

Computer Networks and Internets

《计算机网络与因特网》课件

林坤辉

Chapter 1 Introduction

1.1 Growth of Computer Networking

- Two decades ago, few people had access to a network.
- Now, computer communication has become an essential part of our infrastructure, computer networks are everywhere.
- the growth in networking has an economic impact as well.

1.1.1 Resource Sharing

- Early digital computers were extremely expensive and scarce.
- The first networks were designed to share large-scale computational power.

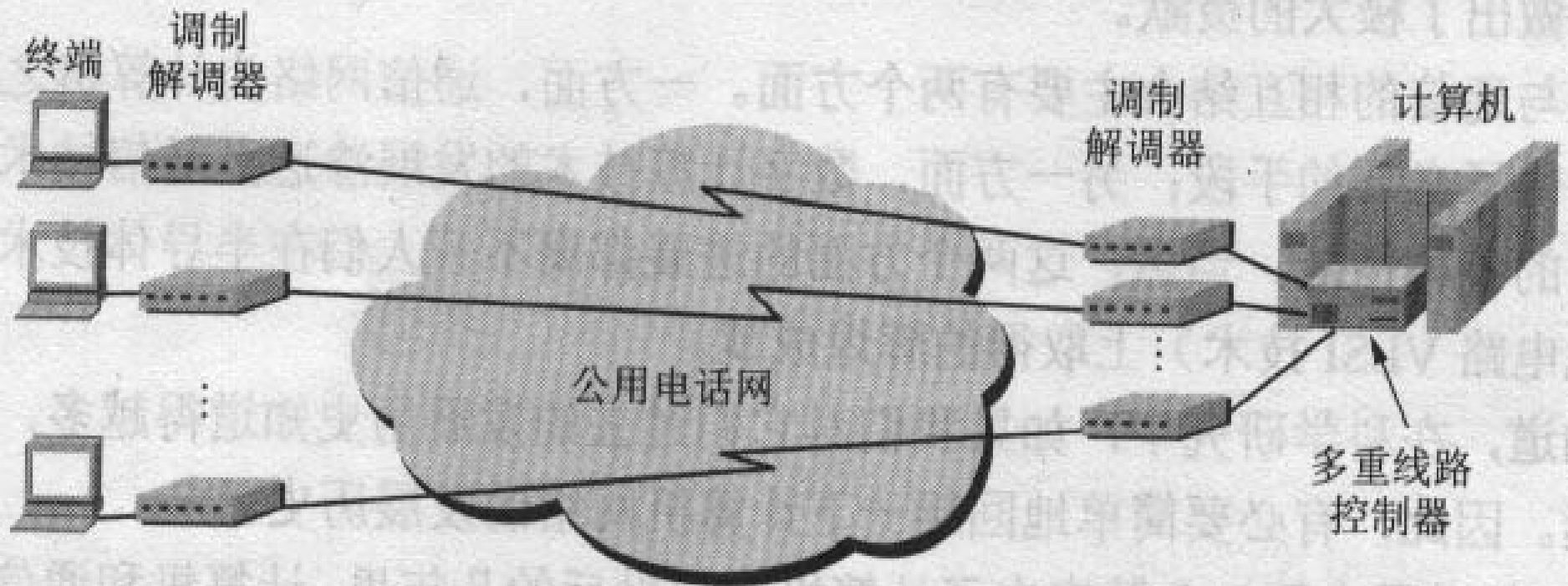


图 1-1 计算机通过多重线路控制器与远程终端相连

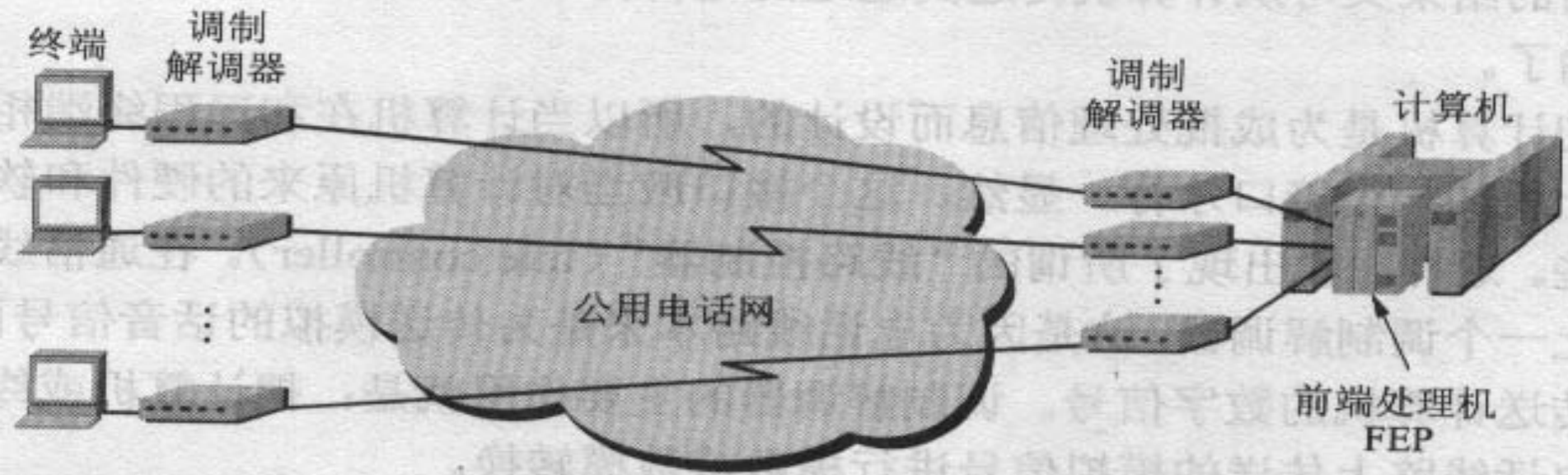


图 1-2 用前端处理机完成通信任务

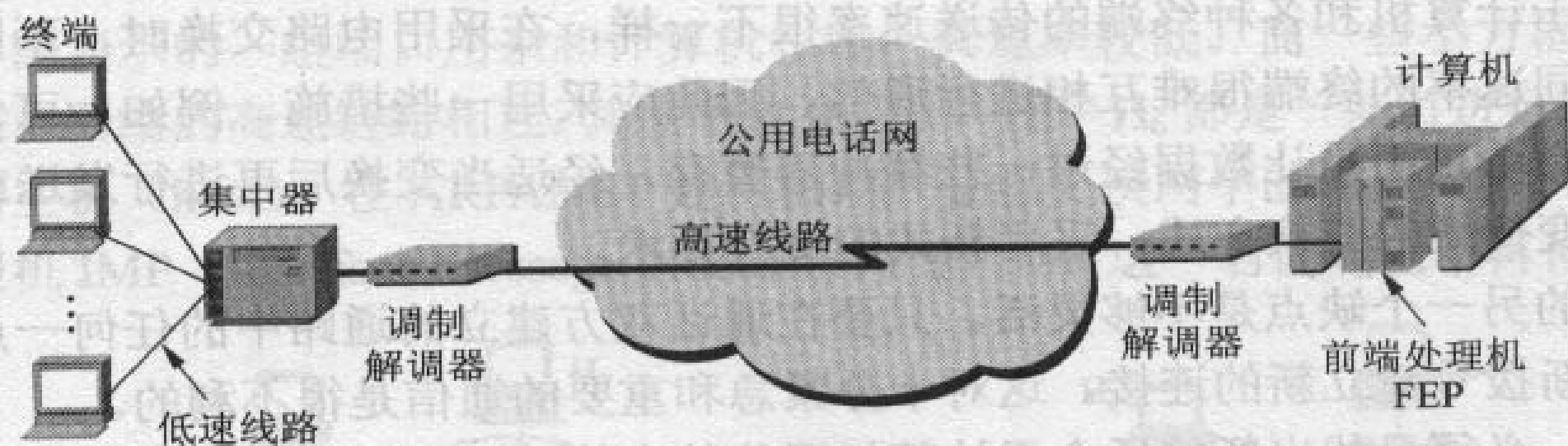
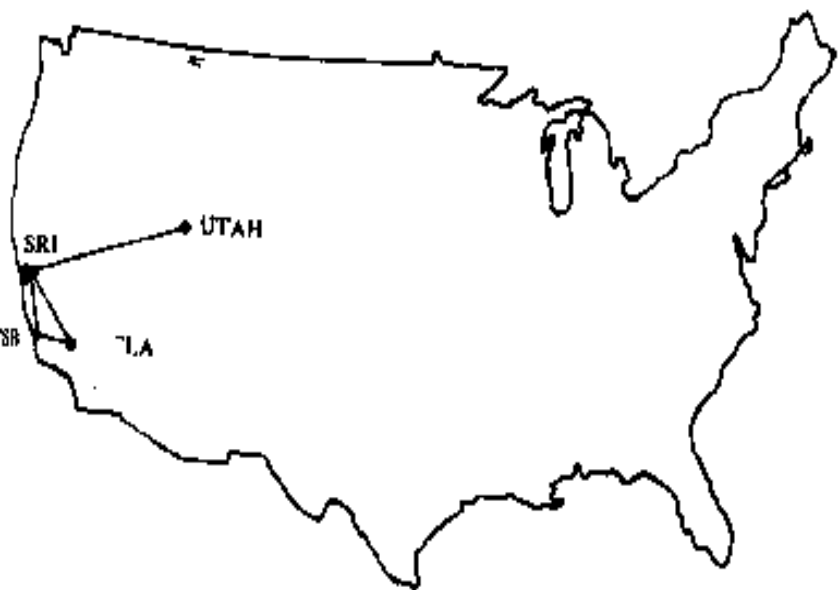


