Trends in Telecommunications and Networking in Secure E-Commerce Applications

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INTRODUCTION

Telecommunications and networking, two prominent technologies of the information age, have enjoyed substantial investments from industry and government, resulting in unparalleled growth in the transmission of voice, video, and data over wired and wireless media. Since their inception several decades ago, these technologies and their business applications have progressed through several stages. Such progression commenced from the development of the primitive electronic funds transfer (EFT) in which funds could be transferred electronically, to the enormous variety of technologies available today. Several decades ago, the delivery of video, voice, and data was accomplished through three independent networks: television, telephone, and data networks, respectively (Panko, 2007). Today, a convergence of the three networks is occurring. For example, networking technology can deliver video, data, voice (through VoIP), graphics and other multimedia contents at considerable speed. Currently, there are many applications associated with telecommunications and networking technologies. They include electronic mail (e-mail), voice over Internet protocol (VoIP), and videoconferencing. Also, the Internet which was built on the world-wide telecommunications and networking infrastructure gave rise to many applications such as electronic commerce (e-commerce), electronic data interchange (EDI), and several other World Wide Web (Web) applications. Electronic commerce, which is the process of buying, selling, or exchanging products, services, and information via computer networks, has evolved and become an ever-booming enterprise.

The advent of broadband digital subscriber line (DSL) and broadband cable has enabled the transmission of data signals through telephone and cable-television (cable-TV) networks.

Moreover, broadband technology has made high speed Internet access very affordable for small businesses and individuals. It has also facilitated e-commerce by providing businesses and consumers easy access to the global information super highway. The fact that e-commerce transactions involve the transmission of personal and organization's proprietary information over the unsecured Internet, make them easy targets for hackers. Therefore, security of electronic communications is a major problem that must be addressed by organizations that engage in e-commerce.

This article presents the trends in telecommunications and networking; security problems confronting such technologies and related e-commerce applications; and the management of security issues associated with these technologies.

BACKGROUND

Major trends surrounding telecommunications and networking technologies are distinctively at three levels, namely industry, technology, and applications. The attributes that uniquely characterize the different levels are described as follows:

- **Industry trends:** Are signified by more competitive vendors, carriers, alliances, and network services, accelerated by deregulation and the growth of the Internet and the World Wide Web.

- **Technology trends:** The extensive use of the Internet, digital fiber-optic, and wireless technologies to create high-speed local and global internetworks for voice, data, images, audio, and video communications are central and, individually and collectively highlight the changing patterns in technology.
- **Applications trends:** The pervasive use of the Internet, enterprise intranets, and interorganizational extranets to support electronic business and commerce, enterprise collaboration, and strategic advantage in local and global markets dominate the applications arena.

The most striking and strong impact effect is at the applications level where, as a consequence, the phenomenal growth of the Internet has heralded the new and ubiquitous electronic marketplace known as e-commerce. It is not an overstatement that e-commerce has revolutionized the way businesses trade with each other and with consumers. Models of e-commerce are many and varied. The most popular implementations are business-to-business (B2B), business-to-consumer (B2C), business to government (B2G) and consumer-to-consumer (C2C) e-commerce transactions (Oreku, & Li, 2005).

B2B e-commerce involves two companies trading or transmitting funds over the Internet utilizing electronic data interchange, electronic mail, and other Web applications. B2C e-commerce occurs when a business provides services or sells products to consumers over the Internet. In this type of e-commerce, the end-user or consumer must provide personal and credit card information online. B2G covers electronic transactions between businesses and the government or the transmission of funds from the government to business for products and services provided. C2C e-commerce involves two end-users where one partner is the online seller and the other is the buyer. It is common for this type of e-commerce to utilize a third party's Web site such as *eBay.com* for online transactions. The third party usually profits by receiving a commission at the end of each sale.

In the United States alone, online retail sales have been projected to more than double from $56 billion in 2003 to $139 billion in 2008 (E-marketer, 2005b). Table 1, in consonance with prevailing projections, presents the estimated quarterly e-commerce retail sales in the United States from 2003 to 2006.

The data, which is not adjusted for holiday and seasonal variations, was obtained from the United

Table 1. Estimated quarterly United States e-commerce retail sales from 2003 to 2006

YEAR	QUARTER	E-COMMERCE RETAIL SALES (IN BILLIONS OF DOLLARS)
2006	3rd Quarter	25.61
	2nd Quarter	24.76
	1st Quarter	24.51
2005	4th Quarter	27.08
	3rd Quarter	21.28
	2nd Quarter	20.14
	1st Quarter	19.53
2004	4th Quarter	21.99
	3rd Quarter	16.95
	2nd Quarter	16.07
	1st Quarter	15.89
2003	4th Quarter	17.70
	3rd Quarter	13.76
	2nd Quarter	12.85
	1st Quarter	12.33