DIGITAL RIGHT MANAGEMENT TO PROTECT MOBILE MULTIMEDIA CONTENTS

Pushpendra Kr. Verma*

Dr. Jayant Shekhar**

Abstract

Digital rights management (DRM) is a generic term for access control technologies that can be used by copyright holders in order to impose limitations on the usage of digital content and devices. DRM systems are used by most of the entertainment industry: music, films, video games and any other media that can be digitized and passed around.

The need for mobile digital right management (DRM) solution is thus intensified in order to safeguard mobile media content. The Open Mobile Alliance (OMA) has been set to define open DRM technologic specifications to protect copyrighted content against piracy, unauthorized use and distribution over mobile networks. However, we argue that there still are some potential security flaws in its recent version 2 specifications. A secure DRM scheme based on Trusted Mobile Platform (TMP) is proposed in this paper to enhance the security of OMA DRM specification v2 and provide interoperability and compatibility between Trusted Computing (TC) and OMA DRM. According to our analysis thereafter the TMP in conjunction with OMA DRM v2 may offer a considerably more robust DRM system for future mobile networks..

Keywords— DRM- Digital rights management, OMA-Open Mobile Alliance, TMP- Trusted Mobile Platform, MNO-Mobile Network Operator, m-commerce- mobile commerce,

* Research Scholar, Department of Computer Applications, NIMS University, Jaipur, Uttar Pradesh, INDIA.

** Professor, Swami Vivekanand Subharti University, Meerut, Uttar Pradesh, INDIA.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A.

International Journal of Management, IT and Engineering
http://www.ijmra.us

531

INTRODUCTION

Mobile multimedia has been promoted as a promising service and application in mobile e-commerce (m-commerce) by many mobile operators and mobile service providers, when high-speed mobile networks are expected to take off in the near future. However, at present, mobile multimedia is still in its infancy, accessed by relatively low-end mobile devices with limited bandwidth and resources. In the near future, when advanced mobile networks and technologies become available, higher demands will be placed on the quality of mobile multimedia services. Such services support both audio and video data, for example, video conferencing, music video, video-on-demand and so on. Rights management deserves more serious concern because intellectual property of distributed multimedia content is as valuable as a company's physical assets. This will become even more important when mobile multimedia services become marketable and an essential part of the business. The purpose of a digital rights management (DRM) system is to allow owners of digital assets (movies, songs) to distribute their products/services/contents electronically in a controlled way.

Objective of the Research paper

Provide an interoperable digital right management platform for content owner

- Define a common set of content usage rule and licensing information.
- Achieve interoperability across multiple digital right management platforms by defining usage rights in standard based expressions.
- Enforce usage rights across multiple digital right management technology platform and playback devices.
- Permanently archive master copy of digital content.

Provide an interoperable digital right management platform for consumers to

- Discover content, metadata and associate usage rights.
- Enjoy legitimate content with their preferred devices, file format and portable usage conditions.

Security techniques used in DRM systems

 DRM systems generally make use of two security techniques: cryptography to protect the content from illicit access and techniques to identify content. Identification techniques can be

used to detect illicit copies and also to link DRM-protected content to a seller of said DRM protect content. This would enable users to easily find (sellers of) legitimate copies of DRM protected content.

In order for a DRM system to cope with discovered weaknesses, it should be able to update client- and server software without affecting content that has been released under an older version of the software.

Review and Literature

1. The 'Interoperable DRM Platform' system architecture of this research is built upon the ISO MPEG-21 multimedia frame work and the early research work of 'Design of the Super distribution Network' by Mori, 1987. ISO MPEG-21 multimedia framework is meant to be open and platform independent and will bring value to the adoption of digital right management for digital content distribution in the creative industry.

2. Prakash, T.N. (1996) discusses digital information delivery, its improve data quality, speed of access, reduction in cost, etc., compare to the traditional document delivery. The document delivery system compared of three components: a document stores, delivery and receiving, which in digital context are digitized, Achieve, telecom system and receiving station respectively. Each of these components is discussed particularly for transmission of large drawing etc.

