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The Evolution of Digital Television in Europe and the Regulation of Conditional Access (1991-1995)

By Campbell Cowie*

Summary

The application of digital technology to television transmission will revolutionise the home entertainment industry. The era of broadcasting a relatively small number of channels to as wide an audience as possible will soon come to an end, to be replaced by an infotainment industry, narrowcasting potentially thousands of information and entertainment services tailored for the interests of small groups or even individuals. This paper explains the development of digital technology and the many advantages offered over conventional analogue television. The consortium approach to the development of technical standards is discussed, as is perhaps the most contentious issue to date, conditional access.

1. Introduction

If technologists are to be believed, before the end of the century there will be a revolution that will change the lives of all Europeans. This technological revolution concerns the world of television. At present television transmission is basically about relaying a rather limited number of television programmes to as many people as possible, whereas after the promised revolution the focus will be on narrowcasting (or even pointcasting) services to small groups (or even individuals), offering varying levels of interactivity over potentially many hundreds of channels. The catalyst for this revolution is the digitisation of television transmission.

This paper is intended to provide some coverage and analysis of the path taken by the television industry towards this new era. A brief discussion of the present day television industry will be followed by an outline of the advantages offered by digital technology. When introducing any new product it is essential that the standard selected is acceptable to the market and so the standard setting process is of great importance, with this importance reflected in the strong focus given to that process within this paper. The most contentious issue to have arisen from the standard setting process is that of conditional access and so the topic merits an in-depth discussion. The paper then proceeds to outline the policies for the regulation of conditional access at both the European and the UK level, together with some feedback from the television industry on the proposed regulations.

2. Analogue Europe

Television pictures are at present carried by electrical signals that vary continuously with the brightness and colour difference of the picture. With component technology these signals remain separate, but with composite systems, such as PAL¹ (Phase Altered Line) and SECAM² (Sequential Encoded Colour Amplitude Modulation), the signals are combined to create the single composite signal.

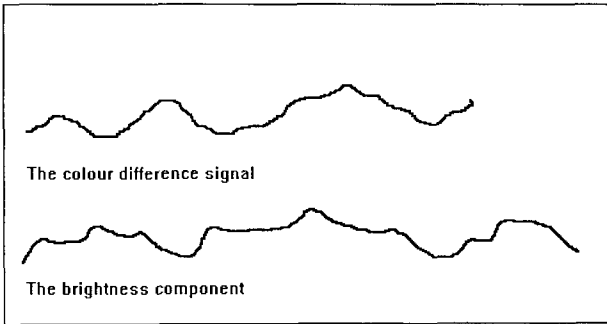
The intrinsic nature of the analogue signal renders it susceptible to a number of weaknesses, with signal distortion and interference commonplace at any point in the signal chain. These weaknesses mean that the picture received is often of poor quality and subject to ghosting. A more serious drawback, however, is the limited transmission capacity permitted by the use of analogue technology. For example, in the UK terrestrial television broadcasting industry, the 44 UHF channels utilized by the 4 broadcasters consume almost 400 MHz of valuable radio frequency spectrum. This has forced the ever growing mobile communications industry to move to the higher 900 MHz and 1800 MHz frequencies, requiring more expensive hardware and inhibiting the spread of mobile communica-

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¹ The standard for much of Europe, including Germany and the UK.

² The standard for France and much of Eastern Europe.

Figure 1



tions. Although not such a serious problem for cable and satellite, the use of analogue technology leaves the three delivery platforms with little scope for future growth.

UK Television Capacity

Delivery System	No. of Channels	Max. Potential Coverage (%)
Terrestrial	4-12	99.4
Satellite	60	70
Cable	50	70

Source: (CDG, 1994).

3. Standards for Analogue Europe

Despite the ambitions of the European Union, the television transmission industry is one in which the promised Single Market for all goods and services does not yet exist. The present structure of the European television industry clearly illustrates the problem, with a number of national markets employing differing transmission standards meaning different production (hardware and software) specification requirements.

During the last major technological upheaval in the television industry, the introduction of colour television, the European consumer electronics market was dominated by the large national champions, Nokia, Philips and Thomson. When colour television was introduced in the 1960s the French broadcasting authority, after consultation with domestic industry, adopted the system known as SECAM as the national standard, while the majority of the rest of Europe opted for the PAL system developed in Germany. Given the significance of the consumer electronics to European economies and the protectionist barriers that new standards can raise it is clear that decisions were made that were as much political as they were technical^{3,4}.

The outcome of that particular episode, with the multitude of national standards within Europe, means that

consumers are unable to benefit from the genuine cross border price competition promised by the Single Market, while hardware manufacturers are forced to operate with a large number of different production lines, each producing slightly different equipment to meet the requirements of the different markets. Clearly Europe suffers from the lack of a single standard.

4. Digitizing the picture

In the digital environment, the electrical signal representing the television picture is sampled at regular intervals, with each sample represented by a binary number. The binary number represents the approximate amplitude of the signal at each sample point. The binary digits (bits) provide the information used to reconstruct the television picture at the reception equipment⁵.