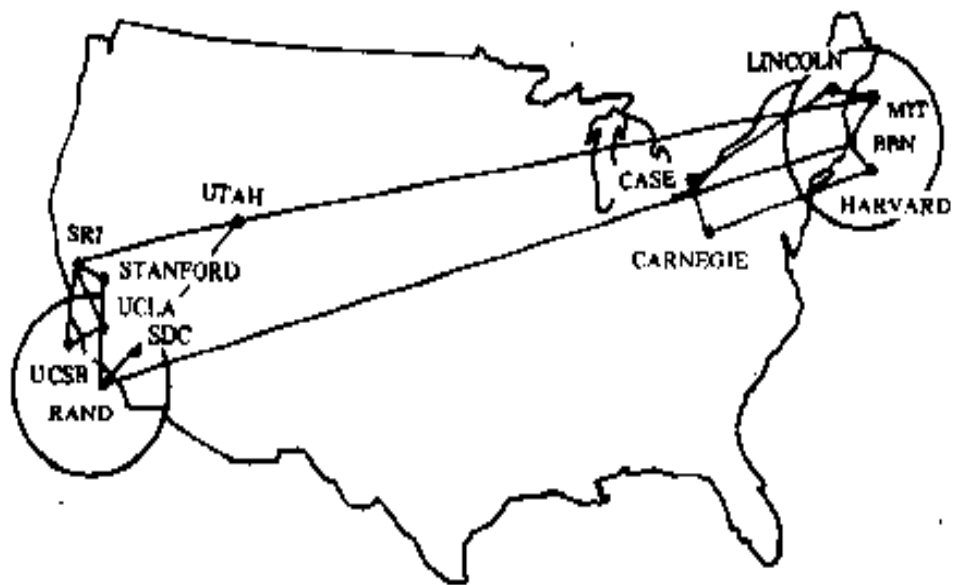
图 1-3 采用集中器以降低通信费用

- ARPA(高级研究计划署) was especially concerned about the lack of high-powered computer.
- By the latter 1960s, ARPA started investigating data networking.
- The ARPA networking research turned out to be revolutionary.
- A working system called the ARPANET.
- A technology known as internetworking

