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Business Modelling in Home Networks: the OMEGA Case*

Michalis FOKAS, Theodore ROKKAS, Dimitris KATSIANIS, Dimitris VAROUTAS, Thomas SPHICOPOULOS
University of Athens, Panepistimioupolis-Ilisia, Athens, 15784, Greece
Tel: +30210-727318, Fax: +30210727214 Email: D.Varoutas@di.uoa.gr

Abstract: This paper presents ongoing initial results on the business modelling activities regarding the home networks within the OMEGA home networking EU project. OMEGA will develop a user-friendly home access network capable of delivering high-bandwidth services and content at a transmission speed of one Gigabit per second. The purpose of this study is to identify and analyze the potential players and technology variables that affect the position of the OMEGA system into the telecom market. All the necessary information for the analysis of the business case among with the needed definitions are presented. The business case study leads to the definition of a business model for the operation of the OMEGA players and their relationship in the value network and also the dynamics of the delivery of the OMEGA services. A business model that describes the market after the launch of the OMEGA network is also presented along with an initial overview of the OMEGA reference architecture of the network with the basic OMEGA devices and their functionalities. Finally two alternative initial scenarios are defined.

Keywords: technoeconomics, business modelling, home networks, OMEGA.

1. Introduction

The future Internet will require extremely high-bandwidth “core” and “access” networks, along with the associated developments in transmission and switching that are required to achieve this. However, this development alone is not sufficient to deliver the benefits of the future Internet to the customers. Home networks play a critical part in achieving broadband penetration, as they act as a communications segment that enables end-to-end services. Extending access into the home and to individual devices is the way to ensure the success of the future Internet [1].

The telecommunications market offers an increasing variety of services and products for the consumer and it keeps getting more complex and competitive as a large number of players and actors have a role in the delivery of these innovative services to the customer. Consumers require home networks to be simple to install, possible without any new wiring, easy to use and with enough capacity to allow them to fully enjoy the services delivered.

The OMEGA home network is a pivotal technology to be developed by the EU [2] so that the vision of the future internet can be realised.The OMEGA home network will deliver Gbit/s bandwidth and low latency within the home and to the access network, with either wireless

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transmission or using existing wired home infrastructure, thus enabling access to and the development of new and innovative services.

In this article, a initial business model suitable for the OMEGA project will be presented and discussed, as a part of the ongoing research within this Integrated Project. The model will highlight the players and actors involved in the delivery of the foreseen OMEGA services along with their relationships and the relevant cost drivers and revenue streams. Furthermore the architecture of the OMEGA home network will lead to the definition of the network components of which the cost evaluation is another important factor in the technoeconomic analysis of the OMEGA project. However, it should be denoted that the issues discussed hereafter are preliminary and aim to contribute as a initial framework for further research within and outside OMEGA project, without reflecting partners views and decisions in this interesting topic.

2. The OMEGA Network Architecture Reference Model

The OMEGA network needs to achieve an overall capacity in the home area network in the order of Gbit/s in order to successfully deliver the demanding new services which will emerge in the market .At such data rates the range of ‘no new wires' technologies such as HD PLT or WiFi 802.11n will likely remain limited even by using the most sophisticated improvements [3]-[4]. In the same way, other 'no new wires' techniques able to deliver high bit rates such as radio UWB or 60 GHz, or wireless optics are confined to the space of one room for propagation concerns[5].

