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An Open Source Business Roles Model for IMS-based Converged Services

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1 Executive Summary

Traditional telecom sources of revenue are based exclusively in voice and data revenues. They also use a closed-source software model, with no communication between different applications, turning very difficult the delivering of services across different access networks and the deployment of an integrated billing system. Besides that, the complexity to manage these services is huge, from the operator and user points of view. At the same time, the continuous evolution of technology is also creating challenges for service providers. The emergence of Internet Protocol (IP) promises new options, significant savings in Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) and opportunities to develop and bring to market services and applications previously not possible.

The resolution for many of these problems lies in the evolution to the IP Multimedia Subsystem (IMS). IMS will enable operators to implement the vision of a subscriber-centric world with independent services access. Service providers will be able to enhance the communications experiences by allowing the end user to integrate every kind of media (voice, video or data) using any network. IMS will also enable the creation of blended services built with multiple atomic services, like messaging, push to talk, push to share and interactive video.

The proposed framework for Open Source Business Roles model for IMS-converged services intends to facilitate the creation of business models that takes into account the major benefits of open source software to provide reliable solutions in terms of quality, development time and integration. We intend to bring these important qualities to the consumer market and facilitate the integration of commercial and open source components in a whole reliable solution. Besides that, we want to create a business model that facilitates the relationships between universities / research centers and private companies. With this close relationship we intend to reduce the time to market of the solutions developed in partnership by both entities.

2 Introduction

The concept of open source software isn't entirely consensual. To make clear the here-adopted view, we briefly present the notion of free software and open source software, and compare them.

Generally, free or open source software refers to a program in which the source code is available to the general public for use and modification from its original design, free of the usual royalties. However, there are some nuances in the understanding of what exactly constitutes open source software. Two of the most reputed organizations concerning this type of software, differ in terminology and scope: the Free Software Foundation (FSF), recommends the use of the expression "free software" and insists on the obligatory publication of all source code derived from original free source code; and the Open Source Initiative (OSI), which prefers the expression "open source software", and is more liberal on the demand of derivative software publication. [1]

In this work, we will mostly use the OSI view and the expression “open source software”. For its protection, every piece of Open Source software must have a license that guarantees the freedom of use and modification. Its commercial use and how far the protection goes, justifies the existence of several types of licenses.

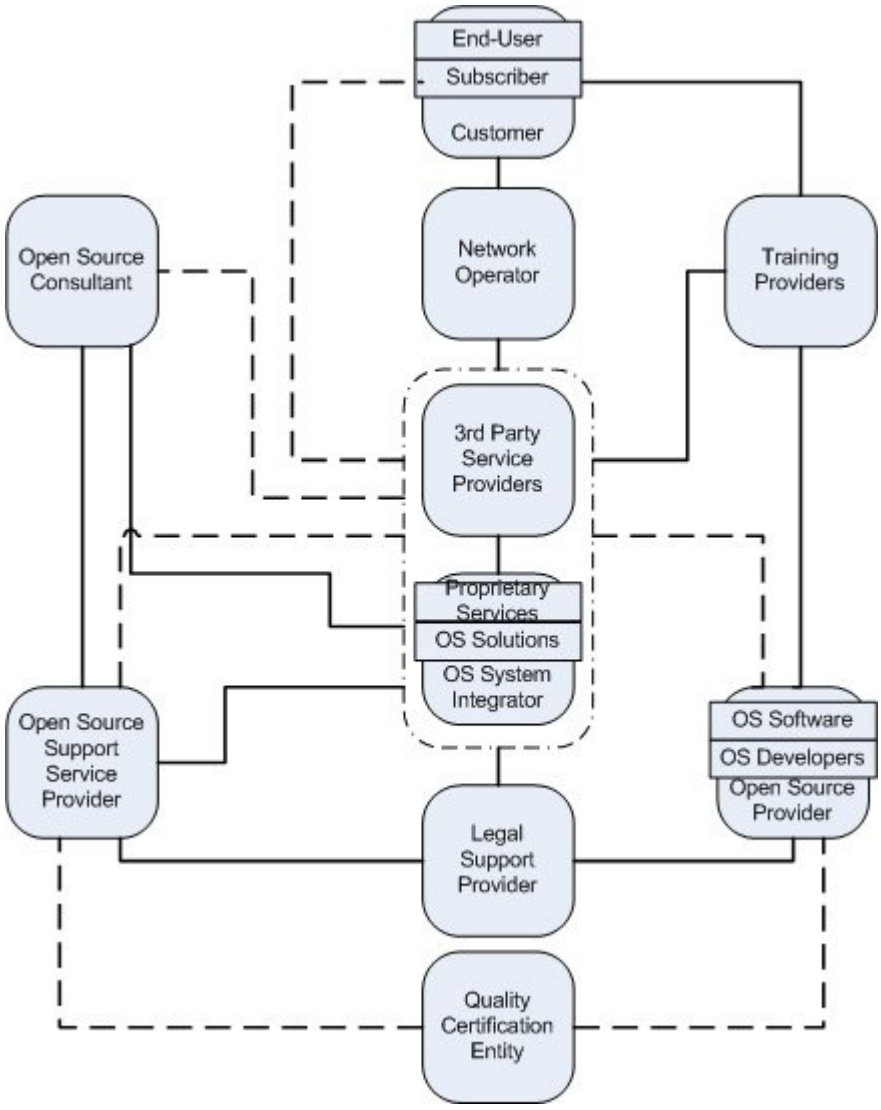
Open Source projects have some common characteristics. These characteristics can also be mentioned as attributes of open source software. Some of these attributes contribute positively to the success of some open source initiatives, namely the high pace of software development and correction of bugs, the high reliability and integrity of the code, platform independence and the support service based on mailing lists and newsgroups.
The open source collaboration process is based on widespread access to source code and open collaboration – a meritocratic philosophy that invites feedback from everyone, regardless of official status or formal training, and frequent releases of interim versions to encourage testing, feedback, and quick evolution of solutions. This open source paradigm is totally opposed to traditional collaboration models, which are based on construction and the attempt to perfection. The software is designed once in a “top-down” mode, and then programmers execute the design. The open-source paradigm, on the other hand, assumes that quality is the result of massive collaboration. The key of the success of the collaborative development model is based on the lower transaction cost for information, enabling the separation of the identification and solution components of quality problems and spreading these tasks over a much larger population than could sensibly be done in traditional hierarchical approaches.