1969 年 12 月



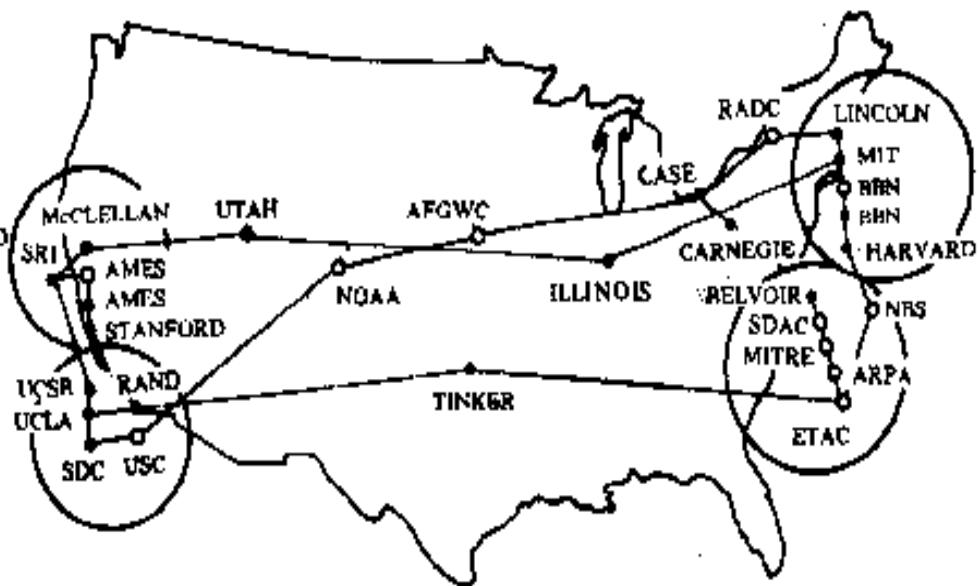
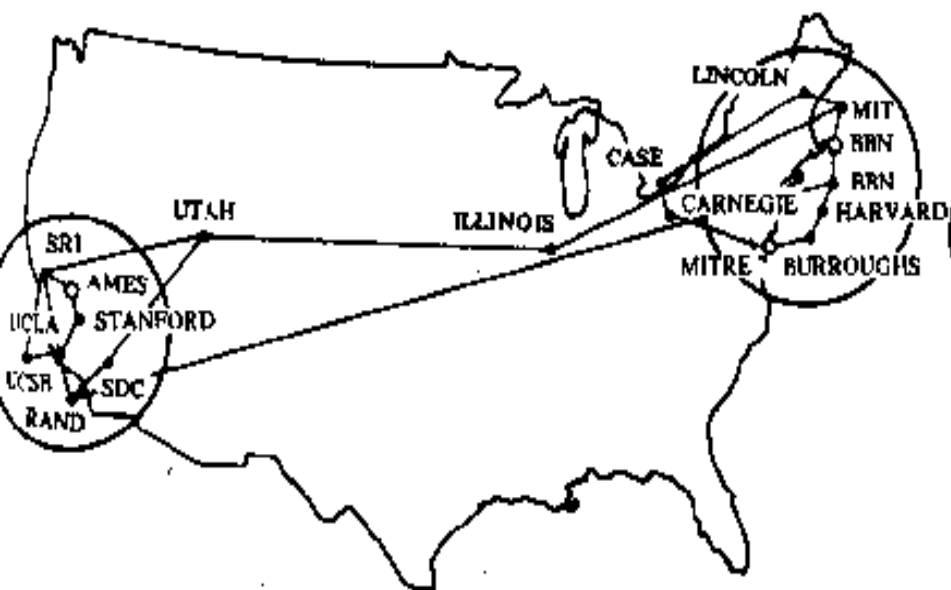
1970 年 12 月



