Mobility Management in B3G (Beyond 3G) Networks: Middleware-based Approach

ESSPE’07 - Dubrovnik, Croatia, September 4, 2007

Lee Rong, Manel Fredj, Valérie Issarny and Nikolaos Georgantas
Arles Group, INRIA – Paris-Rocquencourt
France
Overview

- Introduction
- Related work on mobility management in B3G
- Use case scenario
- Requirements for mobility management in B3G
- Propose a mobility management middleware solution
- Conclusion
Introduction

The B3G (Beyond 3G) network concept:

- Future network environment: heterogeneous network, all-IP platform
- Infrastructure based or infrastructure-less
- User device equipped with multi-radio interfaces
- Goal: enable mobile users to roam freely → mobility management

Service Layer

B3G

UMTS

GPRS

WLAN

LAN

WiMAX

BT
Background on mobility management

Telecomm based:

• Horizontal and vertical handoffs
• Many approaches: Session Initiation Protocol (SIP) - application layer, Mobile IPv4 and Mobile IPv6 - network layer, Stream Control Transmission Protocol (SCTP) - transport layer
• Rely on central entities or tied to a specific OSI layer

Service oriented:

• Find a service substitute and perform reconfiguration (i.e., Gaia)
• Centralized approaches, B3G is not considered
Use case scenario

- Dr. Franklin at a WLAN Access Point at Home
- 3G Station
- Internet
- Dr. Smith
- Mike & George
Requirements for mobility management in B3G: core types

Provide mobility through network handoffs:
- e.g., WiFi to GPRS
- devices communicate in an ad hoc manner, handoff not rely on any central entities, manage multi-radio connections

Provide mobility through service reconfiguration:
- e.g., transfer diagnose duty from Dr. Smith to Dr. Franklin
- mobile service providers, difficult to sustain connections, service inaccessible on other networks
Requirements for mobility management in B3G: specific types

Provide specific mobility management for streaming applications:
• e.g., teleconferencing between the doctors and George
• multi-modality support (e.g., switch from video to audio), buffer support

Provides specific mobility support by delivering messages and data to users:
• e.g., message exchange between Dr. Franklin and George
• asynchronous delivery
Propose a mobility management solution

PLASTIC middleware: initial architecture

PLASTIC: IST-6 project aims at supporting SOA based B3G communication

- Allows collection, storage and retrieval of B3G context

- PLASTIC middleware
  - Initial architecture
  - Web Services
    - Service Accessibility & Composition
  - Context Awareness
  - Plastic Communication Middleware
    - Web-service Oriented Communication
    - Multi-Radio Networking
    - Multi-Radio Device Management
  - Legacy Networked Software Platform
Propose a mobility management solution cont...

PLASTIC middleware with mobility management module

Aims to provide a set of simple and uniform APIs: transparent and explicit

- Fully distributed, do not require any central entities,
- OSI layer independent
Conclusion

Proposed an mobility management middleware extension:

• Handle mobility in B3G networks: fully distributed, OSI layer independent
• Four different handling mechanisms are considered: two core types and two specific types
• Provide a set of simple and uniform APIs
• Currently under development: network handoffs and service reconfiguration
• Future research direction: performance evaluation, comparison to IMS, investigate application specific mobility
Thank You and questions

Questions relate to the presentation:

• What other mobility management aspects should also be considered within the B3G context?

Open questions:

• Is distributed B3G feasible in eHealth, especially with emergency situations?
• Rely on a distributed B3G (privacy, trust)?