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Broadcasting of content protection signalling for television

BT Series
Broadcasting service (television)

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Foreword

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BO	Satellite delivery
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BT	**Broadcasting service (television)**
F	Fixed service
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RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management

***Note**: This ITU-R Report was approved in English by the Study Group under the procedure detailed in Resolution ITU-R 1.*

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REPORT ITU-R BT.2070-1

Broadcasting of content protection signalling for television

(2006-2009)

1 Introduction

This Report comprises a report on the current "state of the art" of digital content protection for broadcast television and related services.

Recent rapid evolution in the nature of consumer use of broadcast and internet services has changed many of the old assumptions made by broadcasters and television equipment manufacturers.

Television broadcasts can now be easily recorded using high-capacity personal video recorders (PVRs), and this content can now be shared with others over high-speed internet connections or by burning to high-capacity removable media such as DVDs.

Old assumptions that a set-top-box connects to a single, display-only, television set are fading fast.

Consumers are increasingly aware of alternative ways to enjoy broadcast content, and are always looking for newer and more rewarding experiences.

Accordingly, there is an urgent need for content owners and broadcasters to balance the need to protect their investment with potential loss of acceptability to an educated and technically knowledgeable user community.

1.1 Background

Working Party 6M (WP 6M) has determined that a compendium of information should be disseminated and carried forward in preparation for a Report on this subject area.

Building upon the initial work of previous meetings of WP 6M, it was determined that in order to develop principles which can safeguard the interests of broadcasters and the public in copy protection signalling for television, a number of topics need to be addressed.

To this end, WP 6M has begun to develop a content protection model as described below.

Radiocommunication SG 6 Recommendations for content protection need to address the requirements identified for each of the reference points and subject areas identified in the model.

The administrations attending WP 6M concurred that this new area of applying security to broadcast material presents challenging topics, and thus great care and deliberation must be taken in creating Recommendations. Further information in accordance with the work programme will be gathered.

1.2 Sources

This Report was prepared based on a number of past input documents provided to Radiocommunication WP 6M, and on public documents and materials suggested to the Rapporteur.

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1.3 Working method

At the April 2005 meeting of WP 6M, it was agreed that the total aggregate volume of contributions on this subject was too much for a simple report. The Rapporteur was therefore requested to produce a "digest" report summarizing the issues and solutions described in the various submissions.

As such, this Report is now intended to summarize what WP 6M has learned so far in this process. Many of the submissions are mentioned explicitly in the text below, while others have been considered without an explicit reference.

The Rapporteur now anticipates a period of consideration for future direction, along with comments made against previous and current text in this Report. This remains a "living report" which will evolve over time, and nothing contained herein constitutes finalized or formally agreed text.

2 The threats to the industry

This section describes some of the commercial threats to broadcasters and content providers resulting from advances in technology. However this list is not exhaustive.

2.1 Commercial piracy

Commercial reproduction of broadcast material includes the mass production of DVD versions of movies and television series, and the sale of content through unlicensed internet services.

It may also include the sale of technology (or advertising therein) that is clearly intended to promote piracy although the software vendor does not directly profit from the act of piracy.

2.2 Casual piracy

This includes consumers who make single copies of movies and other content as gifts for friends or family members with no intent for personal gain. Recent research indicates that most consumers feel this is normal and inevitable activity, though it remains a potential violation of copyright law.

2.3 Region leakage

For some content, broadcasters negotiate the right to transmit based on geographical coverage. These agreements typically allow for a certain amount of leakage, e.g. across terrestrial broadcast boundaries. However, excess leakage for other broadcasters (via internet, satellite footprint or otherwise) can reduce the value of that content for other broadcasters.

NOTE 1 – This effect is unrelated to DVD region coding, and is perhaps most noticeable for content with a very short commercial lifetime such as sporting coverage.

2.4 Early window viewing

Often related to region leakage, this involves audiences having access to content while it is meant to be restricted to another format. For example, being able to obtain DVDs while a movie is still in local theatres, or seeing content from a foreign free-to-air broadcast while it is only available on pay-per-view in the local market.

The effect of early opportunities for viewing is to reduce the revenue potential for existing legitimate licensees of the content, as the potential market shrinks.

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2.5 Loss of advertising revenue

Services that depend on advertising for some or all of their revenue are vulnerable to loss of revenue from any of the above effects, or as a result of advertisement-skipping. However, most consumers feel strongly that they have a right to avoid adverts they find annoying, whether for products they don't want or need, or for products they find distasteful to think about. As always, a balance needs to be struck.

2.6 Derivative works

With today's ease of capturing and editing material, there is a growing risk of copyright works being reused and adapted without permission. For example reusing a soundtrack for another purpose, or developing an unofficial re-edited version of a movie beyond the bounds of permitted fair use.

2.7 Poor implementations

Where content protection is mandated, there is a threat to compliant device manufacturers from competing products that do not meet the same standards of protection.

The usual "market will choose best implementations" actually runs in reverse for content protection, where often the (informed) consumer will choose the *least secure* implementation if it provides a perceived greater ease of use or flexibility.

As evidence of this in other markets, readers should consider the relative attractiveness of DVD players that ignore the DVD region code (which are now commonly available in many countries), or cell-phones that are "unlocked" from their original (subsidizing) service provider. Indeed, DVD region coding has recently been declared anti-competitive, and therefore illegal, by the European Commission.

3 The challenges for legitimate use

Balancing the fears of content providers arising from the threats noted above, there are a number of corresponding fears over excessive corporate control of consumer use of broadcast television services.

Throughout the industry there is considerable debate over the technical sensibility of providing both adequate protection and flexibility of use to consumers for the same item of content.

