

Chapter II

Pervasive Business Infrastructure:

The Network Technologies, Routing and Security Issues

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ABSTRACT

The need for more and more flexibility (in terms of time and location) in business operations, context-based services, decentralization of business processes, and information processing and innovative services has introduced new ubiquitous environments, sensing technologies, and pervasive devices. This new category of devices, sensors, and ubiquitous environments, has the capabilities to observe the users all the time using sensors; provide timely information to service providers using communication channels; and offer accurate services to users anywhere and anytime through tiny mobile terminals. This chapter provides the users of the pervasive business technologies an overview of the basic infrastructure and protocols used to form these ubiquitous wireless environments and provide context-based comfort, while taking care of confidentiality, secrecy, integrity, and authenticity. Along with an introduction to the markup languages, protocols, and security threats, the chapter concludes with the discussion of a range of common biometric, cryptographic, and routing solutions.

INTRODUCTION

Because of technological developments, awareness of technology, and highly competitive mar-

kets, the expectations of customers have increased like never before. They need more comfort; self created environments, and flexibility in all the activities of their lives. Pervasive technologies are

used by almost all areas of business, hospitality, health services, education, and entertainment, and so forth, to create this wanted smart environment at work, home, holidays, and so forth. The users of the ubiquitous networks, sensors, and pervasive devices have the choice of different network operators with different access technologies, applications, sensors, and services. Pervasive sensors are embedded into the environment to provide context awareness (i.e., location, temperature, humidity, emotions, mood and actions) of the person. Audio and video information about other smart surrounding devices and query, which is interpreted to provide meaningful services and comfort. To provide this, natural environment sensors are embedded into everyday devices so that they (devices) can grasp information using user's expressions, speech, gesture, and body language.

Users are happy to pay extra for the pervasive services and their choice of environment they receive from the providers. There is a hitch in the minds of the users because they are not conversant with the technological aspects and jargon used by the service providers. In addition, they have to choose right devices and networks that can satisfy their needs, which requires some basic knowledge of the infrastructures used by the service providers. Moreover, pervasive services work on the basis of information exchange. This information, that may be very personal, critical, and confidential, streams through different public and private networks and is stored in servers. Users worry about misuse, unauthorized access, and modification of information and devices. Their fear is a reality because information is easier to access, distort, and misuse through unprotected wireless networks as compared to wired networks. This chapter introduces different technologies forming p-business infrastructure and network technologies used for accessing pervasive services. It also explains different security threats in relation to pervasive technologies and some basic counter-measures or mechanisms for dealing with

these threats. It briefs on languages and protocols used for system development, communication, and security. The chapter also discusses issues related to confidentiality, integrity, and authenticity. The concerns of the users regarding p-business infrastructure and security are real, and so are the consequences of security threats.

P-BUSINESS INFRASTRUCTURE

The fundamental infrastructure of p-business is a combination of various private and public wireless networks; wired networks (including Internet); wireless sensor network (WSN); global wireless media communication standards (e.g., via satellite) and local wireless media communication standards (e.g., wireless fidelity [Wi-Fi] and i-mode network standards); short distance standards (e.g., Bluetooth and Ultra Wideband), cellular carrier specific standards (e.g., Global System for Mobile [GSM], Time Division Multiple Access [TDMA], or Code Division Multiple Access [CDMA], etc.); pervasive devices; embedded controls; software developed using Java; Operating Systems; identification hardware; software, security tools, and techniques.

Wired and Wireless Internet

In last two decades, the Internet revolutionized the world of communication by linking millions of computers and computer networks around the globe by using Internet Protocol (IP), Transmission Control Protocol (TCP), and Hypertext Transfer Protocol (HTTP). Initially conceived as a Cold War Technology by the U.S. Defense Department, Internet has become an essential part of common people's lives after its commercialization in the early 90's. Due to its low entry and access costs, global, direct and quick reach, high productivity, flexibility of operations, decentralization capabilities, decreased geographic and time boundaries, the Internet is a common platform for almost all

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