PERFORMANCE STUDY OF SEAMLESS MOBILITY

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ABSTRACT- Seamless mobility management has the ability to support the different services involved during wireless networks. A mobility management technique is designed for mobile communication approach that is efficiently employed to predict the further user location. Seamless mobility is an experimental design for capturing the present context of user work in which the data are required to be optimized. If the network supports mobility, that has the capability to transfer efficiently from one base station to another while using the mobility handover technique. The mobility handover is essential to execute in link layer and routing of control messages that are automatically attained through the access node. Due to the reduction in scanning delay and handover latency for choosing the number of hops among physical nodes is the major issue. The study helps to reduce the mobility handover latency and scanning delay while selecting the hops between the physical nodes. In addition, the seamless mobility ensures to increase the seamless streaming data delivery with minimum cost.

Key Words: Seamless Mobility, Mobility Handover, Mobility Management and Network Virtualization.

I.INTRODUCTION

Mobility technique is defined as the process of representing the motion of mobile user in which the position, velocity and speed are change over time. Seamless mobility is very useful to predict the method that allows the user to achieve their tasks without any consideration. The process of seamless mobility is designed to generate very easier, continuous access to any type of information is preferred at any time, independent of place, network and device. In order to need the significant changes in wired and wireless network management systems by using seamless mobility in terms of seamless data delivery. Seamless data delivery is designed for Wireless Sensor Networks (WSNs) with Mobile Elements (MEs) that is mainly based on continuous data delivery with enhanced energy efficiency and low data delivery latency.

Seamless mobility has the ability to modify the mobile node's point of connection to an Internet Protocol (IP)-based network without any lose in current connections and disruption during communication. Every IP-based wireless network is an IP-based wireless access scheme that is essential to produce the wireless networks to be highly scalable, robust and cost effective. Accordingly, the node in the network is efficiently performed as mobile nodes that help to alter their location and point of connection to the internet often. Thus the process of mobility management is a significant problem in every IP wireless network for producing the seamless facility to mobile nodes from one wireless system to another. Then, the dynamic resource management is also needs to allow the adequate resource in selected route for transreceiver of data packets during the seamless roaming of mobile nodes.

Seamless roaming is designed for detecting the user that is very useful to employ their applications over the wireless network without any distinct interference. That is very useful to improve the seamless data delivery throughout the signal coverage area. A seamless mobility is essential to require efficient resource reservation and context transfer measures during the handoff technique. Since the user has the ability to moves from one place in the network to another by using seamless mobility. Resource reservation and context transfer technique take place preceding handover continuation of the same amount of data. That allows the user to receive the data or services at the prior connection point to be more feasible. Thus the process of resource reservation is needed to be better efficient use of bandwidth and lesser handover latency and utilization of resource.

This paper is organized as follows: Section II discusses seamless mobility. Section III describes the existing seamless mobility technique, Section IV identifies the possible comparison between them, Section V explains the limitations as well as the related work and Section VI concludes the paper, research work is given as to decrease the scanning delay and handover latency while increasing the seamless streaming data delivery with lesser cost.

II.LITERATURE REVIEW

A Seamless Mobility Handover (SMH) [1] designed for IPv6 over LowWPAN to support optimal mobility handover cost and delay by performing the control message routing in the link layer. Radio Frequency Identification (RFID) in [14] depends upon the seamless personal communication method with cloud computing. But, preserving the quality of communication is very hard task when it controls new IP address. Multi-Path TCP system in [2] planned potential solution to address the handoff- and mobility-related service continuity problem. However, even the connection attains the lesser throughput rate. Seamless mobility in [18] generates information with data from public transport operators that allow the allocation of information in isolated manner. Adaptive Handover Prediction (AHP) method in [10] describes seamless mobility based wireless networks. Though, it does not measure the D-Scan method due to the failure of lesser handover delay in small average range.

A local anchor-based architecture in [3] utilizes coordination among small cells with new handover system for static cluster of small cells. Though, the approach is difficult to attain the stringent backhaul latency requirements and handover failure. Network-based mobility management in [8] minimizes handover latency, high packet loss and also improves the performance of video transmission during high speed mobility and throughput. A seamless approach for Virtual Network (VN) migration using integer linear programming formulation in [4] reduces the cost involved and bandwidth consumption. Software-Defined Networking (SDN) and Parallel Redundancy Protocol (PRP) in [12] introduce high quality of redundancy by various active paths, improved reliability and data flows are controlled well. However, the approach is to improve its overload and complexity.