The digitisation of television transmission offers several significant advantages over the current analogue technology. The absolute nature of the digital signal, with either something or nothing (in terms of voltage), means that the signal is a great deal more robust than its analogue counterpart, with its continuously varying signal subject to severe degradation. Analogue signals, given their susceptibility to cross interference, need to be separated by so called taboo frequencies. These taboo frequencies are a major cause of the analogue system's inefficient use of the radio frequency spectrum.

The robustness of the digital signal and the ability to utilize complex error correction techniques with digital transmissions mean that it has a higher immunity from cross interference, so the taboo channels can be used gainfully to carry television signals. The Convergent Decisions Group have estimated that digital transmission technology utilizes the radio frequency spectrum eighty-eight times more efficiently than its analogue counterpart⁶. Digital

Figure 2

Sampling the Analogue Signal



Each sample is represented by a binary number eg 01100111.

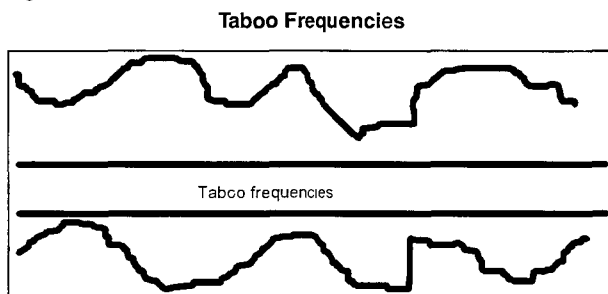
³ 95 percent of PAL and SECAM components are the same. The reason for the different standard decisions had to do with each nation's desire to control valuable access to patents.

⁴ 5.Brown, Cave et al. (1992).

⁵ The information packaging and transmission technique is somewhat complex and beyond the scope of this paper.

⁶ CDG (1995).

Figure 3



television offers great opportunity for increased efficiency in the use of what is a most valuable commodity. In a recent report compiled by the Adam Smith Institute regarding the proposed privatisation of the BBC transmission system, it was estimated that if analogue television transmission was shut down, the available spectrum could be worth as much as £5bn per annum to the UK Treasury⁷.

The increased number of channels makes possible the introduction of services such as video on demand and staggercasting, as well as interactive services such as home banking and games. Clearly this technology is desirable and the not insignificant advantages have not gone unnoticed by those involved in the industry, with a number of digital trials already having taken place. (UK trials have included BBC in March 1995, NTL, Eutelsat and BSkyB in February 1995. Canal Plus, Telepiu, Kirch and Bertlesmann all plan to launch commercial services in 1996.)

It is, however, of vital importance that the move to digital television is well planned, with each step carefully taken. The first important hurdle to be cleared is that of the standard setting process.

5. The standard setting process

The advent of digital transmission technology not only offers the advantages listed earlier. The digital television industry is a new industry and as such offers Europe a unique opportunity to finally engineer a Single Market in European television, with European level standardisation replacing the disparate collection of national transmission standards prevalent today.

Effective European level standardisation of transmission systems offers, in addition to cross border price competition and scale economies, the significant reduction in the uncertainty that often surrounds new technologies. Reduced uncertainty gives the manufacturers and, more importantly, the consumers, the confidence in the new technology that is essential if the take up of the new product is to be successful.

For the success of the new television industry it is essential that the standards which are specified are acceptable to both the manufacturers and the broadcasters⁸. The European television industry has a very recent experience of a

technology failing as a result of poor standardisation. The development of the MAC⁹ (Multiplexed Analogue Components) family of standards was an attempt by the European Community, in 1986, to introduce a single transmission standard for Europe. The MAC standard was developed as a response to the Japanese proposals for the adoption of the MUSE transmission system as a world standard for high definition television. Had MUSE been adopted as a world standard the effect on the already ailing European consumer electronics manufacturers would have been devastating, with the manufacturers from the far east highly likely to increase their market dominance. Again, clearly a decision was made that had as much to do with protectionist politics as it had to do with technology.

The MAC standard became so fragmented, with national governments selecting different variations of it (MAC essentially became a family of standards with DMAC, D2MAC and HDMAC three of the members) that many of the benefits of a single standard were lost and the standard weakened. Consequently, MAC was effectively steamrollered by the broadcasters who treated the new standard with complete disinterest. In the UK, for example, it was finally killed off when Sky Television, using a PAL transmission system on the medium powered Astra satellite, capitalized on the lack of technological foresight shown by the European Commission, and upon the regulations forcing BSB to wait until the relevant MAC chips were commercially available, to build up a sizable installed market base. Once Sky had gained a strong foothold in the direct to home satellite market it was inevitable that the MAC orientated BSB would fail, and in 1989 the two operators merged to form BSkyB, using the PAL transmission standard. The MAC Directive only covered transmission via high powered satellites, while unforeseen technological advances made it possible for lesser powered satellites to relay television signals, permitting the Astra satellite to operate outwith the Commission's jurisdiction.

