usage - for which the current defence solutions are still incumbent. New conceptual paradigms and practical short term solutions for assuring and managing VOIP are demanded from both the research community and the operational actors.

Topics

- Management and security issues in VoIP systems
- Intrusion prevention and detection techniques and algorithms for VoIP networks
- Active response mechanisms for defending VoIP networks
- Security assessment and vulnerability discovery for VoIP
- Security management for VoIP deployments
- Issues and challenges in VOIP management and operations
- Peer-to-peer management and configuration for VoIP

- Peer-to-peer security issues for VoIP deployments
- SPAM over Internet telephony (SPIT) detection and prevention in VoIP networks
- Experience and position papers on VoIP operations and deployment
- Enterprise security policies for VoIP
- Enterprise and carrier network architectures for managing secure VoIP
- Session Border Control management and security features
- Security issues with NAT traversal mechanisms
- Management of NAT traversal techniques for VoIP their management
- Management and security issues for IMS architectures
- Management and security issues for NGN architectures

Workshop chairs

Saverio Niccolini	NEC Europe Ltd.	Germany
Henning Schulzrinne	Columbia University	USA
Radu State	INRIA	France

First IEEE International Workshop on Broadband Convergence Networks (BcN)

April 7, 2006, Vancouver, Canada, co-located with IEEE NOMS 2006, www.bcn2006.org

In Broadband Convergence Networks (BcN), also known as Next Generation Networks (NGN), various types of convergence will take place such as convergence of wired and wireless networks, and convergence of telecommunications and broadcasting. For broadband end-to-end mobile networking, the broadband wired networks (such as IP/MPLS with WDM optical networks) will be converged with wireless networks (such as IEEE 802.11e Wireless LAN, 802.16 Wireless MAN and 3G/4G wireless cellular networks). Also, the IP-based telecommunication network will be converged with broadcast network to provide IP-based high-quality broadband multimedia broadcasting and multicasting. Several countries of strong Internet infrastructure are going to provide initial BcN commercial services soon.

For efficient service provisioning on the broadband converged networks, well-designed and implemented network operations and management functions with traffic engineering are essential. ITU-T has been operating a special expert group called FGNGN (Focus Group on Next Generation Networks) to provide the architecture of NGN, but the network operations and management issues have not fully studied yet. IETF has some working groups on network operations and managements of IP/MPLS networks, but the operations and management for integrated networking with wired & wireless, telecommunication and broadcasting networks has not been covered yet.

The goal of this workshop is to gather people with different backgrounds to share the current status on standardization efforts, technology development, end users' requirements, research issues as well as regulatory issues of BcN and to discuss challenges and possible solutions in the broadband networking for QoS-guaranteed real-time multimedia services on BcN. Areas of interest include the architectures, applications, and

management issues of BcN.

Topics of interest for this workshop include, but not limited to, the following:

- Architecture and Standardization
- Applications and Service Provisioning
- QoS Management
- Traffic Engineering
- Inter-domain Networking
- QoS-guaranteed multimedia service provisioning across broadband wired & wireless networks
- Converged networking issues for telecommunication and broadcasting
- Broadband Access networking with hybrid fiber optic and wireless network
- Security issues on the convergence networks
- Accounting and Billing
- Seamless service provisioning with roaming and handover
- Regulatory Issues
- Automated resource management and service provisioning
- Signaling for Application Sessions and Networking
- Virtual Networks and Operators

Workshop chairs

Young-Tak Kim	Yeungnam Univ.	Korea
Takeo Hamada	Fujitsu Labs of America	USA
Nazim Agoulmine	University of Evry	France

First IEEE/IFIP International Workshop on Business Driven IT Management (BDIM 2006)

April 7, 2006, Vancouver, Canada, co-located with IEEE NOMS 2006, www.businessdrivenitmanagement.org/bdim2006/

Information Technology (IT) management has evolved significantly over the past few years as IT-based solutions have become mission-critical to businesses. From device, network and systems management, solutions have evolved to include service management and IT governance, as witnessed by the recent popularity of ITIL and COBIT frameworks. A recent shift in perspective brought to bear a more user-centric approach to IT management, putting IT managers in condition to look at IT not just from the IT department's traditional point of view but from the user's point of view: this is the reason for the appearance of services and quality of service metrics in these frameworks. Even more recently, a further shift towards holistic understanding of IT in the business is occurring: one now wishes to look beyond IT services to the business context where the services are used. This is termed Business Driven IT Management (BDIM) and is the object of this workshop. BDIM focuses on the impact of IT on business processes and business results and vice versa; besides the conventional IT metrics such as availability and response time, it looks at key performance indicators (KPIs), that is metrics that have significance from the point of view of the business supported by the IT. The BDIM approach aims at rethinking IT management from a business perspective, whether this be in an operational, tactical or strategic context.