In the prospect of the Gb/s data rate in home networking, it appears thus interesting to distribute the functions of connectivity inside the home with the help of interconnection points (the extenders) spread in the home, and achieving the hybridization of technologies. This scenario is illustrated on the following picture:

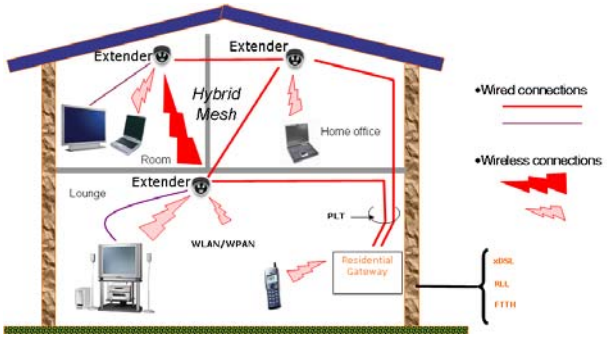

Figure 1: Illustration of hybridization of technologies inside the home network (Source: OMEGA)

This illustration highlights the interconnection of a wide range of terminals with a mesh network ensuring the coverage of the whole home area. The terminals can be classified in families or clusters, not completely disjoint: data communication terminals (computers, PDA, notebook, etc), gaming cluster, voice/video communication terminals (analog/digital phones, videophones, etc), entertainment consumer electronics audio/video terminals (STB, TV, MP3 player, etc) and domestic equipment (fridge, sensor networks, etc).

Figure 1 illustrates the network concept. Data enters the home and is routed by the home gateway (Omega Gateway). The gateway in turn is connected to OMEGA hardware, which can deliver Gbit/s data transmission. Room-area communications is provided through ultra wide band (UWB) radio and broadcasting by use of visible-light communications (VLC) or Infrared Red communication (IRC).

To extend UWB penetration, the gateway can also use lower frequency RF to connect to terminals, or use power-line communications (PLC) beyond state of the art 100 Mbps net to connect to OMEGA bridges within the house. Bridges can alternatively or complementarily be networked by means of high speed radio backbone, leading to the first hybridization of wireline and wireless connectivities.

The Main component used in all cases is the Omega Gateway (OG) the boundary element between the OMEGA and the access network. All the information flows that enter or exit the OMEGA network from or to the access network pass through the OG. If we try to define the technology options within OMEGA houses, we may identify at least 3 without counting hybrid/combination (Radio, Power Line Communication PLC, Hybrid Wireless Optical (HWO)).

3. Business Modelling in Home networks

The business model concept unifies important decision variables from different areas of economics, operations and strategy. There are many definitions for business models, some are only limited on the economics examining how profit can be produced, a different approach is that of specifying the primary elements and their interrelations.

In this document the definition adopted is that a business model stands for the architecture for the product, service and information flows, including a description of the various business players and their roles, the potential benefits within a value network and the sources of revenue.

Home networking except the communication among people also includes several new elements such as personalization, portability, higher quality, etc. Is also offers new services such as person-to-person messaging, content, games and other broadband services, and unlike traditional voice, which is vertically bundled involves a number of players. These players are not only the traditional telecom operators (service, network operator), but also from other industries content, IT, consumer devices. New business roles emerge, and their relationships are growing complex. As home networks begin to formulate new roles, relationships are becoming an integral part of business. Every player must understand its position in the network of suppliers, customers, buyers and competitors, to provide greater value and maximize his potential profit.

In this document the concept of “value network” is adopted, instead of the traditional company-specific “value chain” approach [6]-[7]. A reference model that consists of the players in the OMEGA case and their relationships will be developed and the key players, the revenue streams and the cost drivers will be identified.

The players that have role in this value chain can be generally divided into these groups:

- End-users (the people inside the home network)
- Equipment vendors (shops or firms that end user can buy the above equipment), who can be further divided into: PC and peripherals vendors, TV and A/V vendors, surveillance equipment vendors and others

Or there can be a bundler that combines part of the above or all of them.

- Service providers including internet providers, content producers/owners, content providers, content aggregators, distributors, value-added service providers (VASP) and service integrators.
- Network providers including internet access, TV network, telephone

4. The OMEGA Case

The OMEGA business model involves a plethora of players that interact with each other and the consumer forming a complex network. In the following figure this business model is described

with all the participating players, their relationships, revenue streams and cost drivers. The direction of the arrows in the model represents the direction of the delivery of services. Revenue flow is considered to be in the opposite direction. In some cases revenue sharing exists between two players, which is represented by a bidirectional arrow. The ellipse represents a player. A player may take up one or more roles. The rectangular boxes within the ellipse represent roles.

