Business Models and Revenue Streams in 3G Market

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***Abstract*—The introduction of 3G systems and the convergence of the IP and telecommunications worlds it induces are expected to foster the emergence of hybrid business models in service provision. 3G networks are expected to enable the enrichment of services with additional value, which will be contributed by market players other than the mobile network operator. These players will typically come in the form of Application/Service providers, Content Providers and Service/Content Aggregators. The transition from a rigid strictly operator-centric network to a dynamic open market should be evolutionary and lead to business models that preserve the positive features of the existing paradigms, while removing some of their limitations. In such a framework, the typical mobile network operator possesses significant strategic advantages; since it maintains the customer relationship and provides integrated robust authentication mechanisms and rigid security features that establish an important level of trust with its subscribers. Present paper discusses the business placement of mobile network operators in 3G era and presents the new business competences they may undertake. Furthermore, the main existing and forthcoming potential business models are identified and the revenue streams induced for the involved players are analysed and discussed.**

***Index Terms*— business models, revenue streams, 3G market**

I. INTRODUCTION

FUTURE mobile telecommunication systems, commonly referred to as 3rd generation (3G) or 4G, are expected to trigger significant changes in the telecommunication services sector, by facilitating the participation of various market players in the overall service provision process. 3G networks are expected to enable the enrichment of services with additional value, which will be contributed by market players other than the mobile network operator. These players will typically come in the form of Wireless Application/Service Providers (WASPs), Content Providers and Service/Content Aggregators.

This opposes to the mobile business paradigm until 2nd generation (2G) networks, where network access and service/application provision are being bundled together in various subscription-based offerings by network operators. Services are typically developed by operators and equipment vendors, possibly in co-operation with a small number of external entities, like content providers [1]. This paradigm leads to important restrictions:

- The number and functionality of available 2G value-added services is very limited; a typical GSM operator nowadays offers typically no more than a few dozens of content-oriented applications. Consequently, the corresponding revenues are negligible compared with the income from basic and supplementary services.
- Service time-to-market is in the order of months or even years, since the coupling of services with the underlying network makes service development, testing and deployment a tedious and time-consuming task.
- Most services are accessible exclusively to the subscribers of a single operator.

The introduction of 3G systems and the convergence of the IP and telecommunications worlds it induces are expected to foster the emergence of hybrid models in service provision. The transition from a rigid strictly operator-centric network to a dynamic open market should be evolutionary and lead to business models that preserve the positive features of the existing paradigms, while removing some of their limitations.

In such a framework, the typical mobile network operator possesses significant strategic advantages, since it maintains the customer relationship and provides integrated robust authentication mechanisms and rigid security features that establish an important level of trust with its subscribers. Thus, it presents a form of "bridge" for application and content providers seeking to position themselves in 3G market. On the other hand, application and content providers are able to provide an abundance of resources (i.e. applications and content) that can contribute greatly to increased revenues for all involved business players. Moreover, the creation of a dynamic and highly profitable market requires the availability of sophisticated application/service management mechanisms that enable applications to be rapidly deployed, quickly and efficiently discovered by end users, and optimally provisioned for end users. Finally, applications consumption charges must be calculated in flexible ways that make applications usage more attractive to users.

Current paper focuses on the innovative business relationships raised in the new communications era, as they are studied in

the IST project LIAISON [2]. LIAISON (LocatIon bAsed servIceS for the enhancement of wOrking enviroNment) is a project designed to turn emergent technologies, applications and services into actual business cases in order to allow European key actors to fulfil the needs of workers in their daily life. The aim of LIAISON is to provide end-to-end solutions for a wide range of mobile workers by combining existing standards and positioning techniques with innovations resulting from EGNOS and Galileo as well as the newest Telecom techniques. In that scope, the business model development is meant to draw the most accurate forecast of the market and ensure fair access to revenue between different actors involved in the Location-based Services chain. At first, based on service definition and planned architecture, and depending on the diversity of test cases, a number of location-based services are chosen for the elaboration of the business model. Then, based on the market analysis results, estimation and forecast of those services usage is performed, while the users' willingness to adopt them is assessed. The costs for the service provider, in terms of platform and equipment investment and expected services and network usage, for some example test cases are identified and the business model frame is built accordingly. Furthermore, pricing and revenue sharing models are benchmarked to select the most efficient one. Efficiency is analysed in term of Return Over Investment, market size and stimulation, service diversity, etc.