Although the workshop program is still being finalized, the following topics give an idea of the breadth of the workshop:

- Models for measuring/estimating business-IT alignment
- IT Management strategies from a business perspective
- Rethinking ITIL and COBIT processes from a business perspective
- Business impact models for IT faults and performance degradations
- Business driven IT optimization problems
- Business driven IT planning and decision-making
- Automated IT management solutions from a business perspective
- IT actions to enhance/optimize business performance
- Mechanisms for enforcing business rules and security policies
- Business process modeling for IT management
- E-commerce, e-business and relation to IT infrastructures
- Services infrastructures and QOS concerns that have customer impact (e.g. MTBF, MTTR, Response times, latency etc)
- Case studies in business driven IT management (in e-commerce, messaging, ...)
- Business driven Service Level Management
- Business driven dynamic provisioning
- Business driven inventory management
- Business continuity management and its impact on IT
- Business objectives and their impact on new IT paradigms such as utility/grid computing
- Adaptive/autonomic computing from a business perspective
- Tools for business driven IT management
- Data mining techniques for business impact model construction
- Modeling of business operations and their relationships to IT
- Modeling of business strategies and their relationships to IT

Workshop chairs

Claudio Bartolini	HP	USA
Akhil Sahai	HP	USA
Jacques Philippe Sauvé	UFCG	Brazil

Transportation from Vancouver International Airport to Downtown Vancouver

1) Scheduled Buses - YVR Airporter

(Pick-ups to Downtown Hotels at the Vancouver International Airport Domestic & International Terminals)

The YVR Airporter provides bus service to major hotel destinations in downtown Vancouver, the Canada Place Cruise Ship Terminal and the bus depot/train station. The YVR Airporter bus is located on the International and Domestic Arrivals level curb. No reservations required.

Schedule and Departure times from the airport:
<http://www.yvrairporter.com/xPdf/Schedule2006.pdf>

- International Terminal - every 20 minutes from 8:55 to 19:15 and every 30 minutes from 20:25 to 21:25.
- Domestic Terminal - every 20 minutes from 9:00 to 19:20 and every 30 minutes from 20:30 to 21:30.

Tickets may be purchased at the YVR Airporter counter, their pickup locations or on the motor coach.

<i>Fares</i>	<i>One-Way</i>	<i>Round Trip</i>
Adult	\$12.00	\$18.00
Child 5-12 yrs	\$5.00	\$10.00
Senior 65+ yrs	\$9.00	\$17.00
Family*	\$24.00	\$36.00

(* Family fare is 2 adults/2 children 16 years & under)

Further information on service, schedules and fares may be obtained from the Airporter counter located on the International and Domestic Arrivals levels, their website, www.yvrairporter.com (map of the airport and downtown can be found in the website).

Note:

Six of the NOMS 2006 discount hotels are pick-up points of the YVR Airporter service. Please refer to the location map of downtown hotels.

2) Taxi

It takes approximately 30-40 minutes to travel from the airport to major downtown hotels in Vancouver. Yellow Cabs and Black Top Cabs are the major taxi companies in Vancouver. The cost is approximately CAD\$30-35.

Location Map of Downtown Hotels



NOMS 2006 Discount Hotel List:

- 30** Vancouver Convention and Exhibition Centre
- 30** Pan Pacific Vancouver
- 49** Fairmont Waterfront
- 35** Renaissance Vancouver Hotel Harbourside
- 13** Vancouver Marriott Pinnacle Downtown
- 12** Days Inn Vancouver Downtown
- 25** Hyatt Regency Vancouver
- 14** Delta Vancouver Suites
- 29** Pacific Palisades Hotel
- 16** Empire Landmark

Metropolitan Hotel Vancouver (not numbered in the map, near No. 18)

Convention Level



NOMS 2006 Registration Form

Symposium Registration Form – Offline Registration 3-7 April 2006, Vancouver, Canada

If you are not able to register online, please print this page, fill in all necessary information and fax this form to: +1-732-465-6447

First (given) Name		Last (family/ surname) Name	
Title or Position		Company/ Organization	
Street			
Qty	State/ Province	Postal Code	Country
Phone Number		Fax Number	E-mail Address

