A semi-autonomous generic network for seamless personalised services at home and elsewhere.

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The IEE Systems Engineering Professional Network

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Printed and published by the IEE, Michael Faraday House, Six Hills Way,
Stevenage, Herts SG1 2AY, UK

Abstract

The ePerSpace project is creating an open, interoperable and trusted semi-autonomous (hybrid) generic distributed networked system, with content adaptation and service platform management, in which home and personal devices can seamlessly work together to provide personalised services. This paper will present the main concept and components of the system, including a Global Service Manager, Local Service Manager, and the user and residential gateways, and it will give an overview of services run on this global service platform.

About the Speaker

Professor Kambiz Madani is the Director of the Communications & Compunetics Research Group at the University of Westminster, and has over 20 years of direct experience in leading many international industrial research and development projects for a variety of Telecommunication applications. With a PhD from King's College, University of London (1979), he served as a senior principal design engineer at STC Telecommunications and as Technical Executive at ERA Technology, in charge of the research activities within the RF Technology Division until 1992. He then joined the University of Westminster and created the Westminster Wideband Research Laboratory, carrying out contract research in the communication systems hardware and software, and establishing the first specialist MSc Course in the UK in Mobile Personal and Satellite Communications. He has been the technical leader for over 25 large & medium size funded projects in the telecommunications field, including industrial, EPSRC, & EC FP5 & FP6. He has over 70 technical publications, and has been an active member of Technical Committees and sessions for many international conferences.

A Semi-Autonomous Generic Network for Seamless Personalised Services at Home & Elsewhere

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Abstract

The ePerSpace Project is an EC-funded Integrated Project (IP) under European Framework 6 Program (FP6), consisting of a research consortium of 20 partners from telecom operators, broadcasters, manufacturers, academia & SMEs. The ePerSpace project is developing and implementing a semi-autonomous generic distributed networked system with wide ranging applications, accessible at home and globally anywhere else outside home. The project is creating an open, interoperable and trusted integration framework to create network enabled audiovisual systems and home platforms where home and personal devices can seamlessly work together providing personalised services, provisioning content adaptation, and managing service platforms. Using the personalisation information the system can recognise and form specific user communities towards which specific services can be directed.

The paper presents the main concept and components of the system including the Global Service Manager which handles service providers, users and the residential gateways; and Local Service Manager, which manages home and personal devices inside the Home Area Network, and communication between GSeM and LSeM. The paper also gives an overview of services run on this global service platform. A particular health care application for this architecture is being developed by the Communications & Compunetics Research Group (CCRG) at the University of Westminster.

1. ePerSpace Project

ePerSpace [1] is an EC-funded Integrated Project (IP) under European Framework 6 Program (FP6), consisting of a research consortium of 20 partners from telecom operators, broadcasters, manufacturers, academia & SMEs. The main objective of the ePerSpace project is to provide a networked audiovisual system with wide ranging applications at home and virtually anywhere, by enabling innovative value-added services. It is envisaged that the ePerSpace open architecture will increase the range of novel services and the speed of developing them, by re-using well-defined system components and their interfaces. The ePerSpace Project is developing an open and trusted integrated framework, allowing provisioning of personalised audiovisual services together with context adaptation of content at home, and elsewhere.

2. Service Architecture

The ePerSpace business model is based on the Open Services Gateway initiative (OSGi) technology that resides on the Residential Gateway (RG) at home, and provides access to remote services from inside the Home Area Network (HAN).

The ePerSpace service management architecture [2-4] (**Figure 1**) has been designed as a hybrid system, in which there are a number of Global Service

Managers (GseM), interfacing with each other. Each individual Global Service Manager is controlled by a System Operator (SO), and interfaces with a large number of value-added Service Providers (SP). Each individual Global Service Manager also interfaces to & controls a large number of Local Service Managers (LSM), which reside at user homes on the Residential Gateway.

