



www.ijarcsse.com

Volume 3, Issue 5, May 2013

ISSN: 2277 128X

# International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: [www.ijarcsse.com](http://www.ijarcsse.com)

## Trends in Mobile Agent Communication for Mobile Networks

Parwinder Singh<sup>1</sup>, Mrs. Sheenam Malhotra<sup>2</sup>

<sup>1</sup>Deptt. of Computer Science & Engineering, Shri Guru Granth Sahib World University, Fatehgarh Sahib, India

<sup>2</sup>A.P Deptt. of Computer Science & Engineering, Shri Guru Granth Sahib World University, Fatehgarh Sahib, India

---

**Abstract:** *Mobile agent management provides great solution for Simple Network Management Protocol limitations. Next generation mobile networks provide a great solution of multimedia services to the customers at all times and at all places. Fulfilling the dynamic needs of the customers requires complex network architectures and high performance delivery systems. Further the management of such networks really needs fast response and immediate solutions for all the network related issues. Developing new services managing customer expectations and providing such services with efficiency, effectiveness and with quality at less cost are the challenges to be handled by the next generation network management systems. Hence there is an urgent need to enhance the functional aspects of the current day network management systems, so that the offered services are up to the expectations and are able to with stand the competition. Generally Agent manager starts and dispatches the agents to various areas around destinations of the network components and the agents will carry on the assigned tasks on the move and follow the instructions as per the defined norms or wait for next steps. Mobile agent security is always a big concern for network integrity. In the paper the new changes in mobile agent's communication and application used by mobile agents are analyzed.*

**Keywords:** *Quality of Service (QoS), Long Term Evolution (LTE) Communication, Simple Network Management Protocol (SNMP), Forward Proxy (FPP), Search by Path Chase (SPC), File Transfer Protocol (FTP), Authentication Authorization Accounting Protocol (AAA), Region Agent Register (RAR), Site Agent Register (SAR).*

---

### 1. Mobile Agents

A mobile agent is a software program and data which represents a user in a computer network, and is capable of migrating autonomously from node to node in a heterogeneous network to perform some computation on behalf of the user continuously with the features of autonomy, social ability, learning, adaptively, reactivity, mobility etc [1][2]. They are defined as objects that have behavior, state, and location. Its tasks are determined by the agent application, and can range from online shopping to real-time device control to distributed scientific computing. It decides when and where to migrate. It can execute at any point or suspend its execution, moves easily across the network and continue its execution on another host. When a mobile agent decides to move, it saves its own state, transports this saved state to the new host, and resumes execution from the saved state. Each agent is typically composed of the agent code, the agent execution thread along with an execution stack, and the agent data part, which corresponds to the values of the agent's global variables [3]. Mobile agents are used in a wide area of applications like Network Management and Monitoring such as processing data over unreliable networks, Information Searching and Filtering like distributed DBMS (Database Management System), mobile media, Internet, Intrusion Detection, Military, telecommunications, Secure brokering such as untrustworthy collaborators etc. The ability of a mobile agent to personify their creator's intentions and to act and negotiate on behalf of them makes it well suited for electronic commerce For example, instead of spending a huge amount of time going through on-line bookstores to find the best deal on a book, firing up an agent to do this task would save us a considerable amount of time. [3]

### 2. Communication in Mobile Agents

Mobile Agent communication provides great support and big advantages over traditional architectures of network communication. Different Schemes for communication of Mobile Agents are as follows.

- 1) **Home-server schemes:** are the most popular communication protocols for multi-agent systems because they are compatible with the current Internet Protocol. In this approach, each mobile agent associates with a stationary agent, which is called the mobile agent's home agent. [3]

