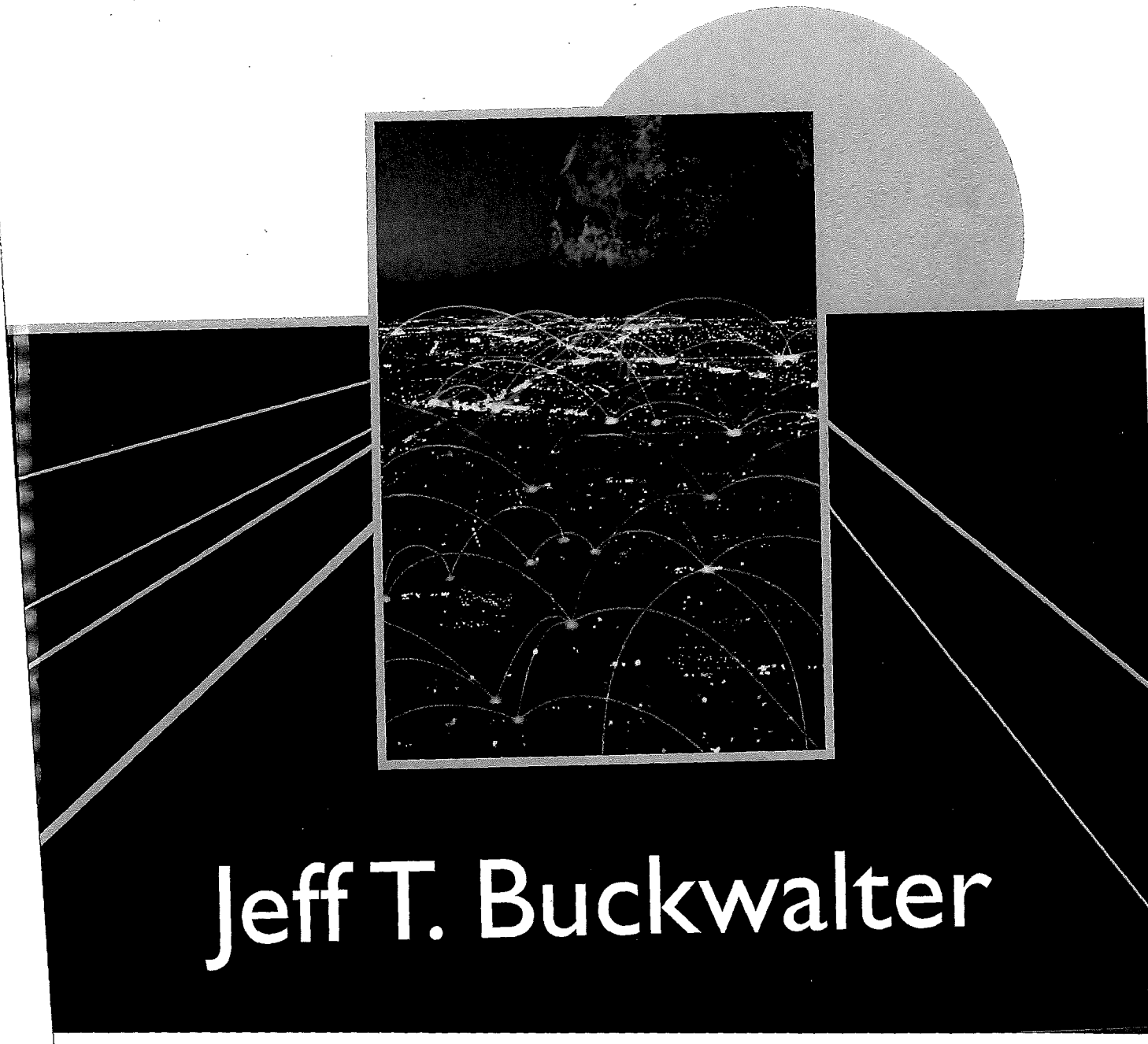
Frame Relay

Technology and Practice



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FRAME RELAY

TECHNOLOGY AND PRACTICE

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ADDISON–WESLEY

Boston • San Francisco • New York • Toronto • Montreal
London • Munich • Paris • Madrid
Capetown • Sydney • Tokyo • Singapore • Mexico City

Library of Congress Cataloging-in-Publication Data

Buckwalter, Jeff T.
Frame relay : technology and practice / Jeff T. Buckwalter.
p. cm.
Includes bibliographical references and index.
ISBN 0-201-48524-9
1. Frame relay (Data transmission) 2. Computer networks. I. Title.
TK5105.38 B83 1999
004.6'6—dc21 99-051438
CIP

Text printed on recycled and acid-free paper.

ISBN 0201485249

2 3 4 5 6 7 MA 04 03 02 01

2nd Printing January 2002

Chapter 1

Introduction

This chapter introduces changes in the business and technical communities that are driving demand for new communications services—in particular, frame relay services. An understanding of these trends provides a context for evaluating frame relay and other emerging technologies.

We introduce a simple block diagram for a frame relay network and briefly discuss the basic components. Frame relay networks will be discussed in much more depth in later chapters.

Next, we describe the major benefits of frame relay technology. These benefits are why frame relay has become so popular within the last few years. For balance, we also describe the major disadvantages of the technology.

Lastly, we briefly discuss the relation of frame relay to other technologies. We point out its major advantages and disadvantages as compared to leased lines, ATM, X.25, switched digital facilities, virtual private networks (VPNs), and other emerging technologies. These comparisons will be discussed further in later chapters.

Driving Forces for Frame Relay

Frame relay has been one of the major success stories in the data communications arena. From its introduction in the early 1990s, the combination of frame relay products and services has grown rapidly to an estimated $15 billion in annual global revenues in the year 2000 [VerticalSG99]. Growth rates have often been over 100% per year. *Why*?

The Need for Frame Relay

For a number of years, managers of **wide area networks** (WANs) have had several needs on their wish lists. Frame relay technology was developed to specifically address these needs, which are

- A higher performance packet technology
- Integration of traffic from both legacy and LAN applications over the same physical network
- Simpler network management
- More reliable networks
- Lower network costs

We now explore each one.

A Higher Performance Packet Technology

"High performance" means high throughput, low delay, and high efficiency. Good throughput and delay are requirements for a wide area network. High efficiency is desirable in order to obtain good return on investment.

Network managers have seen a dramatic increase in the volume of data traffic over the years. Some of the reasons for this, such as LAN internetworking and the shift from text to graphics, we will discuss in the next subsection. The result has been a need to handle much higher throughput, in bits per second, than previously.

In addition to the need for higher raw throughput, network managers also need low network delay, especially across the wide area network. Low delay (also known as latency) is necessary in part because of the expectations that LAN users have for very fast response time. Typically, users do not care and do not want to know whether the resources they are using are on their own LAN or on a distant one. In either case, they want fast response time, even though it is technically much harder to provide it across the wide area.

Lastly, network managers need a technology that efficiently handles bursty traffic. Most *data* traffic is bursty, meaning that an end user may want to transfer a 10-Mbyte file across the network and then do no more transfers for 20 minutes. This tends to produce very high circuit utilizations for *short* periods of time, then no utilization at all for *long* periods of time, resulting in a low *average* circuit utilization. (For our purposes, circuit utilization is the percentage of time the circuit is busy.) Network managers find it hard to cost-justify an expensive long-distance circuit that may be busy for only 5% of the time on the average. For that reason, they need a

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