3. Previousresearch papers on Mobile DRM we made use of are Digital Rights Management and Watermarking of Multimedia Content for M-Commerce Applications by Dr. Frank Hartung and F. Ramme, Digital Rights Management for Visual Content in Mobile Applications by Trimeche and Chebil, Overview over Digital Rights Description Languages for DRM by Dr. Frank Hartung, Mobile Digital Rights Management by Zheng Yan. Of course, there are other papers from organizations such as the Open Mobile Alliance regarding Mobile DRM.

DRM Systems for more Consumer Satisfaction

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Management, IT and Engineering
http://www.ijmra.us

533

Current DRM systems often impose stronger restrictions on using digital content than necessary from a business point of view. For example, it is not business logic, which dictates that a song downloaded to a mobile phone cannot be played on other devices. Rather, the mobility of digital assets is often restricted because usage terms and conditions cannot be transferred between devices and because copy protection might get lost when transferring the assets between devices. Interoperable DRM solutions alleviate such problems and thereby increase consumer satisfaction. But interoperability has even more advantages:

- It facilitates the delivery of digital assets in complex supply chains involving many different parties. It enables a persistent and consistent management of rights even in multi-tier supply chains.

- It decreases barriers for the creation of a single European or even worldwide market for digital assets.

- By standardizing, it decreases the cost of setting up and running DRM systems and their complexity, making DRM cheaper and more reliable.

- It makes digital assets more valuable, as they can be used in more situations. Resulting demand increases can benefit producers with higher profits and consumers with lower costs.

- It enables new business models. If more types of usage behavior and user peculiarities are covered by DRM, business can create special offers taking into account individual tastes. Creating such an ideal landscape of interoperable DRM systems requires a certain degree of standardization, so that DRM solutions from different vendors can communicate with each other and digital assets can be used in different environments.

Research Methodology

Research implies the study & exploring knowledge to get the new ideas. Research methodology is a way of solving the research problem systematically. Research Method & Research Methodology, these are two different but related terms. Research Method is a part of Research methodology.

Questionnaires

We have prepared a questionnaire as a broader base for gathering information as part of the research methodology. One part of the questionnaire is a structured and standardized

questionnaire, which can be asked to a whole range of professionals from the industry with closed questions.   The second questionnaire is a semi-structured questionnaire with which we try to get as much information as possible. With the questionnaire, we are after both quantitative and qualitative information. The quantity of previous research is very limited in DRM area due to the immaturity of the issue. Hence, qualitative data is our greatest opportunity to get actionable information from this interview/survey. Some examples of my research work in based on questionnaires are follows:

How many Customers ready to pay for multimedia services per month?

A survey was created for these services among different users of multimedia services in India and the following results are obtained. Most people have voted for spending around 200 – 250 Rs per month for VAS which is roughly around Rs 300 per month. The below pie chart figure1.1, gives the pictorial representation of the percentage of users in the different range
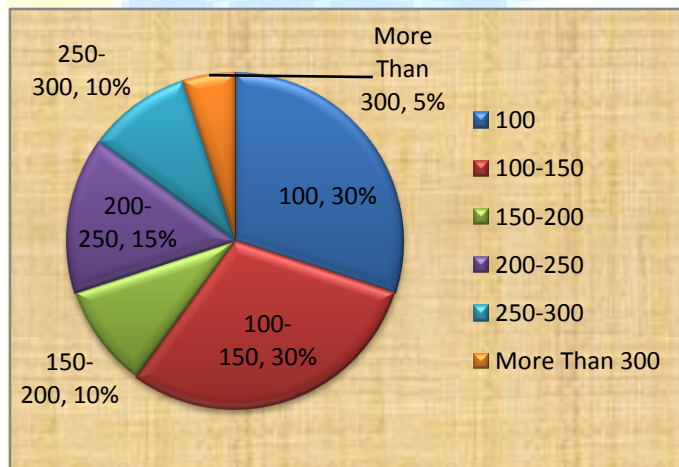
Fig-1.1
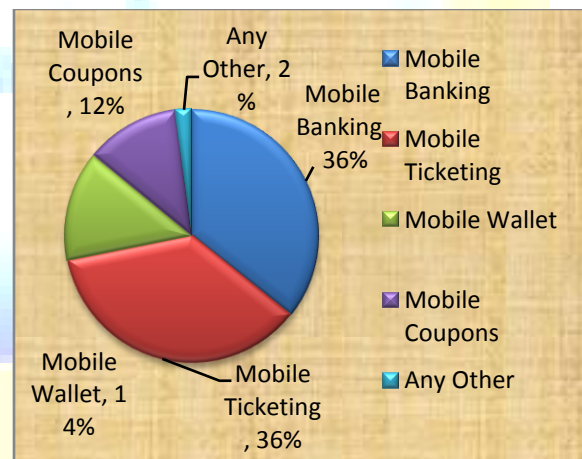
Fig-1.2

