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Chapter VIII

Voice over IP: Protocols and Technical Hurdles

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As the name suggests, voice over Internet Protocol (VoIP) refers to the technology that allows transmission of voice over IP networks. Using VoIP, we can make telephone calls over the Internet or any IP-based corporate networks. With VoIP in place, the Internet does not remain a data-only network; it becomes a telephone network as well.

So, what is the motivation for VoIP? There are several appealing reasons why we want this technology. The most compelling reason behind the emergence of this technology is the enormous cost savings through integration of both voice and data, two large revenue-making media for telecommunication companies, over the same communication infrastructure.

The other major motivation for VoIP is the widespread adoption of IP platform. Today IP is a well-entrenched technology which is deployed in servers, routers, desktop PCs, laptops, and in many hand-held mobile devices, such as palmtops and PDAs. If voice signals could be transported over IP, then voice could be delivered to all these devices, making these devices much more useful than they already are.

This chapter discusses several aspects of VoIP: (1) Advanced applications powered by VoIP, (2) the technical challenges and solutions for making VoIP a reality, (3) various VoIP configurations, and (4) the protocols and standards for VoIP. We conclude the chapter by discussing the future of VoIP.

APPLICATIONS

Of course, the main application of VoIP is the voice or telephony itself (over IP networks), but the fact that IP packets can now carry voice brings along several interesting and useful applications. By no means do we attempt to provide an exhaustive list of all possible VoIP applications, as there are new applications

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popping up in the Internet every now and then. In this section, we explore some of today's key VoIP applications.

Web-Based Call Center and E-Commerce

VoIP allows users browsing a business website on the Internet to initiate a phone call to its call center by "pressing" a button on the web page. The Internet surfer does not need to stop browsing; instead the VoIP phone call will be just an extension of the user's activities on the Web. Such "call-buttons" on web pages were the missing link in e-commerce. Powering a website with a call button helps capture the client's attention while it is still at its peak. Many people tend to lose their keenness to do something as time goes on.

Virtual Second Line

Many home Internet users subscribe to two telephone lines; one line is used for making and receiving voice calls, while the other line is used for Internet surfing. With IP telephony, home users can use the same telephone line for voice calls even when they are using it for Internet surfing. IP telephony, therefore, provides a virtual second line at no extra cost.

Internet Fax

A driving force in the present VoIP market is Internet faxing. The traditional page-by-page faxing over long distance telephone connections is very costly. Because fax machines are connected to telephone networks like the telephone sets, these existing machines (new fax machines are not needed) can now be connected through VoIP systems allowing faxes to travel over IP, significantly saving telephone costs for large corporations. Since conversational latency is not an issue with fax machines, Internet fax enjoys a fast adoption rate.

Unified Messaging

Most employees have a number of communication services that they rely on to keep in touch with customers or colleagues in the course of their duties. Most people have an email address, a mobile phone number, a telephone and a fax number on which they can be reached during working hours, and perhaps another phone and fax number pair for home use. The proliferation of contact points makes it increasingly difficult for the user to manage all the messages arriving through these contact points.

The messaging services provided by traditional phone companies are restricted to voice mail only; they do not allow access to faxes or emails. With the use of packet-switching systems such as IP networks, a unified messaging system has become a reality. The user can get all the messages sent to one location from which s/he can access them at his/her convenience. Voice mail from the home or work telephone can be forwarded to the same location as email. This feature can even be extended further to using just a single telephone number for all the telecommunication services.