

Development of Virtual home
environment (VHE) and location
dependent services
through mobile agent technology

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Brief Description

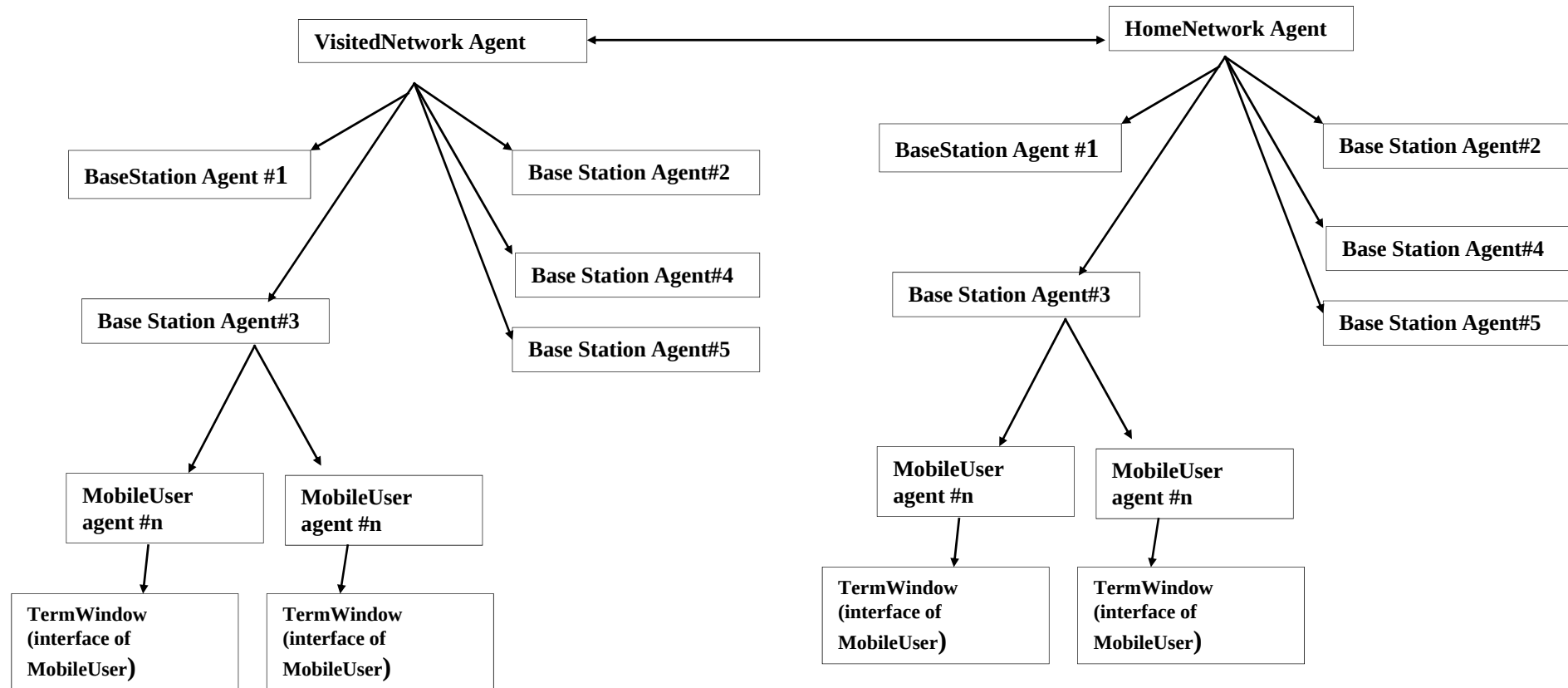
- M.Sc. thesis: Development of Virtual home Environment (VHE) and Location Dependent Services through the Mobile Agent Technology (IBM Aglets framework).
- Location Dependent Services: provision of meteorological information, maps and GPS-related information.



