

OPEN STANDARDS AND INTEROPERABILITY IN EU DIGITAL TV: ECONOMICS AND POLICY ISSUES

NICOLA MATTEUCCI

ABSTRACT. The quest for interoperability of interactive TV has been a major concern of the EU Institutions. Its policy foundations were built on the enabling role of open standards, whose peculiar standardization process should guarantee affordable and widespread intellectual property rights. After having received considerable public support and financial funds, the interactive TV roll-out appears disappointing, and the diffusion of the main concerned standard, the multimedia home platform, stagnates. We conduct a comprehensive analysis of the main market facts and passages of interactive TV policy, to derive a multifaceted assessment of its technological, economic and institutional drivers. Several important issues stand out. Besides the inner complexity of the policy, a few normative inconsistencies and conflicting aims adversely impacted its feasibility. Several logical ambiguities also dampened the correct choice of instruments. In particular, the existing literature clarifies two main points: open standards cannot be uncritically assimilated to open source software, and the role of open standards along the broadcasting value chain is largely unexplored. Consequently, their effects here might differ from those experienced in traditional information and communication technologies markets. Finally, a certain evidence of regulatory capture of the EU policy-maker emerges.

1. INTRODUCTION

The quest for technical interoperability of Information and Communication Technologies (henceforth, ICTs)¹ has been a major concern of the EU Law and policy-making. As interoperability caters for both scale and network externalities, and enlarges consumer choice, it also fosters ICTs diffusion and enables the full exploitation of their potential. Mostly, interoperability is achieved with the implementation of technical standards, either *de facto* or *de jure*, the most important type being interface standards. However, some of these standards may qualify as ‘Trojan horses’, since they embed essential Intellectual Property Rights (henceforth, IPRs) which may eventually lead to the same degree of market power and consumer lock-in which is associated with successful proprietary and non-interoperable solutions. At the same time, the role of IPRs cannot be neglected and they should be guaranteed fair institutional protection, to preserve economic incentives for investment and further innovation.

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¹A glossary of the abbreviations used in this paper appears after the reference list.

What is more dubious, is whether the traditional legal monopoly regime, as granted by copyrights and patents, still qualifies as the most appropriate instrument to develop the Information Society. Likewise, the possibility to frame new IPR tools and business models that cater for both private incentives and the public interest remains largely unexplored. So far, this debate has been mainly confined to the software industry, where innovative ‘free’ or ‘open’ business models have emerged: the Open Source Software movement (henceforth, OSS) is the main example of the search for a new IPR paradigm, conjugating investment incentive and interoperability. Also the EU Institutions’ Agenda has been recently influenced by this movement to open solutions, in different domains.²

A similar approach has also been adopted in new digital communication platforms, such as 3rd generation mobile communication (so called UMTS) and digital TV (henceforth, DTV), on the belief that these platforms could play a fundamental role in providing universal access to the Internet and its interactive services, especially for those citizens with low ICT skills prevented from traditional computer usage. Consequently, the EU Institutions have put strong emphasis and resources to promote the interoperability of interactive services through open standards. However, in UMTS and DTV markets the feasibility of open standards, newer IPRs and free business models remains largely unknown, and the debate among practitioners and policy-makers is often affected by ambiguities, starting from the very definitions of ‘interoperability’ and standard ‘openness’.

As a matter of fact, after several years of policy implementations, the market evidence on the Interactive TV (henceforth, ITV) in EU appears rather disappointing, and points to a few policy inconsistencies, the main element being the very possibility to transpose the openness criterion to a different and possibly incompatible domain – that of DTV. Moreover, in a few member states – in particular Italy – the actual implementation received by the ITV policy features illegal state aid measures colliding with the fundamental principles of technological neutrality and market orientation. In short, these policy shortcomings impinge on the internal coherence and functioning of the EU New Regulatory Framework for electronic communications (NRF, henceforth).