- 2) **Forwarding-Proxy protocol:** It adopts the Forwarding pointers approach for location management and the Forwarding approach for message delivery. Location information in the FP protocol is stored at nodes that the mobile agent has visited. [8] When a mobile agent migrates to a different location, a forwarding proxy that maintains information of the next location of the mobile agent is created at each node.
- 3) **Broadcast protocol:** It is another communicating protocol which does not maintain any location information on mobile agents. The Broadcast protocol broadcasts a message to all nodes within a network in order to deliver it to a mobile agent. If a node has the mobile agent, it delivers the message to the mobile agent directly or through its mailbox (or message dispatcher). [9] The Broadcast protocol can be used to send a message to a group of mobile agents. In this case, the message contains multiple IDs or names of receiver agents. [3] The cost of communication becomes very high as the number of nodes and regions increases.
- 4) **Shadow protocol:** It adopts the Location server and Forwarding pointers approaches for location management and the Forwarding approach for message delivery. The Shadow protocol uses a placeholder (namely, shadow) that records the locations of all dependent agents, similar to a Location server. [10] It also uses forwarding proxies at nodes that the mobile agent has visited. A mobile agent updates the current location to the associated shadow according to a Time To Live (TTL).
- 5) **Search-by-Path-Chase protocol:** It adopts the Location server and Forwarding pointers approaches for location management and the direct approach for message delivery. The SPC protocol takes into account a multi region mobile agent computing environment. Location information is stored in a distributed way at a Region Agent Register (RAR) or a Site Agent Register (SAR). [11]

