

A managed multi-play residential gateway in a multi-provider environment (Task Force 3)



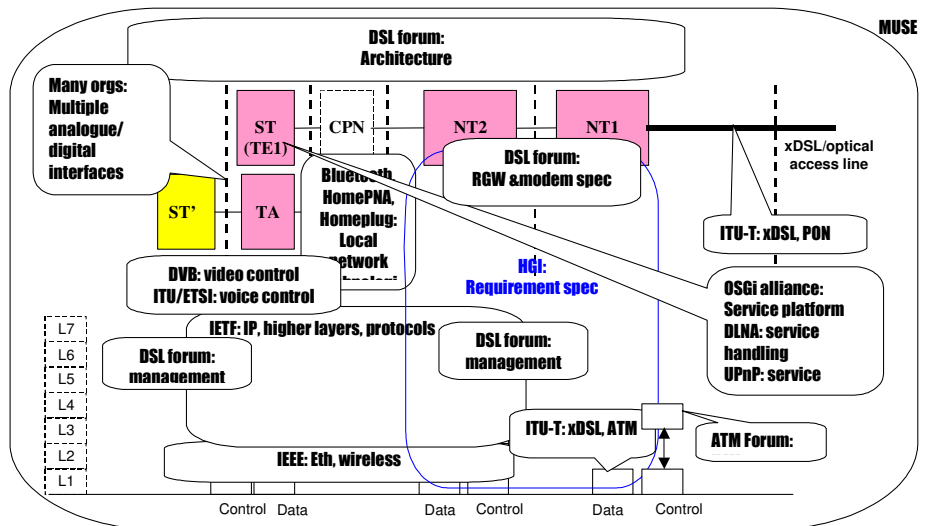
The need for high bandwidth multi-media applications to end users, via multiple service providers and technologies, drives the worldwide development of a new generation of residential devices, networks, and gateways.

Key Features

- Multi-play Residential Gateway supports triple play services and has enhanced enablers for secure and ubiquitous interconnection
- A multi-provider enabled Residential Gateway suited both for single and multiple ACS (Auto-Configuration Server) management and supporting simultaneously multiple connectivity providers
- Support of Fixed Mobile Convergence: mobile connectivity providers, hotspot providers, and co-located hotspot
- Classification of user types, depending upon connection method. Different profiling linked to user types
- Description of an IMS (IP Multimedia Subsystem) enabled RGW; interaction with UPnP (Universal Plug and Play)
- RGW block diagrams
- Multi-provider offering via OSGi (Open Service Gateway initiative) virtual machine
- Concurrent tracks with Home Gateway Initiative

The standardisation of a Residential Gateway (RGW) has so far been very scattered. MUSE aimed at consolidating the functional specifications of a RGW and performed research on future capabilities.

The figure below shows the reference architecture and protocol stack of a residential gateway, together with the areas in which the different standardisation bodies are active. ITU-T has mainly concentrated on the xDSL specification. DSL Forum made some good specifications that focus on different architecture references, requirements and solutions for remote management. ETSI considers IMS, but up to now the RGW is generally not included in the configuration. The Home Gateway Initiative took a deeper look at the RGW, but restricted itself to requirement specifications.



Solution

MUSE aimed at a consolidated functional specification for the RGW, which is realized by accepting/completing existing standards, by analyzing sets of possible solutions, and selecting and specifying particular solutions in different environments. A number of new capabilities were specified during the research of MUSE, which are expected to appear in the RGW in some years from now.

Two deliverables were realized. A first one concentrates on multimedia/IMS services and Fixed Mobile Convergence issues. This deliverable describes advanced features and functionality in a multi-play residential gateway, as a functional entity located in the home, and as a part of the managed IP-based network. It also describes the use case of an IMS enabled RGW. The second deliverable focuses on the management of a RGW in a multi-provider context. It addresses multi-provider configuration, virtual machines, management of QoS (Quality of Service), trustworthiness of the residential gateway, and backup of management data.

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Specification of an advanced, flexible, multi-service Residential Gateway

RGW Block diagram

The multi-play RGW is explained and a block diagram is presented, showing the interfaces, communication functions, system functions and interconnecting functions. Another block diagram shows an IMS enabled RGW.

User types

Not only the home users are connecting to the IP-based network via the RGW. Trusted or un-trusted visitors may also want connectivity, either via the same connection provider that the home user is subscribed to, or via their own provider. There is a so-called parental control function that allows for restricting access to specific applications or content for some home users or trusted visitors. Visitors may use the RGW as a hotspot access point to connect to the Internet via a fixed or mobile hotspot provider.

Network access

MUSE has identified different authentication and IP configuration methods, and described how they should be applied with the residential gateway. Different solutions are considered for different types of users or deployment cases.

Co-located hotspot

The RGW co-located hotspot functionality is quite particular. The advantages and difficulties are considered. A network architecture for fixed and mobile hotspot providers and solutions are presented.

Intra-home and remote access control

A number of use cases were worked out for ubiquitous communication inside the home using an IMS enabled RGW. The RGW can also act as an IMS proxy for non-IMS devices. In combination with UPnP remote access, an interesting configuration for future remote access is presented.

QoS

In addition to the well-known QoS principles, new functionalities in the RGW were defined for use in an IMS environment and for hotspot deployment.

Specification of a managed Residential Gateway with multi-provider functionality

Multi-provider concepts

Concepts that allow for control of RGW functions in a multi-provider environment were described. It is shown that the multi-provider concept should be based on control authority, rather than on ownership.

When the RGW is put in a full multi-provider environment, potential conflicts and interworking issues can be solved at a SLA and/or technical level. Methods for conflict resolution were investigated for three possible interoperability models. The trust aspect of the RGW is discussed and a checklist to estimate the trust is provided.

Multi-provider management

Multi-provider management implies a clear separation of the authority on management data model objects and parameters. OSGi (Open Service Gateway initiative) is a platform that offers virtual RGWs within on physical RGW, and is a way to offer multi-provider capability.

Role based access control to objects and multi-level administrator capabilities are other ways of controlling the data base authorization. In a multi-provider context, the management and policing of QoS and the configuration of traffic classes are crucial. New objects and parameter are specified for the multi-service and multi-provider RGW.

Data protection via backup

It is important that the data base can be restored in case a critical error causes malfunctioning of the RGW. A data backup and restore mechanism is specified. The restore capability can also be used in case the RGW is replaced with another one supporting the same data base model.



MUSE is a European consortium of vendors, operators and universities, active from January 2004-March 2008. The aim is cooperation on research and development of future, low cost, multi-service access networks.

MUSE is partly funded from the FP6 programme of the European Commission and specifications of a multi-play residential gateway and its management in a multiprovider environment are two of the many project deliverables (ref. DTF3.3 and DTF3.4).

More information on MUSE and on obtaining the deliverables can be found on the MUSE website:

www.ist-muse.eu

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