The MAC debacle was an expensive embarrassment for the European Commission, costing some 900m ECUs¹⁰ in development and marketing. However, the Commission learned some valuable lessons from this unhappy episode. The MAC standard failed because, despite the promised incentives¹¹, the European broadcasters were not prepared to be coerced into its acceptance. Although the manufacturers were in favour of the new technology, it

⁷ ASI (1995).

⁸ Consumers are unconcerned about the transmission technology, caring only about the delivered services.

⁹ A transmission standard designed to offer pictures superior to PAL and Secam and developed for satellite transmission.

¹⁰ Broadcast (1994).

¹¹ Broadcasters were promised subsidies if they would help save the ailing standard and accept the mandating of the standard.

became clear that without acceptance from all market players, any hierarchically imposed standard was doomed to failure. On the positive side however, the Eureka programme¹² did show the potential benefits to be reaped from cooperative behaviour and coordination on research and development. Increased coordination, including all market players in the development of new standards, can dramatically reduce the probability of a new standard being simply steamrollered by the market.

The gains to be had from cooperation in standard setting have not gone unnoticed, with the formation of a growing number of industry consortia, such as the ATM forum and DAVIC. This form of voluntary standard setting by committee is highly attractive, as the very market players whose consent and assistance is essential to the success of any new standard are heavily involved in the standard setting process itself. Industry consortia should really be looked upon not simply as means of developing technical standards, but as a medium for collective research and development, where risks and expertise can be shared. It is no coincidence that many of these consortia are formed in industries where the required investment, and risk taken, in developing a new product is high.

One such committee has been responsible for the standards that have been set pertaining to digital television in Europe. This committee is known as the Digital Video Broadcasting Group, or the DVB.

6. The DVB story

The story of the DVB begins really with the birth, in Germany towards the end of 1991, of the European Launching Group for Digital Broadcasting (ELG). Mr. Peter Kahl of the German Federal Ministry of Communications recognised early the strategic importance of digital television and, having witnessed (and learned from) the MAC debacle, set about gathering together interested parties from across the European television industry to coordinate research under the umbrella of the ELG¹³.

After some early setbacks¹⁴, the group quickly grew, with representatives from broadcasting, manufacturing and from national regulatory bodies. Other research programmes, such as the Nordic DIVINE project were brought into the fold in order to minimize the duplication of work, maximize the expertise and prevent a disparity of technical standards. At this point, the intended focus of the Group's work was to specify a digital transmission standard for European high definition terrestrial television, an interest shared by the majority of members, but this direction was altered with the assimilation of those involved in the Astra project, such as BSkyB¹⁵. The focus of the Group's work became geared more towards multichannel satellite broadcasting. This change was for no technical reason, but had more to do with the satellite group's willingness to invest in the new technology, while the terrestrial interests had wasted a great deal of time talking about the possibilities

without committing themselves to the serious investment required to bring the possibilities to reality¹⁶.

The Group continued to expand, with new members from across the globe putting the project firmly in the standard setting spotlight. A memorandum of understanding (MoU) was drafted to lay down the rules for the formal operation of the project. The concept of an MoU was new to the Group and meant that the signatories had to develop an unprecedented level of mutual trust and appreciate the need for a collective approach to the development of the new industry. This MoU, signed in September 1993, regularised the Group in the form of the Digital Video Broadcasting Group. Within the MoU are highlighted the prospects offered by the DVB in developing a unified terrestrial transmission system that avoids the problems caused by the multitude (PAL, SECAM and variants of these) of transmission systems currently existing within Europe. The MoU also recognises the importance of the DVB project to the competitiveness of Europe's high tech industries and to European competitiveness in general.

Article one emphasises the importance of being market driven (not making the same mistakes as with the MAC standard) and moving forward in a harmonious and consensual manner. Article 3 outlines the deliverables hoped for by the signatories to the MoU.

Deliverables hoped for

- a. Draft standards incorporating MPEG2 in order to begin services in 1995 (for cable and satellite)
- b. Draft standards for terrestrial transmission to be ready by the end of 1995
- c. Draft standards for related receiving equipment
- d. Development of a technology base within Europe to exploit the market for the new technology
- e. Encourage a market led approach
- f. Increase the information flow between interested parties
- g. facilitate world wide cooperation.

¹² Eureka is an industry led intergovernmental research programme which was largely responsible for the development of MAC and HDTV (Peterson, 1993).

¹³ Early members included the BBC, NTL and the DTI.

¹⁴ The French authorities, because of the significant investments made in MAC by Thomson, were initially uninterested in the ELG.

¹⁵ An announcement was made by BSkyB regarding their plans for the development of digital services and with the market led philosophy of the ELG, invitations had to be sent to all parties working on the development of digital services, irrespective of the delivery platform.

