Chapter 13

Communication Issues for Small and Medium Enterprises: Provider and Customer Perspectives

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ABSTRACT

This chapter considers communication issues for small and medium enterprises (SMEs) from both provider and customer perspectives. SME communication infrastructure at the individual site should usually be built around Ethernet-based local area network with a remotely manageable integrated access device that enables high speed Internet access, virtual private networking, Voice over Internet Protocol (VoIP) functionality and collaborative services. We further address several open quality of service (QoS) issues that include: service level agreements, signaling for quality of service and management aspects. The proposed framework for service management encompasses interfaces for QoS-aware and legacy applications, generic service level specification, functional model of service negotiation and management policies.

INTRODUCTION

Recent trends in enterprise networks are radically changing the communication infrastructure of these systems. Instead of having diverse data networks, each of which is dedicated to a single class of applications, corporations are moving to a unified Internet Protocol (IP) based intranet. The main prerequisites for building a multiservice IP-based enterprise communication infrastructure include quality of service (QoS) support and differentiation, certain level of mutual service isolation and implementing the appropriate security policy.

Advances in networking technologies create a new opportunity for small and medium enterprises (SMEs) to become more efficient and competitive by interconnecting sites, deploying collaborative applications, increasing remote access of telecommuters and mobile users, deploying collaborative applications and integrating heterogeneous telecommunication services (voice, data, video) over the same network. Benefits of such approach include:
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(1) deployment of new natural communication services (see and listen); (2) use of person-to-person and person-to-machine real-time and non-real-time multimedia and mobile data services; (3) services can easily be self-configured and personalized (same look and feel on various devices) and (4) service mobility (access of home services in visited networks; any service on any access, any device, any location, any time).

Unlike large enterprises, SMEs typically don’t have the necessary IT resources to deploy, integrate and manage these services. For that reason, they need preconfigured, fully integrated equipment that can be easily installed, used and maintained by non-IT experts. The requirements for such equipment encompass a variety of features such as high speed Internet access, QoS support, virtual private networks (VPN), voice over IP (VoIP) gateway, as well as a variety of security mechanisms.

On the other side, fulfillment of such requirements poses a number of new issues to service providers, including: variable bandwidths, high bandwidth business services, absolute and/or relative QoS guarantees, specific support for IP applications (e.g. VPNs and multicasting), service management, as well as security of user and management interfaces (DSL Forum, 2007). High reliability and availability is required to support business and voice services. Besides, service providers need to define appropriate strategies quickly to address the business market, increase revenue, stay competitive, and increase market share (Mordelet, Festraets, & Wang, 2006).

Providers should achieve revenue increase by offering a wide spectrum of new services, particularly multimedia services. Cost reductions are achieved by sharing network infrastructure and systems. Savings are also a function of network scenario, equipment modernization status and customers grow speed. Another important fact is simplification of network management due to use of integrated operation platforms.

In this article we first address QoS issues (from the perspectives of both provider and customer), since QoS support represents a basic requirement for service integration. Providing end-to-end QoS in IP-based networks requires implementation at the network level a variety of mechanisms and algorithms dealing with the call and packet handling, as well as network resource management. They should operate at different time scales, from picoseconds to milliseconds for handling packets in the routers up till hours and days, for performing certain control and management operations. Furthermore, a signaling system is extremely required to inform the network about the user application needs.

The starting point is a proper definition of service level agreement (SLA) between the user and the provider, together with its associated service level specification. Deployment of IP QoS-enabled networks requires a change of traditional concept of static SLA negotiation, due to necessity to redefine SLAs more frequently, according to changes of network resource availability and conditions for provisioning of different QoS levels. In other words, dynamic SLA negotiation is needed, through an appropriate QoS signaling protocol. We address signaling issues and briefly present the two predominant signaling protocols standardized by the Internet Engineering Task Force (IETF).

Deployment of the end-to-end QoS architecture assumes the use of appropriate QoS interfaces by end users and applications, by which they can access the QoS parameters offered by the service provider.

Further, providing automated service management to SME is a mandatory requirement for service providers. For that purpose, we propose a framework that encompasses interfaces for QoS-aware and legacy applications, generic service level specification, functional model of service negotiation and management policies. The prototype implementation has also been addressed.

Finally, we briefly discuss future trends with respect to technologies, features and applicability of the commercially available SME equipment.