Then a survey was conducted for finding out which of the mobile commerce services people are willing to use mostly out of the different services like mobile banking, mobile ticketing, mobile wallet and mobile coupons. The other two services like Mobile wallet and the mobile coupons have almost equal number of responses but very less than that of the mobile banking and ticketing service. As these two services (Mobile wallet and mobile coupons) deal with money and are in the initial stages of introduction to the consumers, many consumers are not fully aware of these services still. The providers of these services have to work thoroughly in improving

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Management, IT and Engineering
http://www.ijmra.us

535

these services with full security measures as these services deals with money and also the service should be very helpful for the customers.

Mobile Multimedia Contents

India is currently the 2nd largest Mobile Market in the world after China, adding nearly 10-12 million subscribers on average monthly.

Most of the Metro's and big cities have nearly come to a saturation point, however, the current phase of growth in Indian Mobile Market is in Rural areas that is now accounting for majority of growth in mobile space
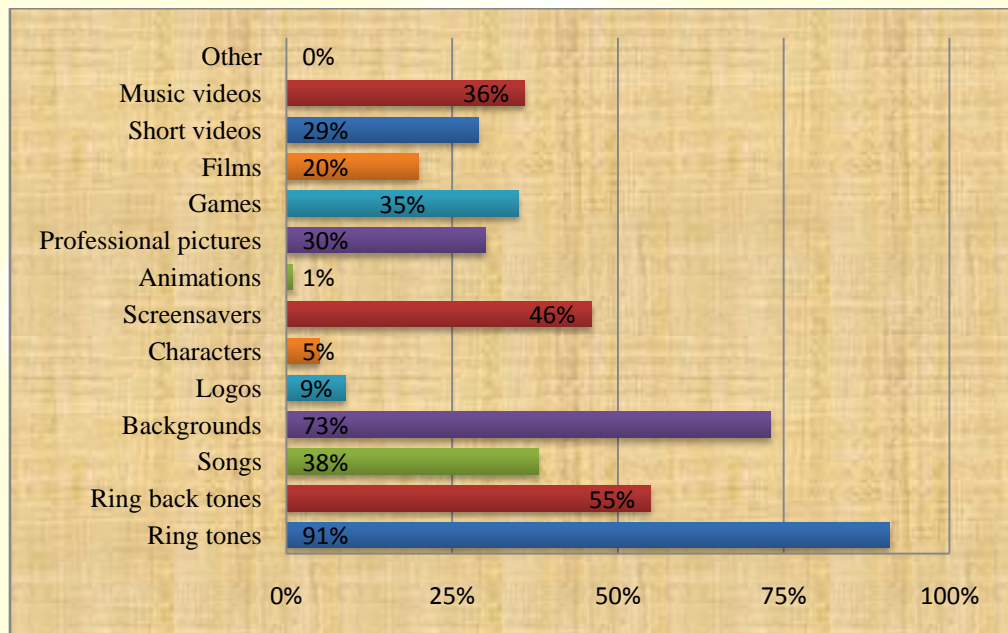
Figure 1.3: Popularity Evaluation of Various Content Types-Now

The branded portals on the Internet are expected to place more emphasis on the Mobile environment. Search options on Mobile are limited and therefore well-known portals can have a better niche compared to others. Addressing of Mobile Multimedia Services is a rather virgin area, as well. This issue also lies in the usability area. Conventional SMS is a blurry area in the presence of multimedia and it jeopardizes the multimedia traffic. The statistics of multimedia traffic sometimes includes the SMS traffic. This causes misinformation.

