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Issues and Challenges in Mobile Computing based on Wireless Sensor Technologies

[1] Ms.M.Chandhraleka, [2] Dr.M.Pushparani
[1] M.Phil Scholar. [2] Professor & Head,
[1, 2] Department Of Computer Science,
[1, 2] Mother Teresa Women's University,
[1, 2] Kodaikanal,India.

ABSTRACT: -

Mobile Computing: A technology that allows transmission of data, via a computer, without having to be connected to a fixed physical link. Mobile voice communication is widely established throughout the world and has had a very rapid increase in the number of subscribers to the various cellular networks over the last few years. An extension of this technology is the ability to send and receive data across these cellular networks. This is the principle of mobile computing. In this article we give an overview of existing cellular networks and describe in detail the CDPD technology which allows data communications across these networks. Finally, we look at the applications of Mobile Computing in the real world Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to other remote or fixed locations. This proves to be the solution to the biggest problem of business people on the move - mobility.

KEYWORD: - Mobile computing, Data, Smart Phone, GSM, CDPD, wireless sensor networks,Ad hoc network.

1. INTRODUCTION

Mobile Computing: A technology that allows transmission of data, through computer without having to be connected to a fixed physical link. Mobile voice communication is widely established throughout the world and has had a very rapid increase in the number of subscribers to the various cellular networks over the last few years. An extension of this technology is the ability to send and receive data across these cellular networks. This is the principle of mobile computing. Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to other remote or fixed locations. This proves to be the solution to the biggest problem of business people on the move - mobility. In this article we give an overview of existing cellular networks and describe in detail the CDPD technology which allows data communications across these networks. Finally, we look at the applications of Mobile Computing in the real world.

2. TYPES of MOBILE SYSTEMS

Mobile computing has several characteristics reminiscent of distributed systems. In order to understand mobile

systems, one must first understand where the similarities and the differences of distributed and mobile systems lie. The following section is an explanation of the different types of distributed systems ranging from the traditional type to nomadic, ad-hoc and finally ubiquitous ones.

2.1 SMART PHONE

Smart-phone is the trend of communications which integrate telecom and Internet services onto a single device. because it has combined the portability of cell-phones with the computing and networking power of PCs. As smart-phones, as endpoints of both networks, have connected the Internet and telecom networks.

2.2 TRADITIONAL SYSTEM

Traditional distributed systems consist of a collection of fixed hosts that are themselves attached to a network– if hosts are disconnected from the network this is considered to be abnormal whereas in a mobile system this is quite the norm of the network. A-hoc systems do not have any fixed infrastructure which differs them both from traditional and nomadic distributed systems. In fact, ad-hoc networks may come together as needed, not necessarily with any assistance from the existing computing. When nodes are detached from the fixed/mobile network they may evolve independently and groups of hosts opportunistically form “clusters” of mini-networks. The speed and ease of deployment make ad-hoc networks highly desirable.

2.3 AD-HOC MOBILE SYSTEM

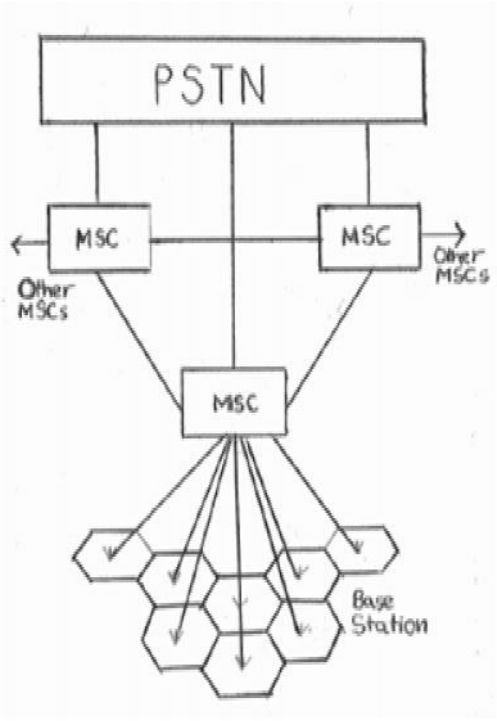
Ad-hoc distributed systems are possibly the only type of network that comes close to mobile networks in the sense that every node is literally *mobile*. It is these networks that are very much seen as the systems of the future, whereby hosts are connected to the network through high-variable quality links. A-hoc systems do not have any fixed infrastructure which differs them both from traditional and nomadic distributed systems. .. These kinds of systems are extremely useful in conditions where the infrastructure is absent, impractical to establish or even expensive to build (e.g.: military applications, high terrain uses, and emergency relief operations.When nodes are detached from the fixed mobile network they may evolve independently and groups of hosts opportunistically form “clusters” of mini-networks. The speed and ease of deployment make ad-hoc networks.

