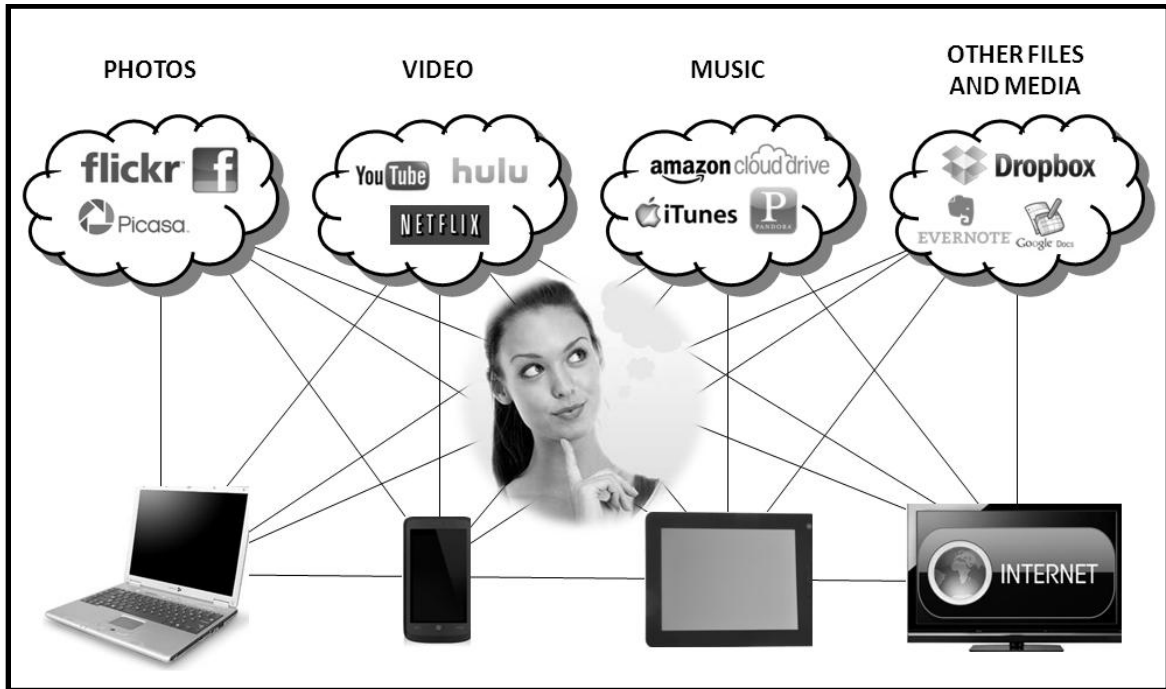


The Future of Cloud Media



White Paper



FUNAMBOL

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Table of Contents

- I. INTRODUCTION..... 3
- II. ACCELERATORS..... 6
- III. MARKET..... 9
- IV. TECHNOLOGY..... 13
- V. CONCLUSION..... 15
- VI. ABOUT FUNAMBOL..... 15

I. INTRODUCTION

From a consumer point of view, there is an increasing array of options to store and access user generated content and commercial media in the cloud. The Amazon Cloud Drive is a new cloud storage service that allows people to buy music and to store and play it via the cloud. Industry watchers believe that Amazon's entry may ignite a "cloud media arms race". It is easy to see how Cloud Drive will be used to purchase additional Amazon commercial content such as movies and e-books and to store user generated content and files. Similarly, Google just introduced its own cloud music service. It has the tagline, "upload your personal music [to the cloud] to listen anywhere, keep everything in sync, and forget the hassle of cables and files".

Industry observers expect Apple, the 800 pound gorilla of online music, to soon transform iTunes from being computer-based to become iCloud, a cloud-centric service where users store and access content in the cloud. They believe this in part because Apple is building a \$billion cloud facility but also because of the advantages of having iTunes in the cloud. This would make it easier for users to access their content on devices outside the home, as well as facilitate the purchase of more content via the cloud. Shifting iTunes to iCloud could also simplify sharing of media via social means as it would be available 7x24. It would not be a big surprise if Apple integrated MobileMe (for user content) and iTunes (for commercial media) into an iCloud digital locker that offers the convenience of all of one's digital media in a single place.

In addition to music, people are increasingly storing and sharing other media and files via the cloud. Facebookers for years have posted pictures online and YouTube is the leading user video site. Cloud file services such as Dropbox and Evernote are gaining traction. Funambol MediaHub, pictured below, is gaining momentum with service providers as a white-label solution to sync, secure and share pictures, video, music, files and more via the cloud.

