

PREFACE

During the past two decades there has been very rapid growth in the number, sophistication, and capacity of networks used to tie together people and computers. This includes both telecommunications and computer networks. Investments in such equipment have grown in size, along with the serious consequences of network failure and capacity shortfall. Accordingly the need for sound network planning has also grown.

Network planning involves the orderly and efficient deployment and management of communication facilities *over time*. This temporal aspect is what distinguishes network planning from generic network management. However, it is sometimes useful to view the field of network planning as a distinct subset of the field of network management. Network planning draws on people and ideas from several fields, including electrical engineering, operations research, computer science, and applied mathematics.

Network planning was originally a child of the telephone industry. Most large telephone carriers have had network planning departments for some time. Telephone companies have been joined in their need for a planning function by cable TV operators and computer network operators. There has also been a steady introduction of new technologies requiring new planning. This includes computers in general, ISDN networks, SONET networks, cellular radio networks, WDM networks and fiber optics, ATM networks, new types of local area and metropolitan area networks, and new cable TV technology.

This book is an introduction to the theory of network planning at the senior/graduate level. It is intended for students, practitioners, and managers interested in the telephone, computer network, and cable TV industries. The book is written in the style of a textbook, complete with homework problems, and a solutions manual. This material is suitable as a text for either a one-quarter course on network planning or for half of a one-semester course on network management and planning. It is in this latter form that I have successfully taught this material to Stony Brook students since 1994.

In this work I have surveyed a number of fundamental areas that are crucial to modern network planning. These areas are mathematical programming, network algorithms, reliability, software and optimization, and data analysis. The chapters on the first three topics are largely quantitative. A good part, though not all, of the last two chapters is qualitative. This is particularly true of the sections dealing with new software technologies.

The wide variance in the type of material covered in this book is due to the multidisciplinary nature of network planning. For topics that are amenable to a mathematical treatment, such has been provided, along with analytical homework problems. For those topics that are best treated qualitatively, a tutorial level presentation has been provided along with review homework problems.

In general, I have concentrated on the theory (in the best sense of the word) behind these areas. I have also assumed little prior knowledge on the part of the reader concerning network planning. The wide coverage of topics means that the reader will see only the “tip of the iceberg.” Hopefully, the references will guide the reader to more detailed sources on the various areas.

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