

New revenue streams with IMS and Mobile Web 2.0

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ABSTRACT

The appearance of Web 2.0 applications on the Internet offers a wealth of new opportunities for Telecom Service Providers. One of the biggest opportunities lies on the confluence of telecommunications with Web 2.0. Telecom Service Providers that are able to become comprehensive information service providers will certainly profit with Web 2.0. The foundations for telecom-web convergence can be found in the inherent technology and platform features of IMS. This paper will introduce the concepts of Mobile Web 2.0 and will analyze the role of IMS in Mobile Web 2.0. Lastly, it will compare two implementation approaches of an IMS/Mobile Web 2.0 strategy and it will look to the new business models generated by the combination of these two technologies.

Categories and Subject Descriptors

Business Technology Solution – *Emerging and future Business Technology Trends.*

General Terms

Economics.

Keywords

Mobile Web 2.0, IMS, Web 2.0, revenue streams, business models.

1. INTRODUCTION

The growth of Internet usage has been increasing tremendously in the past years. Internet World Stats reports that there are approximately 1,46 billion Internet users in the world, 248,2 million Internet users in United States, 384,6 million Internet users in Europe and 578,5 million Internet users in Asia [1]. Obviously there is a big potential market in there and Internet is one of the triggers of the emergence of new business models nowadays. This accelerating growth shows the opportunity to enhance one's business through a good web strategy.

In recent years, many new Internet companies have been developed. Some can be considered really successful, while others are still struggling to attract users by providing

unique selling points. Most of the successful Internet companies tend to build and grow a web community. The increasing importance of business communities confirms that there is a shift in business models from a traditional hierarchical system and competition into more collaboration and social networking.

In just a few years, Web 2.0 has radically changed the dynamics of the fixed Internet by providing a platform for people to meet, greet, and share photos, videos and blogs. The present impact of Web 2.0 may finally be felt on the mobile Web, which has been a static and controlled environment that had been slow to take off. Around the world, carriers have spent billions of dollars building fast third-generation networks, but consumers have not been flocking to the new high-speed services that this infrastructure makes possible [2]. The potential impact of mobile Web 2.0, with its promise of explosive usage and exponential traffic growth, is clear (at least, for leading players of the fixed Internet such as YouTube, MySpace and Flickr).

The idea of convergence has been unquestionably one of the most important concepts in the telecom industry during the past decade. Several technologies have been coming together in the telecom industry: voice and data, fixed and mobile services (with seamless roaming between the networks), and, more recently, Web 2.0 and a new generation of services based on IP Multimedia Subsystem (IMS).

The rapid rise of IMS and Web 2.0 technologies will lower the barriers to market entry for organizations that want to compete with traditional telecom providers. As a consequence, a growing number of service providers must consider companies like Google as significant competitors for consumer and business subscriber revenues.

2. THE WEB 2.0 APPROACH

2.1 Understanding Web 2.0

The term "Web 2.0" was coined by O'Reilly Media at a conference in 2004 and it has become the mechanism to refer to the new Web generation [3]. Rather than just a

static repository for data, the web has become a platform for applications and the enabler for on-line participation, collaboration, harnessing collective intelligence and more [4]. The key concepts are participation and dynamic interaction.

Web 2.0 captures a combination of innovations on the Web in recent years. A precise definition is elusive and many sites are hard to categorize with the binary level “Web 1.0” or “Web 2.0”. But there is a clear separation between a set of highly popular Web 2.0 sites such as Facebook and YouTube, and the “old web”. These separations are visible when projected onto a variety of axes, such as technological (scripting and presentation technologies used to render the site and allow user interaction), structural (purpose and layout of the site), and sociological (notions of friends and groups).

