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# Seamless Handover in Mobile IP-based Next Generation Networks

A Cross-Layer Solution for Ubiquitous Communication over Optimized Routes in IPv6 Networks

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# Summary of the Thesis

## Seamless Handover in Mobile IP-based Next Generation Networks

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The provisioning of seamless handover services to mobile entities (nodes and networks alike) is a key challenge that lies at the core of providing effective mobility management services in Next Generation Networks. It becomes all the more challenging considering the heterogeneity of the underlying wireless access network composed of disparate wireless access technologies.

In this context IETF has proposed Fast Mobile IPv6 (FMIPv6) protocol, which enhances the performance and operational scope of the standard Mobile IPv6 (MIPv6) protocol by reducing the handover delay and packet losses for mobile entities. However, there are performance issues that must be addressed before FMIPv6 can be considered feasible for deployment.

In this regard, this thesis presents different novel solutions that address the many open performance issues identified along the operational spectrum of the FMIPv6 protocol. The main objective and motivation is to enhance the seamless performance of the FMIPv6 handover process by taking into consideration the effect of data link layer operations. Hence a cross layer solution approach is adopted that has motivated the various optimization proposals presented in this thesis. It also describes an innovative solution that decouples the dependence of the FMIPv6 protocol on the speed of the mobile entity and the timing of the protocol initiation.

Besides FMIPv6 protocol, this work also addresses the issue of Route Optimization in the standard Network Mobility (NEMO) protocol. The NEMO standard, which is specified by IETF for rendering mobility management services to mobile networks, does not specify any Route Optimization mechanism. This becomes a major performance impediment especially in the case of nested mobile networks. In this regard a light weight scalable solution has been developed, the performance of which is independent of the nest depth.

The main inspiration behind the presented proposals was to develop feasible solutions that are cost effective and deployable.