The use of open-source software has been increased during the last years in different sectors of activities, namely in the IT industry and government. Up to date, the telecom industry has not yet fully embraced open-source software; however, some Open Source Telecommunications companies are starting to show signs that they are capable of disrupting the telecommunications market. For example, a large proposition of OST companies have raised venture capital (75%) and filed for patents in the system architecture domain (33%). [2]

3 Proposed Framework and Relationships

For the creation of a common Open Source business process, a business role model with clearly assigned tasks and relationships has to be provided. We formulated this model taking in consideration the Eurescom strategic study about Open Source in telecommunications operator environment, and the actual and new tendencies of value chains and business models in telecom industry. [3] The Open Source business role model is illustrated in figure 1.

Figure 1: Open Source business roles model



The Open Source business role model encompasses ten roles and certain relationships between these protagonists. The lines in the figure describe the relationships between the different roles. The lines indicate which role provides input to another role within the Open Source business process. The dashed lines indicate that there is also input that could be provided directly, but this is not the most typical case.

The roles, tasks and relationships illustrated in figure 1 are described bellow:

- **Open Source Providers** – mainly develop, improve and release Open Source software. The Open Source Provider role provides both Open Source software and Open Source developers. Open Source developers generally provide Open Source software, but, in some cases, could also be utilized for the development of proprietary services;
- **Open Source Support Service Providers** – sell support services for Open Source products. Open Source support services encompass Open Source product related failure handling, adding of new features to the Open Source product, versioning, among others;

- **Open Source System Integrator** – use Open Source software in order to build Open Source based system solutions. Apart from Open Source services also proprietary services can be implemented upon Open Source systems;
- **Open Source Consultants** – provide consultancy services on open source solutions. Their know-how is generally based on their previous scientific and/or professional experience;
- **Legal Support Providers** – offer the necessary legal support for formulating, using and understanding Open Source licenses. This role can be provided by a private company or by the Software Freedom Law Center (SFLC). The SFLC provides legal representation and other law-related services to protect and advance Free and Open Source Software (FOSS) offering direct services to non-profit FOSS developers without charge, as well as publicating the results of many of their legal analysis;
- **Quality Certification Entities** – provide certification in the field of software and processes;
- **Training Providers** – offer training services to companies that want to use and configure open source solutions;
- **Portal Providers** – manage the aggregation of specified converged services and technical open source solutions. These entities can also be responsible for the packaging and marketing of services for end users segments;
- **Network Operators** – typically, are responsible to provide network connectivity, location and presence information, access to billing systems, customer databases and management of quality of services. This role can encompass the role of a broadcasting networking operator or mobile network operator;
- **Customers** – buy and use Open Source system solutions.