The essential difference between Web 1.0 and Web 2.0 is that content creators were few in Web 1.0 with the vast majority of users simply acting as consumers of content, while any participant can be a content creator in Web 2.0 and numerous technological aids have been developed to maximize the potential for content creation. The democratic nature of Web 2.0 is exemplified by creations of large number of niche groups (collections of friends) who can exchange content of any kind (text, audio, video) and tag, comment, and link to both intra-group and extra-group pages. A popular innovation in Web 2.0 is “mashups”, which combine or render content in novel forms. For example, street addresses present in a classified advertisement database are linked with a map Web site to visualize the locations [4]. Such cross-site linkage captures the generic concept of creating additional links between records of any semi-structured database with another database.

Web 2.0 is much more than just pasting a new user interface onto an old application. It’s a way of thinking, a new perspective on the entire business of software (from concept through delivery, from marketing through support). Web 2.0 thrives on network effects: databases that get richer the more people interact with them, applications that are smarter the more people use them, marketing that is driven by user experiences, and applications that interact with each other from a broader computing platform.

In fact, Web 2.0 technologies have changed the way the Web is used and perceived. Rather than a mechanism to provide information, the web is now interactive and harnessing the wisdom of many through wikis, blogs, and communities. New terms have been coined or resurrected to explain the new phenomenon: crowdsourcing, social networking, collective intelligence and more [5]. Companies no longer only use the Web as a tool for information dissemination and marketing but as a way to include the customer base in design, development and

support. Web 2.0 is about inclusion, harnessing research and learning. There are even virtual communities such as Second Life and World of Warcraft Games where people can assume new personalities and build an on-line reputation.

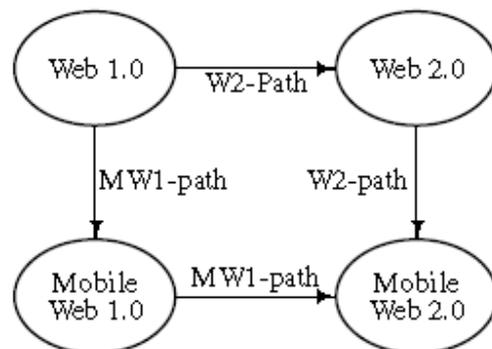
There is a significant number of Web-based services and applications that demonstrate the foundation of the Web 2.0 concept, and they are already being used to a certain extent in education. These are not really technologies as such, but services (or user processes) built using the building blocks of the technologies and open standards that underpin the Internet and the Web. These include blogs, wikis, multimedia sharing services, content syndication, podcasting and content tagging services. Many of these applications of Web technology are relatively mature, having been in use for a number of years, although new features and capabilities are being added on a regular basis.

2.2 The concept of Mobile Web 2.0

Difficulty in establishing a firm and accepted definition, plus the fact that many of Web 2.0 core concepts cannot be replicated directly within the cellular environment, is paralleled in a similar debate on what exactly denotes Mobile Web 2.0. It is possible to identify common themes between an Internet-based and mobile Web-based application, however the exact features or functionality that makes either a “1.0” or “2.0” application is still largely open to interpretation [6].

The Mobile Web 2.0 transition can be modeled in the following two-dimensional model outlined in Figure 1.

Figure 1. Two different transitions to Mobile Web 2.0 [7]



The model highlights the two evolution paths from the original Web 1.0 to the Mobile Web 2.0 as follows:

- Path through Mobile Web 1.0: the mobile Internet needs to address Web 1.0 issues before joining Web 2.0 dynamism;
- Path through Web 2.0: the mobile Internet needs to address Web 2.0 issues to boost its full coverage before Mobile Web 1.0 is established.

The former path is called as MW1-path and the latter path is called as W2-path. These two paths indicate different diffusion strategies for the mobile service developers. When the premature Mobile Web 1.0 is the major obstacle for mobile service adoption, the MW1-path needs to be addressed. When the Web 2.0 is the major driving force, the W2-path needs to be addressed. This leads to the tradeoff consideration between the Mobile Web 1.0 coverage and Web 2.0 driving factors.