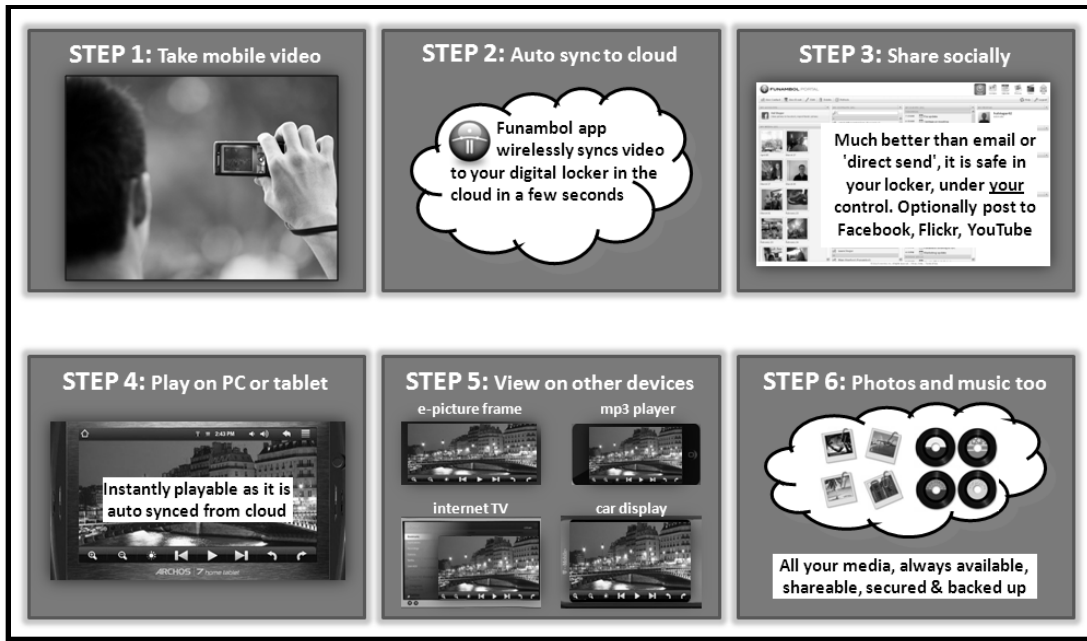


Figure 1: Cloud Media Services To Store Photos, Video, Music And Files Are Gaining Momentum

As options to store media and data in the cloud proliferate, however, there are some storms on the horizon that potentially threaten to impede the growth of cloud-based media. Consider:

- Content fragmentation and confusion. As digital pictures, video, music, files and more spread across multiple clouds and devices, they become increasingly difficult to find and manage. This becomes more challenging as new cloud services arise and people use additional mobile and connected devices, such as e-book readers, wifi cameras, e-picture frames, internet TVs and connected car systems to store and access cloud content. If one's media is not managed in an organized fashion, it could spiral out of control, such that people won't know where their media is located, what plays on which devices, what is backed up and what only works online or off. As digital media becomes fragmented across more clouds and devices, it has the potential to confuse and frustrate rather than simplify.

- Lack of content portability. As people store more data and content in the cloud, and use more mobile devices, they are likely to grow wary of the difficulty of transferring content between devices, and resentful of the need to repurchase content for multiple devices. Examples include a mobile app or ringtone that doesn't transfer to a new phone, a movie or audio subscription that works on a PC but not a smartphone, and a song or video that does not transfer correctly between devices due to an unsupported file format or codec. Many people believe that if you paid for something, why should you need to repurchase it to access it on a different device? As people use more cloud services and mobile devices, and as content providers wrestle with content portability, licensing and business issues, the lack of content portability can become a major sore spot.
- Privacy versus sharing. Many people don't think much about online privacy as they tend to have reconciled themselves into being in one of two camps, those who care about it and those who don't. However, as people increasingly store, access, buy and share data and content via the cloud, security and privacy are emerging as extremely potent issues. It's one thing to transfer media from a digital camera to a personal computer that is secure. It is another to directly upload it into the cloud, even if only into a personal account, due to potential privacy snafus. These include data loss, unauthorized access, and mining for marketing purposes, with or without consent. The ease in which data and media can be stored and accessed in the cloud will likely become viewed as a double-edged sword. People are going to realize that it requires vigilance and effort to strike the right balance between convenience and privacy.

In summary, there are several potential barriers to cloud media adoption. The next section discusses accelerators that can be used to address them.