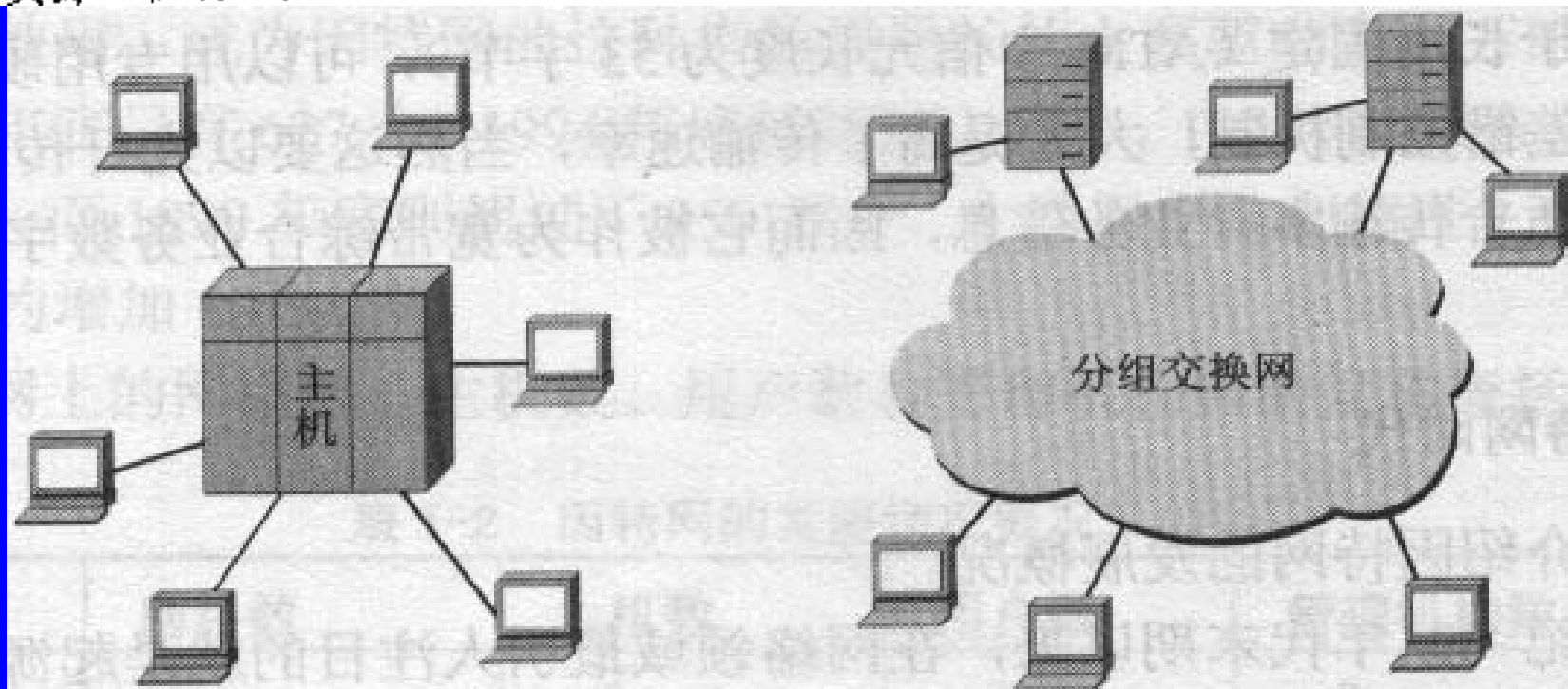
1971 年 9 月

ARPANET 的早期发展情况

1972 年 8 月



ARPANET 的试验成功使计算机网络的概念发生了根本的变化。早期的面向终端的计算机网络是以单个主机为中心的星形网（图 1-8(a)），各终端通过通信线路共享主机的硬件和软件资源。但分组交换网则是以网络为中心（图 1-8(b)），主机和终端都处在网络的外围，构成了用户资源子网。用户通过分组交换网可共享用户资源子网的许多硬件和各种丰富的软件资源。在有些文献中，为了和用户资源子网对比，就将分组交换网称为通信子网。



