

Chapter 2

Technology for SMART HOME

Santanu Das

Abstract The proliferation of internet of things beating human population, trending needs of aging population demanding service on demand, easy access to scalable servers and clouds of services anytime anywhere wide range of marketing is driving the home to SMART HOME which will soon be a reality. This paper presents the technologies responsible for this transformation.

2.1 Introduction

A SMART HOME is a HOME where in all man's comfort, entertainment, and esthetic needs are governed by technology. For example, ambience parameters like lighting/temperature needs are made intelligent to sense the need and provide. In a SMART HOME, a person can have all necessary services right from wake up alarms to personalized calendars with essential reminders to diet needs to medical support available to his disposal with an ease of a click of buttons or gestures. This is possible because of the advancement of wide variety of sensor technologies and high processors technologies.

2.2 Drivers for SMART HOME

SMART HOME is driven by the soon to be necessities like

- Energy conservation and sustainable design
- Home automation/security

S. Das (✉)

Domani Systems Inc, 2 Trap Falls Road, Suite 106, Shelton, CT 06484, USA
e-mail: santanu44@aol.com

- Home assistance (Tele-Assistance)
- e-Health (Telemedicine)
- e-Education
- Remote monitoring of appliances
- Communications and entertainment
- IT services for home and home office

A conceptual SMART HOME model is shown in Fig. 2.1.

Many contributes of this possibilities are electrical power distribution players, smart building control specialists, building application companies providing HVAC, lighting, security for homes, house hold appliances providers, SW, IT, communication equipment players and service providers like telecom operators (Fig. 2.2).

2.3 SMARTNET

The technical model of the SMART HOME is shown in Fig. 2.3.

In a SMART HOME, the SMART circuit constitutes a Master sever with cloud capability with the uplink interfaces on DSL, PON/WIFI on one side and other need-based pluggable service modules on the home side. The service modules can be variety of modules based on any short-range technologies like WIFI, ZIGBee, etc.