Network Entities

- HomeNetwork Agent :Supervising entity of the home network
- VisitedNetwork Agent :Supervising entity of the visited network
- BaseStation Agent : Controller of each Base Station within the network
- MobileUser Agent : Represents the Mobile user while roaming
- ServiceAgent : Agent responsible for service provision

Network Outline



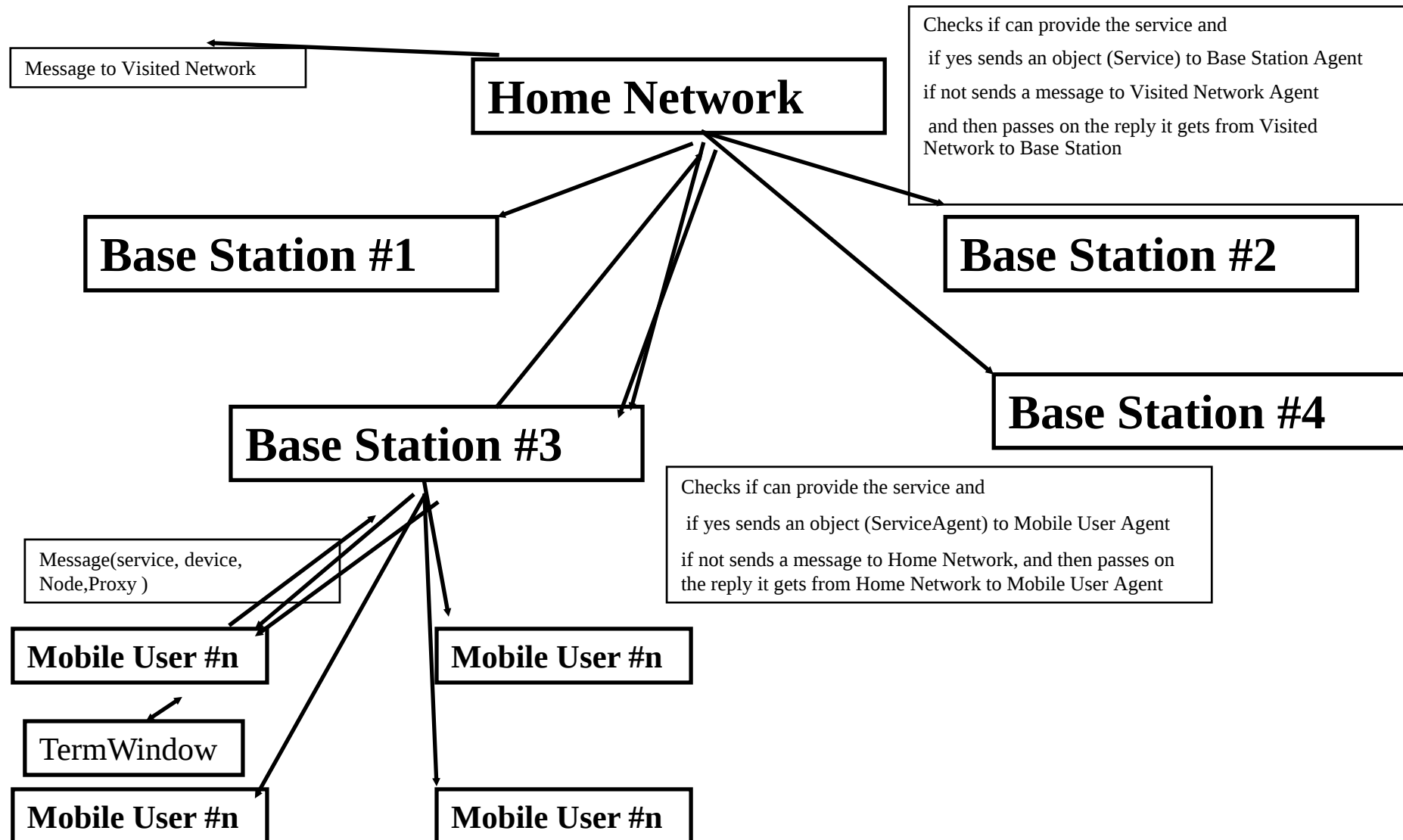
All messages travel through the path MobileUser Agent- BaseStation-HomeNetwork



Steps of Service Request and Provision

1. The process is initiated by the MobileUser Aglet which requests a service. This is done by its interface (TermWindow).
2. This request is transferred as a message from the MobileUser to Aglet BaseStation.
3. The BaseStation checks if it is responsible to provide the requested service
 - a) If yes, creates a ServiceAgent to provide the service locally
 - b) If no, passes the message to HomeNetwork.
4. The HomeNetwork Aglet performs the same inspection as BaseStation did in the previous step, and depending on the results creates the ServiceAgent or passes the message to the last aglet in the row (VisitedNetwork) to create the ServiceAgent .
5. The ServiceAgent finally is created by a network entity, and is dispatched to the Aglet Server (where the MobileUser runs).
 - The ServiceAgent is the entity that provides the software logic needed for a service to be executed and travels from one Aglet Server to another, which could be located in the same computer or any other in the network.
 - The aforementioned network entities could be located anywhere in the network.

