Ambient Networks: A Network Control Layer for the Future Internet

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Outline

• A Wireless World Network Vision
• The Ambient Networks Concept
• Components of the Architecture
• Next Steps
The Network Vision

Network Challenges in the Wireless World

1. **Activate** the networks surrounding the user!
2. **Create** a **secure** and **comfortable** wireless world for the users
3. **Empower** the players for **competition** and **co-operation**
4. **Support** for heterogeneous air-interface and service technologies
   - Seamless services
   - Ease the service provider role
5. **Modular and scalable** functionality
Requirements posed on the AN Architecture

1. Heterogeneous Networks
2. Mobility
3. Composition
4. Security and Privacy
5. Backward Compatibility and Migration
6. Network Robustness and Fault Tolerance
7. Quality of Service
8. Multi-Domain
9. Accountability
10. Context Communications
11. Extensibility of the Network Services Provided
12. Application Innovation and Usability

To be jointly considered within an open system concept

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The Ambient Networks Idea

Ambient Networks:
- Common Control Services
- Networks at the edge
- Auto-configuration
- Scalability

Ambient Control Space

Ambient Connectivity

Composition Networking
Example 1

Ambient Networks composing to form an ad-hoc AN scenario, flat composition
Composition Networking

Example 2

PANs compose with a moving network which provides connectivity to a cellular network.

- Train
- Cell.
- PAN
- PAN

Composition Networking

Example 3

Operators use AN technology to hide different technologies or implementations.

- Service Network Operator
- Opcore
  - Access 1
  - Access 2
Composition Networking

Example 4

Customers can roam into networks where operators have made no agreements before

Op 1

Op 2

PAN

PAN

IMS architecture
Mobile Networks - Evolution

Today

- IMS
- Core: Server
- Gateway
- RAN

Ambient

- Service Platform (IMS++, ...)
- Ambient Control Space
  - ASI
  - ARI
- IP Transport & Access

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Structure of the Reference Points

- The Reference Points support several interfaces in a modular fashion
- Mandatory interfaces ensure basic interworking between AN nodes and ANs
- Optional interfaces are negotiated during composition

Framework Functions

- Concurrently operating functions communicate through **messages**
- Logically centralized **registry** for information aggregation and dissemination
- **Conflict resolution** and consistency maintenance
Abstractions: The AN-Flow Level

Ambient Network A

Ambient Network B

Connectivity Abstraction

Flow Endpoint

Flow Transit

Ambient Network Interface

Abstractions:
The AN-Flow Level

Ambitions: The AN-Bearer Level

Ambient Network A

Ambient Network B

Bearer Abstraction

Intermediary

Bearer Endpoint

Ambient Network Interface

Abstractions:
The AN-Bearer Level
The scope of the ARI and ASI

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Work in Progress – AN Phase 2  
(up to Dec. 2007)

- Further refinement and specification of the Ambient Networks Architecture
- Definition of interfaces and protocols
  - Component interaction via nsis derivate and WebServices investigated
- Standardisation efforts (3GPP and IETF)
- Prototyping and simulations to integrate and validate the proposed functionality

Thank you for your attention! Questions?

www.ambient-networks.org