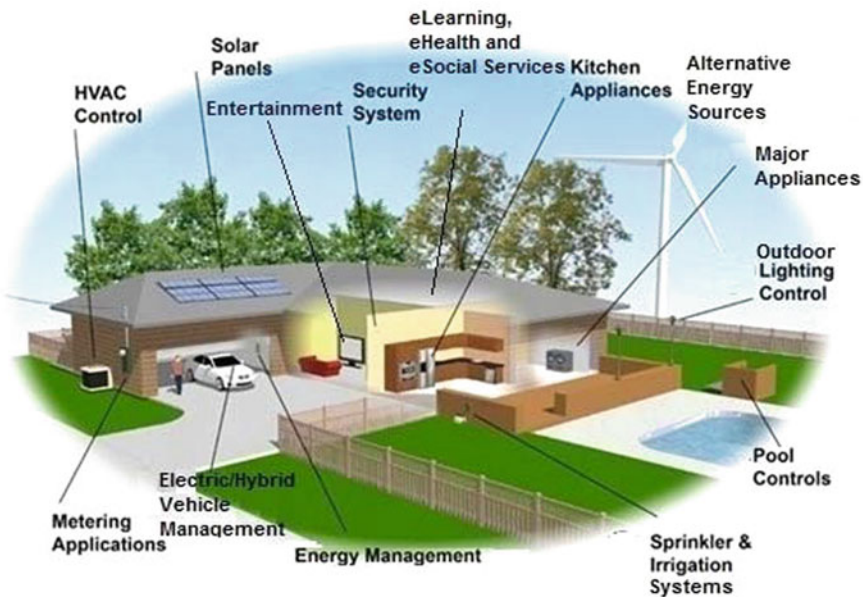


Fig. 2.1 Conceptual SMART HOME model

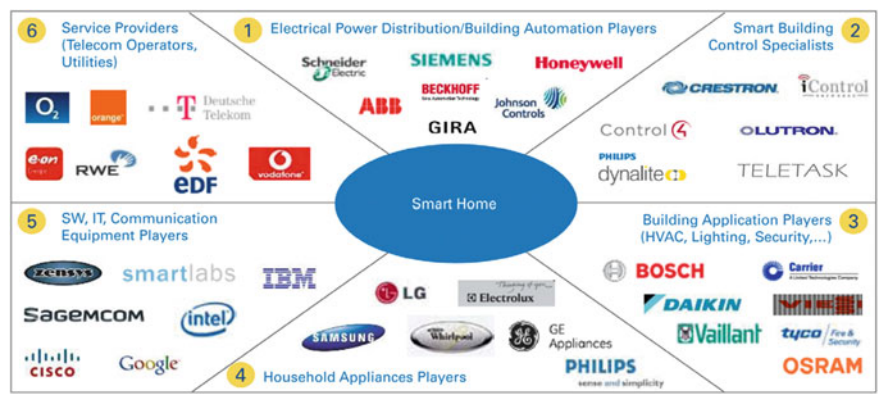


Fig. 2.2 Major architects of SMART HOME. Logos referred in this figure are respective properties of the companies

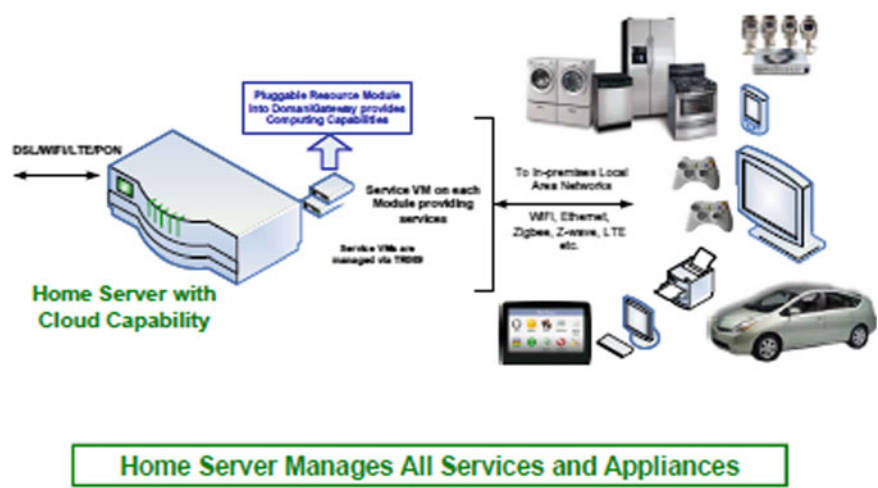


Fig. 2.3 HOME server manages all services and appliances

catering to internal automation/data transfer and controls for automated appliances for both utility and entertainment as shown in Fig. 2.3.

2.4 Requirements of SMART HOME Technologies

It is necessary to integrate entertainment and nonentertainment services like Video, Audio, Games to IT, Home Security, Skype, Browser on TV, etc. The technology should be shared by many service providers with security being par

mount importance. Most of the services have to be in software so that they are flexible, upgradable and most importantly to avoid cluttering of multiple devices. The SMART HOME products should be on the fly provisionable and upgradable with easy user interface. It is essential for all the products on SMART HOME Network to be of low-power products, and they have to be of low cost affordable by larger mass.

The HOME Network has to support heterogeneous technologies to support multiple services. The HOME server is the heart of HOME Network, where most of the service applications run. One such Domani’s HOME server architecture is shown in Fig. 2.4.

User or third party applications run on separate Virtual Machine (VM) with a standard interface to HOME Server.

The Domani’s intelligent software architecture is shown in Fig. 2.5. The other important attributes of server software are in its ease of local and remote upgradability, maintenance, and security.

The multivendor service support frame work is achieved by TR-069-based management infrastructure as shown in Fig. 2.6.