In this article we will focus attention in the W2-Path, because we consider that the Web 2.0 is the major driving force for the appearance of Mobile Web 2.0 and the concept of Mobile Web 1.0 has already emerged between 1999-2005 without a very successfully market penetration [7] [8]. In fact, since the mobile Internet launch in 1999, many venture companies attempted in vain to make use of this vacancy as their business opportunities. The lessons tell us that the behavior changes in the mobile-inherited restrictions are not easy, even over technological evolved generations [8].

Social software has given a tremendous jump in usage over the past few years with blogs and social network services. It acts as a fuel to the Web 2.0 discussion [7]. The differences between Web 2.0 and Mobile Web 2.0 are outlined in Table 1.

Table 1. Differences between Mobile Web 2.0 and Web 2.0 [7]

Mobile Web 2.0	Web 2.0
Mobile search engine	Search Engine
Speculation	Optimization
Page per click	Cost per click
M-participation	Participation
M-syndication	Syndication

Like with Web 2.0, Mobile Web 2.0 is not a technology or standard in its own right, but a framework for delivery of collaborative applications via new user interfaces. Similarly, there are core features emerging that set the latest generation of mobile applications apart from what might now be considered as “last-generation” mobile Internet.

According to Juniper Research the Mobile Web 2.0 framework is composed of the following four applications [9]:

- Mobile Instant Messaging (IM) & Presence – allows users to subscribe and send each other short messages in near real-time, and be notified of changes in status;

- Location Based Services (LBS) – provides personalized services to the subscriber based on their geographic location. While LBS is not specifically “Mobile Web 2.0”, if used in conjunction with other applications and databases, it allows users to share their location details with others (users, third-parties or other applications), collaborate with those nearby and exploit local knowledge;
- Mobile Search – Mobile search engines are based in algorithms that determine the popularity of a certain search result within specific user segments. Mobile search engines can also incorporate contextual mechanisms such as LBS, for delivery of relevant, local results, and enablement of auto completion functionality;
- Social Networking & User-Generated Content (UGC) – Social Networking and UGC are both examples of the social web and embody the concept of the user as both the creator and consumer of content. Today’s mobile phones allow users to create and share content via their favorite social networking and Web 2.0 sites, which can provide access to messaging applications such as chat, presence, IM and VoIP.

Conceptually, the biggest challenge for Mobile Web 2.0 is in understanding and defining its framework. Mobile Web 2.0 pulls together a number of User Interfaces (UI) advances (such as chat, blogs, video and social networking/UGC) with others applications (including mobile search and LBS) to form a generic framework. While the technologies used to deliver the mobile Internet must standardize further, a commercial evolution is also vitally necessary. Disruptions in the traditional telco/mobile value chain are forcing operators to seek partnerships with Web-based players and adopt new business models [10].

Moreover, given the relative immaturity of some of the applications falling within the Mobile Web 2.0 domain, their longevity is already being questioned. Some of the hurdles facing the delivery of Mobile Web 2.0 applications are the following:

- Technology fragmentation – variations in device capability are an intrinsic characteristic of the mobile web environment. This makes it extremely difficult for developers to create an application that can execute a task in the same way on different devices;
- Privacy & Regulation – personal information is critical to the business models being adopted by many Web & Mobile Web 2.0 providers;

- Adjusting to New Partnerships & Business Models – business models remain in a state of flux. On the Web, newcomers and start-ups offering Mobile Web 2.0 applications are currently focused on building their user base and have yet to adopt firm strategies for future revenue generation. Even Web players that have gained an established audience (Facebook, MySpace, etc.) are still experimenting with different business models.
- Channel dominance – in the Mobile Web 2.0 environment, it is necessary to connect the world of Web 2.0 applications (chat, IM, presence and communities) with the mobile operator’s assets (Business Support Systems (BSS), Operational Support Systems (OSS), Customer Relationship Management (CRM), network, etc.) without any party controlling the end-to-end experience;
- Cost of mobile data services – despite the fact that flat-rate data plans are gradually being introduced in some markets, the cost of mobile data remains a significant barrier to adoption, as does lack of transparency in terms of service pricing;
- Security – as use of Mobile Web grows, and device capabilities become more sophisticated, so the security threat posed by mobile virus, malware, inappropriate content, unsolicited communications and spam increases.