Content fragmentation across multiple clouds and devices
Lack of content portability across devices
Privacy concerns versus convenience and sharing

Figure 2: Potential Inhibitors to Growth of Cloud Media

II. ACCELERATORS

The prior section described 'tip of the iceberg' issues that are likely to arise as people store and access more data and media in the cloud. If mobile companies and service providers want to encourage rapid adoption of cloud-based media, here are some guidelines.

- **Flexible digital locker.** It is important to provide a digital locker that allows users to store a wide variety of data and content, as opposed to a single data type. The more types of data and content that people can store in one place, the more valuable it becomes over time, as it helps organize things in one place and is more convenient. This includes PIM data (contacts, calendars, tasks and notes), rich media (pictures, video and music) and files. Lockers that are more flexible will be favored versus limited repositories.
- **Data and content aggregation.** A digital locker should make it easy to aggregate data and content from multiple clouds and devices, by importing it or allowing content from external sources to be indexed or stored. This includes enabling users to buy and store commercial content from licensed sources into their digital locker to sync with all of their devices. This allows carrier, MVNO and internet content (portal) companies to provide new value added services to subscribers and users, while developing important revenue streams. It is also important to deduplicate data and content, and to make it easy for users to move content freely in and out of lockers, as people will be wary of services that lock them in. By providing the freedom to easily move content and to access it on multiple devices, users will be attracted to cloud media services.
- **Diverse device support.** Locker content should be accessible from most if not all devices owned by users, including computers, phones, tablets and other connected devices. The locker should at a minimum have a modern web interface that lets users easily search, view, manage and share content with other people and systems via any browser.

- Content portability and sharing. The more a cloud locker service allows content to be stored and accessed across diverse devices, the more valuable it becomes. For example, if a cloud service supports transcoding of video between formats, or transcoding of audio for lossless play on high fidelity devices but lossy play on other devices, this differentiates the service. Further, making it easy to share content with friends, family, etc., in a secure and easy way, while preserving the privacy and security of digital assets, will spur adoption.
- Viral adoption. A primary *raison d'être* for storing media in the cloud is to make it easy to share with selected people. If a cloud service enables users to aggregate their contact data from multiple sources, this becomes a natural foundation for inviting people to view shared media and establish access controls. Otherwise, people will need to reenter their contact information which impedes use. As people receive notifications of shared content from a cloud service, it is only natural that they may want to try and use such a system for themselves. This viral spreading of a cloud media service is crucial for its vibrancy, and the ability to integrate contact data from multiple sources cannot be underestimated.
- Flexible monetization. Cloud services are employing multiple freemium models to monetize users, including storage, advertising, content and premium. For example, Dropbox uses a storage model that offers a modest amount of free storage to attract users, then charges for additional storage. Google provides numerous free mobile services, such as Gmail and Maps, to get people to rely on Google for a wide spectrum of mobile activities that feed and hone its ad engine. Facebook also relies on advertising to make money, and is making a huge push into the mobile cloud as they see rapid future growth there. Apple is one of the few companies that currently has the scale to give its content software (iTunes) away for free, as it is a conduit to sell music, movies and other digital goods. This is the modern razor and blade strategy, where the razor is free to get as many customers as possible while making money selling add-ons. Another model is premium features, embodied by in-app upgrades or advanced versions of free services with more capabilities.

Whatever cloud monetization method is best for your market and needs, there is only one thing that is certain, which is that monetization models will keep changing and adapting for market trends, conditions and user preferences. It is critical to have flexibility in your cloud content delivery platform to accommodate shifts in service pricing and packaging.

- **Developer support.** A dominant characteristic of Web 2.0 that dramatically increased its appeal was the ability for developers to create mashups that combined data from multiple websites, such as Google Maps and real estate, in ways that were previously unimaginable and impossible. The same potential for innovation arises as more data and content are in the cloud, as long as there are APIs and services for developers to access and integrate content. A major opportunity for cloud content and service providers is to provide a developer-friendly environment that encourages innovative cloud media apps, such as a cloud jukebox that plays one's favorite user generated and commercial content on a wide range of devices. To the extent that a cloud media service offers attractive and easy-to-use hooks and tools for developers, this will help accelerate adoption.

Flexible digital locker
Data and content aggregation
Diverse device support
Content portability and sharing
Viral adoption
Flexible monetization
Developer support

Figure 3: Summary -- Cloud Media Accelerators

III. MARKET

Given the potential barriers and accelerators for cloud media, this section addresses some fundamental questions about cloud media such as:

- How big is the market?
- What major trends impact it?
- How is cloud media likely to evolve and what strategy should service providers pursue?