The salient features of Domani’s server are the following:

- Central Server, Home Server, and IP set-top box have a virtualized architecture
- Linux is the host operating system
 - In all three subsystems
- KVM is our preferred Hypervisor
 - On top of Linux
- Virtual Machines are specialized
 - Depending on the particular services it supports
- Each Virtual Machine has its built in Security Layer
- A common Security Layer isolates the Virtual Machines
 - Common Security Layer is based on Fuzzy Logic

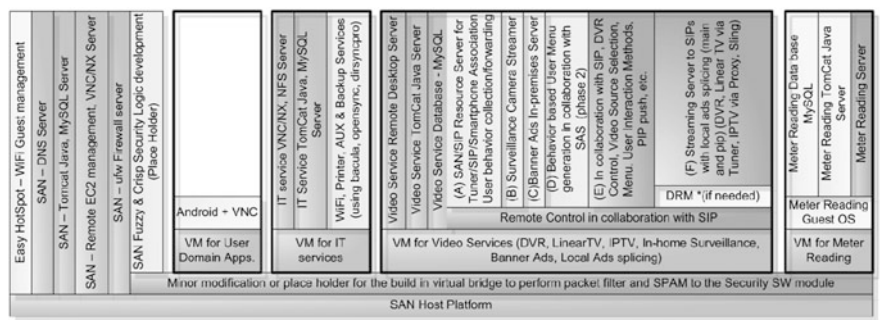


Fig. 2.4 Domani’s HOME SERVER architecture

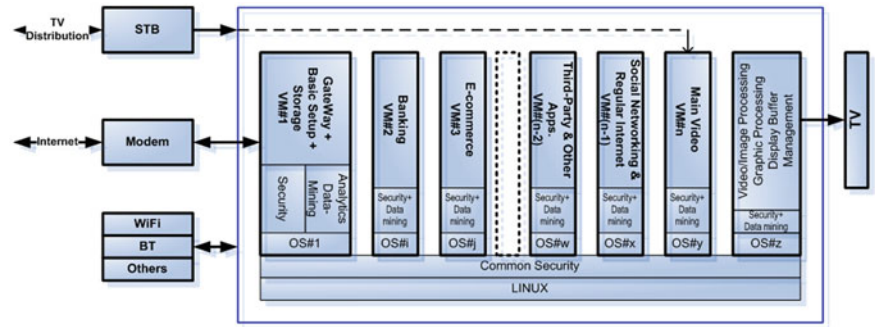


Fig. 2.5 Domani's software architecture

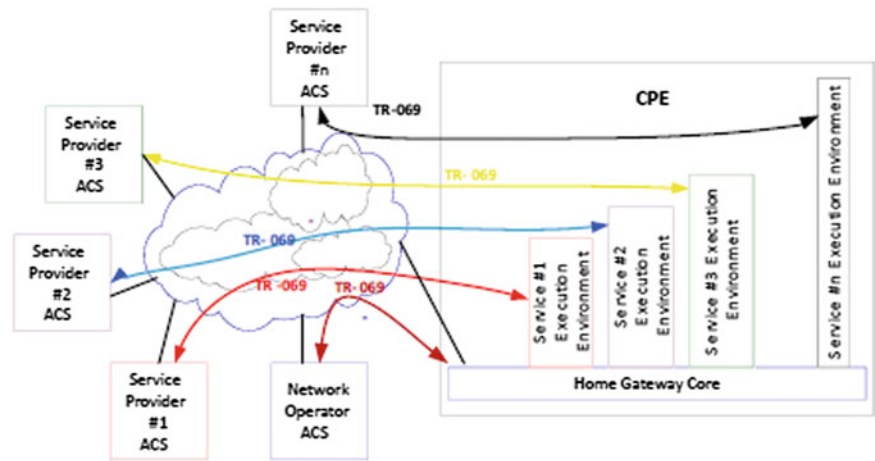


Fig. 2.6 Architecture compatible with OSGi and home gateway initiative

2.4.1 Supported Services

Variety of services like e-learning, telemedicine, VOIP phone, and video conferencing, environmental and appliance monitoring, and many more can be supported by Domani's platform.

2.4.2 SMART Sensor Network

Another essential building block of the SMART Home is the smart sensor network. The sensors are used to sense different parameters in a network configuration which are controlled automatically at home.

2.5 Conclusion

It is to be noted that major building blocks of SMART HOME technology are SMART HOME server and the sensor networks. Necessary features, functional requirements and macro architecture of the hardware, software are defined, and few of the differentiators are identified. The essential features of Domani's server which is suitable for SMART HOME is described. The need for supporting different VM devices is highlighted.

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