3. BUSINESS MODELS AND REVENUE STREAMS OF MOBILE WEB 2.0

Typically, Web 2.0 players are focusing on indirect revenue sources rather than directly charging for usage. These business models are proving attractive to users, challenging Communication Service Providers (CSP)s’ traditional revenue models based on a usage fee. Internet players are rapidly innovating and diversifying their communication and content platforms to maximize their share of today’s converged market. The large Web 2.0 providers are preparing to make inroads into the CSP service domain through acquisition and partnering. For example, Google recently announced its own mobile operating system “Android” in order to gain direct access to mobile consumers, bypassing CSPs [11]. As a result, Web 2.0 platforms are starting to cannibalize CSPs legacy business such as voice but are also aiming at new growth opportunities in areas such as TV.

The appearance of Mobile Web 2.0 combined Telco & Internet Business is changing the key success factors for all players in the market. This situation is described in Table 2.

Table 2. Business success factors for Telco’s with Mobile Web 2.0 [11]

Telecom Business	Web 2.0 – Combined Telco & Internet Business
Competitive pricing Customer attraction in a highly comparable service landscape	Convenience and personalization Customer retention in a highly fragmented service, content and contacts landscape
End-to-end Vertically integrated and standardized services solely developed by the provider	Modularity Short-time-to-market and more variety by integrating and win-win partnerships with ASPs
Predefined services Differentiation by selling pre-defined service packages	Boundless communication and sharing Differentiation by most attractive platform for user interaction and user generated content
Direct usage charging Maximum exploitation of users’ willingness-to-pay within the contract period	Cash-in to indirect revenue sources Utilization of the customer information for personalized advertising and up sell of application bundles

In a situation of low flat rate prices and indirect business models, there are fewer options for price differentiation. Instead of winning new subscribers by aggressive service pricing, it will be more critical to retain users. Communities are very sticky because once a critical mass of users sharing the same interests and appealing content is reached, users tend to stay there. In reality, users want to have access not to one but to many diverse Web 2.0 platforms. Loyalty can therefore be created by providing them with a more convenient and personalized usage of a variety of attractive Web 2.0 applications and content than other providers.

The vertically integrated end-to-end paradigm of defining all components of a service in advance and implementing the entire service internally is not applicable when it comes to keeping pace with the speed of innovation on the Web 2.0. In such a highly fragmented market, an efficient modular application development and implementation, where third party Application Service Providers (ASPs) can easily be integrated, is key [12]. This is especially important to establish win-win partnerships with leading Web 2.0 ASPs. Like this way, a new dimension of Internet services can be established by combining Web 2.0 applications with CSP assets such as information about the user’s credential, his presence status and location, as well as the terminal he is using. This also implies the versatile ability to support a multitude of business models, including revenue sharing with third party ASPs.

The new trend concept of “Web 2.0 goes mobile” means providing tailored mobile access to existing Web 2.0 Internet services by adapting them to the specific needs of mobile users and the capabilities of mobile devices, and thereby differentiating against fixed Internet Web 2.0. For

this purpose, Internet Web 2.0 services can be combined with mobility features such as linking customers' location with Google maps. Building strong partnership with leading ASPs is essential (e.g., T-Mobile does this with Gmail, MySpace, eBay and others). Users can additionally be attracted to the service with special phone offers, containing programmable preferences in the phone browser for a one-touch access to personal sites.