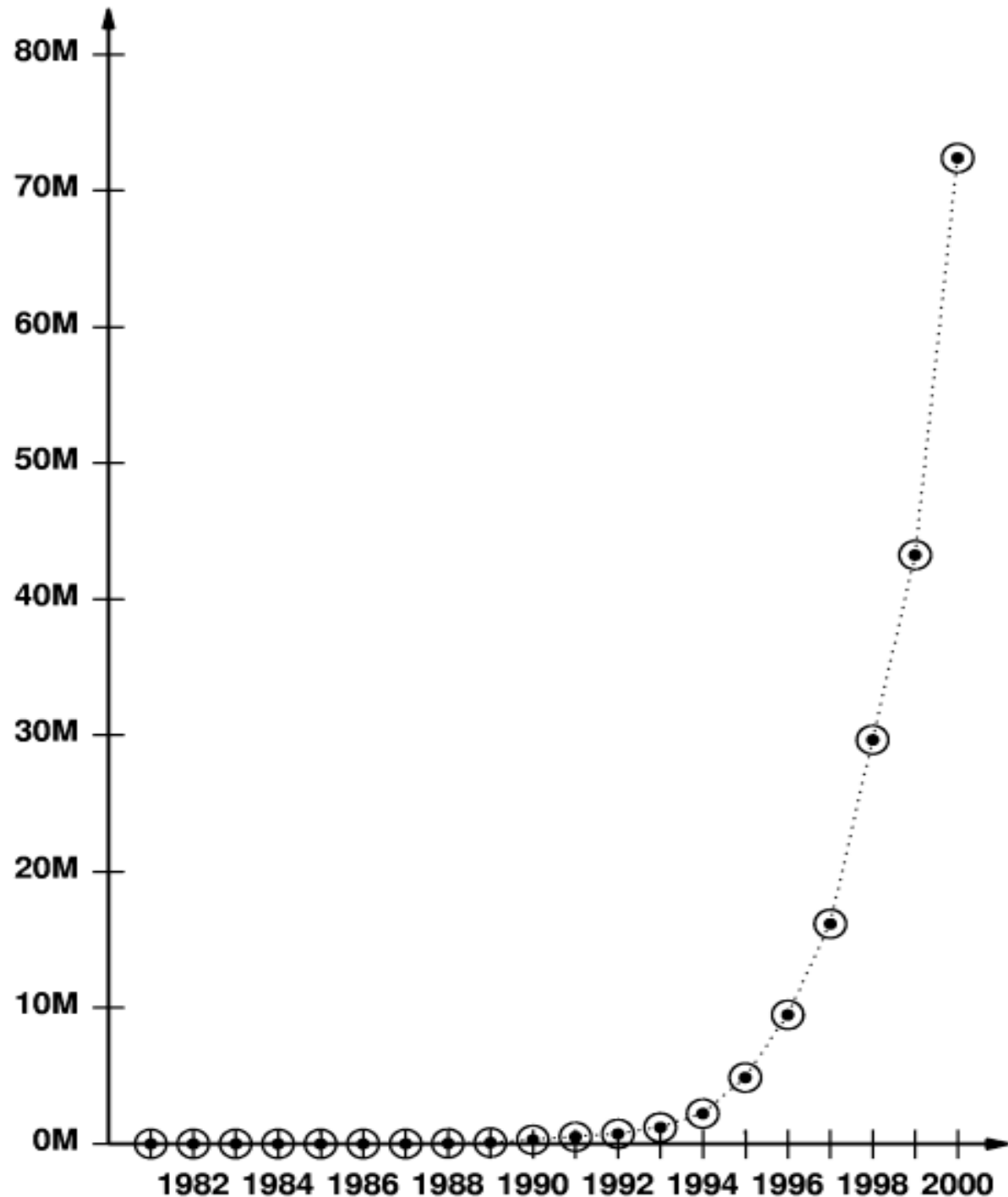
(a) 以单个主机为中心

(b) 以网络为中心

图 1-8 从以单个主机为中心

1.1.2 Growth of The Internet

- The Internet has grown from the early research prototype(原型) to a global communication system that reaches all countries of the world.



1.2 Complexity In Network systems

- Many technologies exist, and each technology has features that distinguish it from the others.
- Multiple organization have created networking standards independently, which are not all compatible.
- Multiple technologies exist that can be used to interconnect two or more networks. .

- There is no single underlying theory that explains the relationship among all parts.
- The set of technologies is diverse and changing rapidly.
- There is no simple and uniform terminology for networking concepts.
- Because multiple organizations define networking technologies and standards, multiple terms exist for a given concept.

1.3 Mastering Complexity

- To master the complexity, one must look beyond the details and concentrate on understanding concepts.
- The text focuses on concepts and avoids unnecessary detail.
- Whenever possible, the text uses analogies(类比) and illustration(图解) to simplify explanations .

1.5 Organization of The Text

- The text is divided into four major parts.
- The first part describes data transmission.
- The second part of the text focuses on packet(包) transmission.
- The third part of the text covers internetworking.
- The fourth part of the text explains networking applications.