¹⁶ Barry Cox of ITV has recently expressed his wish that the damn thing had never been invented." (The Guardian, 18/9/95), while Andy Allan of Carlton confessed "none of us has a clue", in the same article. This illustrates clearly the fact that many of the terrestrial operators are still unsure as how best to deal with the new technology and are wasting valuable time.

The MoU also outlines the structure of the project and the responsibilities of each subgroup or committee.

General Assembly

The GA will meet once a year to oversee the project management and appoint the members of the Steering Board.

Steering Board

The Steering Board consists of a maximum of 34 elected representatives, with only parties willing to contribute resources to the DVB being able to supply candidates for election. The Steering Board is responsible for the policy direction of the DVB project, the day to day management of the project, providing advice to public authorities, amending the working structure of the DVB, electing a chairperson every two years, establishing rules and procedures (including voting rules whereby a 3/4 majority should be required), dealing with procedural disputes and keeping signatories informed on all aspects of the DVB's work.

Terrestrial Commercial Module

Open to senior personnel from any signatory involved in the provision of services and or products; this group provides the definition of service requirements, priorities and time scale requirements to the Technical Module.

Satellite and Cable Commercial Module

Open to senior personnel from any signatory involved in these transmission media; this group provides the definition of service requirements, priorities and time scale requirements to the Technical Module.

Technical Module

This module provides the technical expertise and is open to technical experts from all signatories.

It was hoped that the DVB project would avoid the mistakes of the MAC experience, where broadcaster's advice and market requirements were ignored. It was also hoped that the DVB process would generate specifications speedily and be ready to pass these specification on to the relevant standard setting organisation and the European Commission in time for the planned launch of digital services. The importance of haste was emphasised by Canal Plus, who said that pay tv operators would not delay the launch of their own services, especially in light of the launch of digital satellite services in the United States (DIRECT TV), and that endless discussions would force broadcasters to revert to private development programmes.

The DVB project has been amazingly successful in achieving its aim of producing specifications for standards relating to digital broadcasting within the time period

specified in the MoU. In the fast moving and challenging environment of digital technology development, the fact that over 170 organisations from 18 countries have been able to achieve consensus on some highly contentious issues in such a short period of time is impressive to say the least.

The success of the DVB in an environment where speed is of the essence is largely due to the well focused nature of the work undertaken. For each delivery system, the user requirements are specified by the appropriate Commercial Module and these recommendations are used as constraints on the final specifications. In other words, the Commercial Modules outline the broad parameters for the system, such as the price band and the user functions that form the basis for work subsequently undertaken by the Technical Module. The Technical Module then returns the specifications to the relevant Commercial Module for approval before they are finally approved by the Steering Board. This commercially led approach is in stark contrast to the more common technologically led standard setting process pursued by those such as ETSI.

This simple process has been highly efficient and has generated a large number of specifications in a relatively short period of time. The DVB family currently consists of 7 specifications¹⁷.

1. DVB-S The satellite system specification is designed for use in the 11/12 GHz band and is flexible enough to suit a wide range of transponder bandwidths and powers.
2. DVB-C The specification for cable transmission is compatible with DVB-S and is to be used with a 8 MHz channel.
3. DVB-CS Adapted from DVB-C and DVB-S, the SMATV system is used to serve community antenna installations.
4. DVB-T Specification designed for terrestrial 7-8 MHz channels.
5. DVB-SI Service information system specification to be used by the DVB decoders to help the user navigate bit streams.
6. DVB-TXT The teletext specification.
7. DVB-CI The common interface specification.

The advantage that industry organisations such as the DVB have over established standard setting organisations such as ETSI is one of speed. While specifications produced by ETSI are required to go through a lengthy consultation process whereby interested parties give their views on the proposed standard, the process through the DVB is speedier as those interested have been party to the development of the specification on an on-going basis. Given that the specifications are passed onto ETSI¹⁸ in a

¹⁷ DVB, Going ahead with Digital Television (1995).

¹⁸ The DVB has no authority to set standards. The appropriate standards setting bodies for digital television are ETSI and CENELEC.

form they find acceptable, the process is greatly speeded up. Following approval by the Steering Board the standards are passed on to the relevant standards body for formal ratification. DVB-S and DVB-C have already been standardised by ETSI and were published formally in January 1995, with DVBS becoming ETS 300 421 and DVB-C becoming ETS 300 429. The SI, TXT, and CS specifications have all been submitted to ETSI for formal approval in autumn 1995. DVB-SI will become ETS 300 468, DVB-TXT will become ETS 300 472 and DVB-CS will become ETS 300 473. The lack of serious interest from the terrestrial broadcasters means that work on the standard for terrestrial transmission was slow to start and although the specifications have been approved by the DVB Steering Board, the formal standardisation process is as yet incomplete. In addition to these the Common Interface specification agreed in March 1995 is now with CENELEC for standardisation.

Despite the remarkable success of the DVB, one issue has been the subject of heated debate and has illustrated a significant weakness in the industry consortia approach to standard setting. This is the issue of conditional access.