In that context, that paper elaborates on the new business models of mobile service provision, including identification of business actors and analysis of revenue streams. More specifically, section II discusses the business placement of mobile network operators in 3G era and presents the new business competences they may undertake. Section III identifies the existing and forthcoming potential business models and elaborates on the revenue streams induced for the various players involved. Section IV discusses some technical issues related to the new business era, and finally section V concludes the paper.

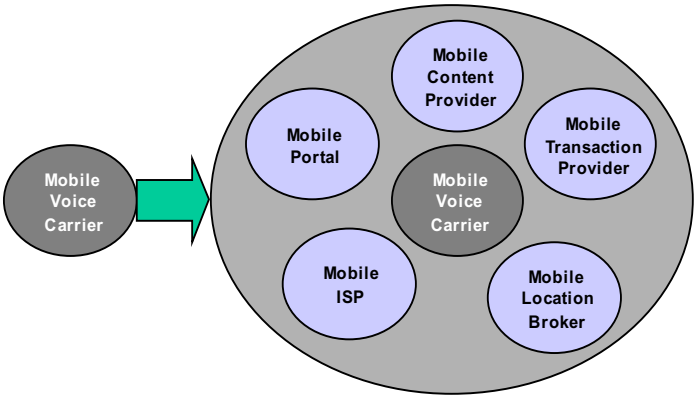

Figure 1. Transformation of Mobile network operator

II. PLACEMENT OF MOBILE NETWORK OPERATORS IN 3G

As the profit margins in the mature mobile voice markets fall, mobile network operators attempt to turn to mobile data services and m-commerce for additional sources of revenue. Therefore, they are transforming themselves from traditional mobile voice carriers to mobile Internet players that also cover more lucrative segments of the value, as illustrated in Figure 1.

During the above transformation mobile network operators may undertake some or all of the following roles:

- **Mobile Internet Service Provider (ISP),** offering Internet access to mobile users. Sources of revenue in this case are the mobile Internet subscriptions as well as traffic and access charges.
- **Mobile Service/Content Provider,** offering compelling information and services. Additional revenues can be generated in this case in the form of access charges for content or in the form of advertising fees.
- **Mobile Portal,** offering mobile users a one-stop shop solution for their entire mobile Internet needs. Additional subscription fees can be charged to users, revenue streams can be created from advertising and revenue-sharing arrangements can be made with service/content providers to generate additional income for mobile network operators.
- **Mobile Location Broker,** leveraging information about the mobile user's position to enter into profitable partnership arrangements with service/content providers, Wireless ASPs and portals.
- **Billing and Payment Provider,** taking advantage of their existing billing relationship with the subscriber and their micropayment infrastructure to collect fees on behalf of service/content providers and retain a pre-agreed percentage per transaction.

The success of the above transformation depends to a great extend on the mobile network operators' ability to leverage their existing subscriber relationship and build partnerships with a critical mass of service/content providers. At the core of this strategy is the realization that whoever controls access to the user's information, holds the key to value creation. Billing details, user location and preferences are critical to the delivery of convenient and highly personalized services, and represent a major asset in negotiating favourable revenue-sharing arrangements with content providers and advertisers.

The biggest threat to mobile operators may however end-up coming from other players, competing for some of the same segments of the value chain, segments where infrastructure ownership does not lend a competitive advantage. Among others they include:

Virtual Mobile Network Operators (VMNOs): VMNOs do not own spectrum, but instead buy bandwidth from traditional mobile operators for resale to their own customers. They are not burdened with the purchase of spectrum licensed and focus on building a close relationship with the customer through personalization, delivery of high value-added applications and services and control over billing.