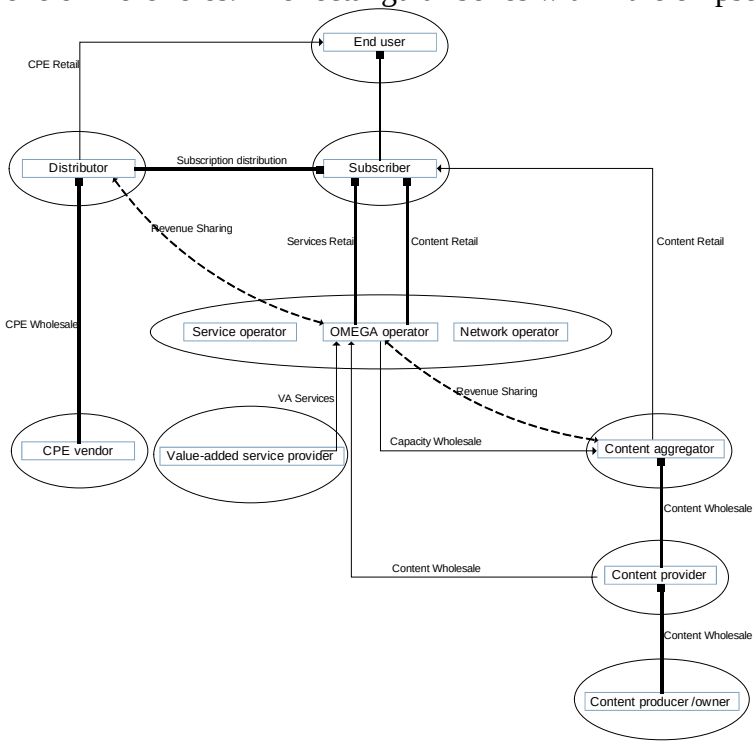

Figure 2: Omega Business Model

In this business model the basic scenario for the delivery of services from the OMEGA operator to the consumer is presented. The consumer buys the OMEGA system from the OMEGA operator and thus subscribes for telecommunication services. This way the OMEGA operator is the main player that the subscriber interacts, providing a variety of telecommunication services like Internet access, telephony, VOIP, IPTV etc. For the provision of these services the OMEGA operator needs to reach its customers through a network. In this study the assumption that the same player has both the OMEGA and network operator roles is made. The network operator is a player who operates both the access and core portion of a network infrastructure.

In this model the OMEGA operator and the subscriber enter into a contract for the delivery of services from the former to the latter. The contract can be either post-paid, in which case the subscriber is billed for the use of the network and the services at the end of each month, or pre-paid, in which case the billing takes place beforehand. There is also a variety of pricing models the operator may use to decide how much he will charge for the services provided.

As far as the CPE distribution is concerned, this is taken care of by the CPE vendor. In this case a balance of power exists between the CPE vendor and the OMEGA operator which depends on the control of each player over the CPE distribution network and the subscriber base respectively. This power sharing leads to relevant revenues and profit sharing between them.

The provisioning of content can be done either by the OMEGA operator or directly by content providers. In the first case, also known as vertical bundling, the OMEGA operator

purchase content from content providers and producers and then delivers it to the consumer through an interface such as a portal. This role of content aggregator offers greater market power to the OMEGA operator who uses his direct relationship with the consumers to become the main player in the content provision business. The other case is that another content aggregator provides content to the subscribers using the OMEGA operator's network capacity. Here, the OMEGA operator sells a part of its capacity to the content aggregator, who in turn has to pay for the capacity usage to the OMEGA operator. Therefore, as in the CPE distribution case, there also exists a sharing of power and revenues between players, which depends on the type of content provided and the customer base of each player.