### 3. Experimentation done with Mobile Agents

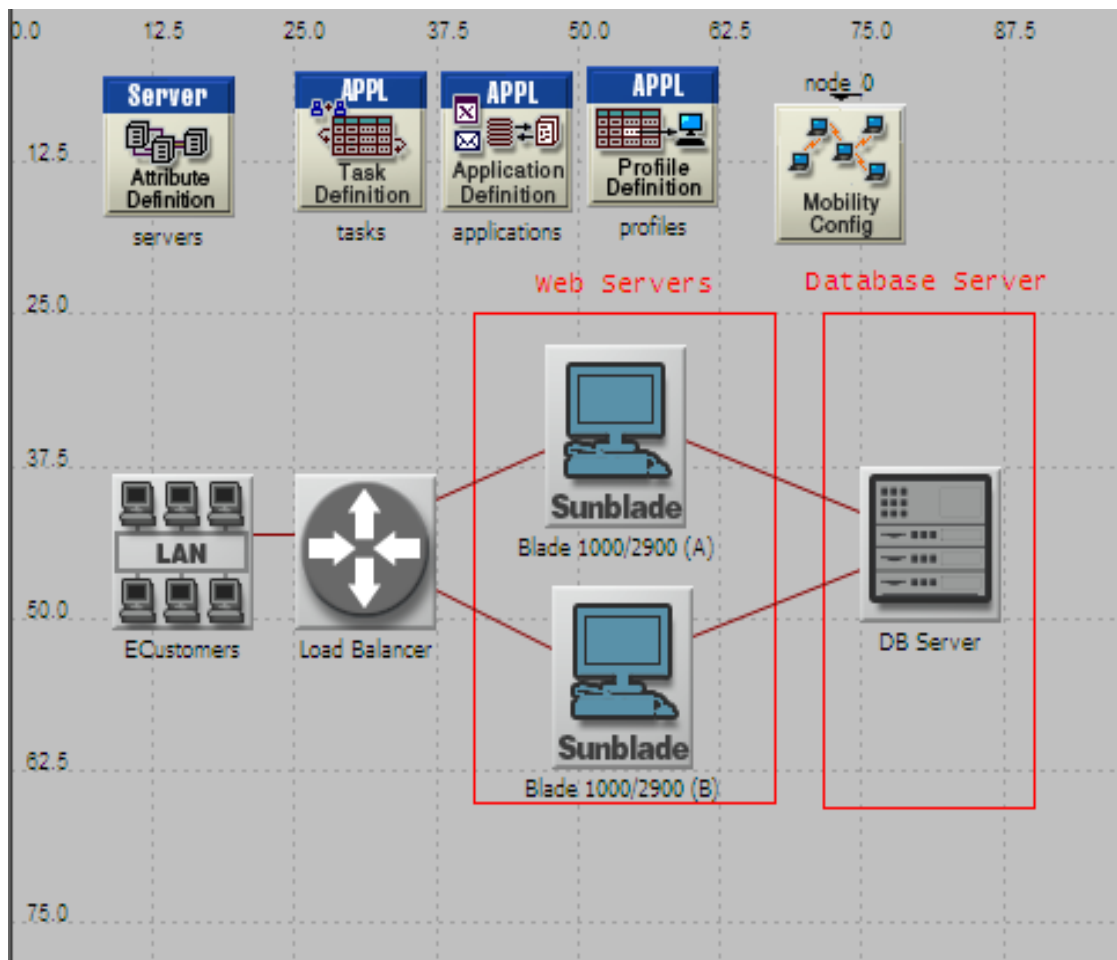


Figure 1: Simulation of Mobile Agent Scenario

We have started our experimentation of mobile agent by implementing simulation which includes two blade servers, one backup server and 15 member LAN structure. A Mobile agent flow is created with custom task and FTP traffic.

The actual request of agent starts from application and moves to e-customer and goes to web server. From web server it collects useful information and initiate process to database server. After this database server replies to the previous source and moves to web servers and then final collective information reached e-customer group. Below figure shows the response time of the application. It is the response time of simulation which analyses the average response of packets from source to destination.