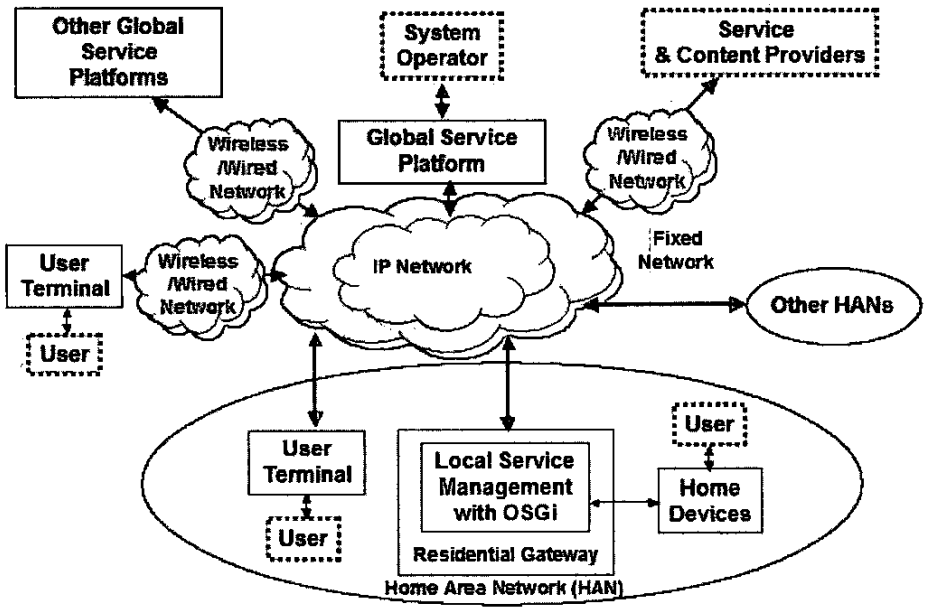

Figure 1: The ePerSpace service management architecture

The System Operator manages the user access to a variety of registered services by using the Global Service Manager. The operators have to sign agreements to regulate their cooperation with the service providers, including for accounting and billing. The users have to subscribe to at least one operator, in order to gain access to any available services in the network. The users access the Global Service Manager through a web interface. The user can access the Global Service Manager through the access and transport networks, as well as the devices community inside the HAN using the RG.

3. Service Analysis

In this project we have analysed a wide variety of ePerSpace services and investigated the relationship between them. The Application Services represent scenario-specific services required for the trials at the end of the Project. Therefore Application Services have been analysed based on a number of selected scenarios and requirements were identified. Based on these requirements, the functionality of both the global and the local service management platforms and the building blocks implementing this functionality were defined. Next, sequential diagrams were developed showing interactions between the global & the local service manager, and service providers, and users. Then the use cases were created showing the operations of these platforms, and class diagrams were made implementing these operations.

3.1 Components of the Global Service Management Platform

The Global Service Manager (GSeM) functionality is shown in **Figure 2**, and handles content and service providers and their services, residential gateways in HANs, and the end users. It contains data storage for the service providers, the users, and the user services. The GSeM provides personalisation, content adaptation, security, service continuity and access to service providers.

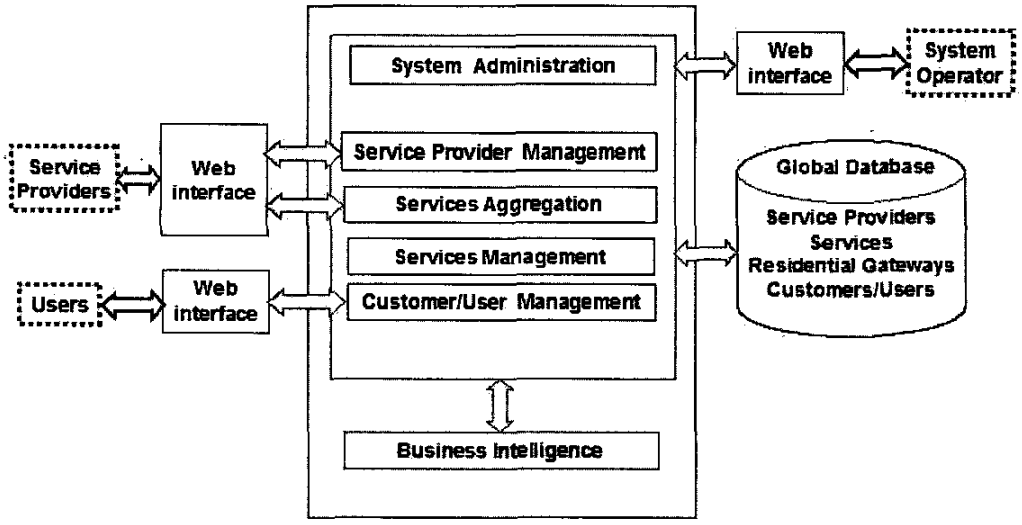

Figure 2: The Global Service Manager Functions

The GSeM architecture is shown in **Figure 3**, and provides contents and services offered by content and service providers through the Global Service Delivery and Global Service Continuity modules for customers at home and anywhere using wired and wireless communication networks. The GSeM may be installed at one of the service providers, for example at a telecommunication company. The system operator handles the management platform through the presentation panel while users can access the management platform through Web interfaces.

The Global Service Management Platform has the following modules:

The **Service Provider Manager** handles registration of service providers with the GSeM, modification and removal of service providers. It also manages data of service providers in the GSeM database.