The present paper provides a comprehensive discussion of the main stylised facts, on the basis of the theoretical literature. In particular, an attempt is made to deepen our understanding of open standards, and their contentious applicability to the DTV value chain; more generally, it assesses the feasibility of the EU project, that of promoting ITV interoperability at the decoder level. Section 2 presents in an essential way the main technologies and operations performed along the TV value chain, together with the relevant competitive strategies. Section 3 systematizes the EU policy on ITV, illustrating its achievements and pitfalls. It focuses on the diverging views on ITV interoperability held by relevant stakeholders, and on the fine-tuning and final policy compromise reached by the Commission. Section 4 highlights the proposed interpretative framework, assessing the failure of the EU ITV policy, and of its main target – the MHP open standard. Section 5 concludes.

²In the EU’s antitrust policy the recent developments on the Microsoft case confirm the EU attitude towards interoperability. In the policy for the Information Society, EU and national E-Government plans are increasingly based on OSS solutions.

2. INTEROPERABILITY ALONG THE DIGITAL TV'S VALUE CHAIN

This section shows why, overall, interactivity and interoperability are more difficult to achieve in broadcasting, and highlights why they present original phenomena and higher degrees of complexity once they are declined to media markets, with respect to the traditional ICT world (computers and Internet).

The communication infrastructure and devices supporting traditional audiovisual TV services can be stylised in two main components, whose exact typology and topology is technology and platform-variant.³ On one side, we have the transmission network, which broadcasts the content to the consumer's premises. On the other side, at the household level we have the consumer's reception equipment, by which the signal is decoded and eventually displayed on the TV set. Concerning the reception equipment, two main alternatives exist for traditional TV-based reception:⁴ the analogue TV set, combined with a digital decoder (or set top box), and the more recent integrated digital TV set, including a digital tuner. These two solutions imply different usage properties, and also specific business strategies and policy implications.

The decoder solution was the first to be implemented, since the launch of the analogue pay-TV in the mid-Nineties, and still prevails. The main advantage of a separate box is its flexibility to accommodate other complex and potentially obsolescent components: in fact, in the pay-TV business model, the decoder embeds the Conditional Access System module (henceforth, CAS), which authorises the household's access to the platform and feeds the TV set with a decrypted audiovisual signal.

Nowadays, EU markets display two main typologies of TV digital decoder: a simpler one (also called 'zapper'), suitable for free-to-air (henceforth, FTA) digital services, is basically composed of a digital tuner and an EPG;⁵ a more complex type ('upper', see figure 1) contains other modules, which enable more elaborate computing functions.

This upper type of decoder contains a crucial component, the API (application program interface), which is a software layer managing the more complex functions and applications:⁶ for example, the API enables two-way communications – as in the case of truly interactive services (home banking or E-government) – and coordinates through the CAS module the pay-TV operations (subscriber authorization, purchase of TV events, etc.). On overall, the API coordinates and manages the informative fluxes within, from and to the decoder, providing external applications with a compatible interface. Once the API is standardised, it enables the portability of content and applications across different types of decoders, since they do not need to be re-authored to fit each system. In short, when the API interface is

³In fact, it varies according to the analogue or digital nature of the technology, and to the different platforms, wire line or wireless: coaxial cable, fibre optic, ADSL, satellite, terrestrial (UHF and VHF) and microwaves are the main examples.

⁴In the PC-based TV reception (not to be confused with the Internet TV), the signal is received via an external plug-in tuner (typical in terrestrial TV) and other apparatuses, connected to the PC motherboard (such as the external dish in satellite TV).

⁵The *electronic programme guide* is a close equivalent of the browser in the Internet world.

⁶Besides the API, these additional functions require other complex hardware components (CPU, memory, etc.), with respect to the FTA zapper.