Service Request and Provision

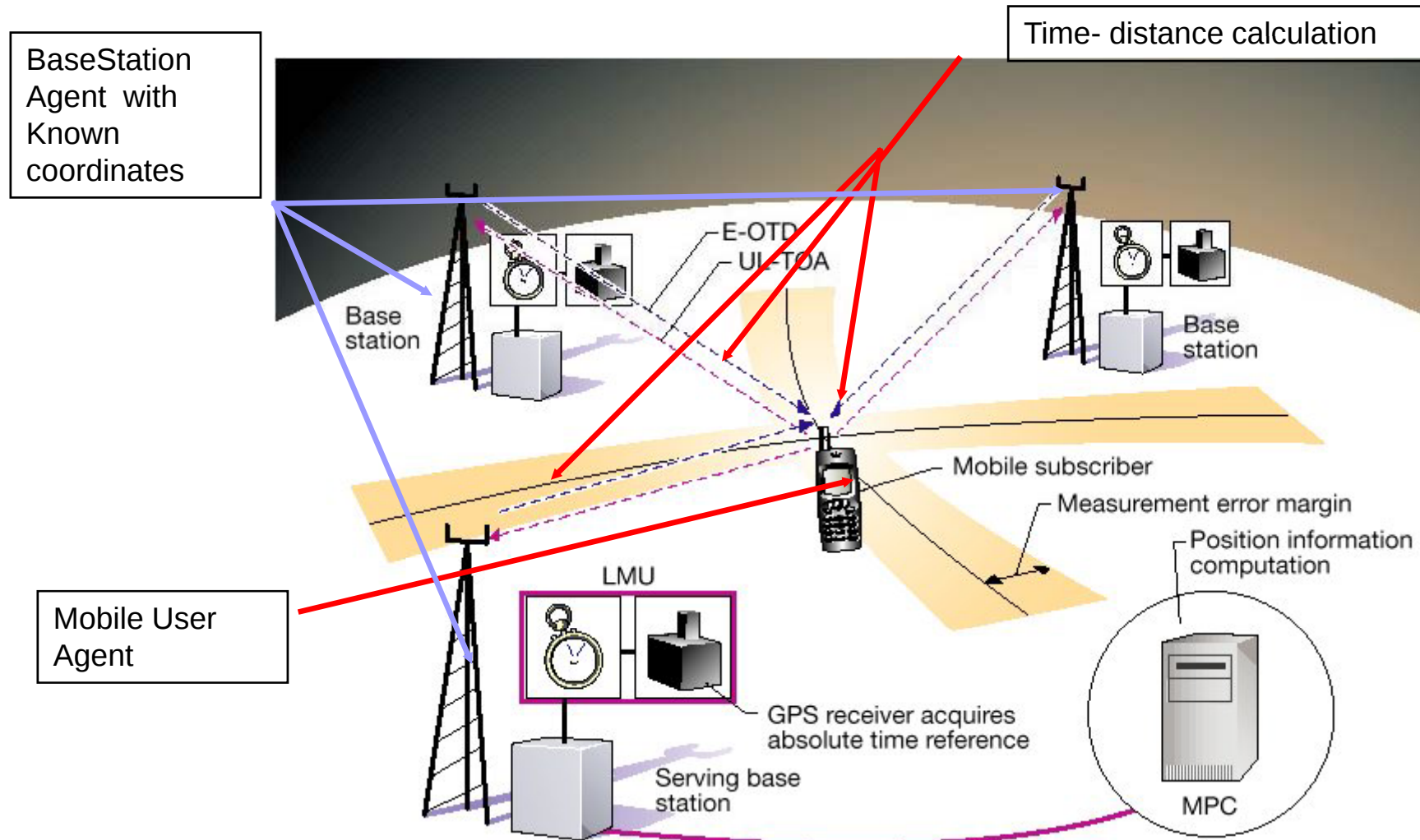




Service “Location Information”

1. After the arrival of the Aglet ServiceAgent to the Aglet Server of MobileUser, the ServiceAgent performs the following actions:
 - a) reads the name of the local BaseStation (e.g Athens, Patra etc) and the equivalent coordinate pair of the latter
 - b) reads the predefined coordinate pairs of the three adjacent BaseStations
 - c) Uses the Random class of Java to “estimate” the time-distance of the MobileUser from these four BaseStations.
2. Then uses all these (coordinate pairs and estimation of time) as an input to the algorithm of GPS to estimate the location of the MobileUser.

