ADVANCED MOBILE COMPUTING: CONCEPT OF UNICAST BLUETOOTH

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ABSTRACT

We live in the era of modernization. In this 21th century the modern civilization is hugely depended upon electronics and communication. Human are seeking of social relationship and interaction with familiars. But instead of face to face communication, now we are interested with mobility. The protocol uses Bluetooth wireless connections as a communications medium. The protocol can be used to transfer various file formats such as image or audio files. The protocol also identifies the language content of the information file. Future work on this protocol involves increasing Bluetooth ranges and the protocol structure will convert from Unicast to Broadcast. This paper presents a Bluetooth based communications protocol used for multimedia on mobile computing devices. The protocol overcomes some of the wireless file transfer protocol limitation issues with mobile computing devices.

Keywords: Bluetooth, Computing, Piconet, Scatternet, Wireless Communication Protocol, Ad-hoc

I. INTRODUCTION

Communication is one of the integral parts of science that has always been a focus point for exchanging information among parties at locations physically apart. The term 'Mobile' has completely revolutionized the communication opening up innovative applications that are limited to one`s imagination. Mobile computing is human-computer interaction by which a computer is expected to be transported during normal usage, mobile computing involves mobile communication, mobile hardware etc. Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile Software deals with the characteristics and requirements of mobile applications. So we can modify that" Mobile computing is taking a computer and all necessary files and software out into the field". In other word mobile computing can be defined as a computing environment over physical mobility.

II. CONCEPT OF MOBILITY

Now the concept of mobility leads to its physical object which is related to movement of matters, whenever movements of virtual objects relate to movement of bits and bytes. Mobility models represent the movement of mobile users, and how their location, velocity and acceleration change over time. Such models are frequently used for simulation purpose when new communication or navigation techniques are investigated. Mobility

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III. WHAT IS MOBILE COMPUTING

A great scientist told that, "Institutions need to think multi-platform. It`s not about putting Blackboard on a phone"-Alan Levine. Mobile computing is the human-computer interaction by which a computer is expected to be transported during normal usage, mobile computing involves mobile communication, mobile hardware etc. Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile Software deals with the characteristics and requirements of mobile applications. So we can modify that" Mobile computing is taking a computer and all necessary files and software out into the field". In other word mobile computing can be defined as a computing environment over physical mobility [1].

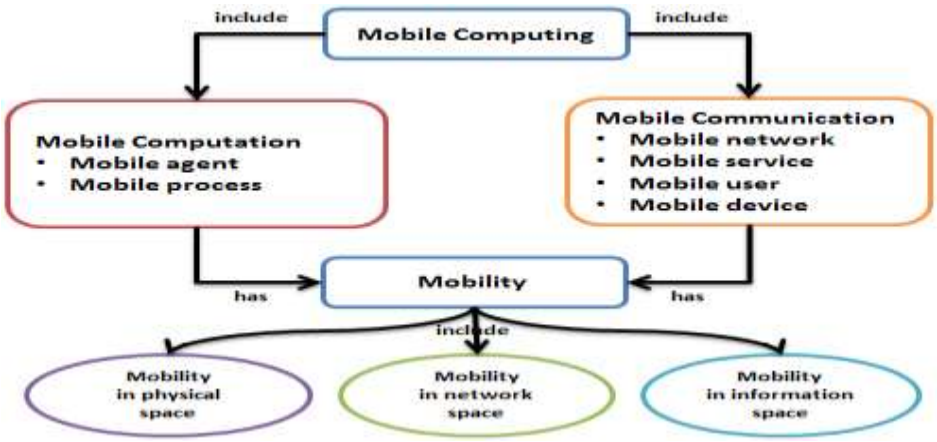

Fig: 1 Basics of Mobile computing

In the last 10 years, the advent of mobile phones as well as laptops has dramatically increased the availability of mobile devices to businesses and home users. More recently, smaller portable devices such as PDAs and especially embedded devices (e.g. washing machines, sensors) have slowly changed the way humans live and think of computers [3].

Computing is drifting away from just being concentrated on computers and relates more and more towards society, its people and its infrastructures. This is particular true where sensors are being developed to be so minute that they are literally embedded in clothing and even humans [4].

Mobile computing is associated with the mobility of hardware, data and software in computer applications. The study of this new area of computing has prompted the need to rethink carefully about the way in which mobile network and systems are conceived. Even though mobile and traditional distributed systems may appear to be

closely related, there are a number of factors that differentiate the two, especially in terms of type of device (fixed/mobile), network connection (permanent/intermittent) and execution context (static/dynamic).