An enhanced Seamless Mobile Internet Protocol (e-SMIPv6) in [5] reduces the delay due to duplicate address detection and minimizes packet loss with seamless mobility supports. The two Mobile Routers (MRs) network mobility in [11] enhance the quality of transmission in handover through significantly decreasing the handover latency and packet loss for high-speed trains. However, the network mobility has more time consuming. Seamless Space-Terrestrial Heterogeneous Networks in [16] designed new technologies of low-latency random access, mobility based on time varying channels and multipath protocols. Seamless connectivity in [13] analyze the part of heterogeneous wireless data networks such as interworking and mobility system in mobile cloud computing. Though, the current interworking and mobility scheme consists of very high packet loss and handover latency.

Application-layer handover technique in [9] maintains seamless mobility for P2P live streaming that increases the stability. Though, the approach cannot appropriate for large-scale P2P systems because the attributes contains enhanced energy utilization and low scalability causes direct communication among peers. A Seamless Streaming Data Delivery (SSDD) in [6] designed multihop cluster-based Wireless Sensor Networks (WSNs) with Mobile Elements (MEs) that is mainly based on continuous data delivery in hierarchical network. Despite improvement in inter cluster and intra cluster communication, packet delivery cost is not focused to greater extent. Hybrid global mobility method in [17] considered current IP sessions to be transfer across different radio access networks that belong to various administrative domains. Though, the network diversity in a heterogeneous vehicular network develops dissemination method appropriate for traffic application remains unaddressed. Mobility management technique in [15] designed the present technique of handling mobility in IP networks as well as future network. Seamless Mobility management system (SeaMoX) in [7] improved QoS requirements for the application of mobile real-time multimedia on cellular networks. But, the cellular network has very high utilization of energy using SeaMoX approach.

In this paper, in order to overcome the above mentioned limitation, a seamless mobility is designed. That aims to guarantee the mobility handover latency and scanning delay is decreased while choosing the physical nodes with smaller cost. Hence, the technique is essential to reduce the utilization of energy for achieving the high performance by using seamless mobility.

III.SEAMLESS MOBILITY

Mobility system plays a significant role in movement of mobile user that employs the wireless telecommunications to represent wireless device or service are being moved. There are several variety of mobility are involved, one of them is seamless mobility. Seamless mobility is defined as the capability to modify the network attachment point while they process the method without losing its connectivity. A mobility management system is efficiently designed for mobile communication technique that is employed to create mobility models for predicting further user positions. Finally, the handover technique has the ability to transfer efficiently from one base station to another while the network supports the mobility model. The performance of seamless mobility is compared against with the three existing methods such as Seamless Mobility Handover (SMH) method, enhanced Seamless Mobile Internet Protocol (e-SMIPv6) system and Virtual Resource Mobility technique.

3.1 Seamless Mobility Handover for 6lowpan Wireless Sensor Networks

Seamless Mobility Handover (SMH) technique is designed for IPv6 over low power wireless personal area networks (6LoWPAN) wireless sensor networks (WSN). In SMH, the mobility handover scheme is essential to execute in link layer and routing of control messages which is automatically achieved through IPv6-access-node trees. Therefore, the process of mobility handover delay and the transmission cost gets minimized. The SMH approach designs the hierarchical IPv6 address structure and hierarchical link address structure for sensor nodes that provides better address compression. Because the length of the address is efficiently decreased, so that the transmission of data cost and delay gets shortened. In SMH, the mobile sensor node cannot require care-of address in mobility handover method, so it cannot implement the binding operation among its home address and care-of address. Routing algorithm is mainly depends upon the IPv6-access-node trees that is essential to design in terms of hierarchical address structure. During routing algorithm, the control messages are automatically routed to destination with lacking of routing detection and reduce the mobility handover cost.