The content provided can be of different types. Examples of content include news, entertainment, games etc. Value-added services can also be provided through the OMEGA operator by other players. Some of the revenue models used by the key players in content provisioning are transaction-based fee, fixed subscription fee, usage-based fee such as time or traffic, license fee and value-based fee.

Table 1 lists the revenue streams and cost drivers for the key players. In this business model the various players, roles and their relationships are presented revealing the complexity in today's telecommunications markets. A major observation for the OMEGA case with regards to business models is that power in terms of control over the value network is distributed among multiple players and not only to the traditional operators even if the measurement of its relative power is higher than the other players in the value chain. It should be noted that there is no single business model that can enable all the telecom services that we see today or expect in the future among the OMEGA system. The framework developed here should act as a starting point for business case analysis and should enable the identification of appropriate power sharing equation among the players in a business model.

5. Scenario Description

In the project the case of an incumbent operator migrating to OMEGA will be examined. The main reason for an incumbent network operator to provide the new home network services is to retain the existing customer base or even gain more in a market exposed to more and more competition. The last years many new actors are entering the telecommunication business including mobile and fixed service providers, new broadband providers and VoIP providers. Ownership of the customer is a vital asset for all operators and so the competition is very hard. As the usage price of telecommunication is decreasing, the subscription fee becomes more important as the main source of revenue. Enhancing the user experience by value added services is a reason for the customer to pay for.

Also many market players such as content providers, TV channels, movie studios, handset and device manufacturers, may be involved in the OMEGA migration.

Scenario A: operator driven

This scenario examines the case of an operator which owns already a fixed network and can provide fixed voice and broadband services to its customers. The operator uses its own transport, access, backhaul and core networks to provide these services to the customers. Furthermore the operator is assumed to have an established position in the market, and a strong market share among the customers. The analysis in this scenario focuses on calculating the effect of the OMEGA migration or not decision on the overall business of the operator. Among other things, this means that only the differences (i.e. delta) between the non-OMEGA and OMEGA case are

considered, revenues and costs that would exist regardless of the decision are not treated separately.

Table 1: Revenues Streams and Cost Drives Players

Players	Roles	Revenues		Costs	
		Interfaces	Streams	Interfaces	Drivers
OMEGA operator	Service operator+ Network Operator+ Content aggregator	Services Retail	Monthly tariff for content subscriptions	Content Wholesale	Costs of rights to broadcasted content
		Content Retail	Usage-based tariffs for content sold directly to consumers	VA Services	Costs of value-added services
		Capacity Wholesale	Capacity revenue from content aggregator	Internal	Capacity provisioning cost
				Internal	Customer acquisition, marketing, provisioning, billing etc. related
Content provider (e.g. TV production company)	Content provider	Content Wholesale	Wholesale tariffs for content	Content Wholesale	Buying rights from content producers
Content producer / owner (e.g. advertiser, TV format owner)	Content producer / owner	Content Wholesale	Selling rights to content providers	Internal	Investments (time and money) on creating new content
Content aggregator	Content aggregator	Content Retail	Content subscription revenue(revenue may be shared between service operator and content aggregator)	Content Wholesale	Content purchase and aggregation cost
Value-added service provider	Value-added service provider	VA Services	Selling value added services to OMEGA operators	Internal	Investments (time and money) on creating new services
CPE Vendor	CPE vendor	CPE Wholesale	CPE revenue from distributor	Internal	CPE manufacturing cost (includes OEM outsourcing)
Distributor	Distributor	CPE_Retail	CPE revenue from end-users	Internal	Distribution channel setup cost
		Subscriber Dstr	Revenue from subscription distribution	CPE_Whl	CPE purchasing cost

Services for future Home Networks

The individual services can be classified to voice, video and data, the customer can choose according to his needs from the table 2 with various possible combinations.

