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Vertical Handoff and Single Sign-On Solutions for Seamless Service Provisioning

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Thang Tran

Dortmund, December 2012

In Memory Of
My Loving Grandma Hung Dai Thu

Kurzfassung

Die stetig wachsende heterogene Netzinfrastruktur bietet mobilen Nutzern Zugriff auf eine Vielfalt von Informations- und Unterhaltungsdiensten. Um den Nutzerkomfort sowie die Verfügbarkeit dieser Dienste zu erhöhen, muss die Nutzung dieser Angebote möglichst unterbrechungsfrei über heterogene Netze erfolgen. Dies impliziert die Entwicklung eines Verfahrens für das nahtlose Umschalten (*Vertical Handoff*) zwischen unterschiedlichen Netztechnologien (z.B. UMTS, WLAN). Zusätzlich sind *Single Sign-On* Systeme erforderlich, die einen schnellen und sicheren Zugriff mit minimaler Interaktion auf geografisch verteilte Dienste ermöglichen.

Hierzu werden im Rahmen dieser Arbeit betreiberunabhängige Vertical Handoff Lösungen für nahtlose Daten- und Sprachkommunikation entworfen. Darüber hinaus wird ein neuartiges Föderationskonzept mit Single Sign-On Unterstützung zur sicheren Interoperabilität von heterogenen Informationsdiensten entwickelt, das den Anwendern sowohl einen schnellen Dienstzugriff als auch einen hohen Benutzerkomfort erlaubt. Die anspruchsvollen Anforderungen leiten sich dabei aus Verbundforschungsprojekten mit Rettungsorganisationen ab, in denen Vertical Handoff und Single Sign-On Lösungen zum effizienten Notfallprozessmanagement in Großschadenslagen beitragen.

Die Leistungsbewertung dieser Lösungen wird mit experimentellen, simulativen sowie analytischen Methoden durchgeführt und zeigt, dass die neuartigen Lösungskonzepte neben der Eigenschaft ihres geringen Integrationsaufwands eine deutlich höhere Leistungsfähigkeit (geringere Verzögerung und kürzere Antwortzeiten) gegenüber bestehenden Standardlösungen aufweisen.

Abstract

The ever-increasing heterogeneous network infrastructure offers mobile users access to a variety of information and entertainment services. To enhance the user experience and the availability of these services, it is mandatory that Internet services have to be provided without interruptions via heterogeneous networks. This implies the development of a method that enables seamless switching (Vertical Handoff) between different wireless network technologies (e.g., UMTS, WiFi). In addition, Single Sign-On (SSO) systems are required to enable fast and secure access with minimal interaction to geographically distributed services.

Given these requirements, this thesis presents novel network operator independent handoff solutions for seamless data and voice communication. Furthermore, a new federation concept with single sign-on feature is proposed that allows secure interoperability of heterogeneous information services for fast service access and higher user experience. The solution concepts developed in this thesis target an entire operational spectrum of the user application environment for seamless service provisioning. The challenging requirements are derived from joint research projects with different rescue organizations where vertical handoff and single sign-on solutions support efficient emergency process management in large-scale emergency events.

The performance evaluation of the proposed solutions in this thesis has been performed by experimental test beds, simulation and analytical methods. The results illustrate that the solutions have not only a significantly higher performance (e.g., short delay and response times), but also a lower integration effort in comparison to existing standard approaches.

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