Monetizing is done by reducing churn within the existing customer base and facilitating the uptake of wireless broadband in the case of photo, music and video sharing communities. Additionally, the Mobile Network Operator (MNO) or Mobile Virtual Network Operator (MVNO) is better prepared to participate in the growing market for mobile advertising. Banner adverts and pop-ups will be more acceptable as soon as they are better tailored to users' preferences. Flat rate or semi flat rate wireless broadband tariffs pave the way for intensive mobile community usage.

Some possibilities to get revenue from mobile advertising are the following:

- Mobile advertising wallpaper – instead of banners that consumers click to see content, screen backgrounds can change to reflect advertising or sponsorship. This is an easy and effective way to push a service without waiting for the consumer's response. Basically all advertisers are winners because their message is always visible and the content accessible [13];
- Pay per referral (consumer) – this is a traditional advertising model that still needs to be refreshed for mobile. The introduction of mobile coupons and vouchers will mean friends and family can send or refer someone to content, services, ringtones, music and so on at the click of a button [13];
- Audio advertising – podcasting is set to be huge on mobile, which after all, is made for audio. Instead of using data streaming as a way of podcasting, vendors should look at ways of taking advantage of the voicemail mechanism. A good example would be providing free access to voicemail when overseas in return for listening to an ad for a few seconds [14].

4. ROLE OF IMS IN MOBILE WEB 2.0

Over the last few years, telecom networks have expanded in both size and scope, becoming complex structures embracing voice, data and video. Each of these areas, however, has tended to grow separately and service providers have been paying a high price for the independent provisioning, support and billing of the various services.

In order to support the critical business transformation of Telecom Service Providers, required by new converged

services, network transformation must also be accomplished. The industry is rapidly standardizing on an IP-based structure and, in order to take full advantage of new devices for both fixed and mobile consumers, the network must become independent of access types. These requirements have led to the design of the IP Multimedia Subsystem (IMS), which has become the strategic choice of the world's leading service providers.

IMS provides an IP-based service-centric creation and control framework that allows voice, data, and video to be supported in a single session, supports interworking with the public switched telephone network (PSTN), and leverages common resources for services. An intrinsic value of IMS is its ability to support the rapid development of new multimedia services that are access-agnostic. IMS architectural functions are described in terms of three logical layers: the access layer, control layer, and services layer. An enhanced services platform functions as an IMS application server in the services layer of an IMS network can leverage application enablers such as presence and location servers.

A core value of IMS is the ability to rapidly create new multimedia services that are access-agnostic. New enhanced messaging services, such as converged applications, can be rapidly created using application frameworks on IMS application servers. This is possible due to the layered IMS architecture, easy integration with enablers, such as presence and location, and a common mechanism for using shared subscriber data through the IMS generic user profile server [15].

Nowadays, conversational services, such as IMS services, are part of the strategy of all major Internet service providers, who create their own communication services with more or less proprietary technologies and link with legacy services. These new players generally have business models that mix paid communication services (e.g., interconnection with legacy communication systems) and free services (that generate ad-based revenue) in their Web 2.0 business strategies.

Telecom operators can respond to these "new competitor" moves by partnering with Internet service providers to manage legacy communication services, bundling services from major Internet players to associate their two brands with one service, and providing key communication services (e.g., IM, VoIP, Multimedia Push/Share, Personal Address Book, etc.) and proliferating them to the largest possible audience by using IMS and Web 2.0 technologies to leverage the traditional proprietary telecom network.

