Chapter 16
Derivation and Simulation of an Efficient QoS Scheme in MANET through Optimised Messaging Based on ABCO Using QualNet

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ABSTRACT

Mobile Ad hoc Network or MANET is a collection of heterogeneous mobile nodes and is infrastructure-less by choice or by default. MANET is prone to confront a lot of challenges in designing a proper Quality of Service (QoS) model where transmission reliability has an important contrtibution. This chapter proposes an optimised message transmission scheme inspired by Artificial Bee Colony Optimisation (ABCO) technique. In this proposed scheme, QoS parameters that have been taken into consideration are throughput, delay, packet loss, and bandwidth utilisation. Here, three agents, namely message selection agent, message forwarding agent, and QoS factor calculating agent, have been introduced to govern and optimise the whole message transmission scheme. Through this method, a significant improvement in QoS factor can be achieved in comparison with the existing schemes. QualNet simulator has been used to evaluate the proposed concept.

1. INTRODUCTION

Studying the evolution of any area of science and technology will not only stimulate our natural curiosity, but also gives us a deeper understanding of the main achievements in that area, making us aware of the existing trends and helps us to evaluate the prospects of specific developments. Computer networks, which is the broader area of our study, emerged relatively recently in the late 1960s. They have inherited many

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useful properties from their predecessors, that is – older and more widely adopted telephone networks. This is not surprising since both computer and telephones are universal instrument of communications.

However, Computer Networks have brought something new into the world of communication – namely, the practically inexhaustible store of information accumulated by human civilization during the several thousand years of its existence. This repository of information is continuing to grow at a steadily increasing rate; which became self-evident in the mid – 1990s, when the rapid growth of the Internet clearly demonstrated that free and anonymous access to information and instant, written communications were highly valued by most individuals.

Below is a brief chronological account of the history of the aforesaid evolution:

- In the late 1950s, early networks of communicating computers included the military radar system Semi-Automatic Ground Environment (SAGE).
- In 1960, the commercial airline reservation system semi-automatic business research environment (SABRE) went online with two connected mainframes.
- In 1962, J.C.R. Licklider developed a working group he called the "Intergalactic Computer Network", a precursor to the ARPANET, at the Advanced Research Projects Agency (ARPA).
- In 1964, researchers at Dartmouth developed the Dartmouth Time Sharing System for distributed users of large computer systems. The same year, at Massachusetts Institute of Technology, a research group supported by General Electric and Bell Labs used a computer to route and manage telephone connections.
- Throughout the 1960s, Leonard Kleinrock, Paul Baran, and Donald Davies independently developed network systems that used packets to transfer information between computers over a network.
- In 1965, Thomas Marill and Lawrence G. Roberts created the first wide area network (WAN). This was an immediate precursor to the ARPANET.
- Also in 1965, the first widely used telephone switch that implemented true computer control was introduced by Western Electric.
- In 1969, the University of California at Los Angeles, the Stanford Research Institute, the University of California at Santa Barbara, and the University of Utah were connected as the beginning of the ARPANET network using 50 Kbit/s circuits.
- In 1972, commercial services using X.25 were deployed, and later used as an underlying infrastructure for expanding TCP/IP networks.
- In 1973, Robert Metcalfe wrote a formal memo at Xerox PARC describing Ethernet, a networking system that was based on the Aloha network, developed in the 1960s by Norman Abramson and colleagues at the University of Hawaii. In July 1976, Robert Metcalfe and David Boggs published their paper "Ethernet: Distributed Packet Switching for Local Computer Networks and collaborated on several patents received in 1977 and 1978. In 1979, Robert Metcalfe pursued making Ethernet an open standard.
- In 1976, John Murphy of Datapoint Corporation created ARCNET, a token-passing network first used to share storage devices.
- In 1995, the transmission speed capacity for Ethernet was increased from 10 Mbit/s to 100 Mbit/s. By 1998, Ethernet supported transmission speeds of a Gigabit. The ability of Ethernet to scale easily (such as quickly adapting to support new fibre optic cable speeds) is a contributing factor to its continued use today.