

Lecture Notes in Computer Science

851

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Advisory Board: W. Brauer D. Gries J. Stoer



Hans-Jürgen Kugler Al Mullery
Norbert Niebert (Eds.)

Towards a Pan-European Telecommunication Service Infrastructure – IS&N '94

Second International Conference on Intelligence
in Broadband Services and Networks
Aachen, Germany, September 7-9, 1994
Proceedings

Springer-Verlag

Berlin Heidelberg New York
London Paris Tokyo
Hong Kong Barcelona
Budapest

Series Editors

Gerhard Goos

Universität Karlsruhe

Postfach 69 80, Vincenz-Priessnitz-Straße 1, D-76131 Karlsruhe, Germany

Juris Hartmanis

Department of Computer Science, Cornell University

4130 Upson Hall, Ithaca, NY 14853, USA

Jan van Leeuwen

Department of Computer Science, Utrecht University

Padualaan 14, 3584 CH Utrecht, The Netherlands

Volume Editors

Hans-Jürgen Kugler

European Software Institute

E-48016 Zamudio, Bizkaia, Spain

Al Mullery

IBM France

BP 43, F-06610 La Gaude, France

Norbert Niebert

Ericsson Eurolab Deutschland GmbH

Ericsson Allee 1, D-52134 Herzogenrath, Germany

CR Subject Classification (1991): C.2, B.4.1, H.4.3

ISBN 3-540-58420-X Springer-Verlag Berlin Heidelberg New York

CIP data applied for

Publication no. EUR15773 EN of the

European Commission,

Dissemination of Scientific and Technical Knowledge Unit,

Directorate-General Telecommunications, Information Market

and Exploitation of Research

Luxembourg

LEGAL NOTICE

Neither the European Commission nor any person acting

on behalf of the Commission is responsible for the use which might be made

of the following information

© ECSC-EC-EAEC, Brussels-Luxembourg, 1994

Printed in Germany

Typesetting: Camera-ready by author

SPIN: 10478920 45/3140-543210 - Printed on acid-free paper

Foreword

"A new 'information society' is emerging, in which management, quality and speed of information are the key factors for competitiveness: as an input to the industries as a whole and as a service provided to ultimate consumers, information and communication technologies influence the economy at all stages."¹

RACE has concerned itself for several years with the development of infrastructures, methods and techniques to make integrated telecommunication services available throughout the European Union, in a market shaped by many monopolies and severe regulation. Still, the situation is far from satisfactory, as also stated in the White Paper: "... supply of services is inadequate and, where it does exist, too costly, with the result that the demand is also too low ...".

Without efficient and usable service there can be no information market 'sans frontiers', no *information society*. And these services need to be created, deployed, managed and maintained efficiently and economically. A *service infrastructure* is needed that allows services to be introduced and used effectively while hiding other, underlying, heterogeneous communications and information services infrastructures.

The group of RACE projects called 'Intelligence in Services and Networks' addresses the essential issues of how to create and manage this infrastructure. They have made this book possible together with other initiatives and individual R&D activities from Europe and many other parts of the world. The book is a result of a conference exploring the vital technical issues in developing a telecommunications service infrastructure. As a response to the call for papers a total of 99 contributions was received for evaluation. A careful selection process supervised by the Programme Committee has resulted in 47 papers presented and printed in this book. Introductions to the topics are provided by the session chairpersons, who were very active in aligning the papers from the different sources.

The editors would like to thank all contributors for their effort and their cooperation, which has made this book possible. A special thank you is devoted to the local organising committee, especially Carmelita Görg and Andrew Butterfield who helped to bring the papers to a common format.

Hans-Jürgen Kugler
Al Mullery
Norbert Niebert

¹ "Growth, competitiveness, employment—The challenges and ways forward into the 21st century", White Paper, European Commission, Brussels, 1994

Preface

The book addresses a number of issues related to the design of telecommunication services in a rapidly changing technological and regulatory environment. The advent of intelligent and user-oriented service control facilities and terminals, together with the potential offered by digital broadband networks, opens up totally new concepts in service provision and operation - utilising integrated voice, data, and video rather than the separate telephone and data services of today.

The book addresses the design of telecommunication services in such a rapidly changing technological and regulatory environment.

The global nature of telecommunications and the liberalisation of the European market for the provision of services means that several operators may compete in providing the same services or services which rely on others forming a new infrastructure.

The success of this investment, however, will be determined by the uptake of services by potential subscribers. The need to fulfill the high quality requirements pertinent to telecommunication services and respond effectively to changes in usage patterns and market forces, means that highly flexible, reliable, secure, and efficient service and network management systems are required.