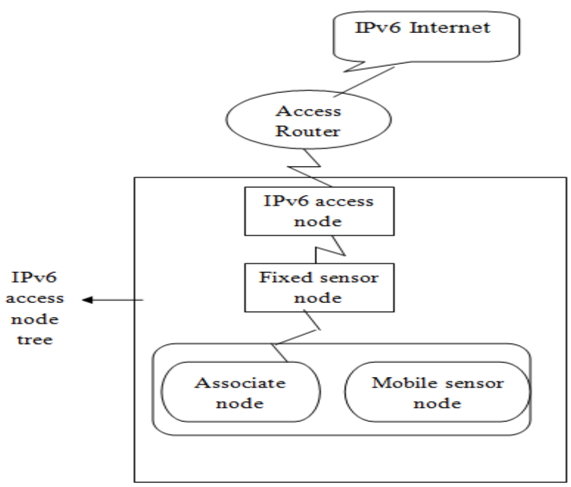

Figure 3.1 Architecture of IPV6 over Low Power Wireless Personal Area Networks WSN (6LoWPAN WSN) System

Figure 1 describes the IPv6-access-node tree design for 6LoWPAN WSN system. 6LoWPAN WSN is mainly consists of three types of nodes such as IPv6 access nodes, fixed sensor nodes and mobile sensor nodes. Initially, the IPv6 access node is essential to associate with 6LoWPAN WSN to the IPv6 Internet by access router. Next, the process of IPv6 access node and several fixed sensor nodes that are essentially forms the structure of tree is termed as IPv6 access node tree. Where the root node is the IPv6 access node and intermediate nodes are also called as fixed sensor nodes.

Every IPv6-access-node trees in 6LoWPAN WSN comprises of routing the backbone and mobile sensor node are efficiently transmitted with IPv6 node through routing backbone. Also, the fixed node supports 6LoWPAN WSN technique that is efficiently transmitted with mobile sensor node is known as associate node. Simultaneously, the mobile sensor node contains only one associated node. Finally, a PAN is very useful to create every node in IPv6-access-node tree and mobile sensor nodes during 6LoWPAN WSN system. Furthermore, the method demonstrates the performance parameters of SMH that efficiently decreases the mobility handover cost and delay to be shortened.

1.2 An enhanced fast handover with seamless mobility support for next-generation wireless networks

The mobile node is efficiently enable to associates the location on Internet that the mobileIPv6 (MIPv6) has the ability to intend for next-generation wireless networks (WNs). Though, MIPv6 protocol consists of some intrinsic disadvantage such as long hand off delay and high packet loss are not supportable for several applications. In order to increase the performance, seamless mobility protocols such as Fast handovers for MIPv6 (FMIPv6), Fast handover for Hierarchical MIPv6 (F-HMIPv6), Simplified Fast handover for MIPv6 networks (SFMIPv6) protocols are addressed. However, the process of seamless mobility model cannot be supported. The enhanced fast handover protocol is designed for improving the performance of seamless mobility technique is termed as enhanced SeamlessMIPv6 (e-SMIPv6). According, the protocol plays a significant role for minimizing the mobility signaling is more possible when the mobile users modify their network connection point.

The bidirectional tunnels are initiated between the accesses routers before actual handover scheme, such that the mobile users employ preceding care-of address inside a new visit network. During e-SMIPv6 method, for decreasing the delay related to duplicate address detection, every access router is essential to preserve the duplicate-free addresses. Therefore, the access router is very useful to execute bicasting for roaming node that ensure to reduce the packet loss in an efficient manner. The process of e-SMIPv6 protocol has the ability to reduce the mobility signaling is more feasible during handoff technique. That provides the high quality result for fast moving and ping-pong moving mobile users. For investigating the performance, the City Section Mobility (CSM) technique is employed to evaluate the mobility signaling cost, moving speed and session arrival rate. Additionally, the results demonstrate that the performance of e-SMIPv6 protocol is much better than the traditional Fast handover for MIPv6 networks (FMIPv6) system.