Table 2: Home network services

Service	Service description
VoIP	Flat rate for unlimited national calls
Videophony	Flat rate for unlimited national calls
Broadband access	Flat rate for unlimited internet access
Digital TV	Includes a basic packet of 5 channels
Digital TV channels	Individual channels
Video on Demand	Pay per viewed movie

The future customer may choose from one of the following bundles of new Home Network services packets (table 3). In addition the customer gets for free some new exclusive services that are limited in the beginning but will be enhanced over the years.

Table 3: Home Network services packets

	Services included						
Packets	VoIP	Videophony	Broadband access	Digital TV	Digital TV channels	Video on Demand	New Home Network services
Bronze	X		X			X	
Silver	X		X	X		X	X
Gold	X	X	X	X	X	X	X
Platinum	X	X	X	X	X	X	X

Over the years the distribution of users in the packets will change, the first years that these packets are introduced most of the users will prefer the basic packets but later a migration to the more advanced is expected (the estimation is based on [8]).

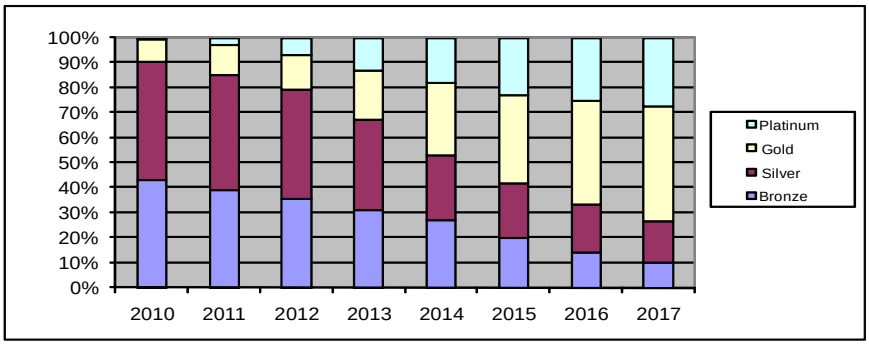

Figure 3: Evolution of subscription distribution among services packets

The ARPU development in the future for new home network services will depend on the customer's valuation of the new functionalities provided.

Scenario B: consumer driven

In this case the consumer buys the OMEGA device not for the new services it introduces but mainly for the improved home networking capabilities that the devise provides. It is not interested in all the various bundles but only for the basic package (voice + internet). However the customer already owns or is interested to purchase a set of devises (TV, pc, PDA, etc) that have the OMEGA functionality in order to build his own home network. In this case the benefit will not be on the content providers but on the operator and the CPE vendors. The operator will increase furthermore his subscriber base although it is not sure that this "type' of customer will buy some of the more advanced new home networking services, and will even gain some customers for the competitors that doesn't offer similar to OMEGA products. The drawback is that the network operator must although made all the necessary upgrades and adjustments to his network to provide the extended bandwidth requirements.

6. Conclusions

The OMEGA business model involves many different players and a complex value network. In this study all the participating players, relationship interfaces, revenue streams and cost drivers are presented. The basic business cases are the following: The operator driven case in which an incumbent (or new entrant) operator with owned private (or not) distribution network offers services via OMEGA systems and the customer driven case in which the consumer buys the OMEGA device not for the new services it introduces but mainly for the improved home networking capabilities it provides. It is not interested in all the various bundles but only in the basic package. In order to perform the techno-economic analysis of these cases a forecasting process is needed. Since no diffusion data is available yet, as the product will be launched in near future, any estimation and forecasting attempts should be based on the diffusion process of other telecommunication and high technology products and services. Since the OMEGA system is expected to bind such similar products it can be considered as a complementary good, the diffusion of which will depend on the diffusion of these similar technologies as well as broadband penetration. Therefore, a dataset about these products and services from different European countries and for a wide period of time must be collected.

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