Mobile Portals: Most mobile operators have mobile portals that they hope will help them build a close relationship with their customers. As a result, they are in direct competition with traditional portals that have established a mobile presence as

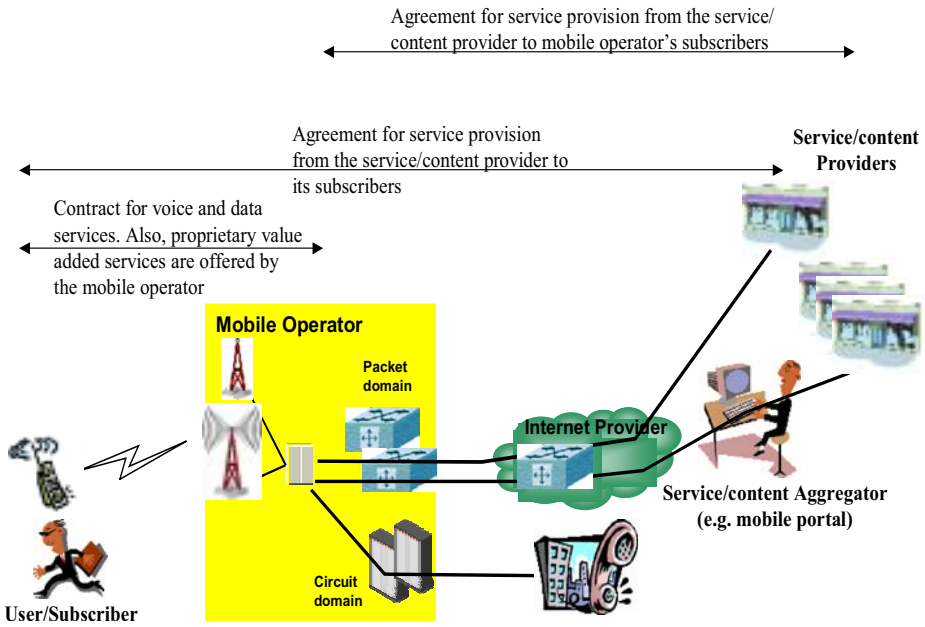

Figure 2: Existing Business Models

well as a number of new entrants.

Third-party Billing Providers: Banks, credit card companies and other billing providers are developing strategies to circumvent the mobile operator's billing relationship with its customers.

III. BUSINESS MODELS AND REVENUE STREAMS FOR 3G

Nowadays, to access a service a user/subscriber initially has to come into agreement with a network provider. This agreement enables the user to access telecommunication and value added services provided by the specific operator. Furthermore, till now for Internet access additional contract between a subscriber and an ISP is required. This of course has been partially altered with the introduction of GPRS, since mobile users can access the Internet directly through their Mobile Operator. Moreover, the usage of services provided by independent entities either is free of charges or is tied to an operator or an ISP. Alternatively, the user has to charge his credit card providing its credit card details to non-trusted entities. The existing business models are illustrated in Figure 2.

Recent evolutions have enabled the introduction of new contracting models [5]. These models enable users to access various networks and services independently of the owner of the underlying network or the provider of a service. With respect to the applicable contracting model for the provision of services to mobile users, three basic business models [4] can be identified:

A) ***The Network Operator Centric Model***, where the user comes into agreement with an operator, which is responsible to provide its subscribers with telecommunication services, and value added services offered by any of the involved players. In this model the mobile operator incorporates the service/content aggregator role and is also responsible for collecting charging information and generates a single bill for all charges incurred. This model is close to the traditional one that has been followed for many years.

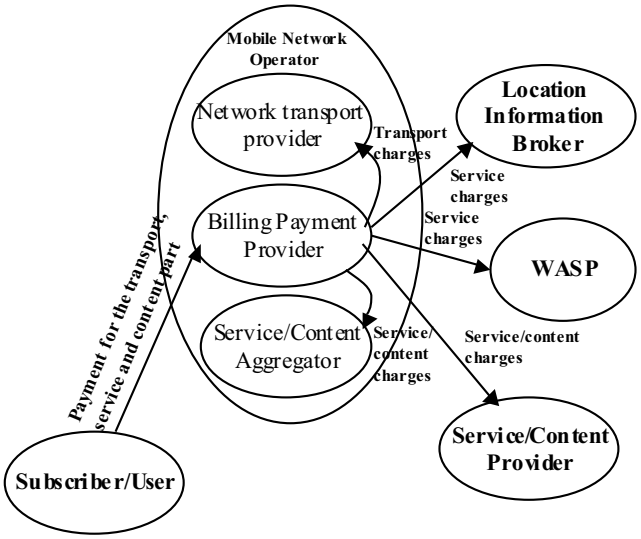

Figure 3 : Revenue Streams for the Network Operator Centric Model

In this model the mobile network operator incorporates the roles of Network transport provider, Billing and Payment provider and Service/Content Aggregator. Hence, it is responsible for collecting the charging information, generating a single bill for all charges incurred and apportioning the revenue between the involved business entities. The revenue streams for this model are depicted in Figure 3.