IV. MOBILE COMPUTING FUNCTION

The mobile computing function can be logically divided into following measure segments:

4.1 User With Device

This device could be fixed like desktop, fixed telephones, digital T V with set top box. Here basically the device should be in wire line services.

4.2 Network

Whenever user is using mobile he/she will use different networks at different places at different time. Through network any user can connect with everyone with the help of Internets, or Bluetooth etc. E.g.: GSM, CDMA, I Mode, Wireless LAN, Bluetooth etc.

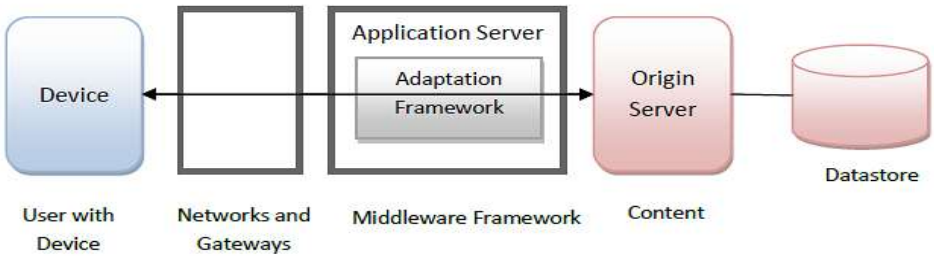

Fig: 2 Mobile Computing Functions

4.3 Gateway

Following network, this is required to interface different transport bearers. These gateways convert one specific transport bearers to another.

4.4 Middlewire

This middleware is more of a function rather than a separate visible note. In the present context middle wire handles the presentation and rendering of the content on a particular device. It will also help and handle the security and personalization for different users.

4.5 Content

Content is a domain where the origin server and content are present. This could be an application system or an aggregation of systems. This content may be mass market, personal or corporate content. Origin server will have some means to accessing the database and the storage device.

V. TYPES OF MOBILE COMPUTING NETWORKS

Through cloud computing, it is possible that, we can access our information from anywhere at any time. But when we use the traditional computer system, they need to locate in that location. Our cloud provider can both own and house the hardware and software necessary to run your home or business applications.

Now we will discuss about the applications and working of networks. Mobile computing will use different types of networks like telephone network, GPRS, ATM, ISDN, CDMA, DSL, Wi-Fi, Bluetooth, Broadband etc [5].

5.1 Wire Line Networks

In case of wire line network, this network is designed over wire or tangible conductors, which may be also called Fixed or Wire line Network [1].

As e.g.: Fixed telephone network, Broadband networks etc. Though, microwave or satellite network do not use wire, but it is considered as wire line network [1].

5.2 Wireless Networks

Mobile networks are generally termed as wireless. This includes wireless networks used by Radio taxis, one way and two way pager, cellular phones.[2].

As e.g.: PCS, AMPS, GSM, CDMA, GPRS etc.

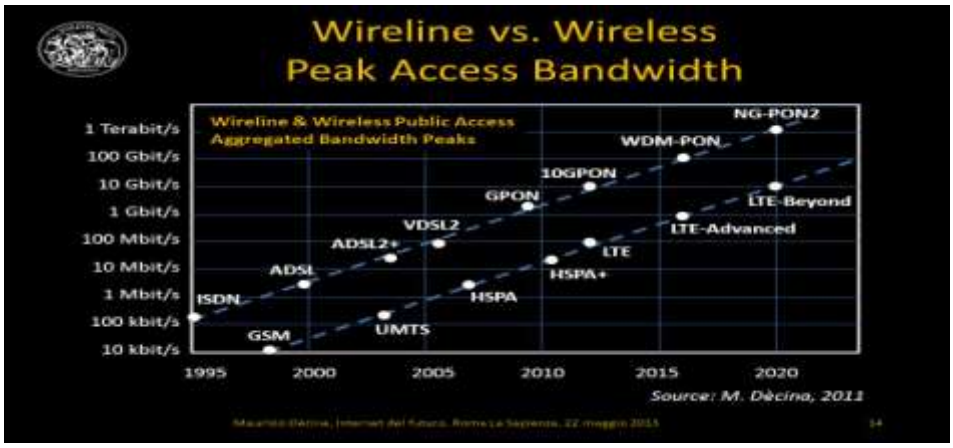

Fig: 3 A Comparison Between Wire Line & Wireless

5.3 Ad-Hoc Networks

In Latin word Ad-hoc means "for this purpose only". An ad-hoc network is a small Area Network. The term ad-hoc has been applied to networks in which new devices can be quickly added using it [3].

