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# Mobile Computing: Fundamentals

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***Abstract*--**Mobile computing can be defined as the use of hand held computer devices capable of wireless broadband network access utilizing battery power and capable of operating in a disconnected fashion when network connectivity is not available. Mobile computing is becoming very important these days, as everybody needs to connect to the internet using different mobile devices like laptop. In this paper we have discussed about various mobile computing issues along with the problems encountered with IP based Protocol. Also we have elaborated the basics of mobile computing.

***Keywords*-***Introduction, Entities, Services, Stages, Application Server, IP base Protocol.*

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## I. INTRODUCTION

The birth of "mobile computing "has signaled as new era in the field of computing and information system. The concept of mobile computing is derived from the realization that as computing machinery decrease in size and increase in computing power users will demand this machinery to be part of their everyday life. Mobile computing addresses those application technical issues that arise when persons move around within a region or country. Mobile computing can be defined as the use of hand held computer devices capable of wireless broadband network access utilizing battery power and capable of operating in a disconnected fashion when network connectivity is not available.[4]. 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 solution to the biggest problem of business people on the move-mobility. The name MOBILE is derived from the first letter in each of the six categories defined by [1] that composition the agenda.
The six categories are:

- **M** the need for mobility
- **O** the need to improve operations
- **B** the need to break business barriers
- **I** the need to improve information quality
- **L** the need to decrease transaction *lag*
- **E** the need to improve *efficiency*

## II ENTITIES

It Contain following entities

***Mobile Node (MN):***

Through internet a host or router that may change its point of attachment from one network or sub network to another. Mobile node is pre-assigned a fixed residence address on a home network, this address is used by others hosts to address their packets to, apart from of its present location.

***Home Agent (HA):***

Mobile node in a visitor list is maintained by Router that used to forward mobile node-addressed packets to the suitable local network when the mobile nodes are not at home. It encapsulate datagram's after checking with the current mobility binding, for a particular mobile node, and sends it to the mobile host's current temporary address.

***Foreign Agent (FA):***

A router that assist a locally accessible mobile node that is away from its home network. Information between the mobile node and the home agent deliver by it.

***Care-of-address (COA):***

An address which identifies the mobile node's current location. It can be observed as tunnel end directed towards a mobile node. It can be either assigned with dynamism or connected with its foreign agent.

***Correspondent Node (CN):***

The packets which are addressed to the mobile node are send by this node.

***Home Address:***

Every Mobile Node assigned a permanent IP address. It remains unchanged despite of where the mobile node is attached to the internet.

***Mobility Agent:***

Mobile Agent supports mobility it could be either a home agent or a foreign agent.

***Tunnel:***

This path leads packets from the home agent to the foreign agent.

## III Support Services

Mobile IP Support Following Services:-

***Agent Discovery:*** Home agents and foreign agents broadcast their ease of use on each link to where they can supply service. A newly arrived mobile node can send a solicitation on the link to learn if any prospective agents are present.

***Registration:*** When the mobile node is away from home, it register its care-of-address with its home agent so that the home agent knows where to forward its packets. Depending on the network design, the mobile node can get registered through home agent. Also the registration can be done indirectly through foreign agent.

***Encapsulation*****:** The process of enclose an IP datagram within another IP header which contains the care-of-address of the mobile node. The IP datagram itself remains integral and untouched during the enclosing process

**Decapsulation:** For access and deliver of the enclosed datagram the process of stripping the outermost IP header of the incoming header is to be performed. It is the reverse process of Encapsulation.

## IV STAGES

There are Four different stages in sequential order:

Agent discovery: When a mobile node is off from home, it desires to search out agents thus it doesn't lose access to the net. There are 2 ways to find agents. The primary is by choosing associate degree agent from among those from time to time publicized, and while the second is by causing out a periodic solicitation till it receives a response from a quality agent. The mobile node therefore gets its care-of-address which can be dynamically appointed or related to its undercover agent.

Registration: The mobile node registers its care-of-address with its home agent so as to get service. The registration method is performed directly from the mobile node, or relayed by the undercover agent to the house agent, counting on whether or not the care-of-address was dynamically appointed or related to its undercover agent. Note that synchronal registrations, with multiple care-of-addresses are feasible.

In service: This is the amount when the registration method and before the service time expiration, given that the mobile node stays within the place. Throughout service time, the mobile node gets forwarded packets from its undercover agent that was originally sent from the mobile node's home agent. Tunneling is the technique to forward the message from home agent to undercover agent and eventually to mobile node.

Deregistration: After the mobile node returns home, it deregisters with its home agent to drop its registered care-of-address. In alternative words, it sets its care-of-address back to its home address. The mobile node achieves this by causing a registration request on to its home agent with the duration set to zero. There it's no got to deregister with the undercover agent as a result of the service expires mechanically once the service time expires.

