

Guest editorial

Feature Interactions in Telecommunications Systems

L.G. Bouma ^a, Nancy Griffiths ^{b,*}, Kristofer Kimbler ^c

^a KPN Research, P.O. Box 421, 2260 AK Leidschendam, Netherlands

^b Lucent Bell Laboratories, 101 Crossfields Corner Road, Holmdel, NJ 07733, USA

^c High Definition Systems AB, Adelgatan 5, SE-21122 Malmö, Sweden

Imagine commuting home from work one day, driving past the downtown stores toward the grocery store when you receive a call on your mobile phone. It's your daughter, asking you to pick up milk on the way home. Now imagine that the call is from your refrigerator. This vision is not so far-fetched with today's computing and communications technologies. The communications network already provides messaging services, and these can easily be extended to support such automated messaging. Global positioning systems can determine where you are. Such devices are already installed in cars to provide directions to the drivers. Determining that you are about to pass the grocery store is just a small step from this. Finally, many appliances already use chips for various functions. It's not much of a stretch for appliance manufacturers to add distributed objects to enable their appliances to communicate. Perhaps the most far-fetched idea is trusting electronic appliances to manage our lives to this extent!

This current issue of *Computer Networks* addresses the interworking of services that the above vision requires. Feature interactions are a major hindrance to proper interworking of different kinds of services, such as messaging services with location detection systems and appliance services. Billing issues could be a hindrance, too. Suppose

that the wireless provider, the wireline provider, and the messaging service provider are all different companies, as they might well be in a competitive marketplace. Different approaches to billing could make it impossible to use the services together, even if they function together exactly as they should.

In 1998, the Fifth International Workshop on Feature Interactions [1] sponsored the first-ever Feature Interaction Detection Contest. The goal of the contest was to compare different automated tools for detecting feature interactions from the feature requirements. This special issue of *COMNET* contains a paper by the contest committee explaining the contest and papers from four of the contestants on their tools for detecting feature interactions. The contest represents a significant advance in the understanding of what is a feature interaction and in the methods for feature interaction detection evaluating tools. It also gave us a greater appreciation of what remains to be done.

In this guest editorial, we briefly describe the contest and then spend some time discussing the contest results and ongoing issues.

1. The contest

The contest provided the requirements for 12 features and challenged each contestant to detect feature interactions using an automated tool. The features were presented in two phases. In phase

* Corresponding author.

E-mail address: nancyg@lucent.com (N. Griffiths).

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Iv

**Kenneth J. Turner, Evan H. Magill, David
J. Marples**



Feature Interactions In Telecommunications Networks Iv:

Feature Interactions in Telecommunications and Software Systems V K. Kimbler, L. G. Bouma, 1998 The LabManual is a valuable tool designed to enhance your lab experience Lab activities objectives materials lists step by step procedures illustrations and review questions are commonly found in a Lab Manual *Feature Interactions in Telecommunications Networks IV* Petre Dini, Raouf Boutaba, L. Logrippo, 1997 **Feature Interactions in Telecommunications and Software Systems VI** Muffy Calder, Evan Magill, 2000 Typically telecommunications services are implemented in software Feature interaction is the term used to describe interference between services or features most attention is given to cases where the interference is undesirable ie there is an incompatibility In telecommunications control and data is distributed and on such a large scale that software development is by numerous disjoint teams by its nature therefore this software experienced the feature interaction problem first But while the workshop focuses on communications services the subject has relevance to any domain where separate software entities control a shared resource *Feature Interactions in Telecommunications and Software Systems VIII* Stephan Reiff-Marganiec, Mark D. Ryan, 2005 Features additional services occur whenever organisations compete by differentiating their products from those of rival organisations Adding one feature may break another or interfere with it in an undesired way This phenomenon is called feature interaction This book explores ways in which the feature interaction problem may be mitigated **Encyclopedia of Software Engineering Three-Volume Set (Print)** Phillip A. Laplante, 2010-11-22 Software engineering requires specialized knowledge of a broad spectrum of topics including the construction of software and the platforms applications and environments in which the software operates as well as an understanding of the people who build and use the software Offering an authoritative perspective the two volumes of the Encyclopedia of Software Engineering cover the entire multidisciplinary scope of this important field More than 200 expert contributors and reviewers from industry and academia across 21 countries provide easy to read entries that cover software requirements design construction testing maintenance configuration management quality control and software engineering management tools and methods Editor Phillip A Laplante uses the most universally recognized definition of the areas of relevance to software engineering the Software Engineering Body of Knowledge SWEBOK as a template for organizing the material Also available in an electronic format this encyclopedia supplies software engineering students IT professionals researchers managers and scholars with unrivaled coverage of the topics that encompass this ever changing field Also Available Online This Taylor E mail e reference taylorandfrancis com International Tel 44 0 20 7017 6062 E mail online sales tandf co uk **Feature Interactions in Telecommunications and Software Systems VII** Daniel Amyot, Luigi Logrippo, 2003 Feature interaction is a phenomenon known to the designers of modern telephone switching systems This phenomenon occurs when one feature modifies or subverts the operation of another one This work brings together representatives of the telecommunications industry and the software industry *Feature Interactions in*

