

# TELETRAFFIC SCIENCE AND ENGINEERING

## VOLUME

1a

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*Professor Dr.-Ing. Paul J. Kühn  
Institute of Communications Switching and Data Technics  
The University of Stuttgart, Stuttgart, Germany*

Teletraffic is the technical term identifying all phenomenons of the control and transport of information within telecommunications networks. The flow of user/control information, as a result of a large number of users, typically experience a stochastic nature.

Teletraffic Science is a well established field. It is based on the theory and on methods of probability and stochastic processes at one hand, and on methods for control, such as scheduling, synchronization of concurrent processes and queueing. Teletraffic Science is therefore strongly related to subjects as Performance Modelling, Queueing Theory, Operations Research, Computer Science and Telecommunications.

Teletraffic Engineering bases on the knowledge of the organization and technology of modern, computer controlled telecommunication systems, such as switching systems, computer networks, broadband and mobile communications systems, for the integration of a broad spectrum of telecommunication services such as voice, audio, graphics, video, individually or in combination (multimedia). Teletraffic Engineering comprises methods and tools for modelling of telecommunication systems and services, performance evaluation, resource dimensioning, cost optimization, forecasting, planning and resource administration (network management).

The main purpose of the new Series on 'Teletraffic Science and Engineering' is the publishing of the Proceedings of the World Conferences ITC, selected special Conferences organized under the IAC (e.g. ITC Specialist Conferences, if appropriate) and special Teletraffic Monographs. Common to all series publications is a high technical quality and a high interest of experts in the field of teletraffic in science/research, system development and network operations. The high technical quality is achieved by strong reviewing practices controlled by international programme committees of leading experts.

KTKo

# The Fundamental Role of Teletraffic in the Evolution of Telecommunications Networks

Proceedings of the 14th International Teletraffic Congress - ITC 14,  
Antibes Juan-les-Pins, France, 6-10 June, 1994

VOLUME

1a

Edited by

JACQUES LABETOULLE

*EURECOM*

*Valbonne, France*

JAMES W. ROBERTS

*France Télécom - CNET*

*Issy les Moulineaux, France*



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## PREFACE

The International Teletraffic Congress is a recognized international organization taking part in the work of the International Telecommunications Union. The congress traditionally deals with the development of teletraffic theory and its application to the design, planning and operation of telecommunication systems, networks and services. Its objective is to bring together people working in the teletraffic field in universities, equipment manufacturers, network operators and service providers to enable the exchange of ideas and experience and to foster personal contacts.

The first ITC took place in 1955 in Copenhagen and subsequent congresses have been held at three yearly intervals in The Hague, Paris, London, New York, Munich, Stockholm, Melbourne, Torremolinos, Montreal, Kyoto, Torino and Copenhagen (again). The present vitality of the ITC, which promotes specialist and regional seminars in addition to the triennial congresses, owes much to the energy and enthusiasm of Professor Arne JENSEN. Between the first and last congresses in Copenhagen, both of which he chaired, he has overseen an impressive development in the science (or art) of teletraffic theory and engineering as chairman of the International Advisory Council. At the end of the last congress, however, when he became Chairman Emeritus of the IAC, Arne JENSEN left the executive responsibility for the ITC to a new chairman, Professor Paul KUHN. ITC 14 is thus the first congress under a new chairman. It differs in two important respects from its predecessors.

Firstly, the papers to be presented have been selected by an international programme committee after a thorough review of the full paper (and not just an abstract) by three independent referees. It was possible to accept only slightly more than half of the submitted papers. The choice was difficult and we regret that it has been necessary to exclude many good quality papers. The high rejection rate does, however, ensure an exceptionally high standard for the work presented in ITC 14.

The second innovation concerns the congress schedule. ITC 14 takes place from Monday to Friday, breaking with the traditional Wednesday to Wednesday schedule of previous congresses. Regular sessions are scheduled for Monday, Tuesday, Thursday and Friday. Plenary sessions in the mornings will allow the presentation of high quality papers of general interest within subject areas of fairly broad scope. The majority of papers will be presented in more focussed parallel sessions taking place in the afternoons.

Wednesday morning is reserved for three parallel tracks of special sessions of two types. Following the success of the similar event organized in ITC 13 in Copenhagen, a workshop on *Teletraffic Engineering for Developing Countries* will occupy one track. The other two tracks are devoted to sessions on "hot topics" where invited speakers will provide up to date input on important teletraffic issues arising in four different areas: *Signalling and the Intelligent Network*, *Personal Communication Services*, *Traffic Measurement* and *Cost/Quality Tradeoffs for New Information Services*. Papers presented in these sessions do not appear in the Proceedings.

The contents of ITC 14 illustrate the important role of teletraffic in the current period of rapid evolution of telecommunications networks. A large number of papers address the teletraffic issues behind developments in broadband communications and ATM technology. The extension of possibilities for user mobility and personal communications together with the generalization of common channel signalling and the provision of new intelligent network services are further extremely significant developments whose teletraffic implications are explored in a number of contributions. These papers illustrate the expanding role of the teletraffic specialist whose concerns now include characterizing and quantifying the traffic of variable bit rate and mobile services, determining what quality of service criteria are appropriate for new services and defining the traffic control procedures by which they can be guaranteed, interpreting the impact on network dimensions and cost of proposed technical solutions and contributing to the elaboration of international standards compatible with the objective of a cost effective network providing reliable service.

Of course, ITC 14 also addresses traditional teletraffic subjects, proposing enhancements to traffic engineering practices for existing circuit and packet switched telecommunications networks and making valuable original contributions to the fundamental mathematical tools on which teletraffic theory is based. Even the traditional role of the traffic engineer may be seen to gain in importance in an increasingly competitive environment where customers will naturally select the most cost effective and reliable networks and services. The contents of these Proceedings accurately reflect the extremely wide scope of the ITC, extending from basic mathematical theory to day-to-day traffic engineering practices, and constitutes the state of the art in 1994 of one of the fundamental telecommunications sciences.

As Vice-chairman and Chairman of the Programme Committee, we have had the responsibility of implementing the new paper selection procedure and preparing the Technical Programme within the framework set out by Paul KUHN and the IAC. Overall responsibility for the organization of ITC 14 has been in the capable hands of the General Secretary, Prosper CHEMOUL. He joins with us in wishing participants a highly fruitful and enjoyable congress.

Jacques LABETOULLE    and    Jim ROBERTS

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## TECHNICAL PROGRAMME

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11.00 a.m.-12.30 p.m. Plenary Session	A20: Directions in Teletraffic Research
2.00 p.m.-3.30 p.m. Parallel Sessions	A31: ATM Multiplexer Performance (1)
	A32: Signalling and Intelligent Network Performance
	A33: Analysis of Queueing Systems (1)
4.00 p.m.-5.30 p.m. Parallel Sessions	A41: B-ISDN Traffic Descriptors
	A42: Switch Overload Controls
	A43: Video and Data Traffic Characteristics
<b>Tuesday 7 June 1994</b>	
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	B32: Teletraffic Analysis of Mobile Telecommunications
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	B42: Dynamic Routing
	B43: Analysis of Queueing Systems (2)
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	C12: Traffic Measurement
	C13: Teletraffic Engineering for Developing Countries (1)
11.00 a.m.-12.30 p.m. Special Sessions	C21: Mobile and Personal Communications
	C22: Managing Cost/Performance Tradeoffs for New Information Services
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