Which Indian City Uses Social Networking maximum through its mobile phones?
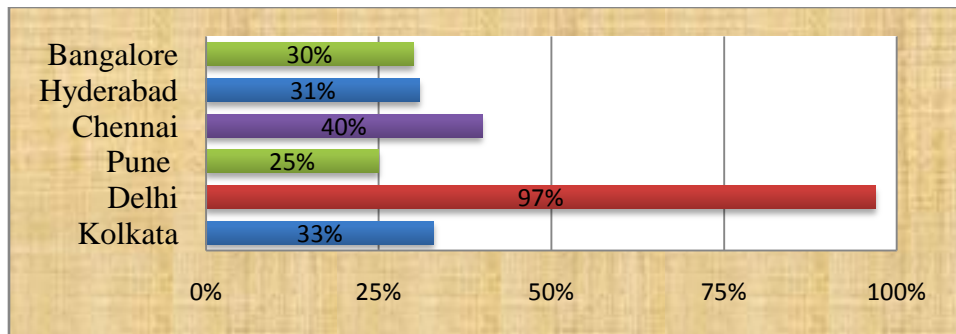
Fig 1.4 Indian City Uses Social Networking maximum through its mobile phones

Which Social networking site is most favoured by Indian Urban Mobile Subscribers?
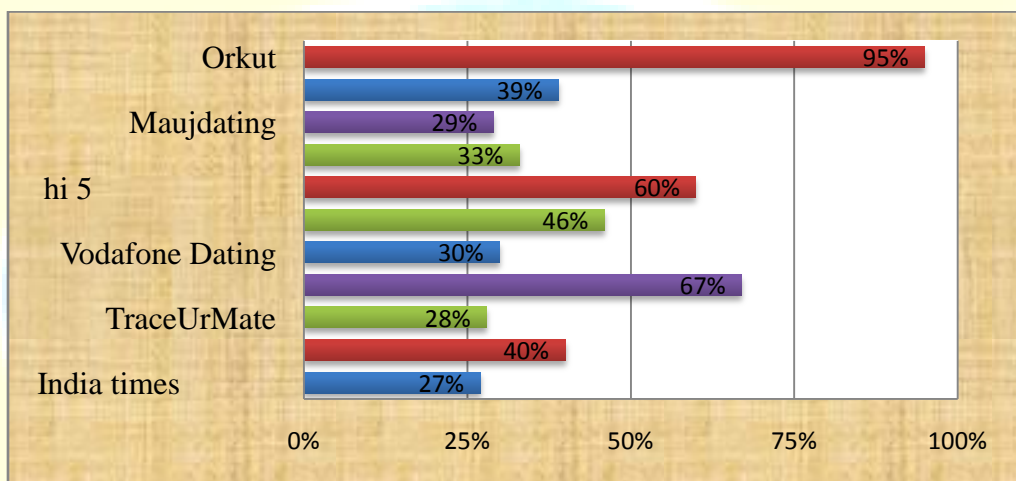

Fig 1.5: Social networking site is most favored by Indian Mobile Subscribers

The content is widely billed by the Mobile Network Operator and it is found to be most convenient this way. There is also possibility of micro-payment. However, micro- payment is close to an uninhabited area for vast majority of end-users and it will take time to turn into being habitual as opposed to paying the monthly bill by bank order.

We know Orkut is the king in India be it web or Mobile, but what in the world is "Mycantos", which accounts for nearly 4% of urban India using it?. I am also surprised that twitter does not find any mention here – Isn't it part of a Social Networking Phenomenon?

Nearly 18.5 million Indian Urban Mobile subscribers used their mobile phones for searches, with Google taking the numero-uno position with 5.76 million followed by yahoo with 4.58 million