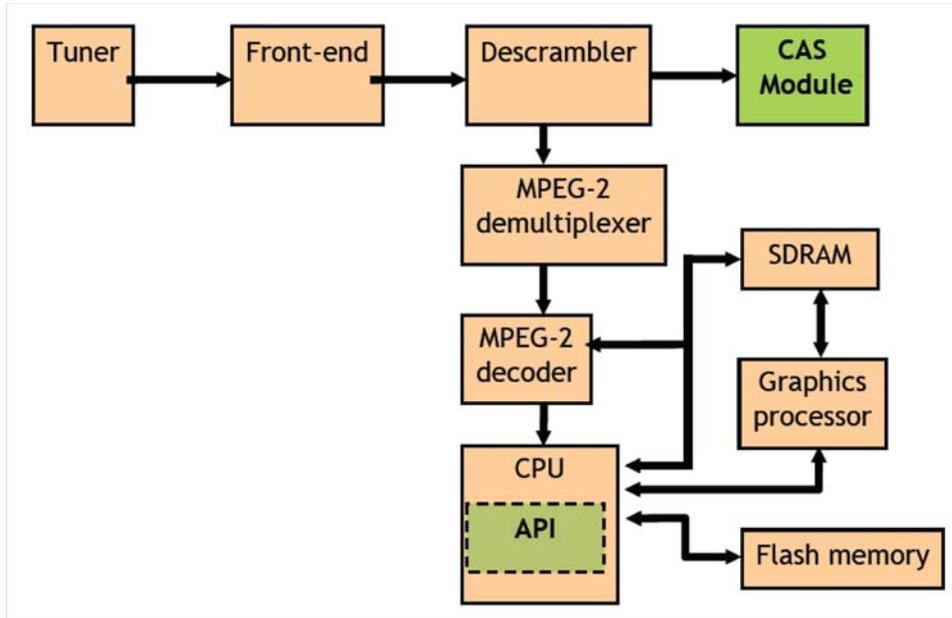


FIGURE 1. Typical structure of a TV decoder (“upper” type).
Source: Adapted from www.webinteractivetv.org

standardised, its leverage effect is magnified and it promotes the emergence of horizontal markets, which in turn enable economies of scale and – hopefully – affordable decoder prices.

Table 1. Main differences between proprietary and open APIs for DTV decoders

	Proprietary API	Open API
Domain	Typical in pay TV (satellite or cable).	Typical in FTA TV (terrestrial).
Property	Designed, owned and managed by one single company.	Standardised by an official SSO, often promoted by hybrid subjects (eg: DVB consortium for the MHP).
Licensing	Actual availability of specification for third party implementers may vary. IPRs licensed on discretionary terms.	Specification publicly available. IPRs licensed on FRAND terms.
Examples	MediaHighway (Canal+ group), OpenTV, Liberate, Microsoft TV, NDS (News Corp. group), PowerTV.	MHP (based on Java) (Italy); MHEG-5 (UK), OCAP (cable TV in US, based on MHP), JavaTV.

Source: Our elaboration on www.webinteractivetv.org

Due to strategic and secrecy reasons, CAS and API modules have been initially developed as proprietary systems, partly protected by industrial secrets and partly

by restrained IPRs. In these cases, these modules can be rendered interoperable with third party solutions only after *ad hoc* technical configurations and release of relevant source code – accompanied by discretionary IPR licensing agreements (see table 1).

However, these IPRs might also lead to market dominance and its abuse. Sometimes, the ways in which dominant firms manage their IPRs go beyond the legitimate interest of exploiting the associated legal monopoly rents or preventing piracy, and might also qualify as anticompetitive conduct (typically, in the form of discriminatory conduct or refusal to deal).⁷

Oligopoly theory has convincingly showed that, especially in network industries, strategies based on proprietary IPRs and incompatibility can embed powerful leverage and exclusionary effects, since they might raise consumer’ switching costs to such an extent that the competitive tension in the market is substantially sterilised. *Mutatis mutandis*, a similar foreclosure phenomenon might happen with premium content, since in pay-TV the latter is typically broadcasted under exclusivity clauses (see Nicita and Ramello, 2005, Ramello and Silva, 2008).⁸ In such situations, market shares behave as highly inertial, or even tend to further concentration (in a winner takes all outcome – see the reviews of Katz and Shapiro, 1994 or Gandal, 2002).

These stylizations explain the business facts regarding TV decoders and platforms, mainly in the case of vertically-integrated broadcasters – typical in the more concentrated pay-TV market. Here, most of the times the strategic intention underlying a firm’s denial of third party access to its own proprietary platform (for example, to its CAS module) is that of excluding rivals not just from the hardware layer, but mostly from the supply of broadcasting services. In this case, if the new entrant’s quest for interoperability with the incumbent platform is not answered (for example, either with a technical converter or the licensing of the dominant platform’ IPRs), the new entrant is vertically foreclosed.

