Digital Rights Management on Open and Semi-open Networks

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1   Introduction

Recent public estimates indicate that by about 2005 the number of the Mobile Internet users will pass 500 million. In the future, mobile access is expected to be the dominant way of using the Internet and its services. [1, 4] Widespread mobile use most likely requires entirely new types of services to be developed. The new services will probably pose new types of requirements for the underlying Internet infrastructure. New types of content, new types of business models, and new types of terminals require new types of protocols, middleware, and conventions to be adopted.[2]

It is still unknown how the mobile technology industry will transform its business into the new era. If the successful Japanese I-mode is to be taken as an example, it will happen when technology and content providers cooperate providing a standard where the network infrastructure is in some sense closed and every transaction has its price. A digital rights management (DRM) solution is needed to implement this content distribution architecture, which should be capable of handling rights to different types of content and complex charging mechanisms.[3] This paper aims at giving an overview on how the openness of the future Internet affects digital rights management.

2   Open and Closed Networks

The Internet is quite an *open* network. Open means that the Internet specifications and standards are publicly available so that anyone can build new hardware, software, and services to be used on the Internet. The Internet is largely and publicly available, and a would-be user is not required to be for example a member of a certain organization to get the access.

A *closed* network, for the sake of comparison, is a network that does not allow its users to connect services outside the network. For instance, a company's local area network (LAN) that is not connected to the Internet at all is closed. It merely provides connections to the other machines and services in the same network.

Interestingly, there are lots of networks that fall between these two extremes. They are not completely open or closed. Instead, they do provide an access to the services on the Internet, but this access is more or less limited. For example, a user may access only certain services on the Internet. Often these kinds of semi-open networks are connected to the Internet using some kind of a gateway that allows certain traffic but prevents the other. For example the world's leading Internet access provider America Online, Inc. (AOL) used to be a quite closed network. Yet, it has been opened gradually and today it would be difficult to claim that AOL is not a part of the Internet. [5]

If a network requires specific infrastructure, platform, middleware, or other proprietary technologies, it cannot be completely open. In the Mobile Internet, appliances like Palm VII hand-held devices [7], WAP phones [8], and I-mode phones [6] offer a limited access to the Internet based on the access providers' policies and proprietary technologies. Therefore Palm, WAP, and I-mode networks are typically semi-open networks and in our opinion they provide mobile Internet access. In the future, we will probably see also more open mobile networks. We consider a network a part of the Internet if it is open enough to provide users an access to essential services on the Internet, like e-mail and most of the public WWW pages.

While openness is a desired attribute in general, a closed or a semi-open network can also offer important advantages. It does not need to use all the standard protocols and tools that often lack important properties like security. Instead, a proprietary protocol, for example, can provide a much higher-level confidentiality, data integrity, and authentication.

Closed networks can also offer more sophisticated methods for traffic accounting and invoicing as an example. There will probably exist lots of closed and semi-open networks on the edge of the Internet in the future also.

	Open Network	Semi-Open Network	Closed Network
Example	Internet	I-mode	Intranet
Connections	Unlimited to all directions	Filtered	Only internal
Services	All kinds	Lacks in variety	Specific
Revenues	From niche	From major services	Fully manageable
DRM	No generic solution	Many services	Can be part of architecture

Table 1. Some features of open, semi-open, and closed networks considering digital content transactions.

3 Conclusions

There will be open and semi-open parts on the future Internet. Digital rights management systems enable many important features to information product distribution on the Internet. At the same time the systems have significant costs: how should content distributors maintain user friendliness and solve revenue-earning difficulties? While DRM systems enable efficient charging possibilities, it is a challenge to implement DRM on the open Internet in a way that attracts customers and really adds value to their experience.

Plausibly, there will be many competing DRM solutions. They should however be standardized and interoperable enough to enable customers to use information products on different platforms. DRM systems must be appropriately applicable to both open and semi-open networks. It may be technically easier to implement a DRM system on a semi-open environment, but that is not a sufficient solution for a longer sight. DRM system providers should at least have roadmaps how to develop their products to work on an open network and on multiple platforms.

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