CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

7.1.1 Multiagent based progressive transmission and broadcasting

The system developed by us in the thesis work has two major subsystems by name Multiagent based hierarchical embedded differential image for progressive transmission using lossless compression and Design and evaluation of network-wide time synchronization using reference broadcasts. The Multiagent based hierarchy embedded differential image for progressive transmission using lossless compression improves the performance and reusability. The agent selects the best method for compressing the image and finally the output image is constructed by multiagents. With the help of multiagents, version up gradation problem can be resolved. In design and evaluation of network wide time synchronization using multiagent reference broadcasts provides more precise, flexible, and resource efficient network time synchronization than traditional algorithms. Multiagents synchronize the sending side and the receiving side in progressive transmission and broadcasting.

In this thesis, we have used lossless compression which has the advantage of perfect reconstruction. But it has the disadvantage of having lower compression ratio. Compression ratio of lossless compression ranges from 20:1 to 30:1, whereas for lossy compression it ranges from 2:1 to 4:1. Hence a hybrid combination of lossy and lossless compression is used to
overcome this drawback. The hybrid combination yields better compression ratio than the lossless compression and perfect reconstruction than the lossy compression. It supports to data formats and yields higher entropy than the lossless case. The usage of agents provide advantages like increased reusability, cost effective solution reduced memory wastage less congestion and elimination of version up-gradation problem.

Hence the subsystem progressive transmission of Hierarchically Embedded Differential Images (HEDI) using lossless compression is done by using Multi Agent. It improves the performance and reusability. Our system provides compression four different methods for compression. The agent selects the best method for compressing the image and finally the output image is reconstructed.

In this thesis work, another subsystem namely, Design and evaluation of network-wide time synchronization using multi reference broadcast explored a form of time synchronization, by name Reference-Broadcast Synchronization (RBS), that provides more precise, flexible, and resource-efficient network time synchronization than traditional algorithms. The fundamental property of our design is that it synchronizes a set of receivers with one another, as opposed to traditional protocols in which senders synchronize with receivers with the help of agents.

7.1.2 Multiagent Based Network Security

The security issues existing for open multi-agent systems have been identified. The security issues are mainly related to agent execution and the fact that, since agents are autonomous and need to act upon information received from various entities, the trustworthiness of this information needs to
be guaranteed by the system and considered by the agent. Security issues related to agent execution and mobile agents were explored.

Our thesis work also considered the fact that the agents are under the control of the executing host. The security issues for non-mobile agents are presented in a great extent be tackled through existing security technology and protocols. However, issues related to trust and delegation in a large scale multi agent system are non-trivial to solve. Although a public key infrastructure is likely to be an important part of the solution, agents need to be able to reason and make decisions based on various security parameters. Execution of agents on untrusted platforms is another factor introducing non trivial security concerns, in particular related to correct agent execution and confidentiality of agent data. There does not seem to be a single solution to the security problems introduced by mobile agents unless trusted hardware is introduced, which is likely to prove too expensive for most applications. The way forward appears to lie in a range of mechanisms aimed at solving particular problems. This could, for example, include mechanisms that depend on agents executing on several hosts rather than on only one host, mechanisms and protocols binding agent actions to hosts, generation of various types of audit information that can be used in case of disputes, and so on. Solutions to certain problems do exist, but for mobile agents to be more widely adopted this is an area that requires further research.

In this thesis work we have applied effective security mechanisms like data origin authentication entity authentication, non repudiation and confidentiality of communication to make the multiagent system implemented in this work as a secure one. The authentication mechanism ensures that the communication an agent receives from another agent is from the intended agent only and not from the malicious agents and platforms. This mechanisms also provides security when one agent moves across platforms. Moreover this mechanisms involves trusted platforms to update the agent’s key. The non
repudiation mechanism used in this thesis work is based on a timestamp mechanism and it ensures that it will not be possible for an agent to refuse what it had communicated at a later point in time. Confidentiality of agent communication is ensured by a technique proposed by us which uses a combination of symmetric and asymmetric encryption algorithms.

7.2 FUTURE SCOPE

Further work in this direction can be aimed at using mobile agents instead of using sender and receiving agents for progressive transmission and broadcasting. Mobile Agents move from one machine to another and can execute on each of them. We have used meansampling and subsampling as preprocessing techniques before progressive transmission. Apart from mean sampling and subsampling methods the performance of the system may be analysed by applying more effective sampling schemes. In this thesis work, we have applied four receiver agents for broadcasting the images. The performance of the system may be improved by applying optimal number of receiver agents.

Security is perhaps the most critical issue in a mobile agent system as discussed earlier. In the current agent systems, several different approaches are used to address these problems. There is a consensus that mechanisms should be provided to keep the machines from being harmed by the agents as well as to protect the agents from these machines. However, only a few systems implement some protection of the agents from the machines. For mobile agents it is a non-trivial task to ensure that communication originating from the agent cannot be spoofed. Several techniques to limit the threats posed to mobile agent communication is of importance. The security mechanisms provided in this thesis work are enough in the case of stationary agents. When we move toward mobile agents, it is necessary to provide more effective security mechanisms.