As e.g.: Bluetooth

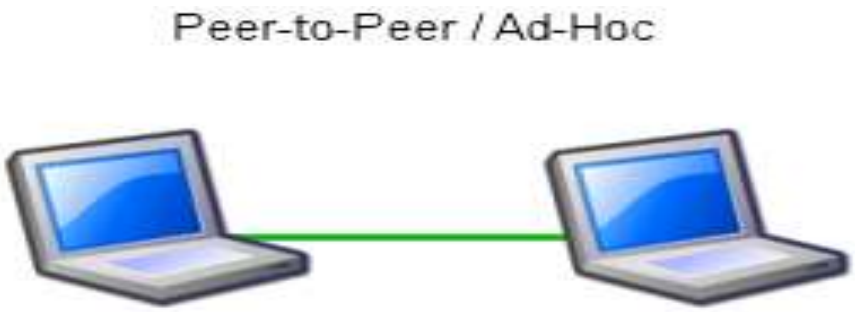

Fig: 4 Ad-Hoc Networks

5.4 Bearers

For different types of networks, there are different types of transport bearers. These can be http, protocols for or dialup connection [4].

VI. CONCEPT OF UNICAST, BROADCAST & MULTICAST SYSTEM

6.1 Unicast

Unicast is the term used to describe communication where a piece of information is sent from one point to another point. In this case there is just one sender, and one receiver. Unicast transmission, in which a packet is sent from a single source to a specified destination, is still the predominant form of transmission on LANs and within the internet. All LANs an IP networks support the unicast transfer mode.

6.2 Multicast

Multicast is the term to describe communication where a piece of information is sent from one or more points to a set of other points. In this case there is may be one or more senders, and the information is distributed to a set of reference. One example of an application which may use multicast is a video server sending out networked TV CHANNELS

6.3 Broadcast

Broadcast is the term used to describe communication where a piece of information is sent from one point to all other points. In this case there is just one sender, but the information is sent to all connected receivers. Broadcast transmission is supported on most LANs (e.g.: Ethernet), and may be used to send the same message to all computers on the LAN(e.g.: the address revolution protocol(arp) uses this to send an address revolution query to all computer on LAN).

VII. BLUETOOTH DEVICE

Now in the 21th century, Bluetooth dev ice is one of the most popular devices using in wireless which is specially categorized under ad-hoc or Personal Area Networks (PAN).

7.1 History

The word "Bluetooth" is an Aglicized version of the Scandinavian Blåtand/Blåtann, the epithet of the tenth-century king Harald I of Denmark and parts of Norway who united dissonant Danish tribes into a single kingdom. The idea of this name was proposed by Jim Kardach who developed a system that would allow mobile phones to communicate with computers (at the time he was reading Frans Gunnar Bengtsson's historical novel The Long Ships about Vikings and king Harald Bluetooth).The implication is that Bluetooth does the same with communications protocols, uniting them into one universal standard. The Bluetooth logo is a bind rune merging the Younger Futhark runes (Hagall) ( ) and (Bjarkan) ( ), Harald's initials. The concept behind Bluetooth Technology was to unify the telecom & computing industries. It allows users to make ad-hoc wireless communication between devices like mobile phones, laptops, notebooks.

7.2 Range

Devices carrying Bluetooth enabled chips can easily transfer data at a speed of about 720kbps-1Mbit/sec within 50metres(approximately 150ft) of range or beyond through walls, clothing and even luggage bags.

7.3 Bluetooth Vs. Wi-Fi

Perhaps pitting these two wireless technologies against each other is unfair since both offer unique advantages and complement rather than compete with each other. Wi-Fi offers a means to wirelessly

connect one or more computers to each other and to a router so they can access the Internet. Wi-Fi range can reach longer distances than Bluetooth and transfers data faster as well. Bluetooth is a short-range wireless medium but offers a means to link not just computers, but PDAs, headphones, headsets, printers and other technology with each other.

7.4 How Does Bluetooth Works?

Bluetooth takes the information normally carried by a wire and transmits it at a special frequency to another Bluetooth device. Both the sending and receiving devices have what is called a Bluetooth receiver chip, which translates data into a wireless transmission and then back to normal again, depending on if it is sending or receiving data.

VIII. CONCEPT OF BLUETOOTH PROTOCOL

Bluetooth was the unlicensed 2.4GHz ISM frequency band. There are 79available Bluetooth channels spread 1MHz apart from 2402MHz to 2480MHz.IEEE has adapted Bluetooth as the 802.15.1a standard. Bluetooth allows power levels starting frame 1mw carrying 10cm to 100cm mv covering up to 100metres. Bluetooth support both Unicast (Point to Point) & Multicast (Point to Multipoint).