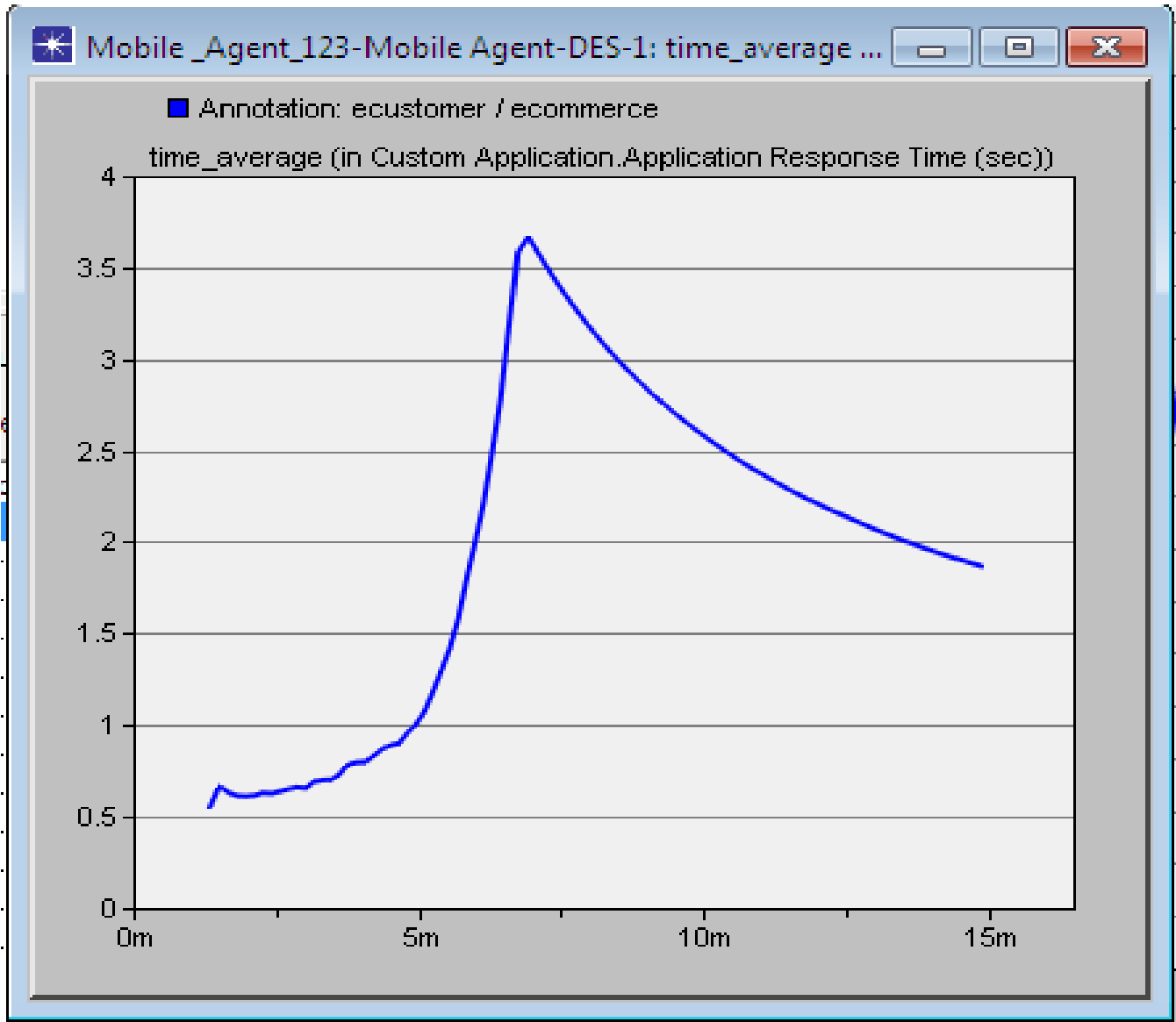


Figure 2: Application Response Time for the simulation

Further we have analyzed the delay of the total simulation. The complete communication of the mobile agent produces overall better results as response time is good. Figure 3 shows delay of simulation in which source to destination average delay is analyzed.

