1. Introduction

Software Architecture (SwA) Group is involved in designing platform for network connectivity of Philips Consumer Electronics (CE) devices. Currently SwA is involved in the implementation of Universal Plug and Play (UPnP) into the CE devices, which allows them to establish peer-to-peer communication. The next step is to provide services for the consumers and their CE devices. The output is a distributed environment, in which issues, such as security, interoperability etc, are very important.

Until now SwA has developed a prototype of Community services, in which consumers create their own communities and share assets. Currently the structure of this prototype allows users to share their assets by uploading them at Internet based storage, which is accessible by every one in the community. The aim of this project is to design architecture for distributed storing of assets at users’ devices. Reasonably, security issues become important, such as establishing secure communication channels, authentication and authorization.

1.1 Gatewayed Communities

This is a directory-based model with two basic entities – communities and people. A community may contain sub-communities and people. Each entity has a number of elements in it, e.g. community directory has members, administrators, assets, etc; people directory contains of identity, assets, buddy list, etc. The aim of communities is to build trusted environments and on this base different applications that involve groups of people and assets to be developed.

1.2 UPnP

UPnP extends the notion of Device Plug and Play (PnP) capabilities in operating system, to include the entire network, enabling discovery and control of devices, including, networked devices and services, such as network-attached printers, Internet gateways, and consumer electronics equipment.

With UPnP, a device can dynamically join a network, obtain an IP address, convey its capabilities, and learn about the presence and capabilities of other devices – all automatically. Devices can subsequently communicate with each other directly, thereby further enabling peer to peer networking.
2. Project motivation

The amount of digital assets people have grows very rapidly. This does not only hold for the commercial assets. Also a large amount of personal assets is created with for example the digital still cameras and digital video cameras. An important application of these assets is sharing it with relatives, friends, colleagues, members of a sports club, or other people belonging to a specific group (community). This sharing can be done while you are in close proximity of each other e.g. by looking at the picture or video on the same device, or at some distance of each other by looking at it on different devices maybe even on different moments in time. These examples of remote sharing introduce issues with respect to security and privacy. How can assets be easily and securely shared with others, what are potential concepts that can help consumers to easily configure the access to their personal assets?

3. Project goal

This project is focused on the security architectures for sharing personal assets based on a community service somewhere on the Internet. As mentioned before the current approach for sharing assets in a community is through copying the assets to a community owned asset pool. The (copy of the) asset is given to the community who has capacity for storing the assets, becomes owner and can manage the access control (granting access to the shared assets only to community members). Another approach is that the assets remain with their original owner (in his home network) and only a reference to the assets is shared in the community. This project will focus on the latter approach and research security architectures that allow members of the community to access the shared community assets in the homes of the community members.

3.1 The Research Assignment

The research assignment is used as a preparation study for the project, which includes literature study at least in the following topics:

- Security protocols
- Authentication and authorization mechanisms
- Gatewayed Communities
- Home Networking
- UPnP (Security)

The research assignment period is closed with a report and an oral presentation of the research at the research colloquia for staff and students. In general, the report should contain the following items:

- A description of and the motive for the research subject
- Scientific and societal importance
- The planning and staging of the research
- Methodological foundation of the research
- Description and comparison of different research approaches
- Evaluation of research approaches
- Description of carried out analyses
- Results and conclusions

3.2 The Master Thesis

The outcome of the Master thesis project is a report of the work and the results of the thesis project. The report must also cover the points listed at the end of section 3.1, but now with respect to the thesis project.

4. Conclusion for the faculty

5. Relevance for involved company

The projects extends the Gatewayed Communities prototype developed by Philips by providing community member with option to store their assets at privat storages, as explained in section 3. Philips also wants to investigate the impact on the security architecture if the assets are not managed on a separate PC but are distributed over several devices in the home controlled by e.g. UPnP with an access control mechanism based on UPnP security.

6. Global Planning for the project

6.1 Project milestones & time schedule
First – Technical Choice and Architecture requirements: Build a list of requirements. Describe several possible solutions. Clearly state what kind of technology could be used and what is the architecture of the solution.
End: 15 Oct

Second – Initial implementation: Run an initial (start up) demo of one of the previously described solutions.
End: before Christmas

Third – Implementation: Improve the demo (add/improve features); document the demo and the architecture.
End: 15 April

Forth – Final stage: Prepare final report, presentation, and documentation.
End: 15 June

6.2 Research Assignment
Initial Meeting and discussion of Research assignment content – 6 Oct.
First version of the assignment – End of Oct

Delivery of the final report 15 Nov

Presentation December

7. Student program – credit points and subjects
The MSc programme in Computer Science includes 60 ECTS credit points for compulsory, specialization elective and free elective subjects, 15 ECTS Research Assignment and 45 ECTS Master thesis project. Until now (Aug 2004) subjects for 43 ECTS points are finished. The status of the rest 17:
   a. OOLT (IN4023 – 6 ECTS) – project in progress expected delivery January 2005
   b. Model Checking (IN – 6 ECTS) – project in progress expected delivery October 2004
   c. Free elective 5 ECTS not started yet. (possible exchange with TU Eindhoven)

8. Project organisation
This section contains contact information for the graduate student (8.1), the university supervisor (8.2), the university professor (8.3) and the company supervisor (8.4).

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8.4 Company supervisor
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References
The master thesis project. Published at the CS/MKE MSc Blackboard community site of the University of Delft, 2003.

The research assignment. Published at the CS/MKE MSc Blackboard community site of the University of Delft, 2003.


Understanding Universal Plug and Play
http://www.upnp.org/download/UPNP_UnderstandingUPNP.doc

Universal Plug and Play Device Architecture
http://www.upnp.org/Device_Architecture_v0.92.htm