

# Chapter XXXVIII

## VoIP Quality and Security Issues for Consumers and Small Businesses

**David Bell**

*Pacific Union College, USA*

**Sunil Hazari**

*University of West Georgia, USA*

### **ABSTRACT**

*VoIP is the use of Internet protocols to provide telephone services that have previously been delivered over traditional telephone networks. Advantages of VoIP include cost, portability, and functionality which are the main reasons that many consumers and small businesses are considering this technology as a replacement to traditional telephone services. There are however risks associated with VoIP services which impact quality and security of the phone system for voice communications. This chapter reviews issues related to quality and security as faced by consumers and small businesses. Recommendations are provided to improve call quality and mitigate threats faced in the VoIP environment.*

### **INTRODUCTION**

In recent years, technologies have evolved that make it much easier for consumers and businesses to replace the use of the traditional Public Switched Telephone Network (PSTN) with alternate voice communications systems, including Voice over Internet Protocol (VoIP). Many are switching to VoIP to reduce costs and to allow integration of

voice with other web applications (Rash, 2005). There are competing technologies from various companies such as Skype and Vonage that each have advantages and disadvantage in terms of costs, interoperability, functionality, and quality (Mark, 2005).

VoIP usage has increased dramatically in recent years. In Q1 2006, 3.9 million U.S. households used VoIP for their home phone service,

accounting for 3.5% of the U.S. consumer market (Frommer, 2006). Nearly 48% of VoIP subscribers used Vonage as their service provider, with its closest rival Skype holding 12% of the VoIP market. By Q4 2007 the number of subscribers more than tripled to over 13 million households (Burton, 2008). However, Comcast and Time Warner, two large cable companies that also bundle VoIP service, now command over half of VoIP subscribers with Vonage falling into third place at 20% and Skype falling into a distant fifth place at 8%. Together, combined quarterly revenue of the top six VoIP providers now exceeds \$1.4 billion (Elliott, 2008).

Regardless of the particular VoIP brand or protocol utilized, there are several significant factors that must be considered before replacing PSTN service with a VoIP-based solution. Some of the most important problems with VoIP technology include reduced call quality (Wilson, 2005), reduced privacy of communications, and the inherent lack of security found on the public networks that deliver VoIP data (Garretson, 2005).

Although VoIP technologies provide many opportunities for reducing cost and adding functionality not readily available from PSTN solutions, there are a number of factors affecting quality and security of such communications that must be explored to determine their impact on the viability of using VoIP for day-to-day voice communications. The objectives of this paper are to explore methods for improving VoIP call quality and security issues, primarily in the context of consumers and small businesses. This paper focuses on issues affecting call quality that are related to encoding techniques, transport methodologies, and network traversal. The quality of specific hardware, such as microphones, earpieces, routers, and switches are not considered. The security issues examined are limited to the privacy of the content of the phone conversations and possible network intrusion vulnerabilities introduced by the implementation of VoIP.

## **BACKGROUND**

The concept of utilizing the Internet to transmit voice conversations is not a new one. The idea dates back to the 1970s, though the data rates and connectivity available to most individuals made it impractical for common usage at the time (Schulzrinne, 1999). As Internet access proliferated in the mid 1990s, companies such as Vocaltec emerged selling software to facilitate VoIP conversations (Varshney, Snow, McGivern, & Howard, 2002). The products generally required both parties in a conversation to be running the same proprietary software on their computers, and did not provide a path to the PSTN, severely limiting their usefulness for general voice communications.

Since that time, VoIP technologies have continued to evolve, including establishment of several important standards. Development of the Session Initiation Protocol (SIP) has helped to standardize procedures for establishing, changing, and terminating of Internet-based phone calls (Schulzrinne & Rosenberg, 1998). Development of *codecs* for encoding of the audio signal based on available bandwidth and capabilities of the hardware and software at each end point (Garbin & Gharakhanian, 2006) has facilitated communications between software and hardware of multiple vendors, as well as connections into the PSTN (Varshney et al., 2002). As high speed Internet access has continued to become more ubiquitous, an increasing number of businesses and consumers have realized the significant cost savings that can be realized by switching some or all of their voice services to VoIP.

Several questions are addressed in this study. With the increasing availability and adoption of VoIP technologies by both consumers and businesses, there are concerns in the areas of quality, privacy, and security when compared to the traditional PSTN. This paper will explore factors of VoIP implementations that affect communication quality, and methods that may be utilized

9 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/voip-quality-security-issues-consumers/21691](http://www.igi-global.com/chapter/voip-quality-security-issues-consumers/21691)

## Related Content

---

### Analysis of E-Commerce and Traditional Marketing Mode From the Perspective of Ecological Environment Protection

Cui Song (2025). *International Journal of Interdisciplinary Telecommunications and Networking* (pp. 1-16).

[www.irma-international.org/article/analysis-of-e-commerce-and-traditional-marketing-mode-from-the-perspective-of-ecological-environment-protection/365347](http://www.irma-international.org/article/analysis-of-e-commerce-and-traditional-marketing-mode-from-the-perspective-of-ecological-environment-protection/365347)

### Coverage Analysis of Heterogeneous Wireless Network with n-Interacted Transmission Nodes

Soumya Ranjan Samal, Shuvabrata Bandopadhyaya, Saroj Kumar Dora and Vladimir Poulkov (2017).

*International Journal of Interdisciplinary Telecommunications and Networking* (pp. 49-58).

[www.irma-international.org/article/coverage-analysis-of-heterogeneous-wireless-network-with-n-interacted-transmission-nodes/188439](http://www.irma-international.org/article/coverage-analysis-of-heterogeneous-wireless-network-with-n-interacted-transmission-nodes/188439)

### Next Generation Wearable Devices: Smart Health Monitoring Device and Smart Surveillance Hat using D2D Communications in LTE Assisted Networks

Niraj Shakhakarmi (2014). *International Journal of Interdisciplinary Telecommunications and Networking* (pp. 25-51).

[www.irma-international.org/article/next-generation-wearable-devices/124037](http://www.irma-international.org/article/next-generation-wearable-devices/124037)

### Short-Range Ultrasonic Communications in Air

Chuan Li, David Hutchins and Roger Green (2013). *Communication in Transportation Systems* (pp. 358-396).

[www.irma-international.org/chapter/short-range-ultrasonic-communications-air/74494](http://www.irma-international.org/chapter/short-range-ultrasonic-communications-air/74494)

### Novel Nature-Derived Intelligent Algorithms and Their Applications in Antenna Optimization

Bo Xing (2016). *Wideband, Multiband, and Smart Reconfigurable Antennas for Modern Wireless Communications* (pp. 296-339).

[www.irma-international.org/chapter/novel-nature-derived-intelligent-algorithms-and-their-applications-in-antenna-optimization/136618](http://www.irma-international.org/chapter/novel-nature-derived-intelligent-algorithms-and-their-applications-in-antenna-optimization/136618)