At the same time, is also true that the incentives to interoperability depend on the competitor nature: once the fringe manages to obtain access to the incumbent’s platform and succeeds in acquiring a sizable base of customers, it would probably convert to the same ‘walled garden’ model – this is the so-called ‘time-inconsistency’ of the compatibility choice (see Besen and Farrel, 1994).

Further, media markets, with respect to traditional ICT ones, present a more complex structure of incentives to compatibility, since broadcasters display a larger set of strategic moves and business models. For example, face to the increasing digital audience fragmentation, broadcasters may consider profitable to extend their presence across multiple platforms, both traditional and new ones – the current move towards the Internet TV is a case in point. Moreover, broadcasters may adopt multiple business models – pay, FTA and mixed – which again add complexity to the stylised predictions on interoperability derived from traditional telecom markets.

On overall, market evidence seems to suggest that the defence of a proprietary and non-interoperable solution stands as an eligible strategy for incumbent and

⁷In US, these cases have often found an antitrust fix in the “essential facility doctrine”, abundantly extended to the new technological fields covered by IPR. In EU its application has been more parsimonious, and in general dubious.

⁸Moreover, in media markets the strategic leverage and network effects stemming from the technical platform and those from the exclusivity of the premium content reinforce each other.

pay-TV operators, while the reverse seems to hold for new entrants and FTA TV operators.

3. THE EU POLICY ON ITV INTEROPERABILITY

3.1. ITV interoperability in the NRF. The current UE policy for the Information Society, as today synthesised in the NRF and in supranational and national sources,⁹ stylises the EU industries providing electronic communications in two main segments, infrastructure and content; with reference to infrastructure, the policy (mainly within the NRF) is based on a few fundamental principles, including market liberalization, progressive substitution of antitrust for regulation, technological neutrality¹⁰ and market-oriented policy-making.

In particular, market-oriented policy-making is crucial, since it comes out of the reflection on the past errors of dirigisme,¹¹ and acknowledges the intrinsic difficulties of technological forecasting, the information asymmetries and the systemic nature of technological policies. Consequently, EU Law now envisages a market-driven regulatory process open to the consultation of different stakeholders (including, in theory, industry, academia and consumers representatives), with the ambition of regulating infrastructure while assigning to the market the task of selecting the best technological solutions, without distorting spontaneous competition.

A few regulatory measures are provided for, to prevent that market power dampen emerging competition; moreover, these *ex-ante* measures are set as temporary, and must be replaced by *ex-post* antitrust law, as soon as market competition unfolds.¹²

At the same time, content issues are covered by supranational (for example, the *Audiovisual Services Without Frontiers* Directive) and national legislation, in accordance with the principle of subsidiarity of the EU Treaty, which first reserves competence on content and cultural policies for member states (see Art.5 of the UE Treaty, as amended by the Treaty of Amsterdam).

However, a few regulatory inconsistencies arise from the NRF formulation and implementation. In principle, the NRF should only address communication infrastructure – including that for TV transmission – while previous broadcasting regulation was deeply intertwined between content and infrastructure. This separation, when going into the details, is not always clear nor predictable, because content and associated IPRs are increasingly linked to their technological support and transmission infrastructure. As a consequence, while most of the content issues receive a separate treatment from separate EU Law bodies, a few neighbouring

⁹These sources, mainly regarding content regulation, are various. At the EU level, a main example is the recent Directive on “Audiovisual services without frontiers”, approved at the end of 2007.

¹⁰Technological neutrality, in its basic flavour, says that the policy-maker should impose the same rules for the same services, irrespective of the underlying electronic communication platforms: as such, the NRF aims at unifying diverging TLC, Internet and Broadcasting regulations.

¹¹The main example being the case of the EU support to the expensive MAC project, the selected standard for analogue High Definition TV, during the Early-Nineties. It was later abandoned by market players, face to the prospective more promising development of its digital version.

¹²To ensure a smooth transition, these regulations build on the same principles of antitrust law: first, an assessment of market power of incumbent operators is carried out; second, if significant market power (SMP) is found, transitory remedies are imposed, such as “third party” regulated access to incumbent’s networks and associated facilities.

items are also covered by the NRF, which is based on different principles and structures of enforcement.