3.3 Optimal Virtual Network Migration: A Step Closer For Seamless Resource Mobility

Network Virtualization is essential to generate the operators that has the capability to transfer the components of virtual network (VN) among the physical hosts in real-time and seamlessly to end-users. Virtual resource mobility is designed for fault management such as VN Clone migration and Virtual Network Re-Embedding-Node-Link For- mulation (VNRE-NLF) approach. Initially, the VN Clone migration has the ability to need no assumption about the protocols running during the virtual networks or its individual design. Next, VNRE-NLF technique is described as the integer linear programming creation that is efficiently determine the online virtual network re- embedding issues. Since, the virtual nodes and virtual links optimization offers the optimal bound for the migration of VNs from physical resources is subjected to failure.

The main aim of virtual resource mobility helps to reduce the entire VN migration cost per re-embedding including the quantity of virtual nodes migrated and utilization of physical bandwidth. Therefore, the virtual resource mobility has the capability to attain the better VN Clone migration and also it rapidly executed to obtain the better solution. Thus the process of VN Clone approach is more appropriate to create both the non-and real- time traffic. Finally, the virtual resource mobility is not only significant to possess sufficient spare capacity to re-accommodate the virtual nodes and also the virtual links affected by physical resource shutdown. But, it contains the further capacity to enable the virtual link re-assignments and virtual node migrations are more possible to create the performance of VN re- embedding problem is efficiently being executed.

The experimental evaluation using seamless mobility technique is conducted on various factors such as energy consumption, scanning delay and seamless mobility efficiency.

IV. COMPARISON OF SEAMLESS MOBILITY USING DIFFERENT TECHNIQUES AND SUGGESTIONS

In order to compare the seamless mobility method using different techniques, the number of nodes is taken to perform this experiment. Various parameters are used for seamless mobility techniques.

4.1 Energy Consumption

Energy Consumption (EC) is measured as the ratio of the average energy required in every node to the total number of energy is being consumed. Energy consumption is measured in terms of Joules (J) and is mathematically formulated as below,

$$EC = \frac{Average\ energy\ consumes\ for\ every\ node}{Total\ number\ of\ energy\ consumed}$$

When lower the energy consumption, the method is said to be more efficient.

Table 4.1 Tabulation of Energy Consumption

Number of Nodes	Energy Consumption (J)		
	SMH	e-SMIPv6 System	Virtual Resource Mobility
10	70	62	50
20	73	64	53
30	76	65	57
40	78	69	59
50	80	73	63
60	82	75	65
70	85	77	68
80	86	79	70
90	88	80	72
100	91	82	75

Table 4.1 describes the energy consumption versus different number of nodes in the range of 10 to 100. The energy consumption comparison takes place on existing Seamless Mobility Handover (SMH) technique, enhanced Seamless Mobile Internet Protocol (e-SMIPv6) system and Virtual Resource Mobility technique.

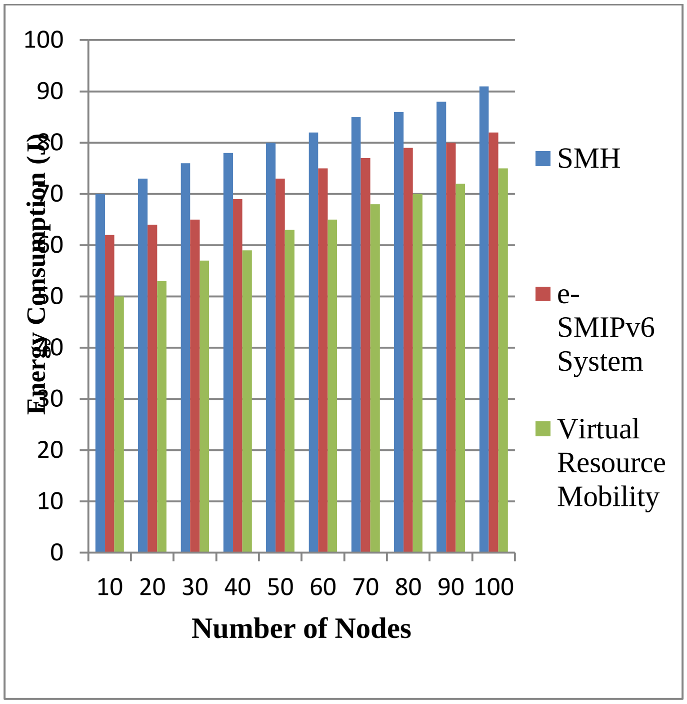

Figure 4.1 Measurement of Energy Consumption

Figure 4.1 measures the energy consumption of existing techniques. Energy consumption of Virtual Resource Mobility technique is comparatively lesser than that of Seamless Mobility Handover (SMH) technique and enhanced Seamless Mobile Internet Protocol (e-SMIPv6) technique. Research in Virtual Resource Mobility method consumes 15% lesser utilization of energy than enhanced Seamless Mobile Internet Protocol (e-SMIPv6) method and 29% lesser energy utilization than Seamless Mobility Handover (SMH) technique.