5. BUILDING AN IMS/MOBILE WEB 2.0 STRATEGY

5.1 Challenges of successful integration

Mobile Web 2.0 based telecom services will distinguish themselves from traditional voice based telecom services in business model, network architecture, service management and subscriber billing. To have a successful Web 2.0 integration with telecom services the following issues must be addressed [11] [16]:

- Authentication and authorization – for subscribers, network access authentication, authorization and accounting can quickly become quite complicated. In a Web 2.0 based network, a service may include a large number of third party applications, with widely different functionality and billing models, for example, by talk time, traffic, call attempts and QoS;
- Service coordination for complex applications – carriers are using IMS to provide a common core network for IP services. Therefore, when the IMS platform is deployed, more and more services will be running on this platform. Services are triggered by a variety of conditions, which may conflict with each other. Therefore, it will be needed a mechanism to prioritize these services;
- Solution architecture – to implement telecom-web convergence, IMS is the best choice due to its architecture and maturity. Specifically, the separation of access from applications, to allow universal service access for converged applications, based on a Service Delivery Platform (SDP);
- SOA and orchestration promote service innovation – utilizing a Service Oriented Architecture (SOA), the service provider, service consumer, and service broker can create an automatic processing mechanism for web service through standardized service rollout, hunting, and invocation. This mechanism makes the telecom service capabilities available to the outside and brings in the service capabilities from the outside (Internet and Enterprise IT).

5.2 Two possible implementations

To determine how Web 2.0 can help telecom operators introducing their communication services into the web environment using their existing infrastructure and IMS, we considered two different approaches: one based on web portal concepts, the other based on a web services API.

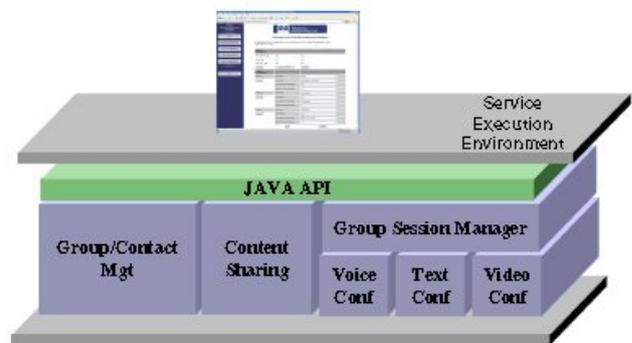
5.2.1 Using a Web Portal

In this scenario, IMS services are accessed through a standard web browser compatible with JavaScript and the

content must be accessible from multiple platforms such as personal computers, personal digital assistants (PDAs), and cell phones.

In the specific context of instant group communication components, a web portal should be used as a gateway to the individual service components, to provide end user access to various group session features (e.g., for controlling group members and for launching audio/video/IM conferences). With this facility, a group communication client on any browser-enabled handsets could launch IMS services, and an access-agnostic client could access partially or totally to the same services using the web portal as described in Figure 2.

Figure 2. Web Portal on top of IMS services [17]



The benefits of using a Web Portal interface include:

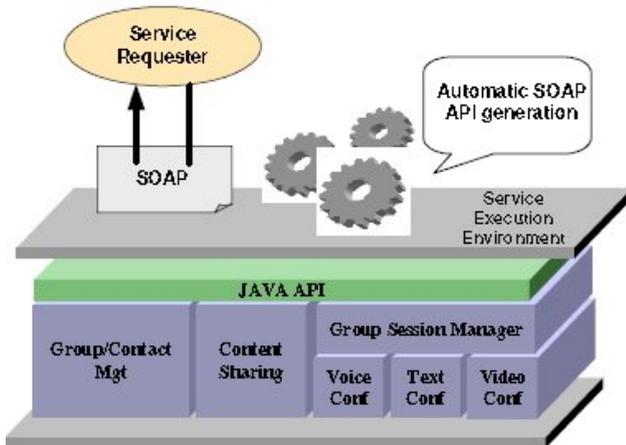
- No software installation is required and updates are automatic;
- Applications run on a wide variety of operating systems and browsers;
- Rich user experience can be delivered to any customer without the need to provide software on new dedicated handsets;
- The browser becomes a graphical user interface for all communication services.