**Next to the registration method**

After each steps area unit followed, the registration method between the mobile nodes and therefore the home agent is complete. However, the tip result can be either a reliable registration or a failing registration. For a reliable registration, that service has been granted, the house agent starts to serve its consumer -- the registered mobile node -- by receiving the incoming datagram that is self-addressed to the mobile node, encapsulating the datagram, and forwarding it to the mobile node's care-of address. The mobile node's undercover agent then gets the encapsulated datagram, decapsulates it, and eventually delivers it to the mobile node. For the case of the mobile node not having a remote agent as a result of it itself encompasses a transient address, the datagram is directly and forwarded intact to the mobile node from the house agent while not inquiring the intermediate step. The house agent can retell the procedure till the service time expires for the mobile node. It's the responsibility of the mobile node to give notice the house agent by supplying a brand new registration request if it desires to increase the service time, or to cancel the service

## V AREAS OF APPLICATIONS

a) Facilitate the business initiatives by sustaining mobility of

1. Patrons(customer)
2. Suppliers and Businesses
3. Workforce(employee)

b) Mobile computing applications

1. Wireless messaging (e.g., SMS)
2. Mobile ecommerce (M-Commerce) and its variant

c) Positional commerce *(p-commerce)* .

1. Voice commerce (v-commerce).

d)Television commerce (T-Commerce)

1. Mobile ebusiness application (MEBAs), e.g., M-CRM, M-portal

e) specialize applications

1. Location sensitive apps
2. Wireless sensor network apps

## VI MOBILE COMPUTING APPLICATION SERVERS (MCAS)

It is defined as a software program which runs in a server and provides the following functionality:

1. Application level logic that handle commerce functions concerned(involved) in a particular organization and its incorporation with backend catalog or commerce

application systems for example processor economic accounting system, developed systems, stock, Enterprise Resource Planning) and emerging Customer Resource Management systems
2. Handheld computers, notebook, PDA, etc i.e. application server take raw data from catalog application/query and transform the data on a specific lean client (or a solid client like a PC) in view of its presentation space characteristics and limitations.
3. operation services, in some cases - with multi-threading for intense volume and persistency i.e. recovery transversely session failure.
4. Application programming level interface with specific communications protocol

An application server might be considered as part of a multi-tier i.e. three tier architecture. Those are :

1. First tier - A thin client based on handheld devices or a thick client on a PC - typically a browser-based interface in the Web context
2. Middle tier consists of business applications on a set of servers - communications and business applications
3. Third Tier - backend heritage(legacy) data base system and mission-critical ERP systems on large number of server or supercomputer.

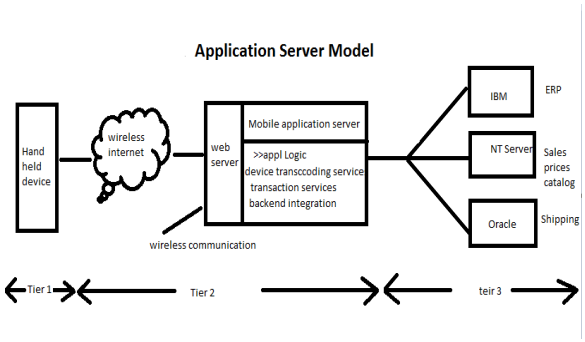


**Figure 1 Application Server Model**

## VII VARIOUS ISSUES IN MOBILE COMPUTING

### 1. Security Issues[5]

A. Discretion: Preventing illicit users from gaining access to vital information of any meticulous user.
B. *Reliability:* Ensures illicit modification, devastation or preservation of information cannot occur
C. *Ease of use*: Ensuring authorized users receiving the access they require.
D. *Legitimate*: Ensuring that only endorsed users have access to services.
E. *Liability (Accountability)*: Ensuring that the users are held liable for there security related activities by arranging the user and his/her activities are linked if and when necessary.

### *2.* Bandwidth:

Bandwidth consumption can be enhanced by sorting and density of data before communication. Furthermore, lazy write back and file pre-fetching can help the network in times of peak demands. Lazy write back is very supportive in the sense that the data to be written may go through further modification. The technique of caching frequently accessed data items can play vital role in reducing conflict in narrow bandwidth wireless networks. To improve query response time, cached data is used. As mobile clients often cut off to keep battery power the cached data can support disconnected operation

### 3. Locality Intelligence:

As the mobile computers move they come across networks with dissimilar features. A mobile computer must be able to switch
from infrared mode to radio mode as it moves from inside to outside. Moreover it should be accomplished of switching from cellular mode of operation to satellite mode as the computer moves from metropolitan and rustic areas.