3.1 Legitimate fair use

In many countries, there are historical principals of fair use that are recognized in legislation or common law. These vary greatly between jurisdictions, so there are no hard-and-fast rules for what should be allowed.

Some of these are not well solved through use of technology (such as expiry of copyright material into the public domain), but blocking certain other rights may result in consumer complaints, regulatory restrictions, or legal challenges to content protection technologies.

The digital media project (http://www.chiariglione.org/project/) has attempted to identify a number of "traditional" rights consumers associate with content they "own" in today's world of television and digital media. How applicable these traditional rights are in the world of rapidly evolving technology is a subject of intense debate.

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3.2 Accessibility

Of specific interest are the traditional rights employed by those working to assist people with various disabilities, for example the RNIB (http://www.rnib.org.uk) and RNID (http://www.rnid.org.uk/) who are very active in UK policy making.

3.2.1 Application usability

As television becomes increasingly interactive, there is a risk that some of the audience will be denied access to content due to inability to use some of the interactive applications that make it available. For example, content protection mechanisms that complicate the user interface may become awkward for users with limited vision.

3.2.2 Addition of subtitling and descriptive audio

Examples include volunteers adding descriptive audio to television shows for the visually impaired, or overlaying signing for the hard of hearing. The modified shows would then be made available to the relevant community.

Both of these examples can be hampered by content protection technology, leaving those groups entirely dependent on the timely delivery of these features by the original content producers.

This is further complicated for those who rely on subtitling for less common languages.

3.3 Education and academia

It is a traditional right of academia to employ extracts of copyright works of many kinds for use in academic study, criticism, or as teaching materials. Content protection technology can make this onerous or impossible.

3.4 Public service obligations

Some broadcasters are bound by public service obligations such that content they transmit must be made available to all legitimate users without any technical barrier. In such cases it is often unlawful to require any form of subscription to the service – the user is already recognized as a subscriber because they live in the territory and pay the relevant license or tax, so they already have right of access to this content which cannot be denied by the broadcaster.

3.5 Open source software

Content protection technology often depends on some form of trust model, with some degree of robustness in the device before it is trusted with valuable content (see § 5.2.2). However, those companies and individuals adhering to the strict principles of open source software may be unable to prove robustness, as their software can be changed by anyone using the provided source. There is therefore a fear that this community will be forever denied access to broadcast television content despite the innovations they might be able to contribute to the industry.

Others will contend that open source software is inherently insecure and as such is an inherently unacceptable development methodology for systems that must protect content.

Both camps have some strong proponents.

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3.6 Public domain material

In some territories there is fear that content which is already in the public domain could become over-controlled by making it available under broadcast content protection, thus denying by technological means the legitimate rights that users have with public domain material. Some broadcasters fear legal exposure if accused of this.

3.7 Creative commons

A recent innovation in the publication of content is the use of creative commons licenses. These allow for the non-commercial creative reuse of the labelled content, provided that the original author is credited. This approach is attractive for smaller content providers such as independent artists and authors, as it allows their work to flow and become far more visible. A variant of creative commons allows for commercial use by residents of developing nations. Some major broadcast organizations are now adopting creative commons as a means to give consumers and other content creators access to their archival materials in a useful manner.

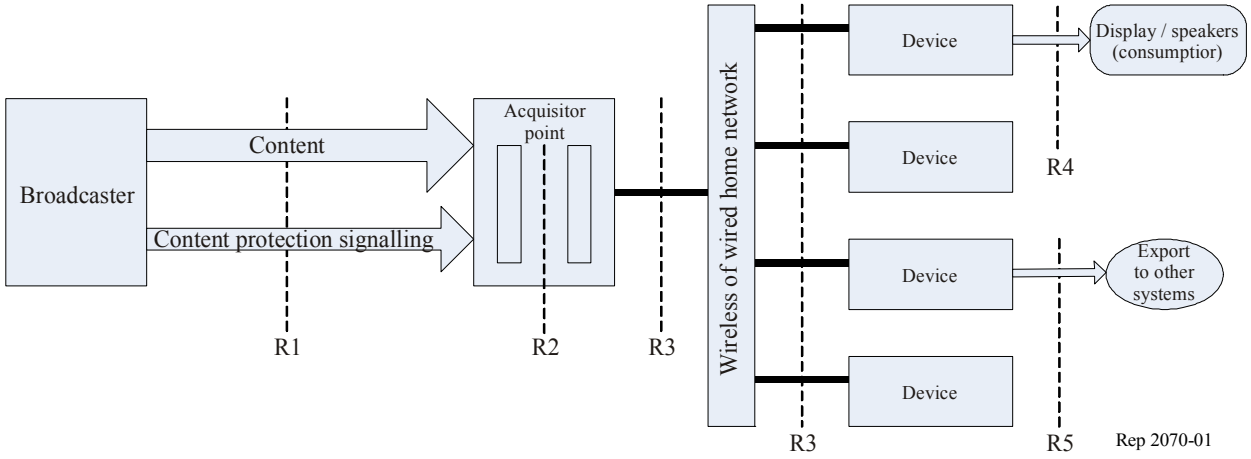
4 Architectural model

Content protection for broadcasting is a very complex subject, and many well-known proposals solve only part of the bigger puzzle.

Radiocommunication WP 6M will therefore use the following model to identify areas of study.

FIGURE 1

WP 6M content protection model



With this diagram we define a set of reference points at which requirements and/or solutions need to be defined. Some of the terminology used is based on the DVB (http://www.dvb.org) CPCM concepts.

The following diagram further breaks down these reference points into topics for consideration or study.

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