This book is concerned with the infrastructure necessary to develop, deploy, manage, and effectively market new and innovative services - approaches often referred to as Intelligence in Services and Networks, or IS&N systems for short. The book therefore addresses "seed" services, architectures, processes, methods, tools, and techniques. The issue of an advanced Service infrastructure in a European context is a crucial factor for the further development and deployment of telecommunication technologies.

The challenges are outlined in the book together with state of the art solutions. The articles presented originate from work carried out in RACE and other international initiatives like EURESCOM and TINA-C as well as from individual contributions.

List of Referees

Serious and detailed reviews are an essential foundation for the quality of the selection and later production process of the papers. The reviewers for the papers presented in this book have fulfilled their role with real personal engagement. It is therefore a great pleasure to thank them as well as the authors for their efforts.

Holger Berse
 Andrew Butterfield
 Mario Campolargo
 Joe Chester
 G. Cisneros
 Anne M. Clarke
 Berhard Cohen
 Quy Dang
 Michel Dauphin
 Keith Dickerson
 G. Giandonato
 Carmelita Görg
 Jane Hall
 Nick Hine
 June Hunt
 Kerstin Keil
 Ivan Kruzela
 Richard Lewis

Ferdinando Lucidi
 Wolfango Maggi
 Patrick McLaughlin
 Donal O' Mahony
 Declan O' Sullivan
 Rick Reed
 Alfred Ressenig
 Anders Rockstrøm
 Michael Rupprecht
 Peter Schoo
 Gerd Schürmann
 Otto Spaniol
 George Stassinopoulos
 Linda Strick
 Manfred Thüring
 Sebastiano Trigila
 Bernhard Walke
 Frank Wilson

Table of Contents

The Context of IS&N

<i>M. Campolargo</i>	1
----------------------------	---

Standards for Integrated Services and Networks

<i>K.R. Dickerson, J.P. Chester</i>	5
---	---

Industrial Requirements on a Service Creation Environment

<i>J. Hållstrand, D. Martin</i>	17
---------------------------------------	----

Defining and Structuring Service Requirements on the IN in order to Evaluate IN Architecture Initiatives

<i>D. Keane, C. Treanor, C. Licciardi, T. Mota</i>	27
--	----

Service Engineering versus Software Engineering - A Foundational Study

<i>M. Mac an Airchinnigh, H.-J. Kugler</i>	39
--	----

Integration of Adaptations for People with Special Needs

<i>N.A. Hine, W. Beattie, I.A.S. Gordon, J.L. Arnott, A. McKinlay, A.Spaepen, F. Wauters</i>	51
--	----

Surveillance and Protection in IBC Management: The Applicability of Two RACE Security Projects - SecureNet II and SESAME

<i>D. Androutsopoulos, P. Kaijser, S. Katsikas, K. Presttun, D. Salmon, P. Spirakis</i>	61
---	----

User Interfaces and their Implications for Future Services

<i>K. Keil</i>	73
----------------------	----

Metaphors and Layers of Signification: The Consequences for Advanced User Service Interfaces

<i>C. Condon, S. Keuneke</i>	75
------------------------------------	----

Graphical User Interface Style Guide for Mobile Communication Services

<i>M. Abramovici, N. Klußmann</i>	89
---	----

Advanced Videocommunications with Stereoscopy and Individual Perspectives

<i>M. Böcker, K. Hopf, D. Runde</i>	99
---	----

Hypermedia Applications for Distance Education and Training

<i>J.M. Haake, J. Hannemann, M. Thüring</i>	109
---	-----

Component Models and Service Creation

P. Schoo 121

Future Communication Networks - What (Public) Service Providers Should Provide

K. Jakobs 123

Modelling Services in the Portfolio from a Service Provisioning Perspective

H. Braux, J. Dreteler, M. Grasdijk, J.-L. Le Bail 133

Enhanced IN for Personal Communications

H. Bisseling, J. den Hartog, B. Schrijver 145

A Component Theory for Telecommunication Architectures

H. Li 157

Building Dedicated Service Creation Environments for Reuse Based Production

J. Hållstrand, M. M. Marques, L. Pontén 169

TMN Implementation Issues

R. J. Lewis 179

Management of Optical Networks: SNMP Agents Enabling TMN

A. Carvalho, F. de Carvalho, G. Pavlou 181

Requirements of Inter-Domain Management and their Implications for TMN Architecture and Implementation

L. H. Bjerring, M. Tschichholz 193

Security Requirements of the TMN X-Interface within End-to-End Service Management of Virtual Private Networks

W. Donnelly, S. O'Connell 207

High-Level Access APIs in the OSIMIS TMN Platform: Harnessing and Hiding

A. Carr, G. Pavlou, T. Tin 219

Services and Services Management

P. McLaughlin 231

User Requirements for Advanced Communication Services

A.M. Clarke, S.M. Pomfrett 235

Personal Communications - What is Beyond Radio?