IX. PICONETS & SCATTERNETS

Bluetooth protocol uses the concept of master and slave. In a master-slave protocol, a device cannot talk as and when the desire. They need to wait till the time, the master allows talking.

9.1 Piconet

A piconet is the type of connection that is formed between two or more Bluetooth-enabled devices such as modern cell phones or PDAs. Bluetooth enabled devices are "peer units" in that they are able to act as either master or slave. However, when a piconet is formed between two or more devices, one device takes the role of 'master', and all other devices assume a 'slave' role for synchronization reasons. Piconets have a 3-bit address space, which limits the maximum size of a piconet to 8 devices, i.e. 1 master and 7 slaves. Piconet is an ad-hoc computer network linking a wireless user group of devices using Bluetooth Technology protocols. Its data Transfer rate is 200-2100 kilobits/sec.

9.2 Scatternet

A scatternet is a number of interconnected piconets that supports communication between more than 8 devices. Scatter nets can be formed +6+when a member of one piconet (either the master or one of the slaves) elects to participate as a slave in a second, separate piconet. The device participating in both piconets can relay data between members of both ad-hoc networks. However, the basic Bluetooth protocol does not support this relaying - the host software of each device would need to manage it. Using this approach, it is possible to join together numerous piconets into a large scatternet, and to expand the physical size of the network beyond Bluetooth's limited range. Scatternet is a type of ad-hoc computer network consisting of two or more piconets. A scatternet is formed when a device from one piconet also act as a member of another piconet.

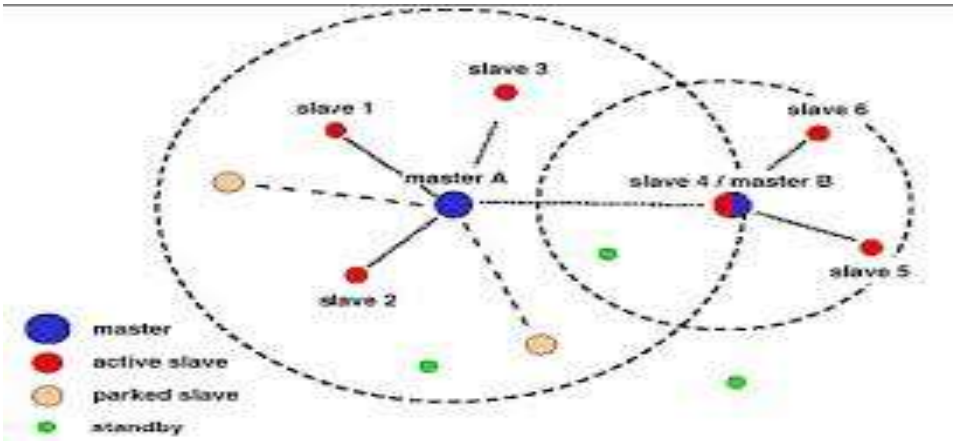

Fig: 5 Piconet & Scatternet

X. CONCEPT OF BROADCAST BLUETOOTH

Though we know that, the concept of Bluetooth technology came to unify the Telecom & the computer industry, since it is a two way process of communication. As a result, concept of piconets and scatternet come and we have to maintain the master-slave concept. But we can convert Bluetooth Technology from Unicast to broadcast connections. Besides, Broadcast connection, we will follow the one way process of communication, like FM Radio connection. Bluetooth devices can receive data, when they are in same frequency range of the sender device, at a certain time. Here we also main the one way connections so that the telecom industry can get secure way.

XI. APPLICATIONS OF BROADCAST BLUETOOTH

It will help a lot in the shopping malls, railway stations to send any important announcements, sell offers, train departure-arrival times etc. Besides, schools, colleges, any technical Universities or Institutions, corporate profiles, companies also can use it.

As e.g.: the boss wants to send holiday notice to all technical stuffs and employees. If we can use Bluetooth, then he don`t need to write notice to the notice board. All the employees will get the message technically and perfectly in time. The faculty members, Guest lecturers can send assignment sheets, data's, class notes, tutorials sheets among all the students. And the students will get relief from Photo copy.

XII. CONCLUSION

A protocol for a Bluetooth is being present in this paper. The Bluetooth protocol was designed to be simplistic so that it could be implemented onto any mobile computing device with limited computing and programmability capability. In the Bluetooth protocol is limited in Unicast and Multicast Connections. Future work on this protocol involves that the Bluetooth protocol will get work in Broadcast connections. The Two ways communication process will be changed into the one way communication process.

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