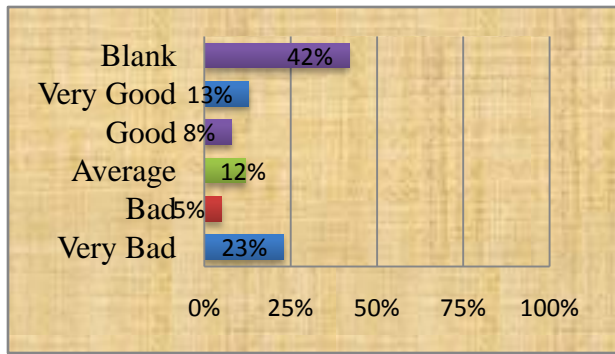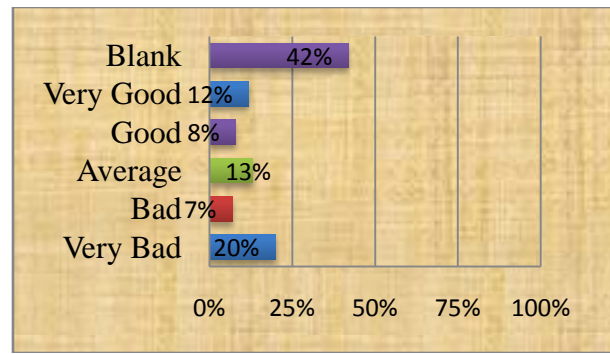**Please Rate the following DRM systems**

Fig 1.6: SecuRom DRM
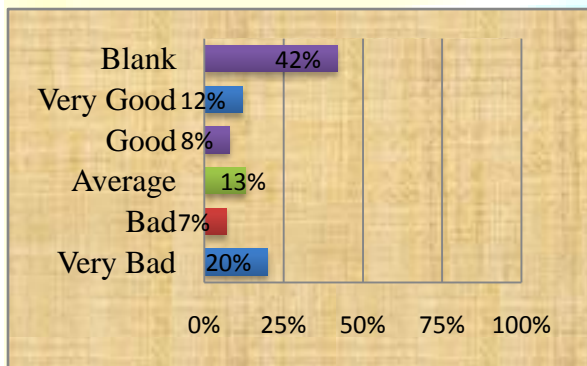

Fig 1.7: Solid shield DRM

Fig. 1.8: Steam CEG DRM
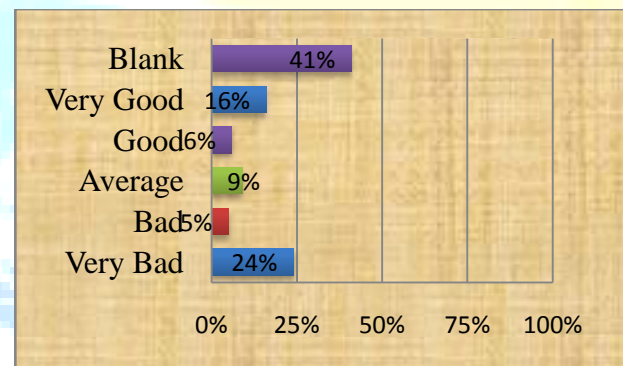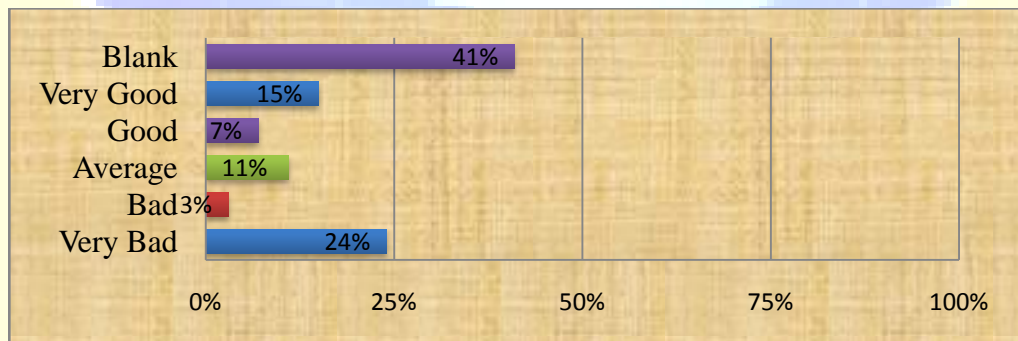

Fig. 1.9: Ubi DRM

Figure 1.10: EA DRM

The data in these figures where far closer than expected, even though in most cases there is a clear majority.