4.2 Scanning Delay

The scanning delay is defined as the time taken by scanning a nodes sent to arrive in the destination. The scanning delay is measured in terms of milliseconds (ms) and is mathematically formulated as below,

$$Scanning\ Delay = \sum \frac{arrive\ time - send\ time\ of\ nodes}{Total\ number\ of\ nodes}$$

When the scanning delay is lower, the method is said to be more efficient.

Table 4.2 Tabulation of Scanning Delay

Number of Nodes	Scanning Delay (ms)		
	SMH	e-SMIPv6 System	Virtual Resource Mobility
10	40	30	46
20	42	33	48
30	44	35	51
40	47	38	54
50	48	40	57
60	50	41	59
70	54	44	61
80	57	46	63
90	59	49	66
100	64	52	70

Table 4.2 describes the scanning delay versus different number of nodes in the range of 10 to 100. The scanning delay comparison takes place on existing Seamless Mobility Handover (SMH) technique, enhanced Seamless Mobile Internet Protocol (e-SMIPv6) system and Virtual Resource Mobility technique.

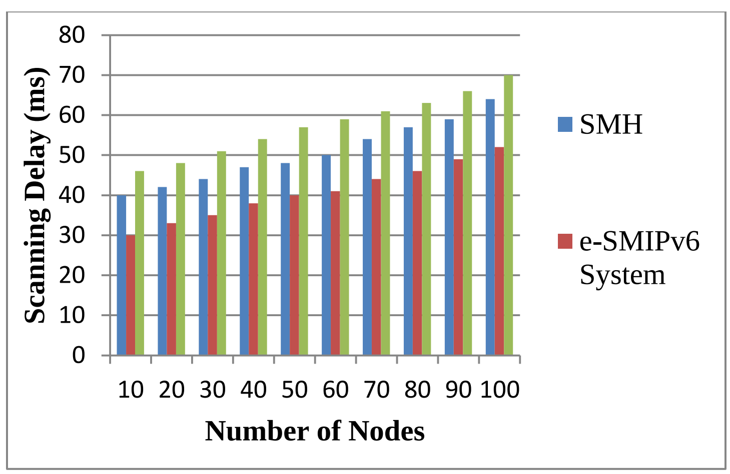

Figure 4.2 Measurement of Scanning Delay

Figure 4.2 measures the scanning delay of existing techniques. Scanning delay of enhanced Seamless Mobile Internet Protocol (e-SMIPv6) system is comparatively lesser than that of Seamless Mobility Handover (SMH) technique and Virtual Resource Mobility technique. Research in enhanced Seamless Mobile Internet Protocol (e-SMIPv6) approach has 42% lesser scanning delay than Virtual Resource Mobility technique and 24% lesser scanning delay than Seamless Mobility Handover (SMH) technique.

4.3 Seamless Mobility Efficiency (SME)

Seamless mobility efficiency is defined as the ratio of exactly detecting the nodes to the total number of nodes taken. Seamless mobility efficiency is measured in terms of percentage (%) and is mathematically formulated as below,

$$SME\ (\%) = \frac{Number\ of\ exactly\ detecting\ the\ nodes}{Total\ number\ of\ nodes} \times 100$$

When the seamless mobility efficiency is higher, the method is said to be more efficient.

Table 4.3 Tabulation of Seamless Mobility Efficiency

Number of Nodes	Seamless Mobility Efficiency (%)		
	SMH	e-SMIPv6 System	Virtual Resource Mobility
10	70	54	63
20	75	56	67
30	78	61	70
40	81	63	72
50	83	66	75
60	85	68	77
70	87	70	79
80	89	74	81
90	92	76	82
100	94	79	85

Table 4.3 describes the seamless mobility efficiency versus different number of nodes in the range of 10 to 100. The seamless mobility efficiency comparison takes place on existing Seamless Mobility Handover (SMH) technique, enhanced Seamless Mobile Internet Protocol (e-SMIPv6) system and Virtual Resource Mobility technique.