3.1 Scenario Presentation

We considered a scenario where a Network Operator wants to be able to provide a converged fixed-mobile solution that enables communication through various media devices to their customers. The Network Operators will want also to be able to support a common service environment to implement flexible and scalable advanced solutions adapted to each individual's preference.

The IMS architecture is the best suited for blending of real-time and non real-time multimedia services and it optimizes the application life-cycle through rapid and efficient service creation and deployment. Further, basic IMS services such as Presence and Messaging, can become enablers of larger, personalized, interactive and collaborative multimedia services. The ability to reduce the lead time for new communication services will guide to faster return on investment. The ability to personalize new services will increase customer satisfaction and brand value. Taken together, they will facilitate mass-market customization and an increase in revenue and brand value.

IMS supports the concept of an open source creation model that allows the inclusion of third-party applications and application servers, enabling operators to tailor services and applications for their customers. Operators can develop the new services themselves, outsource the development work, or purchase IMS-compliant applications from external sources. [4] This potential of IMS

architecture allied with the flexibility of our framework turns easier the creation and deliver of open source based services using an IMS architecture.

The customers should have access to a different wide range of applications, namely:

- Instant Conferencing & Messaging – the network operator shall be able to utilize a common infrastructure to support a variety of messaging technologies, including IM, SMS, MMS and e-mail;
- IP Centrex – it shall be provided a virtual PBX that supplies the sophisticated capabilities usually found in premise-based PBXs, such as extension dialling, automatic call back, conference calling, calling forward and transfer;
- Video on Demand (VoD) – it shall be possible to deliver video content over broadband IP networks to the individual viewer initiated by the user at a specific time of his choice. Most commonly, it is a streaming unicast, but it can also be able to provide broadcast and multicast services;
- Gaming – mobile entertainment holds the potential to generate considerable revenue for third-generation networks and can be seen as a strategic asset. It is possible to introduce a gaming solution that can be multiparty, mobile and combined with chat and voice. At the same time, coupled with the real-time communication capabilities, the games can provide a catalyst for the formation of online communities which, it turn, produce a social framework for individual and group communication;
- Location Based Services – user shall benefit from the availability of location-enabled services. The possibility of locating places of interest, friends or family, or determining their own location on demand, has obvious benefits for users and can be applied in a huge number of applications;
- Combinational Services – all the services presented before shall be able to be combined originating new integrated services like voice + video sharing, chat + gaming and message + calendar.

3.2 Building Blocks of the Business Analysis Methodology

Conceptualizations of a business model try to formalize informal descriptions into building blocks and their relationships. While many different conceptualizations exist, Osterwalder proposed a synthetization of different conceptualizations into a single reference model based on the similarities of a large range of models, which constitutes a business model design template enabling enterprises to describe their business models. [5]

Following the Osterwalder vision, a business model can be described by looking at a set of nine building blocks. To get a good overview of a business model, we shall describe the customer segments, the value proposition that satisfies the customer segments needs, the used distribution channels, the customer relationships, the major revenue streams and cost structure, the key resources and key activities performed by the company to implement the enterprise business model and the partner network of the enterprise.

Customer Segments

The actual scenario can address a wide range of customer segments depending of the different kind of services that are provided by Network Operator and Service Providers. The IMS architecture brings some important benefits for the Network Operator in terms of customer market, especially the followings:

- Creates customer loyalty by providing lifestyle communications environment;
- Opens a unique opportunity to be first to market with new revenue-generating services.

Deploying the IMS architecture gives a service provider the opportunity to be first-to-market with a range of services that are customizable to specific localized market requirements. In a market where multiple players compete for the same customer, early market entry and service flexibility can produce market share and profitability.

Value Proposition

The value proposition for this scenario shall contain the following elements:

- An inherent enabler for fixed/mobile convergence with single set of services that apply network-wide. It is composed by one network that supports multiple access technologies;
- It supports flexible bundling of revenue-generating, rich multimedia services, as it allows applications to add/drop media components, invite or disconnect communications parties, and access a wide range of service capabilities (location, presence, charging, instant messaging, conferencing, etc.);
- It supports enhanced E2E QoS support and security for the standard IMS architecture. These key features will provide important benefits for the Network Operator;
- It uses open and well-specified interfaces that will limit interoperability issues and allow rapid take-up.