N. Niebert, E. Geulen 247

Service Provisioning in a Multi-Provider Environment

R. Davison, P. O'Brien 259

Application of TINA-C Architecture to Management Services	
<i>L.A. de la Fuente, J. Pavón, N. Singer</i>	273
An Evolutionary Approach for TMN Management of IN Services	
<i>N. Beires, T. Magedanz, M. Kockelmans</i>	285
The Use of TMN as an Architectural Framework for Value Added Services Management	
<i>I. de Caluwé, P. Leever, J. Wester</i>	295
End-to-End Service Management with Multiple Providers	
<i>L.H. Bjerring, J.M. Schneider</i>	305
Beyond IN	
<i>J. Hunt</i>	319
Personal Communication - Network Aspects and Implementations	
<i>U. Jonsson, S. Kleier</i>	321
A Service Creation Environment for a Future Intelligent Network	
<i>P. Mudhar</i>	333
Providing Services in a World of IBC Resources: An Architectural Approach	
<i>D. Prevedourou, G. D. Stamoulis, I. Tönnby, T. An.</i>	343
Service Specification Concepts in TINA-C	
<i>H. Berndt, P. Graubmann, M. Wakano</i>	355
Application of Distributed Techniques to the Modelling of IN Architectures and Support of Service Execution	
<i>P. Carvalho, M. Mesquita, L. da Silva, F. Roque</i>	367
Distributed Transaction Processing in the IBC	
<i>G. Lacoste</i>	377
Methods and Tools	
<i>A. Galis</i>	391
Formalisation of Properties for Feature Interaction Detection: Experience in a Real-Life Situation	
<i>W. Bouma, W. Levelt, A. Melisse, K. Middelburg, L. Verhaard</i>	393
Development of Telecommunications Management Systems Using OO Methods and CASE Tool Support	
<i>P. S. Nielsen, B. Lønvgig</i>	407

A Decision Support System for Assurance of Quality of Service in Intelligent Network Service Provisioning	
<i>A. Newcombe, D. D. Borvitch, F. Lodge, T. Curran</i>	419
Formal Description of OSI Management Information Structure as a Prerequisite for Formal Specifications of TMN Interfaces	
<i>J. Keller, O. Dubuisson</i>	433
Specification and Design of TMN Systems	
<i>D. O'Sullivan</i>	443
Structuring Principles for Total Quality Management in IBCN	
<i>Z. Lioupas, Y. Manolessos, M. Theologou</i>	445
Service / Resource Discovery and Allocation	
<i>D. C. Doyle, D. S. Cochrane</i>	455
Specifying Pan-European Management Systems	
<i>L. Strick, J. Meinköhn</i>	467
Computational Modelling - UPT Split Charging Management Case	
<i>E. Dahle, P. L. Giganti</i>	479
Scenarios	
<i>A. Ressenig</i>	491
Security in Use and Management of VPN - a Banking Scenario	
<i>J. Ølnes, P. Spilling, A. Berquist</i>	493
SAMSON, Security Management in a Health Care Scenario	
<i>B. Baum-Waidner, H. Bunz, C. Capellaro</i>	503
IN Service Security and Service Management Security and their Relationships - Using UPT as a Case Study	
<i>D. Maillot, J. Ølnes, P. Spilling</i>	513
Architectures and Methods	
<i>S. Trigila</i>	525
A Service-Driven Vision of Integrated Broadband Communications: the OSA Approach	
<i>G. Bruno, F. Lucidi, J. Insulander, U. Larsson</i>	529
Concepts for a Flexible Service Architecture	
<i>J.-P. Redlich, D. Balfanz</i>	539

A Comparison of the PRISM and OMNI-Point Methodologies for the Specification of Management Systems	
<i>D. Sullivan, P. McLaughlin</i>	553
Formal Methods and Service Specification	
<i>M. M. Mac an Airchinnigh, G. O'Regan, D. Belsnes</i>	563
Achieving a Pan - European Service Infrastructure	
<i>A. Mullery</i>	573
Author Index	581