	Votes		
SecuROM:	20% Very Bad	--	12% Very Good
Solidshield:	20% Very Bad	--	12% Very Good
Steam CEG:	12% Very Good	--	20% Very Bad
UbiDRM:	24% Very Bad	--	16% Very Good

International Journal of Management, IT and Engineering
http://www.ijmra.us

EACore: 24% Very Bad   --   15% Very Good

To draw a conclusion on this is difficult, as the gap between Very Good and Very bad in most cases does not give an impression of a sweeping majority. Especially when considering that throughout the Questionnaire, there are many references to DRM being a cause of so much piracy.
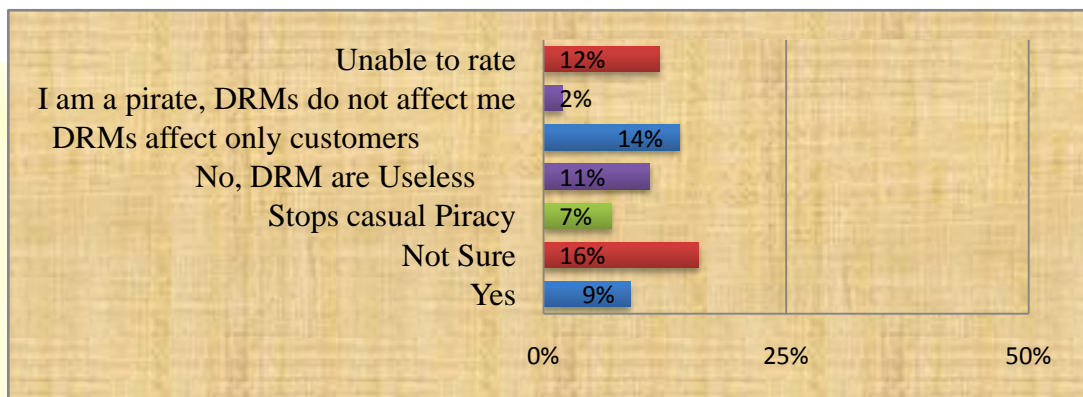
Do you think DRM system work ?

Figure 1.11: DRM System Work

There is no clear leader to this question, but demonstrates that publishers might have more success with some other anti-piracy method than a DRM. The two positive responses, "Yes" (9%) and "Stops casual Piracy" (7%), only account for 16% of the total vote.

The negative responses, "No" (12%) "DRMs are useless" (11.2%) "DRMs affect only customers" (14%) and "I am a pirate, DRMs do not affect me" (2%), makes a total of 39%. "Not Sure"(16%) and Blank Answer (28%) makes up the rest at 44%.

Which of the following players are motivated for future release OMA DRM deployment?
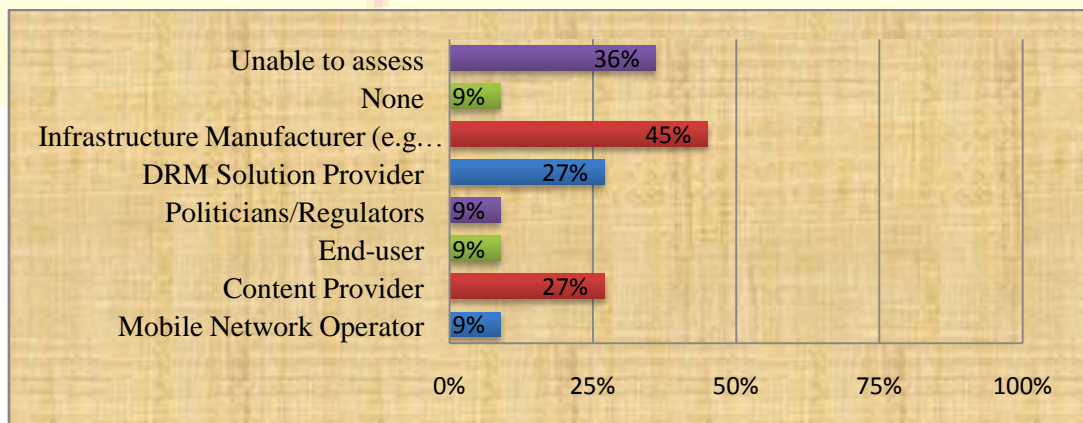
Figure 1.12: Motivation of the Players for OMA DRM Future Releases

The end-users motivation for no DRM deployment is clear, but the operator's response nullified the 9% of the responses.