The **Service Aggregator Manager**'s task is to get service bundles from Service Providers, store them in the GSeM file system and update them as required. Having the service bundles the Services Manager registers, updates and removes services from GSeM. The Service Aggregator Manager also performs service aggregation in order to create a new service by combining existing services.

Customers can registers with the GSeM through the **Customer/User Manager.** The manager supports updating customers' data and removal customers from the GSeM. Customers can create, update and delete users in the GSeM through the Customer/User Manager. As a result, the manager handles data related to customers and users.

The **Services Manager** handles residential gateways, services and users. At one side it handles RGs i.e. subscription, updating and removal of RGs; managing and storing configuration of RGs; installing, updating and removing services bundles on RGs. The Services Manager registers, update and remove services offered by Service Providers in GSeM. Customers and users can subscribe and un-subscibre services through the Services Manager.

The **System Administrator** performs GSeM-level management supervising all blocks of the Global Service Manager. The system operator accesses the System Administrator through the Presentation Panel.

The **Business Intelligence** module processes data contained in the Global Database in order to produce usage reports. It also implements application-specific tasks, such as accounting/billing.

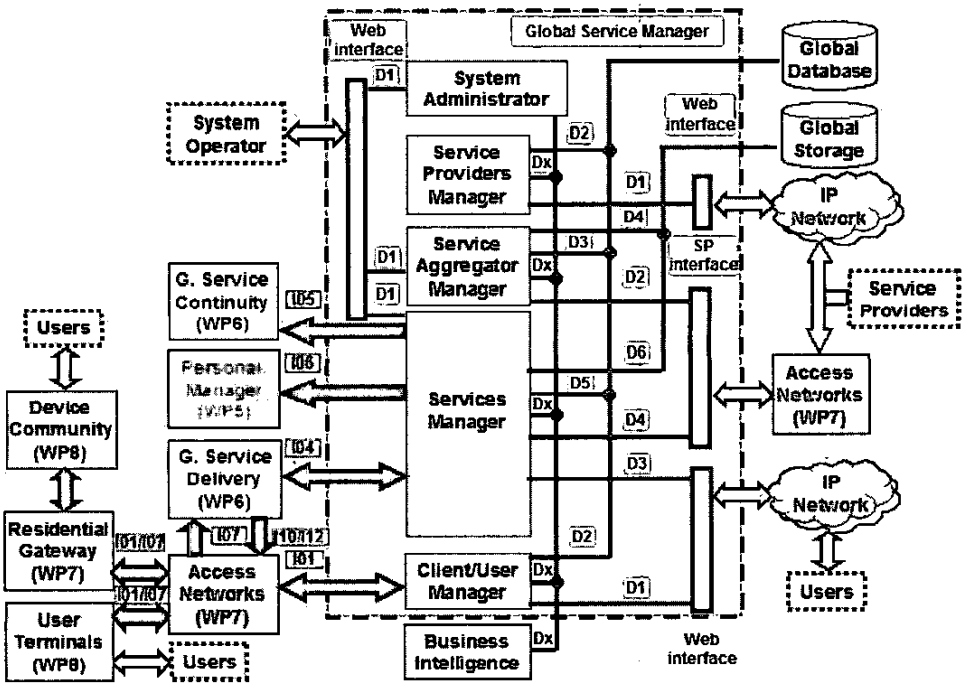

Figure 3: The Global Service Manager Architecture

The **Service Delivery module** receives services requests from customers/users, discovers the corresponding services in the Global Service Manager and provides the requested services invoking the service and returning the result(s). The module also passes data related to the requested services to the Business Intelligence module.

The **Service Continuity module** gets context/service/user specific data, such as service type, personal profile, device capabilities, content type, user location, personalising service. Taking into account this data it supervises adaptation of services based on content, context and profile.

3.2 Components of the Local Service Management Platform

The Local Service Manager (LSeM) functionality ids shown in **Figure 4**, and is based on OSGi and is installed on the residential gateway. The OSGi framework manages the OSGi system bundles. The local service management platform includes storage system for users data and local services' bundles, and has components for local content adaptation and local personalisation.