One main example of shared regulation are the NRF provisions for the interoperability of DTV interactive services, which lie at the intersection of the (previously separated) TLC and broadcasting industries. Basically, according to Art. 18 of the Framework Directive, a DTV interactive service (be it a quiz, a poll or an e-Government service) should be accessible without platform or service limitations, to promote the free flow of information, media pluralism and cultural diversity.

Concerning its enforcement, the Framework Directive prescribes a regime of decentralised support to be offered by member states (see Art. 18 (1) and (2), commented *infra*); only if these measures prove to be insufficient, the Commission must use a procedure similar to that generally aimed at ensuring interoperability of communication networks (ex Art. 17), eventually leading to mandatory adoption of standards by the Commission – as a last resort solution (see section 3.2).¹³

This complex and decentralised enforcement structure is clearly prone to coordination failures and information asymmetries; in some cases, it is also conducive to member states' abuses.

3.2. Diverging views on ITV interoperability. Despite its provisions on interoperability of Interactive TV, the NRF does not provide any workable definition of the two concepts; unfortunately, both concepts are highly multi-faceted and volatile, referring to the technological frontier. Here, we provide some introductory guidelines to the two.

1) Interoperability can be literally defined as the ability to work together or, more generally, as the property of being compatible with something else. When the term is used in the ICT and media industries, and referred to an electronic device (or a piece of software), one mainly focuses on the property of data exchange and processing, according to predefined specific purposes.¹⁴

Standards (both *de facto* and *de jure*)¹⁵ are the most usual and straightforward instrument to achieve interoperability, although they are neither sufficient nor necessary.¹⁶ Standards build on formalised knowledge, and inevitably embody IPRs, including patents and copyrights: a subset of these IPRs might turn out to be essential to market a well-functioning or economically affordable implementation of the original technical specification.

¹³In fact, Art. 17 says that the Commission establishes a list of standards whose use should be encouraged by member states, to the minimum necessary to achieve interoperability of digital communication networks and services (Art. 17.2). Only if the suggested list of standards is not correctly implemented, and as a result interoperability of networks or services in one or more member states has not been achieved, the Commission might intervene to order the compulsory implementation of these standards (Art. 17.3).

¹⁴Moreover, in communication industries the interoperability of services is an accompanying property of network interconnection.

¹⁵*De facto* standards, despite being widely accepted and used in the market, are technical specifications which did not undergo a procedurally formalised and consensus-driven process of adoption, carried out by a formally recognised standardization body. Standard Setting Organizations, beside formal standardization bodies (in EU: CEN, CENELEC and ETSI), increasingly feature industrial consortia and fora as initial actors or proponents: a main example here is the DVB, a industry consortium developing standards for digital broadcasting.

¹⁶In fact, complementary measures should be ensured: interoperability testing, reference implementations, technical assistance services and troubleshooting. Ad-hoc converters and industry guidelines can be alternatives to standards.

A large literature (among the reviews, see those of David and Greenstein 1990, and Matutes and Regibeau, 1996) shows that technical standards provide for scale and network economies, potentially enhancing total welfare. However, when there are strong network effects, first-mover advantages and premature standardization might irreversibly displace future superior alternatives (Besen and Farrell, 1994, Liebowitz and Margolis, 1996).

In principle, the policy-maker should critically evaluate the market's ability to efficiently choose between alternative standards; for example, spontaneous market acceptance could result either too slow or too fast (see Stango, 2004). Because of that, many believe that *de facto* market standards are inferior to *de jure* standards. On the other side, other factors (the difficulty of technological forecasting, the asymmetries of information, the role of industry lobbying and regulatory capture) might also alter the policy-maker's ability to select between competing alternatives. As a result, a third option has emerged, and Standard Setting Organizations (henceforth SSOs) – both traditional and new ones, including consortia and fora – have been experimenting participatory, consensus-driven and open standardization processes, mediated in some way by the market (see Funk and Methe, 2001, Greenstein and Stango, 2007).