5.2.2 Using Web Services API

While a web portal approach brings some clear benefits, an approach based on web services is required in order to offer the modularity and flexibility necessary to support more dynamic component combinations. In this second approach, the goal is to expose the right set of components as web services, allowing solution designers to easily build group communication services.

In most cases, web services are simply application programming interfaces (API) that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services. A possible implementation approach is illustrated in Figure 3.

Figure 3. Web Service access to IMS services [17]



The advantages of using an approach based on web services include:

- Both service providers and client applications can access the API;
- Service providers and/or operators can leverage on the API to offer richer or enhanced services (e.g., through chaining facilities);
- As Web Services are remote API, they can easily be accessed from any devices with HTTP support.

5.3 New business models

Web 2.0-based blended services create opportunities for telecom operators to embrace different business models. Legacy communication services are generally based on price/unit or on flat rates, while ad-based revenue models are popular on the web. The right mix between these two depends on the objectives of the provider and the combination of content and communication services. By itself, the combination of IMS and Web 2.0 does not introduce new business models, but because it represents a link between two different worlds, it may introduce operators to new business models which can stand alone or be used in various combinations [10] [18]. They include:

- Wholesaling – an agreement between an operator (wholesaler) and a service provider (e.g., Virtual Network Operator (VNO)). The VNO then offers services to commercial institutions or consumers. The wholesaler owns and operates the access network and offers connectivity to service providers;
- Outsourcing – this involves transferring the management of resources and day-to-day business functions to an external supplier. The primary focus of this business model is two-fold: to reduce the total cost of ownership of an existing operation or to improve time-to-market of new services that would,

otherwise, require longer periods to be implemented internally;

- Asset-sharing – this model is triggered when two or more service providers that individually own and operate networks share overlapping tangible assets. The benefits of this model include the ability for service providers to realize significant cost-efficiencies by eliminating overlapping infrastructure;
- Content aggregation and brokering – this involves the coordination of commercial agreements and technologies that support the availability and legal distribution of user-generated content (UGC) and premium content. Revenue is generated as individuals directly purchase content (such as video on demand and pay-per-view models) or sign up for subscription to premium content;
- Targeted advertising – this refers to the ability to interactively connect individuals with the brands and people they are interested in through multiple screens (mobile, computer, TV and so forth). Targeted advertising models should be optimized to provide the right message to the right people at the right place at the right time. Brands and advertisers will pay a premium to service providers that can offer these types of targeted advertising services, making significant contributions to top-line revenue growth;
- UGC and communities – this model calls for the development and deployment of platforms, tools and applications that allow any user to generate and distribute multimedia content. This content can be developed by individuals or in a collaborative environment by multiple users. After content is initially created, it can be modified and commented by other users. Common types of UGC include discussion boards, blogs, social networking sites, photo sharing sites, as well as game sites and any other web site that offers the opportunity for the consumer to share their knowledge and familiarity with a product or experience.

6. CONCLUSIONS

The successful implementation of a service infrastructure that supports the integration of telecom functions with Web 2.0 provides a foundation for new and innovative services that can attract and hold customers. In order to attain maximum value from this new set of capabilities, a service provider must also create or foster the creation of services that customers will enjoy and, more importantly, pay for.

The IMS has the ability to create new multimedia services that are access-agnostic and is a technology particularly

suiting for converged applications scenarios. Telecom operators can build an IMS/Mobile Web 2.0 based in two different approaches: one based on web portal concepts and other based on a web service API. The choice of which implementation model is the best to be adopted for a given service will depend on many factors, including the levels of flexibility, openness and performance that are required. The targeted user experience (and potentially the underlying targeted devices/handsets) is also a trigger for the choice.

The combination of IMS and Web 2.0 may introduce operators to new business models which can stand alone or be used in various combinations. Each of these business models reduces operational costs or increases the top-line revenue. The business models that result in cost savings are outsourcing, wholesaling, asset-sharing and hosted services, while content aggregation and brokering, advertising, user-generated content increase the top-line revenue.

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