Communication and Distribution Channels

Network Operators and Service Providers are looking together for new sales, distribution, marketing and advertising channels. They want to improve their source of revenue and attract new customer segments.

The conventional channel to market for content providers has been via a network operator, who decides how it is offered, presented and priced. But this is changing rapidly and content providers now have direct ways of engaging with their target audience. It follows now that a major question for network operators is how they can incorporate off-portal content successfully as part of their next-generation data strategy, built around personalization, rich content and a more converged user experience.

Customer Relationships

One of the biggest challenges of a Network Operator is to improve customer retention and profitability. This can be reached by improving the efficiency and responsiveness of processes

(such as order processing, billing and customer service) and by enabling shorter time to market for high-demand services.

The service level convergence allows carriers to rate and/or bill any type of service in the same system with a single point of management. It also enables the possibility of offering multiple services and charging or billing a user with a single invoice or using a single prepaid account. A customer receives a single bill or uses a prepaid account for many mobile and non-mobile services such as voice, content, parking or ticket payments.

Key Resources & Key Activities

At the basis of every business model there is a set of key resources a company must dispose of to make its business model work. Attending to this scenario, we considered that a Network Operator shall have technical competences in the fields of management and marketing, a strong brand image and reputation, and shall establish a direct relationship channel with the customers. The 3rd Party Service Provider shall have specialized human resources with technical knowledge on specific technologic domains. The 3rd Party Service Provider is responsible to provide technical solutions in their business domains and to establish a close relationship with the Network Operator. In this model, it can exist several 3rd Party Service Providers, which are responsible to provide “best-of-breed” solutions in the domains of gaming, location based applications and real-time communications for the Network Operator.

Others refereed entities in the model, will provide the following key activities. The Open Source Support Service Provider is responsible to develop specific OS solutions to the Open Source System Integrator. The Open Source Provider is responsible to develop Open Source projects in cooperation with other developers around the world. The Legal Support Provider is responsible to offer juridical advisory. The Quality Certification is an independent entity which is responsible to evaluate the software provided by the Open Source System Integrator entity. The Training Providers entity is responsible for the formation of human resources at the 3rd Party Service Providers and to the Customers. Finally, the Open Source Consultant is responsible to provide consultancy services attending to the “best-of-breed” solutions in the IMS field.

Revenue Streams & Cost Structure

The most important revenues of this model are the data transport incomes and services accesses that the Network Operator gets from the customer. The services access to the platform can be billed based on a period of access, number of accesses or facilities used by the customer to the platform. Also, the 3rd Party Service Providers receive important incomes from the Network Operator based on the kind of services or platform that they offer to the Network Operator.

On the other side, the most relevant expenses of this model are the technical infrastructure that the Network Operator needs to keep to offer its services and maintain a communication channel with the customer. Also, the Network Operator will need to pay for the services/application provided by a 3rd Party Service Provider.

Partner Network

The new valuable services that a Network Operator can offer to customers are dependent on the partnership agreements with 3rd Party Services Providers. Partnerships agreement can be established between the Network Operator and Service Providers that provide solutions in terms of location based services (LBS), mobile gaming and VoD/IPTV services.
At the same time, the Network Operator can also establish other partnerships with other Service Providers, independently of the kind of value-added applications that it is offering to its customers. We can consider the following partners:

- Subscriber management solution providers – this partnership can be important to incorporate enriched media and subscriber management in end-to-end IMS networks and applications for mobile, integrated fixed-mobile and multi-plays operators. As a result of this collaboration scenario, subscribers would enjoy converged voice, video and messaging services, as well as data management;
- Manufacturers – one of the major areas of concern in IMS deployments is the capability to work with different equipment manufacturers. Customers want the ability to link through different equipments provided by several companies;
- Advertisers – the advertising market can be used as a complementary business model for an IMS scenario. Advertising can be tied to free or discounted calls and free content delivery. Various innovations can be used with this model, namely real-time advertising and advertising based in search/discovery ads.

3.3 Model Assessment

In the previous section we presented the Ostwerwalder methodology to describe a business model by going through each of its building blocks. Now, after we have described the business model in detail, we have the elements to start assessing it. We achieve this by asking a number of key questions that crystallizes a business model's strengths, weaknesses and highlights opportunities and threats. This analysis is also known as SWOT analysis.