Accompanying Guest Name (if attending)

I am registering as: ☐ Technical Paper Presenter ☐ Application Paper Presenter ☐ Poster Presenter ☐ Panelist ☐ Tutorial Presenter ☐ Conf. Attendee

Symposium Registration (all fees are in US dollars)

Category	Early Bird (by Feb. 7, 2006)	Advance (by Mar. 15, 2006)	Late/On-Site (after Mar. 15, 2006)	Sub Total (\$ US) 1
Full Member – IEEE*	<input type="checkbox"/> 600	<input type="checkbox"/> 700	<input type="checkbox"/> 800	
Full Non-Member	<input type="checkbox"/> 750	<input type="checkbox"/> 875	<input type="checkbox"/> 1000	
Full Non-Member with 1/2-year Comsoc affiliate membership	<input type="checkbox"/> 775	<input type="checkbox"/> 900	<input type="checkbox"/> 1025	
Student Member – IEEE	<input type="checkbox"/> 200	<input type="checkbox"/> 250	<input type="checkbox"/> 300	
Student Non-Member	<input type="checkbox"/> 250	<input type="checkbox"/> 325	<input type="checkbox"/> 375	
Life Member	<input type="checkbox"/> 200	<input type="checkbox"/> 250	<input type="checkbox"/> 300	

*Note: fee includes a complimentary 1/2 year ComSoc membership; Check here if you do not wish a 1/2 year complimentary ComSoc membership ☐

- All NOMS 2006 paper presenters must register at the FULL rate. For authors presenting multiple papers, one FULL registration is valid for up to three papers.

- I am registering as: ☐ Comsoc Member ☐ IEEE Member ☐ Comsoc Sister Society Member. Please enter your member number: _____

- Members of the following ComSoc Sister Societies may register at the IEEE Member rate. Please check the appropriate affiliation:

AET ☐, CQS ☐, CIC ☐, CIE ☐, CIEE ☐, EZS ☐, THE ☐, IEICE ☐, IETE ☐, KICS ☐, LITTA ☐, POPOV ☐, REV ☐, SBRT ☐, SEE ☐, SEEI ☐, SR ☐, VDE ☐

- Full Registration includes all plenary sessions, technical/application/panel sessions, one Symposium Record, refreshments, lunch Tuesday through Thursday, Welcome Reception, and Banquet. Student and Life Member Registration include the same benefits as full registration except Banquet.

- IEEE Full Member and IEEE Student Member registrants of NOMS 2006 will be eligible for a 1-year free subscription to IEEE TNSM (www.etnsn.org) when it becomes available.

Tutorial Registration (Fees for NOMS 2006 Registered Participants / for Non-Registered Participants)

# of tutorials	Early Bird (by Feb. 7, 2006)	Advanced (by Mar. 15, 2006)	Late/On-Site (after Mar. 15, 2006)	Sub Total (\$ US) 2
1 (Non-student)	<input type="checkbox"/> 150 / <input type="checkbox"/> 300	<input type="checkbox"/> 200 / <input type="checkbox"/> 400	<input type="checkbox"/> 250 / <input type="checkbox"/> 500	
2 (Non-student)	<input type="checkbox"/> 250 / <input type="checkbox"/> 500	<input type="checkbox"/> 300 / <input type="checkbox"/> 600	<input type="checkbox"/> 350 / <input type="checkbox"/> 700	
3 or 4 (Non-student)	<input type="checkbox"/> 350 / <input type="checkbox"/> 700	<input type="checkbox"/> 400 / <input type="checkbox"/> 800	<input type="checkbox"/> 450 / <input type="checkbox"/> 900	
1 (Student)	<input type="checkbox"/> 75 / <input type="checkbox"/> 125	<input type="checkbox"/> 100 / <input type="checkbox"/> 150	<input type="checkbox"/> 125 / <input type="checkbox"/> 175	
2 (Student)	<input type="checkbox"/> 100 / <input type="checkbox"/> 150	<input type="checkbox"/> 125 / <input type="checkbox"/> 175	<input type="checkbox"/> 150 / <input type="checkbox"/> 200	
3 or 4 (Student)	<input type="checkbox"/> 125 / <input type="checkbox"/> 175	<input type="checkbox"/> 150 / <input type="checkbox"/> 200	<input type="checkbox"/> 175 / <input type="checkbox"/> 225	

Please check in the NOMS 2006 homepage all tutorial sessions you plan to attend. Select only one for each time period.

