Performance Evaluation of Multi-Interfaced Fast Handoff Scheme for PNEMO Environment

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***Abstract*—Mobility management is classified into two parts such as location management and handoff management. The earlier one concentrates on location update whereas the later one manages continuous Internet connectivity while the Mobile Router (MR) changes its single point of attachment to the network. Therefore, frequent movement of the MR is one of the significant characteristics in Network Mobility (NEMO) environment. Because, in accordance with the standard Network Mobility Basic Support Protocol (NEMO BSP), the MR utilizes single Interface to attach to the access link. MR requires changing its Care of Address (CoA) when it moves among different wireless access networks. As a result, it can directly influence the performance of the mobility management protocols during inter technology handoff of multi-interfaced MR. This paper proposed a multi-interfaced fast handoff scheme in Proxy NEMO (PNEMO) environment. After that, it represents a comparative analysis between the proposed multi-interfaced scheme, NEMO BSP and the PNEMO scheme respectively. The performance disparities of these schemes are estimated and analyzed via both numerical and simulation approaches. The simulation is performed through NS-3 network simulator. The performance metrics estimated for evaluation are mainly handoff delay and packet loss. It has been perceived that, the proposed scheme performs better compared to the PNEMO scheme and NEMO BSP.**

***Index Terms*—NEMO; NEMO BSP; PNEMO; Multi-interfaced MR; Mobility management.**

I. INTRODUCTION

At the present time, mobility management with providing a continuous Internet connectivity is one of the ultimate demanding research concerns in Network Mobility (NEMO) environments. It becomes more difficult to meet all the prerequisite of NEMO by the conventional mobility management protocols with its extensions to support network layer mobility management [1]–[4]. This is due to the frequent movement of MR during handoff in NEMO. Therefore, the Network Mobility Basic Support (NEMO BSP) has been standardized to provide a continuous Internet connectivity of a cluster of Mobile Network Nodes (MNNs) by a MR in a mobile network [5], [6].

Since NEMO BSP is an amended version of MIPv6, it is still challenging issues for real time application scenarios due to increase handoff delay and packet loss during handoff. Therefore, in order to overcome these drawbacks of NEMO BSP, there have been some proposals linked to network-based schemes in NEMO manipulating the fast handoff feature on PMIPv6 in NEMO. Although, these schemes can provide better handoff performance, still required to survey the characteristics of each NEMO entities to provide seamless handoff during inter technology handoff (i.e. movement among different access networks). This is because; NEMO is concerned not only with the MR but also MNNs. Moreover, these schemes still experience a higher handoff delay due to extra tunnelling burden that leads to a lower throughput during inter technology handoff [7]–[17]. It is evident from existing evaluation results that, the handoff delay on Home Agent (HA) remains increasing with the increase number of MNNs. This leads to increase much more data traffic that is being routed via HA in NEMO [10]–[13]. Precisely, increment of the number of MNNs can enhance higher tunnelling burden and extra signalling overhead on the link between the present and new access routers.

The basis of this work is to know the functioning mechanism of the mobility management schemes and to determine which protocol provide better handoff performance. The contribution of this paper includes: (i) propose a multi-interfaced fast handoff scheme in PNEMO environment. (ii) develop a simulation scenario using NS 3 simulator to compare the applicability and efficiency of the proposed scheme with that of the PNEMO scheme and NEMO BSP (ii) Investigate and analyse numerical and simulation outcomes in terms of handoff delay, and packet loss.

The remaining portion of this paper is structured as follows: the proposed multi-interfaced fast handoff scheme is detailed in Section II. Then, performance evaluation is offered in Section III. Section IV present both numerical and simulation outcomes with analysis. Finally, the paper is concluded in Section V.

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