B) ***The Service/content Aggregator Centric Model***, where the service/content aggregator is responsible to provide its subscribers with its own advanced services (i.e. service, discovery, terminal capabilities negotiation, etc.), along with access to content and services offered by 3rd party independent providers. It is assumed that the service/content aggregator comes into directly agreement with a network provider for delivering content and services through the network provider's transport infrastructure. Definitely, the user should have subscription with the service/content aggregator and with a network provider but for service execution the service/content aggregator defines the prices, collects the charging information and charges the user for the transport part as well as for the service and content parts. Another option would be the network operator to charge separately the user for the transport part but this is not compatible with the One-stop billing requirement [4][7][8]. The apportioning of revenues between the network provider, the service/content provider and the service/content aggregator is performed by the latter based on the commercial agreements established among the players.

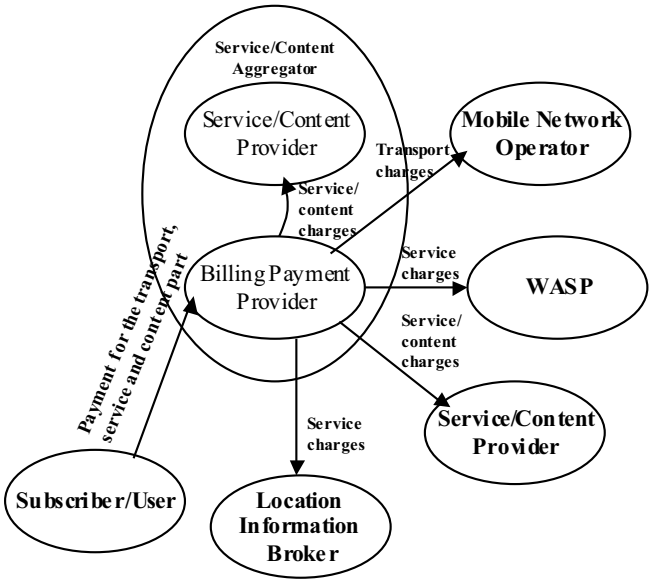

Figure 4 : Revenue Streams for the Service/content Aggregator Centric Model

In this model the role of billing and payment provider is undertaken by the service/content aggregator, which collects all the charges, produce a single itemized bill and shares the revenues. The apportioning of revenues between the involved players is performed based on their pre-established commercial agreements. Figure 4 illustrates the revenue streams for this model in case the service/content aggregator charges the user for the transport, the service and the content part.

C) ***The Service/content Provider Centric Model,*** where the service/content provider comes directly into agreement with a network provider for delivering its content and services through the latter's transport infrastructure. This model is similar to the service/content aggregator centric model with the service/content provider to undertake now the business role of service/content aggregator. The users/subscribers are charged directly by the service/content provider, which also defines the pricing and payment policies. Taking into consideration the difficulties introduced in the billing process in case that a usage based charging model applies and the requirement of this model for subscription with each service/content provider offers interested services, it is induced that this model can apply only for some very popular services (e.g. MMS images or MP3) and in parallel with one of the aforementioned user subscription models [4].

According to this model, the user comes to subscription agreement with a service/content provider, which incorporates the roles of service/content aggregator and billing and payment provider. The user, then, is charged directly by the service/content provider for the transport, service and content part of its own services, as illustrated in Figure 5. The Service/Content Provider collects and apportions the revenue between the involved business entities according to the pre-established business agreements. The possibility the network operator to charge separately the user for the transport part is not precluded.