In particular, open standards feature a wider plurality of stakeholders, and better guarantee the public availability of the embedded IPRs; in particular, their SSOs are bound to FRAND (fair, reasonable and non discriminatory) terms, while licensing their essential IPRs. However, the concept of 'openness' of a standard is tricky, being many-sided. Consequently, the measure of the public availability of its IPRs needs a multidimensional metrics (see Krechmer, 2006, West, 2003). For example, going to the financial sphere of licensing, FRAND terms do not necessarily imply small or cheap royalties, since the latter are usually proportionate to the importance of the concerned open standard, or to the number of the embedded IPRs. As a matter of fact, some commentators believe that FRAND licensing commitments are insufficient, and might turn out to be highly discretionary – especially when multiple essential patents are involved (see Treacy and Lawrance, 2008).

More generally, also *de jure* and even open standards might emerge from hidden agendas, as the regulator and/or the SSO become captured or dominated by a strong interest group. In particular, due to the powerful conditioning role of the mass media, this outcome is highly realistic in standard setting initiatives involving communication or TV-related technologies.

2) The second concept left undefined in the EU policy is that of Interactive TV. Its basic idea dates back to the second half of the Nineties. Faced with the increasing popularity of the Internet and its consequent boom at the end of that decade, TV operators – mainly FTA broadcasters and consumer electronics (henceforth, CE) manufacturers – started to figure out new ways of delivering TV services, featuring interactivity and additional services; these would have revived mature and stagnating FTA markets. Moreover, the next arrival of the Internet TV model was also prefigured. Further, at that time the fast development of pay-TV (enabled by digital technologies) was urging a new generation of more intelligent decoders, and the upgrading of its core component – the API – which should have gradually enabled new transactional functions (see the 'upper type' in figure 1).

These favourable techno-economic prospects spurred the Digital Video Broadcasting (henceforth, DVB) consortium into action, which embarked in the Multimedia Home Platform (henceforth, MHP) project since 1996; however, at that time DVB membership did not include major ICT (and particularly API) producers, so that the original MHP project built around the idea of a low-cost presentation API based on the MHEG-5 specification.¹⁷ Coherently with this idea, various European (mainly public) broadcasters started to politically advocate the need of a EU-wide move to one unique standardised API that, contrary to most of the existing proprietary and incompatible APIs, should not have been controlled by one vertically-integrated operator, but left open and publicly available for potential implementers.

When in mid-2000 MHP was first released, the Internet bubble was about to burst and soon ITV and media markets conditions would have appeared far less attractive. At that time, DVB membership had been enlarged to new operators, and also the MHP project had become more articulated. In particular, MHP had been reoriented toward a more complex execution engine based on the Java virtual machine, a technology developed by *Sun* for Internet, which offers a high standard of security for on-line transactional applications (such as e-commerce or e-banking).

On one side, MHP advocates continued their campaigning efforts with a view to the incoming approval of the NRF. MHP supporters were mostly Scandinavian TV operators and German broadcasters (while German cable operators remained rather sceptical), but the bulk was represented by major CE manufacturers. On the other side, pay-TV operators did not perceive the need for a new open standard such as the MHP, on the ground of its economic effectiveness (too costly for its prospective expected benefits) and the perceived lack of consumer interest on ITV. Similarly, at that time the interest for MHP was also geographically differentiated: on one side, Scandinavian countries, Benelux and Germany were in general supportive (due to their analogue TV legacy and the larger potential for DTV take-off); on the other side, most of the larger countries (UK, France, Italy, Spain) were opposed, or alternatively were just favouring a long-term migration strategy to MHP, while maintaining compatibility with existing proprietary APIs and remaining open to alternative future specifications (see CENELEC, 2003). Concerning alternatives, both in UK and France there was a strong preference for the simpler MHEG-5; more generally, the preference for a standardised but simpler presentation API was held by several European cable TV operators, which were primarily concerned by the additional cost burdens and the technical immaturity of MHP (see ECCA 2003, p. 3).

The final draft of the NRF incorporates a sort of compromise between these diverging views on open API standardization as mean to achieve interoperability. In particular, Art. 18 of the Framework Directive – later added to the Commission's draft by the European Parliament – does assign a special status to open APIs, and indirectly to the underlying MHP specification, which was the first to be formally recognized in the list of standards published in the EU Official Journal.

