Chapter XXXI
Basics of Telecommunications Management

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ABSTRACT

The purpose of this chapter is to provide a simple understandable approach to the basics of telecommunications management. This chapter is composed of four logically interlaced parts: the background information, the main components of telecommunications management, the future trends, and the conclusion. The background information section reviews the literature. The main part discusses management notions together with a short explanation of basic management systems. These systems include the management functions, the managed objects, the management information base, and the management protocols. The future trends section provides solutions most likely to appear in the future. The conclusion summarizes the fundamental mechanisms of this field.

INTRODUCTION

The worldwide information exchange and the mobility for users as well as for devices resulted in the integration of different telecommunication networks. The first telecommunication networks were wired and regional. For example, in Europe, regionalism meant the domination of local national wired networks in each different country. This structure only changed around the end of the 20th century with the appearance of new technologies that allowed the extension of regional network groups into a huge, global wired and even wireless network. The most important global network is the Internet. The basic idea about the Internet was to create the 'network of networks', where users all around the world can be integrated into one huge network. Therefore the main purpose of the Internet is to allow users to communicate with each other in a fast and reliable way. The next big step forward was the creation of the World Wide Web. This let users to reach various services, like Internet based databases or applications. One of the biggest successes around the Web was the development of the electronic business, or simply e-business.

This evolution requires new telecommunications management methods, which are pointing towards the development of the fundamentals of telecommunications management, first of all, the management protocols and Management Information Bases (MIBs). Advanced protocols and well-structured MIBs are the key components to ensure a fast and secure network operation. At the same time, the greater the network, the more management problems may occur. One serious management problem is the lack of security. For example, it is possible that a user can reach services or information which he or she was not authorized for.

Early management systems were responsible only for fault detection. After the networks became wider and the numbers of users increased, the necessity of other management functions emerged. There are five management functions today: fault, account, configuration, performance, and security management. These functions are associated with the network resources, called the managed objects.

The objective of this chapter is to introduce and explain the basics of telecommunications management focusing on the user's point of view. Therefore, this chapter explains the fundamentals of telecommunications management in an easily understandable way: starting at the definition of telecommunications management, presenting the management functions, the managed objects, the management information bases and the main management protocols. Towards the end of the chapter, a simplified example on telecommunications management functions demonstrates the operation of a distributed network, and then the future trends focus on the expected new techniques and solutions, while the conclusion summarizes the contents of this chapter.

BACKGROUND

Network management takes place between two major types of systems: those in control, called managing systems, and those observed and controlled, called managed systems. Majority of the managing systems are called Network Management Systems (NMS). Managed systems can include hosts, servers, or network components such as routers or intelligent repeaters. To promote interoperability, cooperating systems must adhere to a common framework and a common language, called a protocol. In a managed device, specialized low-impact software modules, called agents, access information about the device and make it available to the NMS. Managed devices maintain values for a number of variables and send reports about those, as required, to the NMS. For example, an agent might report such data as the number of bytes and packets in and out of the device, or the number of broadcast messages sent and received. In the Internet network management framework, each variable is referred to as a managed object, which is anything that an agent can access and report back to the NMS.

All information about the managed objects is contained in the Management Information Base (MIB), which is a database of the managed objects. The managed objects, or variables, can be set or read to provide information on network devices and interfaces. An NMS can control a managed device by sending a message to an agent of a managed device requiring the device to change the value of one or more of its variables.

There are two main methods to describe telecommunications management (Stallings, 2002; Carr & Snyder, 2002). Our explanation follows a top-down approach. We start from the main objective of the management, to show how the resources can be managed, controlled and coordinated to reach high-level and continuous services. The other approach discusses the subject in reverse, from bottom up. It starts with the protocols, either from the Simple Network Management Protocol or the Common Management Information Protocol. Both discussion methods have their advantages: The top-down approach is nearer to application management and to the