Resource Management in Ambient Networks

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Resource Management Example
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A

B
Ambient Networks

- ANI for Composition between ANs
- ASI for user and application interaction
- ARI for access to connectivity resources
Distributed Resource Mgmt

- For a variety of reasons:
  - Extensibility
  - Security and privacy
  - Business and operational flexibility
  - Implementation feasibility

- Brings design considerations:
  - Timescales of algorithms
  - Constraint information and representation of metrics
  - Information sharing
  - Distribution of decision making
Functional Entities

- Ambient Networks has defined FEs
- Those involved in Resource Management are:
  - Flow management
  - Dynamic Internetworking
  - Overlay Management
  - Multi Radio Resource Management
  - Path Selection
  - Handover & Locator Management
FEs for Resource Management

Flow Management

Handover and Locator Management

Path Selection

Multi Radio Resource Management

Other Information Sources such as policy database, mobility toolbox from HOLM

Dynamic Internetworking

Path Query SAP

Path Selection SAP

Constraint Request SAP

Handover Execution SAP

Handover Requirements

Application Requirements

Multi Radio Resource Management Services Interface SAP

MRRM Services Interface SAP

SAP

SAP

SAP

SAP
Connectivity Abstractions

![Diagram of Connectivity Abstractions]
MRRM

- **Uses:**
  - Radio information provided by Generic Link Layer (GLL)
  - Requirements received
  - Other information available e.g. cell capabilities, policy
- **Utility function correlates access flows and requirements**
- **Decides on access flow**
- **Takes into account constraints provided by Path Selection**
Path Selection

- Uses
  - information about available paths beyond the access link
  - e.g. security, QoS availability, connectivity availability, mobility capabilities

- Applies constraints to the access flows being considered by MRRM

- Once access is chosen, then path beyond that access is selected
  - This also includes selecting the most appropriate locator
Handover & Locator Management

- Uses a variety of mobility ‘tools’ to ensure connectivity is maintained when mobility events occur
  - MIP
  - HIP
  - NEMO
  - State Transfer
  - Optimisations for moving networks
- Availability of tools can be taken into account during path selection
- HOLM uses basic connectivity functionality to ensure that locators are available
Access Selection

Access selection may be triggered by receipt of a Link indication from the GLL, a request for access flow setup from flow management or another form of trigger (e.g., via TRS).

1. Determine DAS()

2. Determine CAS()
   - Determine Detected Access Set (DAS)
     - This step may require interaction with the GLL. This step may have already happened.

3. ConstraintsRequest()

4. Apply constraints()

5. ConstraintsResponse(list of accesses with constraints)

6. Determine AAS()
   - Determine Active Access Set (AAS) based on internal information and the constrained list of accesses.
Handover Execution

1: HandoverExecution()
2: Handover Tool Selection()
3: Handover Preparation()
4: Handover Tool Execution()
5: Handover Execution Response

Access selection has already happened so this CP begins with MBRM requesting handover.

Link Command from HOLM may happen here e.g. to attach for MBM N/S or to detach for BBM.

Path Selection happens here

Link Command from HOLM may happen here, again depending on sequence of attach/detach/other tools in use.
Ambient and Aroma

- Ambient has simulation and implementation results
  - IST 2007
  - WWF demonstration
  - M2NM
- Fittingness factor similar to utility functions used in MRRM
  - MRRM also considers non-radio related information
  - Aroma has network-centric suitability
- CARM along same lines as path selection aspects
  - Ambient not specific to 3GPP style networks, therefore, broader scope
  - However, not quite so much detail of specification
Any questions?