7. The Conditional Access debate

Conditional access is the process of determining which individual digital receivers shall be able to receive particular programmes. Conditional access concerns subscription television and as such has an important role in the development of digital television, offering broadcasters an additional method of revenue generation. Conditional access provides broadcasters with a source of revenue that will become increasingly important given the likely vast increase in the number of channels and the relatively fixed levels of advertising expenditure.

The control of access to transmitted services is carried out by two principal technologies. Firstly, a means has to be found of scrambling and descrambling transmission signals and, secondly, a way has to be found of controlling the descrambling so that only selected receivers (those that have subscribed) receive the signal. The first process requires some form of scrambling algorithm and this was quickly developed by the cryptologists within the Conditional Access Specialist Group. The specification process for the Common Scrambling Algorithm was an undoubted success with agreement from all signatories, but similar agreement on the second technology, that of conditional access, was always likely to be more difficult.

In March 1994 Prof. Ulrich Reimers proposed a number of options for conditional access systems. Of the three systems it was argued that one in particular was the most appropriate as it required only a single decoder box with bilateral/multilateral contracts between broadcasters and subscriber management system providers. However, after discussion it was decided that a second option, involving detachable conditional access modules also merited investigation.

Option one mentioned above is the system that has become known as the Common Interface (or Multicrypt). Detachable conditional access modules are connected to the 'host' or set-top box via a common interface. The 'host' contains MPEG-2 level decoding technology, together with a demodulator and the intelligence equipment required by the decoder. The common interface, the link between the proprietorial conditional access module and the decoding host, is of vital importance, as it permits a variety of conditional access modules to interact with the host. The PCMCIA-like interface carries the demodulated data received by the host across to the conditional access module, which verifies and unscrambles the signal, that is then returned across the common interface to the decoder. The essence of the common interface is that the host and module can interact without the host having to identify the particular type of module being used.

The supporters of the Multicrypt option believe that this system will facilitate free competition in the conditional access market and prevent a single operator from determining which programmes are available through the receivers. Multicrypt offers the potential to upgrade or change the conditional access system simply and cheaply by replacing the detachable module, with no need to replace the entire set top box. The ability to change or upgrade the conditional access module reduces the consumers fears over system obsolescence, thereby encouraging the early take up of the new technology. With a common interface and detachable conditional access module, set top box manufacturers need not concern themselves with broadcaster specific requirements, allowing for significant scale economies and genuine competition in the market for set top boxes and integrated television sets. Multicrypt also facilitates competition in the conditional access market, allowing broadcasters to choose between competing services, encouraging the development of ever more efficient encryption techniques.

The third option illustrated above has become known as the Simulcrypt option. With the Simulcrypt technology proprietorial access controls can be connected to a common scrambling process, allowing all European operators to access all European decoders. To gain access to all European decoders, broadcasters will have to negotiate access to each conditional access system with the appropriate monopolist. One drawback of such a system is that the required negotiations could prove expensive and detract from programming budgets. Fair access would have to be granted to systems in all areas for Simulcrypt to be accepted by the broadcasters. Proponents of Simulcrypt propose to segment Europe with different proprietorial systems within each geographic area — in effect creating territorial monopolies.

The Simulcrypt option (supported mainly the providers of analogue subscription services, such as Canal Plus, Premiere and BSkyB) offers a number of advantages over the common interface. The experience gained by those

offering existing encryption services in the fight against piracy in the analogue world may be worth the price of monopoly in the digital environment. The partitioning of Europe into territorial monopolies offers some protection against the pirates. For example, if the proprietary system in Belgium is breached by the hackers, then it is only the market in Belgium to which the pirates have access — the rest of Europe is safe. It is also fair to argue that the conditional access system is a natural monopoly, with the duplication envisaged by the common interface being highly inefficient. The existing providers of such services have the experience and technology to operate subscriber management systems in the digital environment as they have done successfully in the analogue world.

Although no-one as yet knows exactly how the digital tv market will develop it seems likely that proprietary conditional access systems will become dominant and as such, it was felt by the DVB that a code of conduct should be developed in order to calm the fears of the non-pay tv broadcasters concerning access to conditional access systems and so smooth the path towards agreement. In Frankfurt on May 19, 1994, the ad hoc group on Code of Conduct for Conditional Access, chaired by Peter Kahl, were given the task of improving on an earlier effort made by the pay tv operators to prepare a code which would outline the principles by which third parties would be granted access to digital encryption services. This code was to be a rather important part of the package covering all elements of conditional access. The basic objectives of the code are:

- to facilitate an early conditional access infrastructure for digital television services
- to ensure that consumers will not need to acquire a multiplicity of decoders for receiving multiple digital television services from different sources.

The code itself was designed to come into effect when a number of relevant parties had signed it and is to remain in force until January 1997 at which time the code will be renegotiated in a more certain market.

