CHAPTER 7

CONCLUSION AND FUTURE RESEARCH

7.1 CONCLUSION

Due to variable speed of vehicle and always changing network topology, VANET experiences the frequent loss in data and connectivity. Apart from that, the components of mobility management such as continuous connectivity and security became more challenging task in the vehicle network. Whenever a node drops out the signal, handover mechanism is needed to avoid the disconnection of the network and provide uninterrupted data transmission. In this case, lost node has to be replaced by another vehicle. The goal of this research work is to avoid frequent handover in a multihomed scenario through an optimized approach and also to maintain an uninterrupted safe communication network among moving vehicles in a certain environment.

In phase 1, Secured Token Based Handover algorithm is proposed which implements the token based technique that helps in minimizing the loss of data. The proposed algorithm permits the network to communicate with help of token based system that follows First Come First Serve fashion which act as authentication mechanism for guard node entry during the handover between nodes. The STBH algorithm is implemented in MIPv4 protocol.

In phase 2, NEMO+ is redesigned as EFNEMO+ method to work in homogeneous network environment which helps to increase the delivery of packets in the vehicular network. The tentative registration to HA is completed concurrently before the occurrence of the real handover.
To improve the packet transmission to the destination network, the triad protocols is employed. In addition to that, Handover mechanism is proposed based on predictive and reactive mode.

In phase 3, the EFNEMO+ method is improved and extended by adding features that supports multihomed environment. The proposed SEFMNEMO+ mechanism is introduced with multihomed mobility configuration based on flow binding to access the destination network from multiple networks to predict the handover process by accessing the information on actual location and previously recorded context data. The SEFMNEMO+ utilizes multihoming technique when the current working path fails. In order to provide the seamless connectivity to the MR, the predictive policy exchange message is used and it will avoid delay of packet and loss during handover. The Elliptic Curve Digital Signature Algorithm (ECDSA) used in this work that provides protection for the BU messages. Private Key-based Binding Update (PKBU) protocol is used to provide the security effectively. This protocol helps to effectively protect the FBU message against attacks by adversary.

In phase 4, SEFMNEMO+ is being optimized using the fuzzy optimization technique as OSEFMNEMO+ because the network delay has to be optimized to increase the performance of the network during handover. The target selection of network is done using fuzzy concept that is based on various parameters in network. The four fuzzy controllers are used to estimate the parameters and make decision about the selection of network. This proposed method helps to provide the seamless connectivity and also avoid network failure thus reducing the packet loss ratio.

In the experimental analysis, the behaviour of nodes in wireless sensor network and its performance are analyzed using proposed
methodologies and it was implemented using popular and well known Network Simulator tool NS-2. In this simulation work, the network is framed with 100 mobiles nodes and made to perform 20 handover mechanisms at regular interval. The simulation parameters are applied when implementing this proposed technique at the time using the simulation parameters. The performance of the proposed methods are evaluated in terms of network factors such as packet loss ratio, average delay, overhead and throughput.

The experimental analysis of proposed framework OSEFMNEMO+ are compared with EFNEMO+, EFMNEMO+ and SEFMNEMO+ methods and existing NEMO+. The proposed method OSEFMNEMO+ shows 36.92% improvement in packet loss ratio during handover, 30.18% improvement in packet loss ratio with varying handoff node’s speed, 31.85% improvement in average handover delay, 35.22% improvement in average packet delay with varying handoff node’s speed, 30.7% improvement in overhead during handover, 32.55% improvement in overhead with varying handoff node’s speed, 47.40% improvement in throughput during handover and 51.19% improvement in throughput with varying handoff node’s speed than other methods like SEFMNEMO+, EFMNEMO+, EFNEMO+ and existing NEMO+ methods. Experimental results of proposed work shows that average delay, overhead, packet loss are minimized with higher throughput. Therefore, the proposed method is found to have improvement in all observed metrics.

The proposed work met all the objectives such as

- Eliminated burrow burden by implementing advanced registration of the mobile nodes with New Concern of Address
(NCoA) before the handover process thus reduced the traffic congestion.

- Prevented Signal interruption by a temporary or guard node thereby provided the seamless connectivity between the heterogeneous networks.

- Reduced packet loss ratio during handover between the heterogeneous networks.

- Reduced the handover delay using Predictive Policy for advance registration of NCoA with mobile router to Home agent.

- Provided the secure transmission of Binded Update (BU) data from MIM attacks and DoS attack.

- Optimized the handover process using fuzzy concept in multi homing environments

### 7.2 FUTURE RESEARCH

- The proposed methodology is found to provide improvement in the given network experimental setup. But in future it can be tested in a real time test bed with a high traffic and the performance of the method can be analyzed and compared with the proposed result.

- The proposed methodology SEFMNEMO+ has used asymmetric ECDSA key pair for authentication purpose. In future other available authentication methods can be used.