Telecommunications Systems L. G. Bouma, H. Velthuisen, 1994 Features are modifications to the control of telecommunications services A feature interaction occurs when the behaviour of another which can lead to unexpected or undesired behaviour which affects the quality of service The goal of this volume is to generate a combination of techniques through protocol engineering software testing formal techniques and AI and applications to telecommunications services

Active Networks James P. G. Sterbenz, 2002-11-22 This book constitutes the refereed proceedings of the IFIP TC6 4th International Working Conference on Active Networks IWAN 2002 held in Zurich Switzerland in December 2002 The 20 revised full papers presented were carefully reviewed and selected from 53 submissions Among the topics addressed are router architectures reconfigurable systems NodeOS service deployment active network services active network queries network management agents active network performance mobile communications programmable networks network execution environments active network architecture group communication peer to peer networks and interaction detection

Encyclopedia of Computer Science and Technology Allen Kent, James G. Williams, 1999-05-14 An Approach to Complexity from a Human Centered Artificial Intelligence Perspective to The Virtual Workplace *Feature Interactions in Software and Communication Systems X* Masahide Nakamura, Stephan Reiff-Marganiec, 2009 Tenth International Conference of Feature Interactions in Software and Communications Systems ICFI 2009 held in Lisbon Portugal 11 12 June 2009 Pref

Algebraic Methodology and Software Technology Armando M. Haeberer, 1998-12-15 AMAST's goal is to advance awareness of algebraic and logical methodology as part of the fundamental basis of software technology Ten years and seven conferences after the start of the AMAST movement I believe we are attaining this The movement has propagated throughout the world assembling many enthusiastic specialists who have participated not only in the conferences which are now annual but also in the innumerable other activities that AMAST promotes and supports We are now facing the Seventh International Conference on Algebraic Methodology and Software Technology AMAST 98 The previous meetings were held in Iowa City USA 1989 and 1991 in Enschede The Netherlands 1993 in Montreal Canada 1995 in Munich Germany 1996 and in Sydney Australia 1997 This time it is Brazil's turn in a very special part of this colorful country Amazonia Thus if we have done more it is by standing on the shoulders of giants The effort started by Teodor Rus Arthur Fleck and William A Kirk at AMAST 89 was consolidated in AMAST 91 by Teodor Rus Maurice Nivat Charles Rattray and Giuseppe Scollo Then came modular construction of the building wonderfully carried out by Giuseppe Scollo Vangalur Alagar Martin Wirsing and Michael Johnson as Program Chairs of the AMAST conferences held between 1993 and 1997 Feature Interactions in Telecommunications Systems, III Kong E. Cheng, Tadashi Ohta, 1995 In an information society heavily dependent on communications and distributed systems feature interactions are likely to become an even more important problem than they are today A particularly interesting issue given the current work on agents is whether feature interactions will be more likely in systems with many autonomous agents performing tasks The current demand for better and more convenient communications

requires development of a variety of new services as quickly as possible. As the number of services becomes larger, however, feature interactions create incompatibilities between the various functions needed to implement them. In developing telecommunication systems, we now spend huge numbers of person hours on software modifications and testing whenever a new function is added. Much of this time is spent on detecting and eliminating problems arising from feature interaction. In the future, as ever more services are offered, feature interactions will become a major bottleneck in the development of software for telecommunications systems. This book presents opinions on the technical problems involved in feature interactions and definitions of features and feature interactions.

