Abstract
The project seeks for an architecture to unify and simplify the supervision and control of networked devices in commercial building environments. To be adoptable for real-life applications, the technical key features of such an architecture are mainly derived from four high-level requirements: The system must add true user value, still be easy to use, work for a broad range of quite different devices and minimize the engineering costs. This results in a distributed, ad hoc capable and scalable hard- and software infrastructure with the ability to adapt to the context of use and goal-centric services provided by the numerous underlying devices of the heterogeneous building network. Preferably, standard mobile clients such as smartphones and PDAs act as control points providing a graphical end user interface generated on the fly.

Motivation

- Many of the devices in a modern building are equipped with communication interfaces which allow for some kind of remote control.
- Control mostly happens over dedicated, specific (domain, manufacturer, device), inflexible and often proprietary interfaces.
- In many control situations, these interfaces provide too much functionality or no intuitive access to the appropriate one. They do not adapt to the user and her task.
- There are solutions to build up building networks but they are often restricted to specific domains of the building (building automation, IT, telecommunication, security, multimedia...).
- Building environments will continue to be very heterogeneous for many years to come. Is there a way to unify the control interfaces for the users of such an environment?

Requirements

- Adaptivity: Adapt dynamically to parameters changing between different control scenarios. (1) User Role / User Task, (2) Target Devices / Services, (3) Control Points (4) Environment
- Ease of use: Provide usability that is at least equal or better than with conventional controls.
- Broad application range: Integrate devices/services from different domains and vendors.
- Ad-Hoc capable: Add new target devices, services, control points with minimum of effort.
- Scalability: Integrate a big number of devices with variable performance and capabilities.
- Security: Don't allow anybody to bring down a building from the lobby with a Smart Phone.
- Mobile Standard Clients: Let familiar mobile devices act as control points.

CARUSO
Context-Sensitive Architecture for Unified Supervision and Control
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Control Points
- Simple, intuitive user interface for various devices in the building
- Smartphone, PDA, Laptop...
- Dynamic user interface generation using XML files (UPnP and XAML descriptions)
- Two operating modes:
  - Normal operating: Client / Server over CARUSO server
  - Fall back: Peer-To-Peer, directly to target devices

Target Devices
- Devices to be controlled
- Building Automation, Fire & Safety, Multimedia, Telecom, Appliances...
- Connected over TCP/IP and UPnP capable (directly or over gateway)

Caruso Servers
- Modular functionality that can be distributed over physical nodes.
- Proxies discover devices and build up a device directory. Separate the control points from the target devices.
- Gateways convert different building control protocols (ZigBee, KNX/EIB, LON...) to TCP/IP/UPnP. Plug-ins allow easy protocol extensions.
- UI Servers build user interface descriptions to be sent to the control points.
- User Access Servers allow creation, management and handling of different user groups and their rights.
- Services Servers extend the system with user-centric, task-based high-level services.

Research Areas
- Intelligent Buildings
- Plug & Play Technologies
- Wireless / IEEE802.14.5 / ZigBee
- Low resource, low cost platforms
- Localisation
- Research Partner (Industry, FP7)

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