# Efficient Security for Mobile Communication Utilizing Elliptic Curves: Hardware/Software Co-Design of Public-Key Cryptography for SSL Protocol Execution in Embedded Systems

*Manuel Koschuch*

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In recent years, more and more security-sensitive activities like shopping or banking transactions are carried out over the Internet, an inherently insecure medium. In addition, many of these activities are performed using small, mobile devices, severely limited in terms of available energy, memory, and computational power.This work describes the development of a generic cryptographic library in ANSI C that allows to use the memory saving elliptic curve cryptography (ECC) over arbitrary prime and binary extension fields in the secure sockets layer protocol (SSL) to facilitate encrypted communication over the Internet.In addition, the impact of instruction set extensions on the performance of cryptographic operations is investigated.The developed library needs only five percent of the memory OpenSSL requires, with a comparable performance in prime fields, and a performance gain between factors two and eight when using instruction set extensions over the OpenSSL implementation.

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