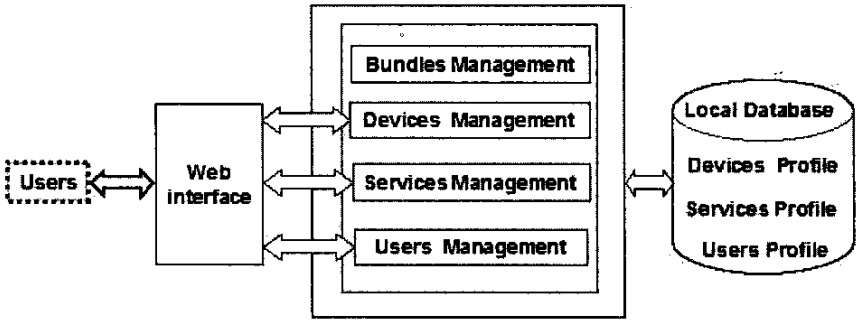

Figure 4: The Local Service Manager Functions

The LSeM architecture is shown in **Figure 5**, and connects customers, who are in the Home Are Network (HAN), to the outside world (i.e. to GSeMs, content and service providers, etc.). The LSeM is installed on the Residential Gateway, and closely collaborates at one hand with the OSGI framework and at the other hand with the Local Content Manager, the Local Profile Manager and the Local Service Continuity module. The implementations of these local modules are based on the implementations of corresponding global modules For example; the Local Content Manager is based on the Global Content Manager. The Local Service Manager has the following modules:

The **Bundles Manager** uses several bundles defined by the OSGi specification. These bundles support downloading bundles from the Global Service Management Platform, storing, updating and removal of bundles. The manager also handles configuration, permission -, priority – and dependency management of bundles.

The **Devices Manager** is based on the **Universal Plug and Play (UpnP)** bundle because most of the devices will be UPnP enabled. The manager downloads and installs devices drivers. It also assigns devices to services and creates a list of available devices and services using the UPnP specification.

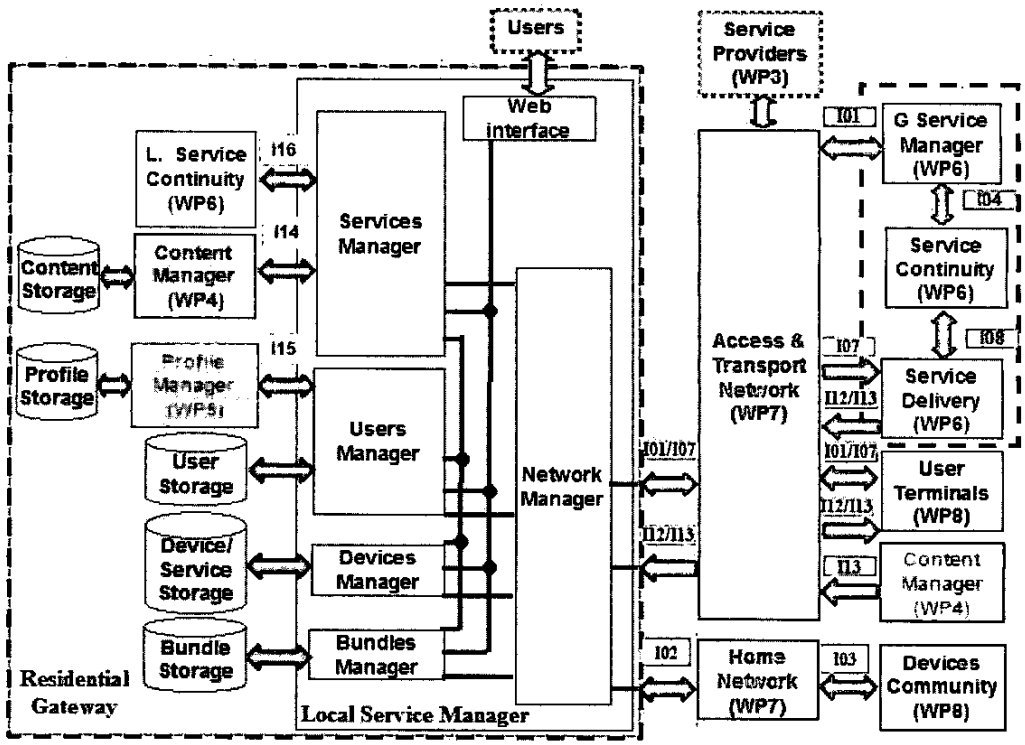

Figure 5: The Local Service Manager Architecture

The **Services Manager** controls the service delivery through the Local Profile Manager, the Local Content Manager and the Local Continuity Manager, i.e. it supports local content and service adaptation if required.

The **Users Manager** performs the authentication and authorisation operations of users using the corresponding OSGi bundles. The manager provides the security measures required by the Devices Manager and Services Manager.

The **Network Manager** is based on the IO Connector OSGI bundle. It supports multiple networks and protocols in order to increase the flexibility of Local Service Manager.

4. Conclusions

This paper describes the ePerSpace service management platform, designed & implemented in the EC-funded Framework VI project. The platform has global & local service management, the components of which were described, and provides novel personalised services, by analysing profiles of both the users & the user devices. The system provides personalised service continuity and content adaptation on any user device, anywhere at home & elsewhere.

5. References

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Acknowledgement

This document is based on the work carried out in the EU-sponsored collaborative research Integrated Project ePerSpace **www.ist-eperspace.org**
Nevertheless, only the authors are responsible for the views expressed here.