Tools and Algorithms for the Construction of Analysis of Systems W. Rance Cleaveland, 2003-05-21 ETAPS 99 is the second instance of the European Joint Conferences on Theory and Practice of Software. ETAPS is an annual federated conference that was established in 1998 by combining a number of existing and new conferences. This year it comprises five conferences: FOSSACS, FASE, ESOP, CC, TACAS, four satellite workshops, CMCS, AS, WAGA, CoFI, seven invited lectures, two invited tutorials, and six contributed tutorials. The events that comprise ETAPS address various aspects of the system development process, including specification, design, implementation, analysis, and improvement. The languages, methodologies, and tools which support these activities are all well within its scope. Dierent blends of theory and practice are represented with an inclination towards theory with a practical motivation on one hand and soundly based practice on the other. Many of the issues involved in software design apply to systems in general, including hardware systems, and the emphasis on software is not intended to be exclusive.

IP Multimedia Subsystem (IMS) Handbook Mohammad Ilyas, Syed A. Ahson, 2018-10-03 Take Part in the Future of Wireless Wireline Convergence. The IP multimedia subsystem (IMS) established as the foundation for future wireless and wireline convergence is the bedrock that will facilitate easy deployment of new rich personalized multimedia communication services that mix telecom and data services. Designers, planners, and researchers of communication systems will need to make full use of the technology occurring with this convergence if they want to be the ones providing end users with new and efficient services that are as cost effective as they are innovative. To provide researchers and technicians with the tools they need to optimize their role in this communication revolution, the IP Multimedia Subsystem (IMS) Handbook presents all the technical aspects of the IMS needed to support the growth of digital traffic and the implementation of underlying networks. This guide covers everything from basic concepts to research grade material, including the future direction of the architecture. Organized in three sections, the book brings together the technical savvy of 50 pioneering experts from around the world, providing complete coverage of relevant concepts, technologies, and services. Learn How IMS Will Speed Innovation, Filling the gap between existing traditional telecommunications and Internet technologies. IMS has led to an environment in which new services and concepts are introduced more quickly than ever before, such as reusable service components and real time integration. The technology promises to be a cost effective evolutionary path to future wireless and wireline convergences that will meet next generation

service requirements *Service Provision* Kenneth J. Turner, Evan H. Magill, David J. Marples, 2005-01-28 This book provides the first overview of the service technologies available to telecoms operators working in a post convergence world Previous books have focused either on computer networks or on telecoms networks This is the first to bring the two together and provide a single reference source for information that is currently only to be found in disparate journals tool specifications and standards documents In order to provide such broad coverage of the topic in a structured and logical fashion the book is divided into 3 parts The first part looks at the underlying network support for services and aims to explain the technology that makes the user visible services possible This section covers multimedia networking both traditional legacy and future softswitch call processing intelligent networks the Internet and Wireless networks Part 2 deals with how these services may be analysed and managed Chapters cover topics such as commercial issues service management quality of service security standards and APIs Part 3 concludes the book by looking ahead at evolving technologies and more speculative possibilities discussing the kinds of services that may be possible in the future and the technologies that will support them Focuses is on how the technology supports the services rather than on technology for its own sake Contributors drawn from both academia and industry companies such as Marconi BT Telcordia Cisco Analysys to give both theoretical and real world perspectives Unique single reference source for a wide range of material currently found only in disparate papers specs and documentation Covers brand new technologies such as JAIN JTAPI Parlay IP multimedia networking active networks WAP wireless LANs agent based services etc **Managing QoS in Multimedia Networks and Services** José Neuman de Souza, Raouf Boutaba, 2013-04-17 Welcome to the third International Conference on Management of Multimedia Networks and Services MMNS 2000 in Fortaleza Brazil The first MMNS was held in Montreal Canada in July 1997 and the second MMNS was held in Versailles France in November 1998 The MMNS conference takes place every year and a half and is aimed to be a truly international event by bringing together researchers and practitioners from all around the world and by organising the conference each time in a different continent country Over the past several years there has been a considerable amount of research within the fields of multimedia networking and network management Much of that work has taken place within the context of managing Quality of Service in broadband integrated services digital networks such as the ATM and more recently in IP based networks to respond to the requirements of emerging multimedia applications ATM networks were designed to support multimedia traffic with diverse characteristics and can be used as the transfer mode for both wired and wireless networks A new set of Internet protocols is being developed to provide better quality of service which is a prerequisite for supporting multimedia applications Multimedia applications have a different set of requirements which impacts the design of the underlying communication network as well as its management Several QoS management mechanisms intervening at different layers of the communication network are required including QoS routing QoS based transport QoS negotiation QoS adaptation FCAPS management and mobility management **Language Constructs for**