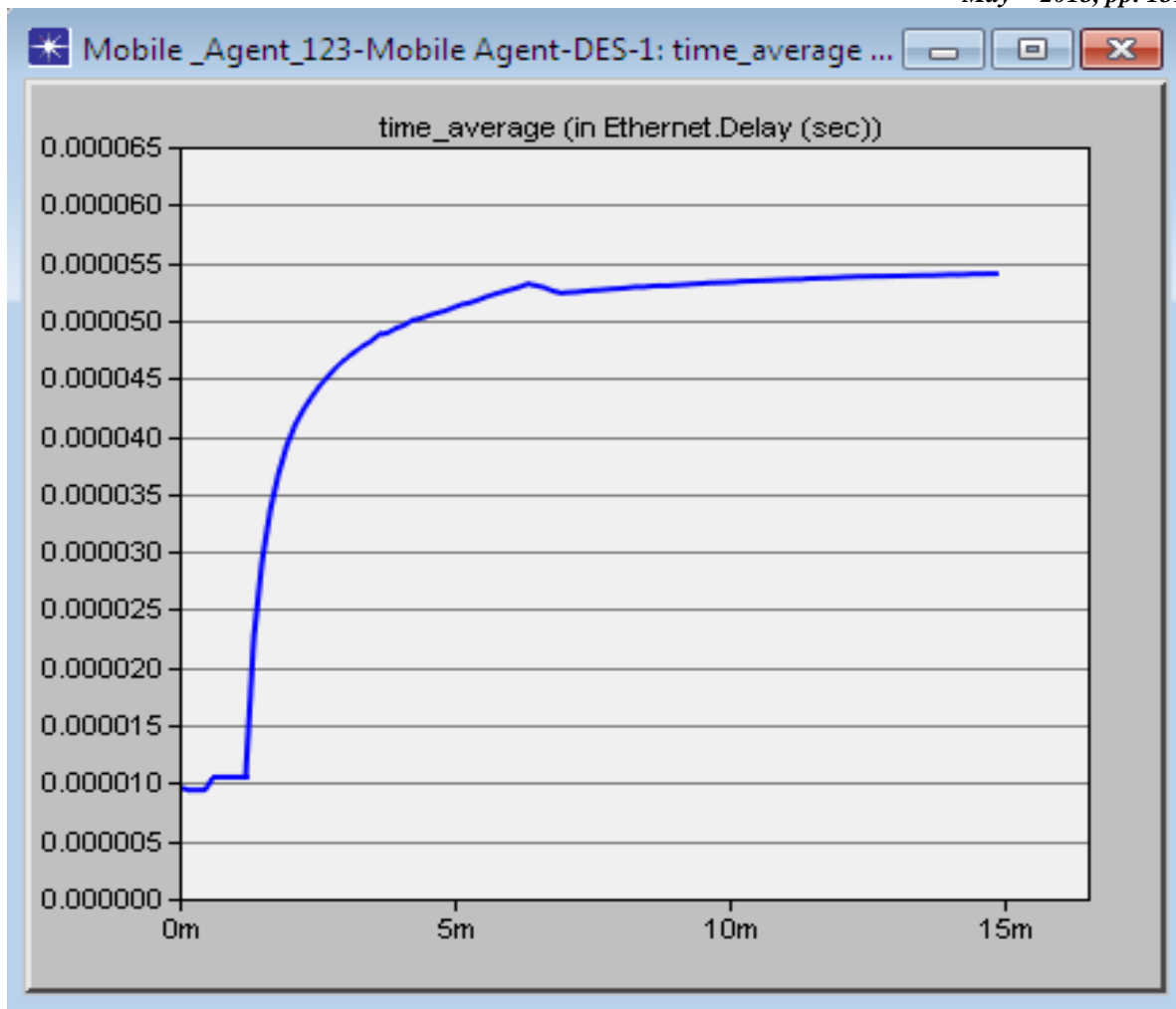


Figure 3: Delay of the simulation

#### 4. Conclusion

The paper explains different communication methods for mobile agents and shows results of some initial experimentation on the mobile agents with communication of LAN structure with servers. In our near future we are developing similar communication approach for mobile agents and that could be tested with different security parameters with secure protocols such as AAA protocol. Future work will contain the testing of agent based communication on the multi level based grid and cloud environments. It is important to check the performance with challenges and issues of mobile agents in these networks due to high usage of these services now days.

#### References

- [1] Shamila Makki, Subbarao V. Wunnava,” Application of Mobile Agents in Managing the Traffic in the Network and Improving the Reliability and Quality of Service”, IAENG International Journal of Computer Science, pp. 4-16, Vol. 3, Issue. 6, 2011.
- [2] Prof.D.Jayaramaiah, A.Prasanth, A.Viswanatha Reddy, Dr.Anirban Basu,” Multi Agent Management System for Next Generation Mobile Networks. [MAMS for NGMN]”, International Journal of Engineering Research & Technology (IJERT), Vol. 1, Issue. 7, September 2012.
- [3] Charu Virmani,” A Comparison of Communication Protocols for Mobile Agents”, International Journal of Advancements in Technology, Vol. 3 No.2, April 2012.
- [4] Yang Kun, Guo Xin, Liu Dayou, “Security in Mobile Agent System: Problems and Approaches”, IJCSNS International Journal of Computer Science and Network Security, Vol.10 No.6, June 2010.

- [5] Cu.D.Nguyen, Anna Perini and Paolo Tonella, "Ontology-based Test Generation for MultiAgent Systems (Short Paper)", International Foundation for Autonomous Agents and Multiagent Systems ([www.ifaamas.org](http://www.ifaamas.org)), pp. 1315-1318, Vol.12, May 2008.
- [6] Gerhard WeiB," Learning to Coordinate Actions in Multi-Agent Systems", Weiss Organization, 2006.
- [7] Niklas Borselius," Mobile agent security", Mobile agent security, Electronics & Communication Engineering Journal, pp. 211-218, Vol.14, Issue.5, IEEE, October 2002.
- [8] J. Baumann, "A Comparison of Mechanisms for Locating Mobile Agents," IBM Research Report 3333, Aug. 1999.
- [9] H. Jafarpour, N. Yazdani, and N. Bazzaz-zadeh, "A Scalable Group Communication Mechanism for Mobile Agents," J. Network and Computer Applications, vol. 30, no. 1, pp. 1153-1172, Jan. 2007.
- [10] J. Baumann and K. Rothermel, "Shadow Approach: An Orphan Detection Protocol for Mobile Agents," Proc. Second Int'l workshop Mobile Agents, pp. 2-13, 1998.
- [11] A.D. Stefano and C. Santoro, "Locating Mobile Agents in a Wide Distributed Environment," International Conference on Human Machine Interfaces 20-23, Dec. 2004.