While boasting of the DVB's successes in development of digital services, Kahl expressed his concerns in September 1994 over the length of time being taken to complete the conditional access package, with special concern reserved for the code of conduct. It was stressed that agreement had to be based on the acceptance of the whole package, not just the code.

The entire conditional access package was to be put in front of the Steering Board on September 27, 1994, for final approval and if it were not possible to present an agreeable package then a declaration would have to be made to the European Commission that a consensual agreement could not be reached. The consequence of such a declaration would be that the Commission would be forced to regulate on the issue, which was an option the DVB had strived to avoid. Although the code is the maximum agreement that could have been reached given the many conflicting in-

terests within the DVB, some, such as Stephen Temple of the DTI, privately expressed concerns over the credibility that the code would have with a majority of the broadcasters that were the intended beneficiaries. Kahl acknowledged that without a sizable majority in favour of accepting the code it would be impossible to move forward and recommended acceptance of the conditional access package to the DVB General Assembly. The opinion of the membership was canvassed with the circulation of a questionnaire. The result was, it seemed, conclusive, with 80 per cent in favour of accepting the voluntary and non-binding code. What this result in effect means is that while the DVB approve of both the Multicrypt and Simulcrypt options, the Common Interface was not made mandatory, leaving decisions as to its inclusion in the set top box entirely to the manufacturers. This increases the probability that proprietary systems will dominate the market, with the manufacturers unlikely to go to the extra expense of including the optional common interface. The DVB, with this vote, were stating their belief that the code of conduct would be sufficient to police the behaviour of the conditional access system providers.

The size of the majority in support of the code would appear to have been significant. However, when the questionnaire itself is studied closely, it is clear that it would have been difficult for those opposed to the code to register their dissent in a clear and unambiguous manner.

8. The questionnaire

1. I will sign the Code as CA-Provider
2. I will sign the Code as Broadcaster
3. I am likely to sign the code as Broadcaster when I am ready to enter the digital pay tv market
4. I support the code but will not sign it, because I am neither Broadcaster nor CA-Provider
5. I will not sign the code because it is not useful nor necessary.

The available options in the questionnaire may help to explain why only sixty three out of a possible 147 DVB members even returned the forms¹⁹. Concern has not only been raised about the low number of returns, but about the basis by which the eighty per cent majority was claimed. When the returned papers are inspected closely the result becomes very interesting. Of the forty five broadcasters affiliated only twenty nine returned the questionnaire, with seventeen in favour and twelve against. Eighteen of the sixty six equipment manufacturers returned their forms, with all in favour. Of twenty seven network operators, thirteen replied with thirteen in favour. And with only three of the

¹⁹ A number of signatories felt it necessary to alter the questionnaire by including another option on whether or not they accepted the code as it was.

nine regulatory bodies replying (2 in favour 1 against), the strength of the vote in favour of the code has to be questioned. Of the sixty three papers returned, a total of fifty were in favour and thirteen against. It is the 50:13 result that is the basis of the eighty per cent claim. The DVB membership as a whole cannot be argued to have been in favour of accepting the code to the extent claimed by Peter Kahl. Taking the votes cast by those most affected by the conditional access issue, the broadcasters and the conditional access providers, the result looks remarkably different from the eighty per cent in favour claim. Of the votes cast by these bodies, seventeen were in favour with twelve against accepting the code. Even this majority should be questioned with nine of the broadcasters voting in favour of the code having interests in the provision of conditional access services²⁰. The details of the vote clearly illustrates the polarization of the membership on the issue of conditional access.

The DVB was clearly embarrassed by the result and tried to cover up the failing to mention the controversy caused by the issue in the press release on September 28, 1994. The press release infers that the result was a clear cut and unanimous one, with no real details of the vote included. The DVB have gone to great lengths to conceal the result of the vote, and the press release has been heavily criticised, being referred to as nothing more than a fig leaf. The press release failed to mention that the decision on the code of conduct was reached with the use of a majority vote, quite unlike the consensual approach to the rest of the package.

While accepting in principle the need for a code of conduct, many signatories have expressed their concerns about the code constructed by the DVB. ZDF, ITV and the EBU express concern over the possibility of monopoly abuse. They claim that there are no safeguards against gatekeepers discriminating and taking unfair advantage of their position (access is not guaranteed), with the code permitting a very one sided balance of power in the market for third party access to conditional access services. The lack of transparency in the negotiation process means that the third party has no way of knowing if they are being discriminated against. Crucially, broadcasters would have no access to the valuable viewer information gathered by the subscriber management services under the code, causing a great deal of anger to broadcasters who believe this information should be made available to aid their programming planning. The BBC were so opposed to the proposed code that they waged a secret war against its acceptance, attempting to persuade like minded signatories to join them in a concerted effort to defeat the code.

The polarization of the DVB on the issue of conditional access illustrates clearly the effect that self interest can have on the normally consensual specifications process. Whenever there is strong self interest, as in this case, clearly the consensual approach to standard setting is unlikely to work.