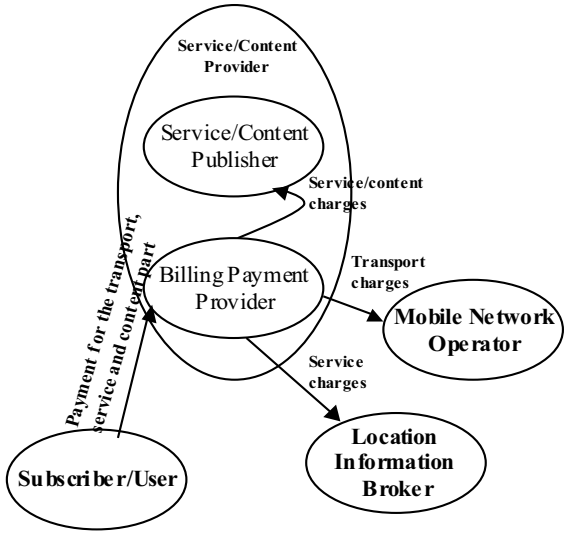

Figure 5: Revenue Streams for the Service/content Provider Centric Model

As conclusion we remark that the involvement of new players in the service provision chain and the introduction of new business models that enable service provision without many contracts or different bills, introduce new requirements regarding the calculation of the service charges as well as the apportioning of the incoming revenues.

IV. ISSUES RELATED TO THE REVENUE STREAM MODELS

Analysis of revenue streams within the different business scenarios determines issues that can prevent interoperability problems and open up fair competition between vendors.

The standardization and openness of the interfaces between the major business players is regarded to allow the creation of an open business environment enabling operators to build

relationships with numerous business partners rapidly and cost-effectively. This will result in cost and service benefits to all the involved business players, including the end-users. Furthermore, the usage of a charging protocol for the exchange of real time charging and authorization information is considered to be a minimum requirement especially for roaming scenarios.

Other critical factors [3][4][5][6] for successful placement in the 3G market include:

- Players have to define their position in the value chain. For example, service providers and content providers should delimit their business relationship and determine, based on the applicable business model, the roles allocated to each one.
- Identification of the interfaces, which are critical for the support of an effective open business model and of those of lower importance.
- Charging information has to be provided from the network elements or the application servers to the billing system.
- Trust among all involved players is key factor to the success, since if trust is missing the result will be disuse of the whole infrastructure, So the design of the authorization and payment infrastructure is very critical.
- Quality of service must meet customers' expectations or services will fail to be consumed.

In an open business environment, a number of players have active role in the service provision process. To bypass the possibility of a complicated pricing model, a layered charging architecture approach structured in three layers: transport, service and content would be preferred [3]. The management and processing of the relevant information should be made separately for each layer.

In addition, on each charging layer different pricing models should be possible to apply. For example, the applied pricing model can be: Cost-based, Subscription-based (e.g. fixed charges), Duration-based, Volume-based, Service-based, Location-based, or Event-based [4][6]. Moreover, the pricing of a service may be based on one or several of the following attributes: Network type (type of the access network), Device capabilities (viewing a picture or video with a low-terminal may invoke a lower price), Quality of Service, Service Termination Indicator (charges may depend on why, when or where a service was abnormally terminated), Transaction type (receiving a certain type of message may have a specific price), Content provider, content aggregator or network operator identity [3][7][8].

From an independent service/content providers' point of view, there is the emerging demand each authorised player to be able to apply dynamically the desired pricing policy for its services' usage. The independent providers should be able to add or modify the tariffs for the service and/or content part.

With respect to the sharing of the incoming revenue between the players (i.e. network operators, service/content providers), it is necessary to introduce an automated process, which apportions the incomes, based on the commercial agreements between them. Till now, only simplified mechanisms have been used for sharing revenues due to practical considerations [3][4]. However, in the oncoming UMTS environment, complex mechanisms making use of information concerning resource allocation and usage should apply.

V. CONCLUSION

3rd generation mobile communication networks have been heralded as a paradigm shift that will irreversibly change the structure of the telecommunications industry. Users will be offered ubiquitous access to an abundance of value-added services, which will be typically the result of co-operation between many contributing market players in the frame of innovative business paradigms. In such a framework, the typical mobile network operator possesses significant strategic advantages; since it maintains the customer relationship and provides integrated robust authentication mechanisms and security features that establish an important level of trust with its subscribers. Present paper discussed the business placement of mobile network operators in 3G era and presented the new business competences they may undertake. Furthermore, the existing and forthcoming business models were identified and the revenue streams induced for the involved players were analysed.

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