Strengths

1. Development community and programming expertise – several applications can be found in the OS community and can be integrated in more advanced IMS full-featured solutions;

2. Decrease time-to-market – the standardization of both communication protocol between the different elements and also the interfaces and functions provided by the common services significantly reduces the time-to-market for rolling out new IMS services and provides to Network Operators with the freedom to experiment new differentiated services. Application developers are no longer hampered by multiple integration and deployment efforts. They can cost-effectively integrate their services into an operator network and immediately launch them to end-users;

3. Lower costs – the communication between the different components (end-users/services) in the IMS infrastructure is based on open and well-defined standard protocols, such as SIP. This reduces significantly the complexity of the systems decreasing CAPEX and OPEX, especially in a complex service environment where a large number of services have been deployed;

4. Integrated and interoperable services – the IMS infrastructure offers open and standard interfaces to 3rd party application developers for creating new sophisticated and attractive bundled multimedia services. Services will be easily, transparently and inexpensively integrated in the Operator network by using common enablers such as charging systems; thus significantly reducing integration issues.

Weakness

1. Dependence from several entities – there are several players in the market and the complexity of coordination between them can be huge;
2. Difficulty of technological implementation – the IMS architecture contains many extremely stateful protocols with lots of optional features, making it easy for implementers to make mistakes;
3. Security issues – IMS runs over a variety of transport protocols, and that expands the product and network services attack surface. We can consider that IMS and SIP are appealing to attackers because they are a key enabler of many presence-based services. By exploiting SIP, attackers can misuse presence-based applications to bypass traditional perimeter network defenses and cause digital misbehavior [4];

Opportunities

1. Lower risk profile – considering this framework, new applications can be introduced with minimal deployment time, effort and expense, therefore the payback period is shorter and the risk of launching new services will be minimized;
2. Less churn – customer loyalty increases when one operator can deliver lifestyle voice and data services and when the customer has access to new applications and services with no delay and no interoperability concerns. The proposed architecture enables rapid service creation via simple modular elements, therefore the result is faster time to market and satisfaction of consumer demand;
3. New revenues from Fixed-Mobile Converged (FMC) bundles – FMC bundles not only deliver core services (i.e., voice, wireless, high-speed data, and video) to quad-play subscribers. They also deliver new and incremental sources of value beyond billing and single-number simplicity;
4. Attractiveness for the participation of Universities and R&D centres – universities and R&D centres with advanced knowledge in the fields of networking and telecommunications can participate in these models as a 3rd Party Service Providers or as an Open Source Consultant entity.

Threats

1. Standardization fork – all the major standards groups are working to harmonize IMS standards. However, all of these standards groups are supported by different telecoms (or divisions within a telecom), each is going after the same customers, and all will want service differentiation. So, it will be possible to appear a kind of IMS forking, originating dozens of different IMS networks; [6]
2. Lack of well-established financial model – there is an uncertainty over how operators should charge subscribers in an all-IP network. When we move to a data-based application, where

we try to connect between a fixed and mobile network, a charging mechanism might be considered, because the receiver of the call is consuming data;

3. Competition against free services (portal voice, video, etc) – the Yahoo, and Google and e-commerce companies like eBay don't need IMS, nor do they need voice or video payments from their customers. In this Internet ad-based world, services are given away for free (such as Skype by eBay) to attract people. Making IMS networks compete against free can be a tough business proposition.

4 Conclusions

The Open Source Model has the potential of changing the current software development paradigm and has become a very successful alternative to traditional software in many areas, from both a technical and an economical point of view, and shall be included in the business strategy of a Telecom Operator. The main advantages of Open Source Software include its high reliability and security, vendor independence, adaptability and cost saving potential.

In this work, we established an Open Source Business Roles Model for IMS-converged services that encompasses ten roles and certain relationships between these entities. This framework can be used by a Network Operator that wants to be able to provide a converged fixed-mobile solution to their customers composed by a different range of applications, namely instant conferencing and messaging, IP Centrex, video on demand (VoD), gaming and location based services.

The proposed framework model will take advantage of the community of developers and the programming expertise available in the open source universe and will decrease time-to-market of new IMS services with lower costs. Besides that, new applications can be introduced with minimal deployment time and this model is particularly attractive and incentivates the participation of universities and R&D centres as a 3rd Party Service Provider or as an Open Source Consultant entity.

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