Agent Based Adaptive Management of Non-Homogeneous Connectivity Resources

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Summary

- Pervasive Environment
- The Mobility Management issue in Heterogeneous Network
- Overall Architecture
- Design and Implementation
- Experimental Results
- Conclusion
Pervasive Environment

Ubiquitous Computing
- Computer everywhere
- Invisibility
- Context-aware
Pervasive Environment
(Heterogeneous Networks)

Network side

Need
QoS (User side)

Mobility Management

Location
Positioning
Routing
Handoff

Horizontal
Vertical
Problems and Expected Advantages

Vertical HO Management between GPRS-Bluetooth

Problems
- Handoff Latency
- Application Invisibility

Advantages
- Increase of bandwidth /m^3
- Differential Traffic Classes (voice and data)
CAPNET: Context Aware Pervasive NETworks
Context Aware Management in Pervasive Network: Hardware and software development for AmI services (Ubicomp)
Overall Architecture

**Application Layer**

**CAPNET Layer**
- Context Component
- Media Component
- Core-components
  - Connectivity Management
  - Component Management
  - Messaging Component
  - Service Discovery
- User Interface Component
- Context-Based Storage

**Layer of business supporting solutions**
- XML-RPC
- JINI
- DB2

**System Layer**
Overall Architecture

Client SIDE: Symbian Series 60

Server SIDE Java

Application for Non-Homogeneous Network

CAPNET MIDDLEWARE

CORE COMPONENTS

CONNECTIVITY MANAGEMENT

Other CAPNET components

Bluetooth Socket Engine

GPRS Socket Engine

RFCOMM/SDP

TCP

L2CAP

IP

Bluetooth Interface

GPRS Interface
Design and Implementation

Scenario

1: RFID
2: Channel Creation (2 connections)
3: User Mobility (no BT anymore)
4: Switch on GPRS connection

Project MIMOSA
(prototype mobile phone)

Microsystems platform for MOBILE Services and Applications
Design and Implementation

Class Diagram
Design and Implementation

Dynamic Diagram

- Channel Creation
- Switch
Design and Implementation

- Block System

- Diagram showing state transitions and processes:

  - Frame transitions labeled with numbers 1 to 9.
  - Process interactions highlighted with arrows.

- Table showing data received:

  - BT data: Total num of bytes received: 60000
  - GPRS data: Total num of bytes received: 345532
Sperimental Results
Transmission Latency

Without Handoff

With Handoff
Packet delivery ratio variando la dimensione del buffer

Banda variando la dimensione del buffer
Sperimental Results

Traffic Classes

Data and Voice Traffic Classes
CONCLUSIONS

- **Heterogeneous Network**
  - New Middleware: Mobility Management between GPRS and Bluetooth for Mobile Phone with RFID
  - Different Traffic Classes Management: Voice and Data

- **Future Developments**
  - Connectivity Management Engine who enables others technologies CO or Connection-less
  - Hard Handoff Application Development
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