Cloud Media Market Size

Industry experts believe that cloud media will be a large, multi-\$billion market. Although precise estimates of its market size have not been publicized, one can gauge the scope of the market by examining forecasts for adjacent markets. For this purpose, cloud media is defined as a cloud-based digital locker service that lets users store, buy, manage, access and share user generated and/or commercial data and content.

Gartner recently forecasted that the overall cloud services market will grow from \$68B in 2010 to \$149B in 2014. IBM recently projected telecom cloud services to grow from \$30B in 2010 to \$88B in 2015. Although cloud media will presumably be a fraction of these amounts, this still points to a large multi-\$billion market.

An IDC report recently predicted that the cloud storage market would grow 35% per year from \$2.7B in 2009 to \$12.2B in 2014. Juniper Research estimated that the mobile cloud market would grow 88% per year from \$400M in 2009 to \$9.5B in 2014. ABI Research forecast that the number of mobile cloud subscribers would grow from 50M in 2010 to 1B in 2014. These figures collectively support an estimate of cloud media that is in the multiple \$billions.

Funambol independently modeled the cloud media market using several factors, including the number of potential users and likely monetization amounts. Using conservative estimates, it predicted a multi-\$billion market size that is consistent with the above projections.

Market Trends

Several major trends are converging to grow the cloud media market:

- 'Mass market-ization' of smartphones, connected devices and mobile data plans. One of the brightest spots in the world economy the past few years has been the rapid adoption of smartphones. Beyond smartphones, tablets such as the iPad, Android and BlackBerry PlayBook are a major new category of computing. On top of this, new consumer electronics are connecting to the internet that enable people to generate and consume more user and commercial content via the cloud (especially video, as costs fall for memory and mobile broadband). People will expect to wirelessly access a wide range of content in the cloud from these devices and for their cloud content to be backed up and shareable.
- Increasing user acceptance of cloud media. As noted earlier, there is an progressive march towards storing more data in the cloud. The main question is when this will 'cross the chasm' and reach critical mass such that it is accepted by a majority. Today, it is largely early adopters but the tipping point is quickly approaching as judged by the enormous growth of cloud media and file services. One consideration, however, is that many people still want to keep their data 'off-cloud' but enjoy the benefits associated with easy cloud access.
- Multi-screen use. A natural consequence of these trends is that people will become more used to consuming media across multiple devices. According to ABI Research, they will need to continually sync devices to contain desired data and content. The advantage of syncing versus streaming is that data is always available, even offline, and the device does not need to access the cloud for oft-accessed information (why stream a song that is listened to repeatedly?). A mix of syncing and streaming will likely prevail as the balance to meet user needs. Upnext Research recently predicted that a 'hybrid/smart' syncing architecture, that syncs and streams cloud media at appropriate intervals, will gain acceptance as a dominant approach for multi-screen services.

Market Segmentation

Cloud media services can be categorized based on whether they involve user generated or commercial content, and are B2C or B2B. The below chart maps some representative services. Most services today are B2C for user generated content, while a few are for commercial content. There are new B2B solutions that enable service providers to deliver branded cloud media solutions that act as alternatives to existing B2C services.