Figure 4.3 measures the seamless mobility efficiency of existing techniques. Seamless mobility efficiency of Seamless Mobility Handover (SMH) technique is comparatively higher than that of enhanced Seamless Mobile Internet Protocol (e-SMIPv6) approach and Virtual Resource Mobility technique. Research in Local Anchor system has 10% higher efficient mobility than Virtual Resource Mobility technique and 20% higher efficient mobility than enhanced Seamless Mobile Internet Protocol (e-SMIPv6) technique.

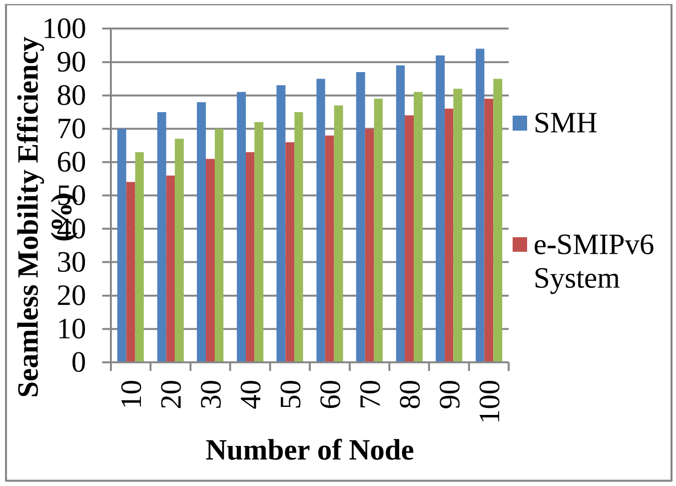

Figure 4.3 Measurement of Seamless Mobility Efficiency

V. DISCUSSION AND LIMITATION OF SEAMLESS MOBILITY USING DIFFERENT TECHNIQUES

Virtual Resource Mobility approach minimize the spare capacity of physical network, but also the VN re-embedding has lesser efficient in terms of virtual link re-assignment. To decrease the migration cost and bandwidth consumption, the number of hops between physical nodes is increased the scanning delay, minimizing seamless transfer of data are not concentrated. Combination of VR cloning is to examine and inclusion of new parameters function like memory RAM of virtual nodes and quantity of hops among physical nodes are remains unsolved.

The problem of handover latency remained to be addressed by using enhanced Seamless Mobile Internet Protocol (e-SMIPv6) technique. Analysis of handover latency and packet loss for roaming users by enduring the multi- media applications are not designed. Also, the MNs technique has an ability to improve the cost of mobility signaling by using e-SMIPv6 technique.

Seamless Mobility Handover (SMH) is not addressed to minimize the transmission cost and delay, the task of mobility handover between the PANs that were connected to different access routers. Mobility handover is not examined when the mobile node moves among the PANs that associates the various access routers. Even some issues in applying IPv6 mobile standards due to the network layer and transmission of IPv6 headers consume more energy consumption.

5.1 Future Direction

The future direction of seamless mobility technique can be used to decrease the scanning delay and utilization of energy while increasing the physical nodes. In addition, to efficiently improves the delivery of seamless data packet with minimum mobility handover latency.

VI. CONCLUSION

The comparison of different techniques for seamless mobility technique is carried out. The process of e-SMIPv6 protocol does not consider the problem of enhanced cost and mobility handover latency. A SMH technique minimizes the transmission delay and the task of mobility handover among the PANs that are associated to various access routers remains unaddressed. Still some issues for applying the IPv6 mobile standards due to the SMH approach consumes higher utilization of energy. Then the virtual resource mobility method is to improve the utilization of bandwidth and scanning delay while choosing the amount of hops between the physical nodes. Finally, from the result, the research work can decrease the mobility handover latency and increase the seamless streaming data delivery while selecting the hops between physical nodes. That helps to reduce the scanning delay, energy consumption and improve the mobility handover efficiency by using seamless mobility with better efficient.

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