The conclusion of this episode, the acceptance of the conditional access package, meant that the DVB had to

recommend to the European Commission that regulatory intervention would not be required as the DVB signatories had agreed to be subject to the code of conduct. The DVB clearly were of the opinion that for effective policing in the conditional access market, the code, plus existing competition law, would be sufficient.

9. European policy on the regulation of Conditional Access

Those who felt aggrieved by the DVB's decision to avoid mandating the Common Interface while also refraining from imposing firm regulations on the provision of conditional access services, had a further opportunity to influence European policy on the regulation of conditional access services.

Supporters of the Multicrypt option lobbied extensively members of the European Parliament, conveying their fears on the potential for monopolistic abuse by the providers of conditional access services²¹ and about the lack of regulatory controls, in the hope that the Parliament would propose acceptable amendments to the draft Directive²².

In outlining the issues confronting him, the Parliament's rapporteur, Gerard Coudron, illustrated the difficulty of coming to any form of satisfactory agreement. While the code does not guarantee fair play and nondiscriminatory access, imposing a mandatory common interface could possibly delay the introduction of digital services by up to two years²³.

After a great deal of consultation with the industry, including representatives from the DVB, Caudron proposed a number of amendments to the draft Directive, which he argued would help to establish a firm commercial and economic footing for the development of the new industry. Amendment 5, made to Article 4, is the most significant amendment as far as the issue of conditional access is concerned. While recognising that conditional access operators are entitled to earn „a fair return" on their investment, this amendment proposes that broadcasters should be permitted access to conditional access services „on a fair, reasonable and nondiscriminatory basis", with access being policed by national governments. Caudron's amendments also include proposals to make decisions on granting access a great deal more transparent, with the providers of such services required to keep separate accounts for each level of their activities. The proposals also include a paragraph proposing that member states also take responsibility for the arbitration of disputes, creating easy and inexpensive resolution procedures.

²⁰ ATM (1994).

²¹ BBC (1994).

²² COM(94)0455.

²³ While the Common Interface will not have completed the formal standardisation process until late 1997, Simulcrypt will be available by the start of 1996.

These proposed amendments are a typical compromise between those seeking a mandatory common interface and those supporting proprietary systems subject to the DVB code of conduct and existing competition law.

The proposed amendments to article four, concerning conditional access, were accepted by the European Council of Ministers despite fierce opposition from the UK.

The amended Directive²⁴ means that existing conditional access service providers, such as Canal Plus, are likely to lead the new industry, with the proprietary Simulcrypt system quickly becoming dominant and Europe being segmented into incompatible conditional access territories. The politicians of Europe appear to have traded the benefits that could have been gained from competition in the Single Market for encryption services, for the early development of digital services.

The Directive, although passed by the Council of Ministers, has still to be accepted into national legislation within the Member states. It is therefore useful to outline the plans of a national government for the regulation of conditional access services.

10. UK policy on Conditional Access

Given the UK's position at the forefront of the digital television industry, the UK Government's proposals for the regulatory framework for digital terrestrial television were keenly awaited as a guide to how the European Directive would be implemented at the national level.

The UK Government has long taken the approach that mandating the common interface would adversely affect investment in digital services, with those who would have been prepared to make significant investments in the new industry being forced to offer the use of the product of their investments to free riders, who were not prepared to take the risk, but still wished to receive the rewards. The UK Government believed that those prepared to take the risks should also be in a position to reap the rewards²⁵.

Clearly the proponents of open access had cause for concern over the issue of exactly how tough the UK Government stance was going to be on the regulation of conditional access, especially so considering the UK's fierce opposition to the European Directive.

Had the Government taken the line proposed by BSkyB, that the regulation of conditional access should be left to existing national and European competition law, as well as the agreement signed at the DVB, then any operator with the courage to make a complaint against the dominant market player would have to have sufficient finances to fund an investigation that could run for as long as two years²⁶. Many small operators would not be in a position to fund such a complaint, with the costs running into hundreds of thousands of pounds. The UK Government, after a lengthy delay, opted for an alternative approach. In the policy document *Digital Terrestrial Broadcasting*²⁷ the Government

outlines its proposals for the introduction of digital terrestrial services in the UK. Among those proposals is a section dealing with the issue of conditional access. The UK Government proposes to ensure that providers of encryption or subscriber management services are not permitted to behave in a discriminatory fashion, selecting one operator's programmes over another, nor are they allowed to refuse access to their services without good reason. Access to conditional access systems should also be granted on "fair and reasonable terms".

Rather than leaving the policing of the conditional access industry to existing competition law and the Office of Fair Trading, the UK Government has proposed to grant Ofcom the responsibility for regulating this market under the Telecommunications Act. Despite the role of advisor allocated to the Independent Television Commission (ITC), those at the ITC are unimpressed with the proposed regulatory structure. The ITC clearly assumed that their existing role as regulator of commercial television in the UK would assure their place as regulator of all to do with television in the digital era. This was not to be.