Service “Location Information”





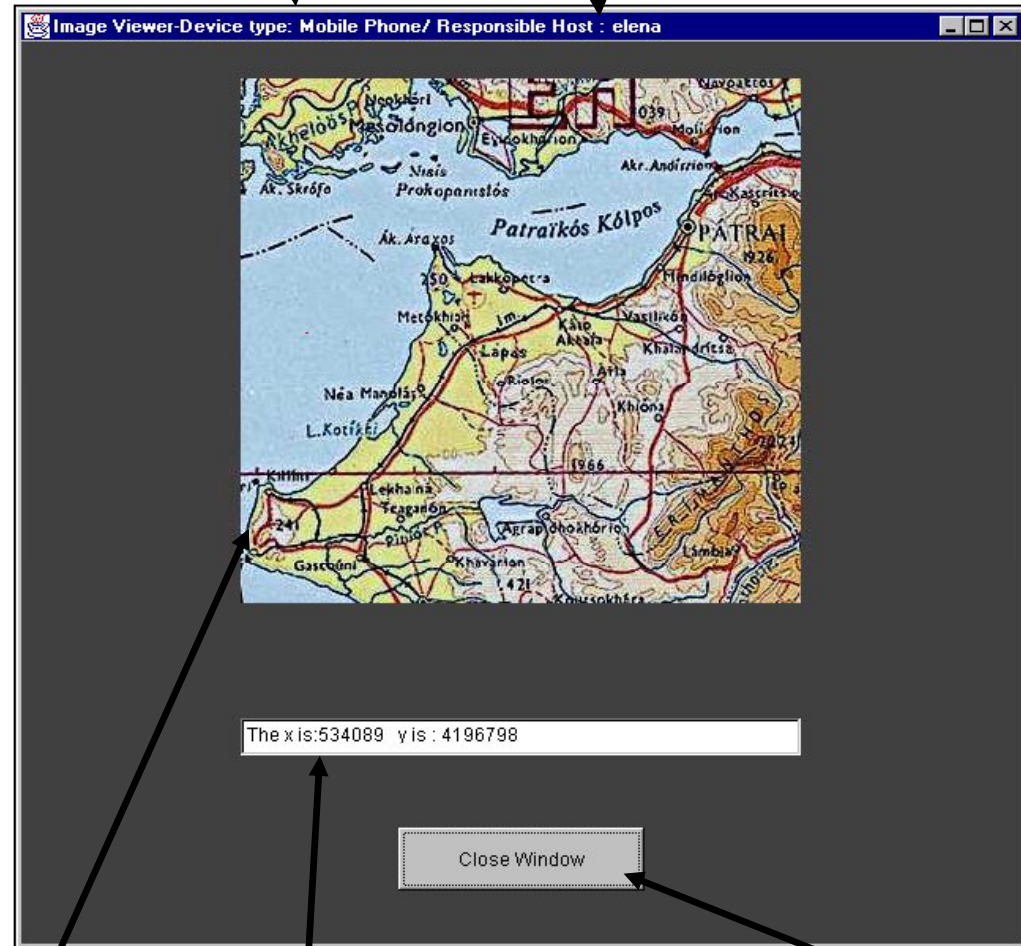
Service “Map Provision”

- After the arrival of the Aglet ServiceAgent to the Aglet Server of MobileUser, the ServiceAgent performs the following actions:
 - reads the name of the local BaseStation (e.g Athens, Patra etc) and the equivalent coordinate pair of the upper left corner of the image.
 - Uses these coordinates to display the image of the correspond area of the BaseStation. Each image has pixel size 200 meters.

Map Provision

Device used to access this service

LAN computer where the agent responsible to provide the service (ServiceAgent) starts its execution



Georeferenced map of the area where the MobileUser is located

While you place the mouse over the image, in this area you can see the coordinates of the below area. These coordinates are expressed in metres, using UTM projection and spheroid WGS 84

Window close



Tools Used

- Programming language: java version 1.1.8
- Mobile agent platform : aglets version 1.0.3
- Development packages :
 - VisualCafe enterprise suite version 3.1
 - Microsoft developer studio (visual C ++ version 5)
 - Rational rose enterprise edition 2000
- Geographical package for image and map manipulation:
 - Erdas imagine version 8.4, professional edition