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Networking in Open Systems

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Preface

The contributions to this volume were prepared for and presented at the IBM Europe Institute 1986 in Oberlech, Austria. The seminar "Networking in Open Systems", which was held from August 18 to August 22, was organized jointly by the IBM European Networking Center (ENC) Heidelberg and the National Bureau of Standards (NBS), Gaithersburg, USA, under the guidance of the Director of Scientific Programs, Dr. H. Budd (IBM), and the organization of Dr. L. Hyvarinen (IBM). The IBM Europe Institute provides in a series of weekly seminars on various topics the opportunity for leading researchers to reflect on the current advances and future directions of their field.

Networking is one of the most challenging areas of computer science. The challenge is to develop techniques to take advantage of new communication technologies such as local area networks, fiber optics, or ISDN in order to provide students, researchers or office workers with the means to communicate via electronic mail, computer conferencing systems, or the ability to retrieve a variety of documents from remote data bases, etc..

Standards, architectures, and implementations of networks following the Open Systems Interconnection model are receiving wide technical, economical, and political attention. The need to interconnect heterogeneous networks and computers for the purpose of transparent access to information via standardized protocols is accepted by many. However, many technical and strategic issues remain controversial and are open to continued research efforts:

1. There is a growing need for increased availability of advanced applications requiring access to remote services in networks of heterogeneous hard- and software. Neutral parties are going to play a crucial role to define the success of OSI to assure a balance of interests of all involved groups ranging from endusers via network providers to manufacturers.

2. OSI is designed as an architecture to interconnect autonomous systems. OSI protocols will require modifications and additions to achieve high performance and network management functions.

3. Standardization and implementation are slow by nature. Ambiguities in standards and necessary compromises cause misunderstandings and create the need for techniques to produce implementations at least parallel to evolving standards. Formal descriptions and program generators will need a closer relationship to prove helpful to real systems.

4. The dramatic advance in technology and the huge market in communication and computer networks, the progressing digitalization of information demand through OSI a consistent use of protocols between private and public applications in networks and the incorporation of ISDN into OSI. Incompatibilities in requirements and proposals from CCITT, e.g. X.400, and industry, e.g. MAP and TOP, are already evident.

The purpose of this book is to provide an overview of the state-of-the-art and to explore the directions of future research in telecommunications and distributed systems. Firstly, the main part concentrates on the evaluation of the CCITT recommendations and ISO standards with respect to OSI and ISDN and user services. Secondly, the book reviews in a top-down fashion new applications that are becoming available in modern offices, manufacturing, and the public domain. Thirdly, different approaches are discussed as to how these applications can be built more easily with advanced programming tools, and what support is needed for network operation in OSI by contrasting OSI to proprietary network architectures. The following main topic deals with operating systems support for communication systems. Many of the currently available operating systems are inadequate with respect to their communication primitives. Very often, today's implementations of OSI do not meet efficiency requirements. These critical deficiencies must be further investigated in order to achieve an open exchange of data. The final part of this volume is devoted to verification, specification, and testing of protocols.

Heidelberg, January 1987 — Gaithersburg, January 1987

G. Müller — R. Blanc

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