Mon. 3 April 2006 AM Tutorials ☐ 1 ☐ 2 PM Tutorials ☐ 3 ☐ 4

Fri. 7 April 2006 AM Tutorials ☐ 5 ☐ 6 PM Tutorials ☐ 7 ☐ 8

Workshop Registration (Fees for NOMS 2006 Registered Participants / for Non-Registered Participants)

Workshop	Early Bird (by Feb. 7, 2006)	Advanced (by Mar. 15, 2006)	Late/On-Site (after Mar. 15, 2006)	Sub Total (\$ US) 3
E2EMON (3 April)	<input type="checkbox"/> 150 / <input type="checkbox"/> 300	<input type="checkbox"/> 175 / <input type="checkbox"/> 350	<input type="checkbox"/> 200 / <input type="checkbox"/> 400	
FeBD (3 April)	<input type="checkbox"/> 150 / <input type="checkbox"/> 300	<input type="checkbox"/> 175 / <input type="checkbox"/> 350	<input type="checkbox"/> 200 / <input type="checkbox"/> 400	
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<http://www.apnoms.org/2006/>

September 27 ~ 29, 2006, Busan, Korea

APNOMS 2006 Overview

The Asia-Pacific Network Operations and Management Symposium (APNOMS) has been one of the premier conferences on network operations and management, in accord with IEEE/IFIP NOMS (Network Operations and Management Symposium), IFIP/IEEE DSOM (Distributed Systems: Operations and Management), and IFIP/IEEE IM (International Symposium on Integrated Network Management).

APNOMS is sponsored by the KICS (Korea Institute of Communication Science) Committee on Korean Network Operations and Management (KNOM) and IEICE (Institute of Electronics, Information and Communication Engineers) Technical Committee on Telecommunication Management (TM).

APNOMS is supported by the IEEE Committee on Network Operations and Management (CNOM), IEEE Asia-Pacific Board (APB), and IEEE Comsoc Japan Chapter and TeleManagement Forum (TMF).

Since 1997, APNOMS has provided annual forum for the research, standards, development, system integrator, vendor, network operators and user communities in telecommunication network/service operations and management. Beginning with the first APNOMS`97 in Seoul Korea, a series of successful symposia had been held in Sendai Japan, Kyongju Korea, Nara Japan, Sydney Australia, Jeju Korea, Fukuoka Japan, and Okinawa Japan. In 2006, APNOMS2006 will be held in Busan Korea.

Topics of Interests

The theme of APNOMS 2006 is "**Management of Broadband Ubiquitous Convergence Networks and Services.**" In APNOMS 2006, the topics of interest include, but not limited to, network & service management for broadband convergence networks, business operations & management, service-oriented managements (i.e., SLA/SLS, security, billing, etc.), management architecture and technologies, various experiences, and recent standardization activities:

❑ Network Management & Service Provisioning

- Applications and Service Provisioning
- SLA/QoS Management, Traffic Engineering
- Management of Ad-hoc/Mesh Networks
- Management of 3G/4G Networks
- Management of Sensor Networks

- Management of DWDM, Optical Cross-connect
- Home Network Management
- Management of Wireless LAN
- Virtual Network Provisioning and Operation

❑ Management Architecture & Technology

- Architecture and Modeling
- Web/Java Based Management
- Mobile Agent-based Management
- Policy-based Management
- Next Generation OSS Platforms
- Converged networking issues for telecommunication and broadcasting
- Management of DWDM, optical networks

❑ Service Management

- Security Management
- Accounting and Billing
- Seamless roaming and handover
- Regulatory Issues
- Management Architecture for Ubiquitous Computing
- Ubiquitous Service Platforms
- Signaling for Application Sessions and Networking

❑ Experiences

- Trials on broadband convergence networks
- Migrations and case studies in interoperability
- Service provisioning across inter-AS domain networking

Paper Submission

Original and unpublished technical session and poster session papers are solicited. Please refer to the APNOMS 2006 homepage for paper preparation and submission instructions. The APNOMS 2006 proceedings will be published in Springer-Verlag's Lecture Notes in Computer Science (LNCS) series (approval pending).

Important Dates

- **Submission Deadline: May 1, 2006**
- Notification of acceptance: July 15, 2006
- Final camera-ready paper due: Aug. 15, 2006

APNOMS 2006 TPC Co-Chairs

Young-Tak Kim, Yeungnam Univ., Korea
(ytkim@yu.ac.kr)

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