What do you consider as negative end-user experience regarding DRM?
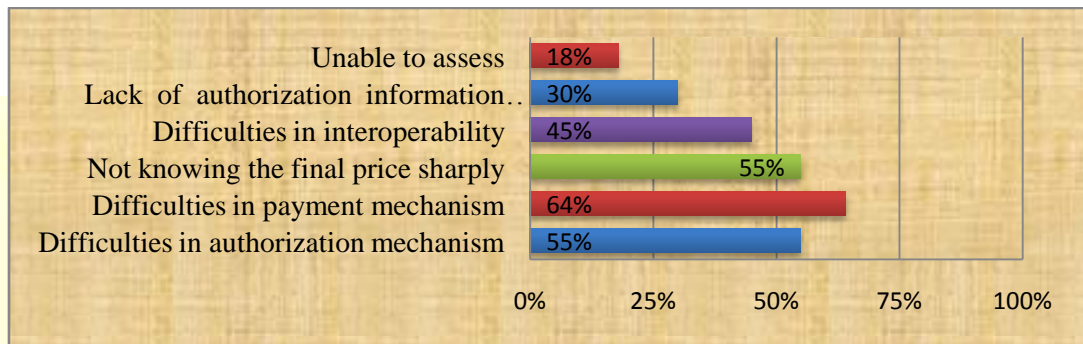

Figure 1.13: Negative User Experience of DRM

Both the content providers and the operators wish to have as many business cases possible supported by a DRM solution such as free preview, gifting and rating etc. However, the features they are interested in keeping control of are different.

Which of the following business models should be supported so that it is preferable by the Mobile Network Operator?
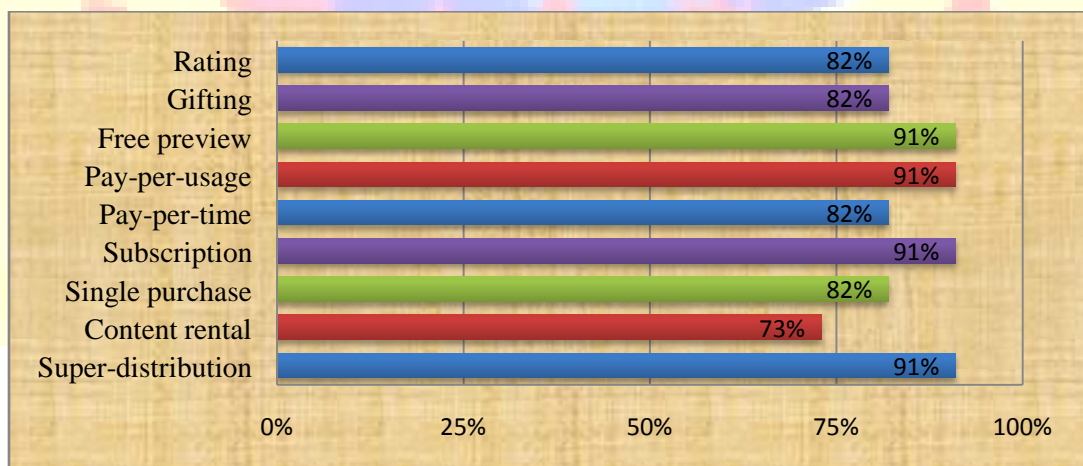

Figure 1.14: Important Business Models that supported by DRM- MNO's View

This also helps to evaluate the **reliability & validity** of the study which can be referred as follows:

1. Around 62% of total respondents are in the age group of 20 to 30 years & 27% users are in age group of 31 to 45 years. Only 7% users are more than of age 45 years. 4% mobile users are below 20 years of age. This shows that the majority community who uses cell phones belongs to age group of 20 & 45 years.

2. Around 39% users are from Student's community, 30% respondents belong to Corporate Employee. 5.5% respondents are Civil Servant, 5% are Businessmen. The remaining 20% belongs to other category. Here other category includes school teachers, housewives & drivers.

3. In this survey the data is gathered directly from 1568 respondents belonging to Idea, BSNL, AirTel, Tata indicom, Reliance & HutchVodafone Service providers. 32.92% users belong to AirTel, 30.46% users belong to Idea, 13.2% users belong to BSNL, 9.51% to Reliance, 8.10% of HutchVoda and 5.81% customers belong to Tata indicom.