In mobile computing as computers are running in cell and are being serviced by dissimilar network provider, the physical distance might not replicate the true network distance. A small movement can effect in a much longer path if cell or network precincts are crossed. It will also lead to updating of the location reliant information as described above. This can raise the network latency with risk of disconnection. Service connections must be vigorously transferred to the adjacent server. Nevertheless, when load balancing is precedence this may not be possible.

### 4. Power utilization/consumption:

Mobile Computers will depend on their batteries as the key power source. Batteries should be preferably as light as possible but at the same time they should be accomplished of longer operation times. Power utilization should be minimized to raise battery life. Chips can be redesigned to operate at lower voltages. Power management can also help. Individual.

## VIII Problems with base Mobile IP protocol [2, 3, 4]

### 1. Dogleg routing

Consider that if a mobile node happens to move to the same subnetwork as its correspondent node that wants to send it datagrams, this is what will happen in order for the datagram to be received by the mobile node, based on the base Mobile IP protocol: the correspondent node will send the datagram all the way to the mobile node's home agent, which may be a half globe away; its home agent will then forward the datagram to its care-of-address, which might just take a half second to reach if the datagram is sent directly from the correspondent node. This kind of "indirect routing" is inefficient and undesirable.

*Fix:*The effort to define extensions to the operation of the base Mobile IP to allow for the optimization of datagram routing

from a correspondent node to a mobile node has been made by the Mobile IP Working Group of the Internet Engineering Task Force (IETF). The key approach to route optimization is as follows:

- Binding cache containing the mobility binding of mobile node(s) is provided for the node that looks for optimizing its own communication with mobile nodes. In this way, the correspondent node has a way to keep track of where the mobile node(s) is. So when the time comes that the correspondent node wishes to send the datagram to its mobile node, it can send the datagram directly to the destination address, eliminating the "zig-zag" routing.

- The means for the mobile node's previous foreign agent to be notified of the mobile node's new location is provided. This mechanism allows datagrams in flight to the mobile node's previous foreign agent to be re-directed to its current address.

2. **Too many unwanted duplicated fields in "IP within IP"**

As discussed previously, the way to encapsulate the datagram is to put the original datagram (= IP header + payload) inside another IP envelope, of which the whole packet = outer IP header (Care-of Address) + original datagram. The fields in the outer IP header add too much overhead to the final datagram -- several fields are duplicated from the inner IP header. This waste of unnecessary space is uneconomical.

*Fix:*Also coming from the IETF, a so-called Minimal Encapsulation scheme is defined, and becomes another option to encapsulate the datagram. The approach to the encapsulation method is as follows:

- Instead of inserting a new header, the original header is modified to reflect the care-of address, and in between the modified IP header and unmodified IP payload, a minimal forwarding header is inserted to store the original source address and original destination address. When the foreign agent tries to decapsulate, it will simply restore the fields in the forwarding header to the IP header, and remove the forwarding header.

There is a restriction to the use of this encapsulation method. If the original datagram is already fragmented, then minimal encapsulation must not be used since there is no room left to store fragmentation information.

**3. Single home agent model -- a fragile model**

Although single home agent model is simple and easy to configure, it has the disadvantage of fragility. The mobile node becomes unreachable once the home agent breaks down.

*Fix:*One possible solution is to support multiple home agents. If one conventional home agent fails, there are still other home agents who can take over the duty and route for the datagram for the mobile node.

**4. Unbearable frequent report to the home agent if the mobile node moves frequently**

If a person is in a moving vehicle and roaming around into neighboring communities, the mobile IP will have to constantly report to the home agent to change its address. This degrades the performance and delays the datagram transmission.

*Fix:*One possible solution is to support foreign agent clustering. The idea is that by making a cluster of foreign agents, moves only from cluster to cluster have to be notified to the home agent. This approach eliminates the number of times a highly mobile node needs to report to its home agent.

REFRENCES

[1] Deepak G , Dr. Pradeep B S," Challenging issue and limitation of mobile computing", Int.J.Computer Techology & Applications,Vol 3 (1),177-181.

[2] Yi-an Chen , "A Survey Paper on Mobile IP", http://www.cs.wustl.edu/~jain/cis788-95/ftp/mobile_ip/index.html#Problems, Accessed on 22, April, 2014,

[3] Raminder Kaur, introduction to mobile computing**",** The Journal of Computer Science and Information Technology , Vol. 4, No.1 (2006) pp. 83-87

[4] White paper, "The Next Generation of Mobile Computing", www.quadrus.com

[5] Thomas Hardjono, Jennifer Seberry,"Information security issues in mobile computing", International Information Processing Conference -Security'95, (IFIP)-SEC'95, 143-151.