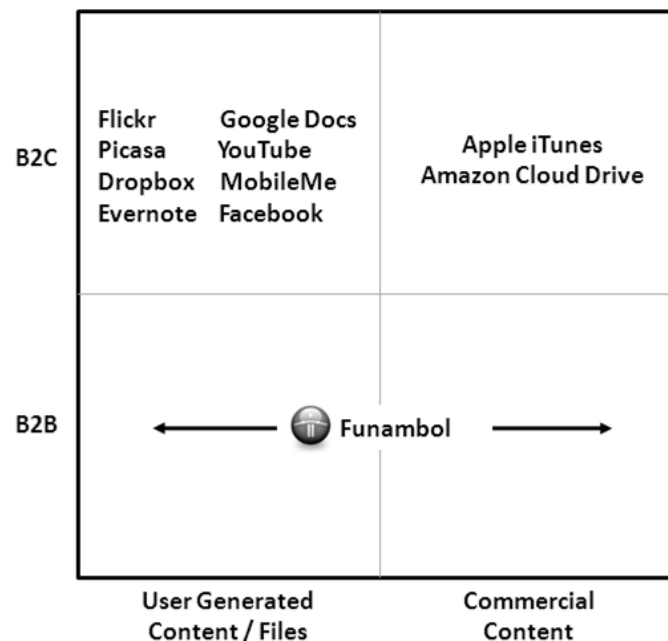


Figure 4: Cloud Media Market Segmentation

Cloud Media Evolution and Strategy

A question asked by many companies, such as operators, portals and device manufacturers, is whether they should offer a cloud media service. While they see a big opportunity, they also see the potential to be squeezed by large smartphone vendors on one side and giant cloud companies on the other who are already offering cloud media services. The questions from their perspective are how cloud media services are likely to evolve and what a 'winning' (apologies to Charlie Sheen) strategy is likely to be.

Predicting industry dynamics is challenging due to unforeseen events. If the impact of the iPhone and Android have taught us anything, it is that the balance of power in the mobile industry and its value chain can change much more rapidly than people imagine.

Caveats aside, Funambol believes that users will ultimately gravitate towards using a small set of digital lockers to store and access their data and media in the cloud. It is unlikely that people will only use one locker, due to heterogeneous media and devices that are not fully supported by a single cloud. It is also unlikely people will want to use more than a few clouds, due to the fragmentation and inconvenience. The challenge for prospective cloud media providers is to offer a service that is sufficiently superior and compelling such that it will be one of the few that people perpetually use.

To do so, a service must address the aforementioned barriers and accelerators. It should be one of the first to market to gain mindshare. Organizations contemplating offering a cloud media service should evaluate their unique strengths to determine how their service can be superior to others. For example, operators are in a unique position to help families and workgroups create a 'friends and family' locker, just as they provided a similar service for mobile calling. They could offer a digital vault that is the trusted hub for all of one's digital media assets as unlike Google and Facebook, they do not need to mine it for marketing purposes. The opportunity is to leverage the unique position and assets of your organization to ensure that your cloud locker is one of the few that will ultimately succeed. The next section describes important technology considerations to achieve this objective.

IV. TECHNOLOGY

This table below compares representative cloud media services to highlight important technology elements to consider when offering a cloud media service.

Company	PIM Sync	Rich Media Sync	File Sync	Cloud Based	Open Source	Cross Device & Platform Sync	Extensive Mobile Support	White Label Solution	Device Mgmt	Trusted Source
Funambol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Real Networks	✗	✓	✗	✓	✗	✓	✗	✓	✗	✗
Dropbox	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓
Flickr	✗	✓	✗	✓	✗	✗	✗	✗	✗	✓
Google	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗
MobileMe	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓

Figure 5: Cloud Media Technology Elements

The significance of this table is not so much its specific ratings per se but rather the column headings that form the major technology elements that should be evaluated when offering a cloud media service. Here is a description of some of these elements.

PIM Sync (contacts, calendars, tasks and notes) -- as previously noted, integrating contact information into a cloud media service is vital for sharing media and viral adoption

Rich Media -- includes pictures, video and music, as well as incorporating other forms of digital media, such as ringtones, e-books, audio books and podcasts, into a flexible digital locker

Cloud-based -- not all cloud media solutions are created equal. There are vast differences in how they are implemented. For example, do they support both syncing and streaming? Do they offer a state-of-the-art AJAX web portal that allows users to visualize their media in the cloud? Do they require all data to be in the cloud or can some reside elsewhere?

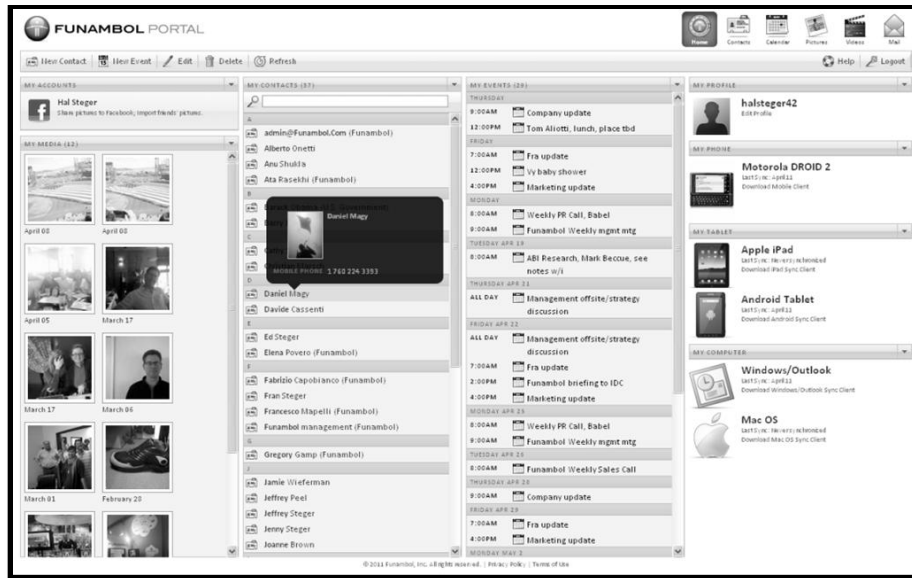


Figure 6: Allowing Users To Visualize and Manage Media via The Cloud Is Important

