

Uni**S**



## Context Dissemination for Autonomic Communication Systems

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## Uni**S** Outline



- Motivation
- System Assumptions
- Structure
- Autonomous Decentralised Community Communication (ADCC) for Context Dissemination
- Example Scenario

# UniS Motivation



Autonomous Communication is a way to define and design self organising, self-healing, self-optimising, self-protecting and evolvable networks...

... and all this has to work in networks that are volatile due to mobility and other **context** changes.

# UniS System Assumptions



Context is key!

Information defines (describes) context

- what is context?
- which context?

Change is the only constant, context for AC is dynamic

→ predicting changes & reacting to changes

# UniS System Assumptions

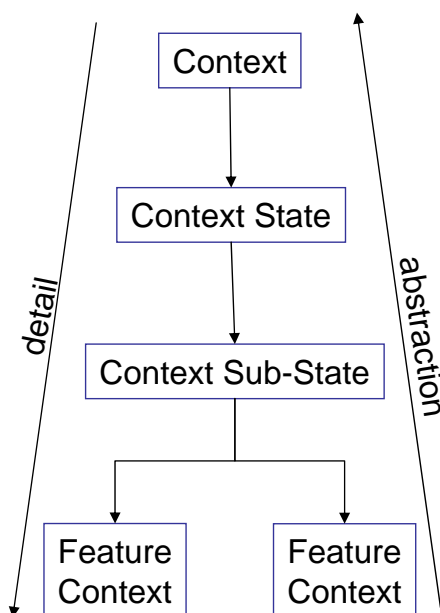


Context is ...

“...physical and social situation in which computational devices are embedded.”

“...any information that can be used to characterize the situation of an entity, where an entity is a person, place, or object that is relevant to the interaction between a user and a application.”

# UniS Context Hierarchy



Generated as consequence of continuous interactions

→ context state: “instantaneous view of the context”

Only parts of the context are affected by changes

→ context sub-state: “application related information cluster”

→ feature context: “information element”

# UniS Context Dissemination

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How to get the required system information (feature context), in time, to the place where it is needed?

7 15/10/2005

WAC 2005 - Vouliagmeni, Athens



# UniS ADCC-Autonomous Decentralised Community Communication

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- Provides and infrastructure for information dissemination
  - Decentralised architecture & application level multicast
  - Originally conceived to distribute real-time content
- Proposal to use it for context dissemination

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# UniS ADCC - Overview



Idea:

user community for exchange of **information of interest**

Principles:

- each member has **individual objectives**, but all **share common interests**
- **no distinction** between sender and receiver
- **self-organising** (logical) network
- **autonomous** join and leave
- **responsibility is shared** by all members
- **efficient broadcast** (share common information)
- **even traffic distribution** (avoid hotspots)
- **mitigate failures** (provide redundancy)
- **communication is multilateral** (sending forward but not to sender)

# UniS ADCC - Overview



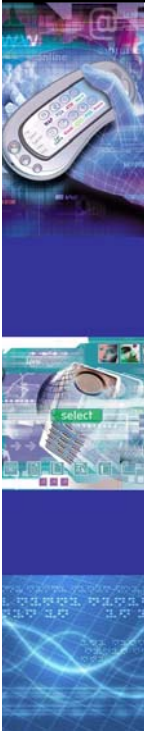
Nodes are organised in 2-dim graph

$$G = \{V, E\}$$

V: set of nodes      E: set of edges

and  $G$  consists of a set of  $n$  Hamiltonian Cycles (HC), each node has 2 neighbours and a HC transverses all nodes within the cycle (only once).

Joining nodes will have to discover at least one member node, which then distributes the request, all 'receiving' nodes then decide whether or not the new node can join.



- ... has been compared to methods like sequential uni-cast and peer-to-peer updates, yet ADCC mean cost is lower and mean delay is significantly lower compared to uni-cast
- ... indications that load on physical links is more evenly distributed

## UniS ADCC for Context Dissemination

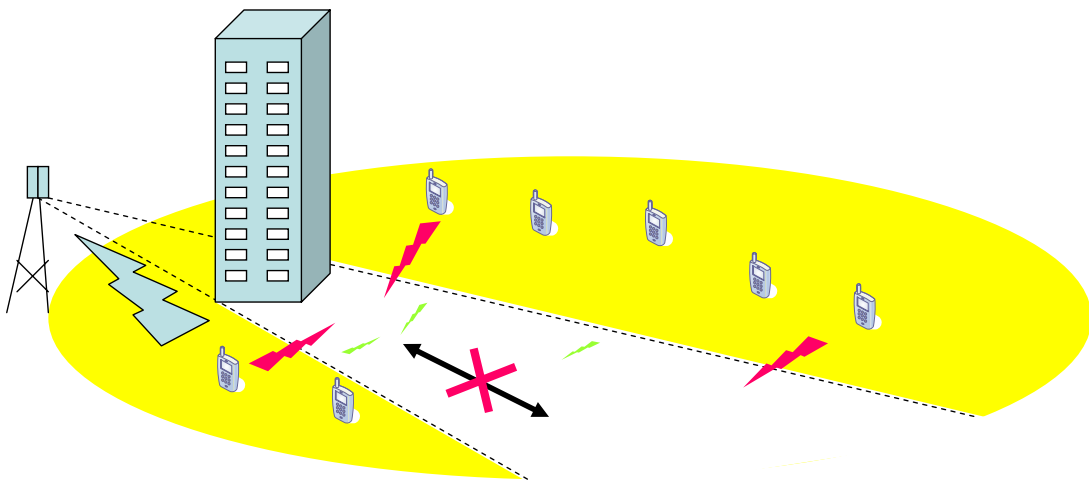


- Network elements (entities) are members of one or more groups
  - Entity group (nodes can join and leave as needed)
  - Membership rules
  - Group behaviour (dictates entity behaviour)
- programmable and controllable group

In AC, “context” may mean different things, and may apply to different nodes; the ADCC features of **content code** (describes outgoing info) and **characterised code** (indicates details) suits well to disseminate feature context.



“Decentralised Spectrum allocation and the shadowing problem”



→ Needs a type of ‘context-awareness’ that passes feature context to those nodes that have only limited ‘spectrum awareness’



- ADCC is a well established concept
- Use of ADCC for Context Dissemination is being further evaluated (analytically)
- Proof of concept implementation pending



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# Thanks for your attention!

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