2.4 CELLULAR NETWORK ARCHITECTURE

Mobile telephony took off with the introduction of cellular technology which allowed the efficient utilization of frequencies enabling the connection of a large number of users. During the 1980's analogue technology was used. In the 1990's the digital cellular technology was introduced with GSM (Global System Mobile) being the most widely accepted system around the world. Other such systems are the DCS1800 (Digital Communication System) and the PCS1900 (Personal Communication System). The technology is hidden from view; it's incorporated in a number of transceivers called Base Stations (BS). Every BS is located at a strategically selected place and covers a given area or cell - hence the name cellular communications. A number of adjacent cells grouped together form an area and the corresponding BSs communicate through a so called Mobile Switching Centre (MSC). The MSC is the heart of a cellular radio system. It is responsible for routing, or switching, calls from the originator to the destination. It can be thought of managing the cell, being responsible for set-up, routing control and termination of the call, for management of inter-MSC hand over and supplementary services, and for collecting charging and accounting information. The

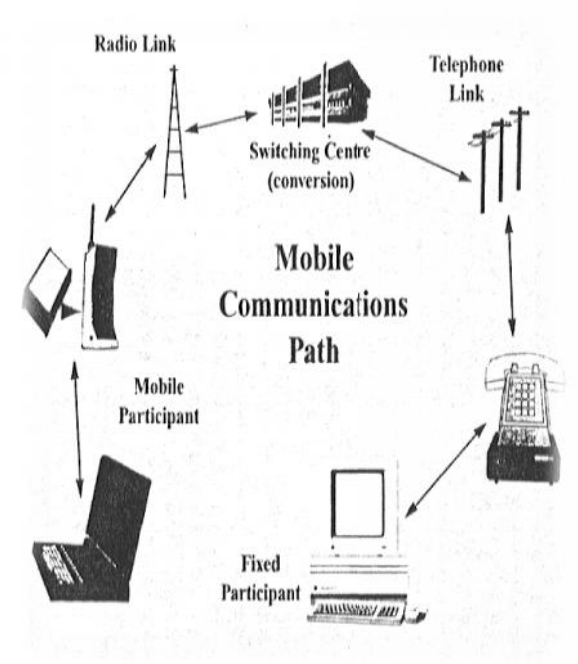
MSC may be connected to other MSCs on the same network or to the PSTN. A cellular network consists of mobile units linked together to switching equipment, which interconnect the different parts of the network and allow access to the fixed Public Switched Telephone Network (PSTN).

MOBILESWITCHINGCENTRE:



Mobile Switching Centre

The DCS technology uses frequencies in the 1800MHz range while PCS in the 1900MHz range. Each cell has a number of channels associated with it. This information is used to direct incoming calls to the MS. If during a call the MS moves to an adjacent cell then a change of frequency will necessarily occur - since adjacent cells never use the same channels. This procedure is called hand over and is the key to Mobile communications These are assigned to subscribers on demand. When a Mobile Station (MS) becomes 'active' it registers with the nearest BS. The corresponding MSC stores the information about that MS and its position.



There are many protocols defining the way packets can be send from the sender to the receiver. The most widely used are the Virtual Circuit-Switching system, which implies that packets have to be sent through the same path, and the Datagram system which allows packets to be sent at various paths depending on the network availability. Packet switching requires more equipment at the receiver, where reconstruction of the message will have to be done. The introduction of mobility in data communications required a move from the Public Switched Data Network (PSDN) to other networks like the ones used by mobile phones. PCSI has come up with an idea called CDPD (Cellular Digital Packet Data) technology which uses the existing mobile network.

3. WIRELESS NETWORK

The topology is highly dynamic and frequent changes in the topology may be hard to predict.

Mobile ad hoc networks are based on wireless links, which will continue to have a significantly lower capacity than their wired counterparts

Mobile ad hoc network nodes rely on batteries or other exhaustible power supplies for their energy. As a consequence, energy savings are an important system design criterion. Furthermore, nodes have to be power-aware: the set of functions offered by a node depends on its available power (CPU, memory, etc.).

Physical security is limited due to the wireless transmission.

Mobile ad hoc networks are affected by higher loss rates, and can experience higher delays and jitter than fixed networks due to the wireless transmission. Target tracking is one of the key applications of wireless sensor networks (WSNs).

Existing work mostly requires organizinggroups of sensor nodes with measurements of a target's movements or accurate distance measurements from the nodes to the target,and predicting those movements. These are, however, often difficult to accurately achieve in practice, especially in the case ofunpredictable environments, sensor faults, etc. In this paper, we propose a new tracking framework, called FaceTrack, which employsthe nodes of a spatial region surrounding a target, called a face. Instead of predicting the target location separately in a face, weestimate the target's moving toward another face.

CONCLUSION

Current distributed systems platforms designed for mobile environments are based on synchronous, connection oriented communications with associated QoS monitoring and management.. Results suggests that quantitative characteristics of browsing behavior—even prior to examining browsing *content*—can be useful predictors of meaningful behavioral outcomes. Mobile software deals with the characteristics and requirements of mobile applications. There is little doubt that mobile computing will enhance many aspects of the lives of humans. One must wonder though whether or not everyone will want to have such an "invading" technology, especially when it comes to ubiquitous computing.

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