# Chapter 4.6
# Telecommunications Management Protocols

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## ABSTRACT

In this chapter, the fundamentals of communication protocols are presented, and then a special application area, the telecommunications management is introduced. The main part of this chapter deals with the telecommunications management protocols. First, the model for Telecommunication Management Network is explained, and then the most widely used protocol, the Simple Network Management Protocol (SNMP), is introduced. This is followed by a discussion on the open system management protocols and the mobile Internet management protocols for Authentication, Authorization and Accounting (AAA), their comparison and evaluation. Subsequently, the expected trends are presented. The conclusion part summarizes the content of this chapter emphasizing the main ideas.

## INTRODUCTION

The Internet and the Internet services have become an essential part of our everyday life. The importance of IP-telephony, voice over IP and IPTV is growing year by year. Mobility has become a buzzword of Internet services. It is quite difficult to answer whether user mobility, device mobility or vehicle mobility is more important. All of these are supported by different network services which meshes our business and private life. To fulfill all these complex services, the network should be reliable under variable circumstances, and it must be simply available. The users and the service providers equally require high quality services. While the network operations are continuously changing, the Quality of Services (QoS), the time constraints and the simplicity of the network resources should remain unchanged. The telecommunications management itself is responsible for the unchanged network operations under variable circumstances. To summarize, the telecommunications management system monitors, controls and coordinates the network resources, while the telecommunications management protocols are the fundamental tools to fulfill these requirements. The objective of this chapter is to present the main protocols of this field.

This chapter consists of five sections followed by references and key terms. The first section discusses the necessity of telecommunications man-

agement protocols and summarizes the structure of them. The next section provides the background information on protocols and telecommunications management, and justifies why this particular method was selected. The next section focuses on the main telecommunications management protocols divided into four parts. The first part explains the Telecommunications Management Network (TMN) model and its architecture. The next part describes the operation of the Simple Network Management Protocol (SNMP), which is the most widely used management protocol. The third part deals with the Open System Interconnection (OSI) protocols, while the fourth part presents the AAA (Authentication, Authorization and Accounting) protocols. The next section forecasts the future trends by elaborating on what kind of new services and protocols are expected. The last section summarizes the main ideas of the chapter. At the end of the chapter, the references and the glossary of key terms are provided.

## BACKGROUND

This section provides an overview of the basics of communication protocols and the telecommunications management. The communication protocols can be compared to dialogues. A simple protocol specifies the rules of a message exchange between the network nodes fulfilling some communication task. The rules are applicable to three areas: the message format, the message exchange and the time assumptions. The message is similar to a word in a human dialogue, where the message format is the correctly spelled word. The message exchange means the phrase or sentences told to each other. The correct message exchange has some goal, e.g. inquiring some information. In a network this could be the task of monitoring a network resource. Monitoring needs a request to read a parameter value and a response with the value of that. The response time is limited. It is similar to a human dialogue, i.e. asking a question and waiting for the answer.

The communication protocols are standardized. This worldwide standardization enables the extension of the network. The network nodes have a layered structure, either the five layer of TCP/IP net, or the seven layer architecture according to the Open System Interconnection (OSI) standards. A protocol specifies the message exchange between peer layers of two different nodes. The telecommunications management protocols are generally application layer protocols. A protocol message has typically two parts, a header part and a data part (see Figure 1). Figure 1 shows the general message structure composed of the header and the data. The header contains the message identifier, the identifier of the source and destination nodes. Sometimes an indication of priority is also included. The presence of other fields in the header depends on the function of the message. Some fields contain values that are constant, others values are variable.

The header is followed by the data or information part .The exchange of protocol messages realizes the steps of the protocol operation (see Figures 2 and 3). Figure 2 presents a generic message structure of the message header that includes a message type identifier and a sequence number. The header is followed by information sent to the destination node. Figure 3 illustrates a dialogue that may take place between a service user and a service provider (Tarnay, 1991; König, 2003).

The main purpose of telecommunications management protocols is the monitoring, controlling and coordinating the network resources to ensure high quality, reliable and error free network operation. The telecommunications management is composed of the telecommunications management station, the Management Information Base, the telecommunications management protocols

*Figure 1. A protocol message*