

Chapter XLIV

A Case Study in the Installation of Wi-Fi Networks in a Chemical Manufacturing Unit in India

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ABSTRACT

This chapter describes a case study in installation of a Wi-Fi network in a chemical manufacturing company. This project, carried out in India, was meant to connect the various dispersed manufacturing units of the organization as well as its administrative offices. Initial studies indicated that a physical network was not appropriate due to the local corrosive chemical environment; Ultra InfoTech was invited to install Wi-Fi network within the complex. This chapter reports on how the project progressed, the lessons learnt and the way to approach this kind of work in future in terms of wireless networking.

INTRODUCTION

This chapter describes the installation of a Wi-Fi network in a chemical manufacturing company in India and the lessons learnt in the process of that installation. This practical experience of Wi-Fi network installation begins with the need to and advantage of having such a network in the first place. Subsequently, the organization – a chemical plant - in which this installation is carried out, is described. This discussion is then followed by the various options available to the organization in terms of putting together a network for its computers. Later, this case study takes the readers through the actual process of Wi-Fi installation at a chemical plant in India. The advantages, limitations, risks, and suggestions on how to handle the risks are also provided.

MOBILE TECHNOLOGIES AND NETWORK

Mobility plays a significant role in almost all aspects of today's life style whether it is a business or personal. This is so, because of the location-independence offered by the mobile networks (Unni and Harmon, 2005). For commercial establishments, increasingly, mobility is becoming mandatory irrespective of nature of commerce being carried out. Out of the many different aspects of mobility as discussed by (Unhelkar, 2008), networks form a vital and often deciding aspect of mobile usage in practice.

There are many different types of mobile networks that can be grouped into two: the short range and the

long range networks. Kuppuswami (2005) has discussed these mobile networks in greater detail than others with respect to their capabilities to connect varied devices by mapping them to neural networks using wireless technologies. In the context of this chapter, the types of networks that are discussed are LAN (Local Area Network), WAN (Wide Area Network), MAN (Metropolitan area network) and RFID (Radio Frequency Identification). The reason for discussing these networks is that they provide some of the options that need to be considered while deciding type of network to be used for environment such as a chemical manufacturing plant.

LAN

Local area network (LAN), generally which is a group of computers and associated devices that share a common communication line or wireless link. Typically, this is a network where connected devices share the resources of a single processor or server or share resources of each other within a small geographical area. Usually, the server has applications and data storage that are shared in common by multiple computer users. A local area network may serve as few as two or three users (e.g., in a home network) or as many as thousands of users (for example, in an FDDI network). Major local area network technologies that are discussed below are usually used in setting up a LAN in an organization.

Ethernet

Ethernet is the most widely installed local area network technology that has been specified in a standard called IEEE 802.3 (<http://standards.ieee.org/getieee802/802.3.html>). An Ethernet LAN typically uses coaxial cable or special grades of twisted pair of wires. Ethernet is used in wireless LAN also. The most common Ethernet systems are called 10BASE-T which provides transmission speeds up to 10 Mbps. Devices are connected to the cable and compete for access using a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol. Fast Ethernet or 100BASE-T provides transmission speeds up to 100 Mbps and is generally used for LAN backbone systems, supporting nodes with 10BASE-T cards. Gigabit Ethernet provides an even higher level of backbone support at 1000 Mbps. However, it should be noted that these speeds are reflecting those of the local hardware rather than the network speeds across the Internet. Furthermore, in the context of a corro-

sive environment such as the shop floor of a chemical manufacturing plant, it is important to note that these physically connected networks need to be protected as well as maintained in a preventative manner.

Token Ring

A Token Ring network is a LAN in which all computers are connected in a ring or star method and a bit or token-passing scheme is used to prevent collision of data between two computers that want to send messages at the same time. The Token Ring protocol is the second most widely used protocol in LANs after Ethernet Networks. However, token ring networks usually have the challenge of a missed token and thereby loss of data packet.

FDDI

FDDI (Fiber Distributed Data Interface) is a set of ANSI and ISO standards (www.ansi.com) for data transmission on fiber optic lines in a LAN which can be extended in range up to 200 km. This protocol is based on the Token Ring protocol. FDDI LAN is used when the area to be covered is larger and number of users to be supported are more. Many times the FDDI is used as a backbone of a wide area network (WAN).

WAN

The term Wide Area Network (WAN) usually refers to a network which covers a large geographical area, which uses communications circuits to connect the intermediate nodes. A major factor impacting WAN design and performance is a requirement that they lease communications circuits from telephone companies or other communications carriers. Transmission rates are typically 2 Mbps, 34 Mbps, 45 Mbps, 155 Mbps, and 625 Mbps (or sometimes considerably more).

Numerous WANs have been constructed, including public packet networks, large corporate networks, military networks, banking networks, stock brokerage networks, and airline reservation networks. Some WANs are very extensive, spanning the globe, but most do not provide true global coverage.

MAN

Metropolitan area network (MAN) is a network that interconnects users with computer resources in a

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