Describing Features Stephen Gilmore, Mark Ryan, 2012-12-06 A feature is a small modification or extension of a system which can be seen as having a self contained functional role such as Call Forwarding Automatic Call back and Voice Mail in telephone services to which users can subscribe Feature interaction happens when one feature modifies or subverts the operation of another and this problem has received a great deal of attention from industry and academics especially in the field of telecommunications where new services are constantly being developed and deployed This volume contains refereed papers resulting from the ESPRIT FIREworks working group The papers focus on the language constructs which have been developed describing features and advocate a feature oriented approach to software design including requirements specification languages and verifications logics

Formal Methods for Open Object-Based Distributed Systems V Bart Jacobs, Arend Rensink, 2002-03-31 Formal Methods for Open Object Based Distributed Systems V brings together research in three important and related fields Formal methods Distributed systems Object based technology Such a convergence is representative of recent advances in the field of distributed systems and provides links between several scientific and technological communities The wide scope of topics covered in this volume range in subject from UML to object based languages and calculi and security and in approach from specification to case studies and verification This volume comprises the proceedings of the Fifth International Conference on Formal Methods for Open Object Based Distributed Systems FMOODS 2002 which was sponsored by the International Federation for Information Processing IFIP and held in Enschede The Netherlands in March 2002

Intelligent Networks and Intelligence in Networks Jorgen Norgaard, Villy Baek Iversen, 2013-03-20 The IFIP International Working Conference on Intelligent Networks 95 was held at the Technical University of Denmark DTU in Copenhagen The conference was organised jointly by the Center for Tete Information at DTU and Tele Danmark Research during August 30 31 1995 and was hosted by the Center for Tete Information The conference was sponsored by IFIP TC6 The papers contained in this book are edited versions of the papers from the conference and some of the tutorial presentations that were arranged prior to the conference The mixture of tutorial papers and conference papers gives a broad and yet thorough coverage of activities and central areas of development in the IN world at this point in time Future developments especially in the area of extended mobility support and multimedia capabilities are also presented

BACKGROUND The theme of the conference was the two major trends in Intelligent Networks IN development ITU and ETSI based IN standards such as CS 1 and the upcoming CS 2 and long term development as undertaken by for example the TINA consortium and the European RACE and ACTS programmes The present IN technology based on capability sets is on its way into the networks and operators are pushing for open platforms to be deployed in the networks in the near future in order to obtain greater freedom in selecting platforms for service provisioning

Objects, Agents, and Features Mark D. Ryan, John-Jules Meyer, Hans-Dieter Ehrich, 2004-06-02 This book is the outcome of an international research seminar on objects agents and features held at Dagstuhl Castle Germany in February 2003 In recent years concepts in object oriented

modeling and programming have been extended in various directions giving rise to new paradigms such as agent orientation and feature orientation. This book explores the relationship between the original paradigm and the two new ones. The 12 revised full papers presented together with an introductory overview by the volume editors were carefully reviewed and improved for publication. Among the topics addressed are agent coordination in object orientation, feature orientation, components and feature interaction, software evolution, agent modeling and analysis, agent interaction, component-based systems, formal specification of agents and feature engineering.

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