Open Source -- provides access to the entire source code of the solution, which offers benefits such as broadest device compatibility, maximum flexibility, complete control, reduced business risk and better ability to engage a developer community

Cross-Device and Platform Sync -- ability to sync media across different brands of devices e.g. between iPhone, Android, BlackBerry and Nokia, as well as different types of devices

Extensive Mobile Support -- a key differentiator of any cloud media service are the breadth of mobile devices it supports, i.e. smartphones, tablets, laptops, mp3 players and more. The more devices that are compatible, the greater the addressable market

White-label Solution -- for service providers, users see your brand, on both device apps as well as the web. Further, you have ultimate control over the user data to comply with privacy and regulatory requirements

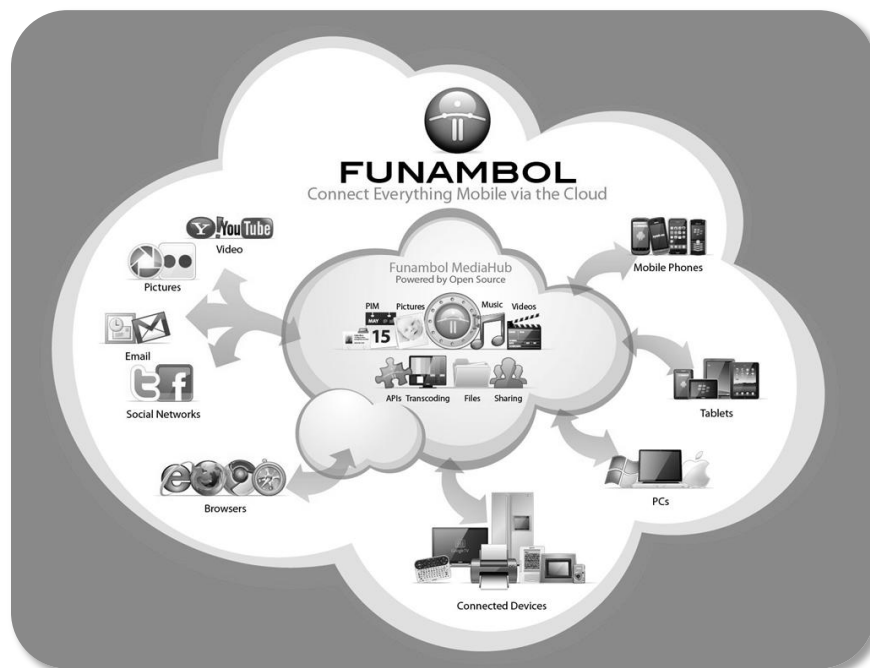
Device Management -- cloud media requires basic device management capabilities integrated into the cloud content delivery platform for optimal performance and customer service

Trusted Source -- companies have the opportunity to differentiate themselves by fully respecting the privacy of users by not mining data for marketing purposes

V. CONCLUSION

In summary, the mass market for cloud media services is quickly growing, as people are increasing frustrated by the difficulty of accessing their data and media across diverse devices. Many initial cloud media and file offerings are inflexible and raise fragmentation and privacy issues, which opens the door for newer cloud locker services. Several technology elements are required for success, to minimize barriers to adoption and to facilitate accelerators that will make cloud media more sunny than stormy.

VI. ABOUT FUNAMBOL



Funambol is the leading provider of smart cloud sync solutions for diverse mobile phones and connected devices. Funambol's commercial software has been deployed by the top companies in mobile, including global operators, device makers, portals, service providers and software firms. Funambol open source has been downloaded five million times by 50,000 developers in 200 countries, making it the #1 mobile open source server project, enabling Funambol to support more devices and content types than any other solution. Funambol is based in Silicon Valley. To learn more about how Funambol can help your cloud media service get to market quickly and successfully, visit <http://www.funambol.com>.

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