In the consultation document, *Beyond the Telephone, the Television and the PC*²⁸, Ofcom outlines its own ideas for the regulation of conditional access, primarily in the broadband switched communications industry. Ofcom argue in this document that methods of securing payment in the digital era could prove highly problematic, with the great expense required to establish an efficient subscriber management system preventing serious competition in this market. If the regulatory structure is ill thought out then Ofcom quite correctly point out that a single company could possibly dominate this new industry. Throughout this document the theme of open access is prevalent, and it is clear that Ofcom, as a regulator, will aim to regulate for open access in the digital conditional access environment.

The role of regulator remains hotly disputed, with the ITC still adamant that the role really should be theirs. The ITC have released a draft of a UK national code of conduct, outlining how they plan to regulate the industry²⁹.

The ITC's mandate, outlined in section 2(2) of the *1990 Broadcasting Act*, requires them to ensure that there is fair and effective competition in the market for television services. Within the published draft the ITC highlight their wish to encourage the development of a conditional access market where the consumers require only a single decoder. While arguing that conditional access service providers should be allowed to earn a "fair return" on investments, the

²⁴ ATM (1995).

²⁵ ITC Parliamentary Bulletin (1995).

²⁶ New Media Markets (1995).

²⁷ DNH (1995).

²⁸ Ofcom (1995).

²⁹ ITC (1995).

ITC also believe that broadcasters should be permitted to negotiate access on a "fair, reasonable and non-discriminatory basis".

This draft goes further than the European Directive by defining the circumstances under which the conditional access service providers would not be obliged to provide access. Broadcasters may be excluded if their inclusion would cause "unreasonable administrative burden, inefficiency or expense".

ITC licensees found guilty of anti-competitive behaviour, after an investigation, would be subject to sanctions set out in the *1990 Broadcasting Act*, including financial penalties and the possible revocation of the ITC license.

No matter who eventually has the responsibility for the regulation of conditional access, it would appear from the information available that ensuring open access will be a priority, with stiff penalties for those not complying.

The issue of choice of regulator promises to not go away until the issue is settled by Parliament.

11. Conclusions

There are a number of conclusions to be made regarding the digitisation of television transmission in Europe. These are summarised below.

1. There are strong technological, economic and political reasons for switching to digital television, but great care has to be taken to ensure that the path to introduction is smooth, and that each step is carefully planned.
2. The MAC episode illustrates well that without the acceptance of all the market players, hierarchically imposed standards will fail.
3. It is dangerous to mandate an anticipatory technological standard in an environment subject to innovation, especially where there is no demonstrated demand from the market players.
4. In high risk, high investment industries, the industry consortia approach offers a speedy alternative to the more traditional standard setting organisations. The market led strategy and consensual approach has worked well in producing specifications for digital television. The growing number of market led consortia may well lead the next generation of standard setting organisations, overthrowing the more traditional bodies.
5. The row over conditional access, and the subsequent disquiet about the result, illustrates the effect that strong self-interest can have on the consortia approach. The traditional standard setting bodies have a number of checking and balancing processes to deal with such self-interest disputes. This episode would suggest that leaving standard setting entirely to market led industry consortia could be dangerous, with powerful lobby groups able to disrupt the normally harmonious and consensual approach. It may be that introducing some of the balancing processes common in the more established bodies will slow the process down, but that may be a worthwhile concession to make in order to maintain the advantages inherent in the market led consortia approach.
6. Digital television will offer a vast number of opportunities to the European television industry, but prior to the transmission it is essential that the industry has in place a regulatory framework that will provide for firm economic foundations. Conditional access will be the primary source of revenue for a large number of the new channels and as such it is important that the conditional access market is permitted to develop in a fair and competitive environment. Until the industry is in operation, it will not be possible to gauge how successful the proposed regulations will be in ensuring this fair competition, but the existing proposals, both at European and UK levels, would suggest that access to encryption services will be tightly regulated, with open access a priority.

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Zusammenfassung

Die Entwicklung des digitalen Fernsehens in Europa und die Regulierung von „conditional access“

Die Verwendung digitaler Technologien in der Fernsehübertragung wird die Branche der Unterhaltungsindustrie für private Haushalte revolutionieren. Die Zeiten, in denen eine relativ kleine Zahl von Programmen für ein möglichst großes Publikum gesendet wurden, neigen sich dem Ende zu. An ihre Stelle tritt eine Informations- und Unterhaltungsindustrie (infotainment), die Tausende von auf die Interessen kleiner Gruppen oder sogar Individuen zugeschnittener Informations- und Unterhaltungsangebote an eine jeweils eng begrenzte Zahl an Interessenten sendet. Das vorliegende Papier führt in die Entwicklung der digitalen Technologie ein und beschreibt die vielen Vorteile gegenüber konventionellem analogem Fernsehen. Die Vereinbarung technischer Standards durch Konsortien wird ebenso diskutiert, wie der bis heute wohl umstrittenste Punkt der Debatte, der des bedingten Zugangs.