4. Coverage, Customer care & Billing services are rated as critical areas wherein customer faces problems. 63% customers are facing problem in Network Coverage including Roaming service. 52% customers have faced difficulties in Customer Care including Poor Service, & Poor information from service provider. Around 14% users face difficulty in Billing Services. Very few (5%) respondents face difficulty in Activation.

5. All service providers offers various Multimedia Services like: SMS, Voice mail, Call forwarding, Caller tune, Clip, Game & Ring-tone download, Internet access, Ticket booking, roaming. 86% users use SMS service. This shows that SMS has become an essential service like Incoming & outgoing for users. 46% users avail Roaming as well as Call Waiting service. 39% use Caller Tune facility, 32% use the Ring-tone download. Internet access users are 21%. Only 12% users involved in Game Downloading. Very few, below 10% users are involved in using other Value Added Services like: Dial-in service, ticket booking, and clip download.

Conclusions

In this research paper, we have presented three initiatives that deal with the development of distributed multimedia applications and Digital Rights Management technologies. In this context, we have proposed several relevant usage scenarios that share some common functionality such as content registration, protection, search, and licensing and access control.

We plan to continue contributing from our developments to the standards in progress and adopt new standards specifications when possible, to facilitate interoperability. Furthermore, we are progressing in the development and exploitation of the architecture and applications on top of it. Suggested a value network model for Mobile Multimedia Industry. Suggested a content classification for Mobile Multimedia based on business segments. Explored the current landscape of Mobile DRM in this flow. Thereafter we conducted interviews and gathered observations from the Industry. Developed a model for resolution for a fundamental problem of Multimedia Industry. Provided recommendations to different players in the Mobile Multimedia Industry. In future work, aims to bring more and more services in convergence form like including DRM application, which integrates multiple facets of user needs.

References

1. Fisher III, W.W. & McGeveran, W. (2006). *The Digital Learning Challenge: Obstacles to Educational Uses of Copyrighted Material in the Digital Age*. Cambridge: Berkman Center for Internet and Society. Retrieved August 17, 2006 from http://cyber.law.harvard.edu/media/files/copyrightandeducation.html.

2. Digital rights management and watermarking of multimedia content for m-commerce applications / Hartung, F. ; Ramme, F. EEE Communications Magazine. - 38(2000), H. 11. - Seite: 78 - 84. - ISSN: 0163-6804

3. R. Mori and S. Tashiro, The concept of super distribution, , Vol. J70-D, No. 1, pp.70-81, 1987

4. Krishan, A.S.A and Chakravarti, A.K. Intellectual property rights in the ensuing global digital economy. Electronics information and planning. 24 (11): 618-25, 1997.

5.   Intellectual property rights. Edited by Debroy, Bivek. New Delhi: B R Publishing, 1998.

6.   Kumar, A. Trademarks, copyrights and patents. New Delhi: Singhal Publications,1997.

7.   Seadle, M. Copyright in the networked world: Spoken words. Library Hi Tech, 18 (1) 2000.p.102-106.

8. Mittal, D.P.: Law of IT (Cyber law). Delhi: Texman, 2000.

9. Samuelson, Pamela, "Copyright and Digital Libraries." Communications of the ACM 38, no.3 (April 1995): 15-21, 110.

10. Cappellini, V. *et al.* Information theoretic aspects in digital watermarking (Editorial). *Signal Processing*, 2001, 8(1), 1117-19.

11. Dittmann, Jana & Nack, Frank. Copyright- Copywrong. *IEEE Multimedia*, 2000, Oct-Dec, 14-17.

12. Hernandez, Martin; Juan, R. & Kutter, Martin. Information retrieval in digital watermarking. *IEEE Commu. Mag.*, 2001, August, 110-16.

13. Jonker, W. & Linnartz, J.P. Digital rights management in consumer electronics products. *IEEE Signal Proc. Mag.*, 2004, March, 82-91.

14. Kundur, Deepa. Watermarking with diversity: Insights and implications. *IEEE Multimedia*,2001, 8(4), 46-52.

15. Page, Thomas. Rights management: Digital watermarking as a form of copyright protection. *Computer Law & Sec. Rep.*, 1998, 14(6), 390-92.