Moreover, Art. 18 reflects a complex policy-mix of objectives, since it both addresses infrastructure and content regulation, while the latter is normally out of the scope of the NRF. In fact, Art. 18 both mentions interoperability (as a

¹⁷MHEG-5 initially diffused as a presentation engine. Later on, before becoming an European standard listed in the Official Journal, it attained the ISO standard certification.

mean to achieve horizontal markets, and hence infrastructure competition) and socio-political and cultural goals. In detail, Art. 18(1) of the Framework Directive prescribes that, in order to promote the free flow of information, media pluralism and cultural diversity, the member states encourage:

- (1) suppliers of interactive DTV services to use an open API
- (2) suppliers of DTV devices (decoders) able to receive interactive DTV services to conform to the open API, and to its minimum interoperability requirements.

Art. 18(2) adds that member states also encourage all proprietors of existing API (both open and proprietary) to make available on FRAND terms (including adequate remuneration) all the information necessary to enable suppliers of interactive DTV services to offer all the API-supported applications in a fully functional manner. Finally, Art. 18(3) says that the Commission, one year after entry into force of the Directive, evaluates the actual effects of Art. 18 and, if interoperability and freedom of choice have not been reached in one or more member states, may mandate the compulsory adoption of an official standard (following the general procedure contemplated by Art.17).

This complex policy-mix has been specified in a series of Commission documents, aimed at disentangling the implementation guidelines of such a difficult political compromise between the interests of the Commission, the Parliament, the member states and the market players.

A first document stressing the move to open standards for multiplatform interoperability is EC (2003), where the Commission focuses on the reduction of barriers that prevent widespread access to new communication services and applications - in particular those provided over DTV and 3G mobile platforms. The underlying belief is that these platforms, having achieved a mass-level and quasi-universal diffusion, can play a fundamental role in providing generalized access to the Internet and its interactive services, especially for those citizens with low ICT skills prevented from conventional computer usage. As a result, the Commission envisages a multiplatform approach to the delivery of Information Society services, where mobile and DTV platforms complement traditional PC-mediated Internet access. Correctly, the Commission recognises that – due to the inner diversity of the concerned industries, operators and business models – standardization and interoperability for API mean different things and contemplate diverging strategies; consequently, a wait-and-see approach was preferred at that time.¹⁸

One year later, at mid-2004, the Commission is called to review the status of API interoperability, and to decide on the implementation of the provisions of Art. 18(3) of the Framework Directive.

Preliminary studies, bilateral hearings and public consultations were launched to prepare this assessment. A crucial conclusion of the CENELEC (2003) report was that a common EU-wide standardization strategy was unfeasible, and that different paths for achieving interoperability were needed in different EU countries.

¹⁸Likewise, the Commission recognises that initial and emerging markets require time to reach interoperability, which prove particularly difficult for new and advanced services. It explicitly mentions a sort of technological life cycle for interoperability: first, a new technology is introduced by proprietary solutions, to become later standardized and interoperable as soon as it matures, either spontaneously or by direct regulation.

This basic point was also recognised by a Commission staff working paper (see EC, 2004a), which provides an illuminating account of the plurality of stakeholders and the inner complexity of the EU policy for API interoperability. First, the Commission services were dwelling on the occurrence of a paradigmatic shift in interoperability, moving from the analogue to the digital era. In fact, while in the world of analogue TV interoperability was technically simpler, since it could be based on a technologically stable reception set connected to one main transmission network, nowadays – say the Commission services – multiple digital networks and fast evolving reception devices (whose intelligence is increasingly software-based) ravel the achievement of interoperability via a common technical specification.

Second, EC (2004a) picks up the CENELEC (2003) argument that a multi-layer strategy was needed to meet the diversity of EU communication markets, and recalls CENELEC's analysis on further and complementary standardization initiatives (on re-authoring and simpler presentation APIs) useful to achieve interoperability in legacy API markets. In particular, the possibility to achieve interoperability at the content level (with a standardised portable content format, such as the PCF) – rather than at the receiver/network level, via a standardised API – was given a stronger emphasis.

Finally, EC (2004a) correctly identifies some potential policy trade-offs and sources of regulatory inconsistencies, although it does not explore them fully. In fact, on one side it correctly notices that, while the construction of the EU common market and the ensuing scale economies require a supranational policy, EU broadcasting regulation remains subject to the subsidiarity principle of the EU Treaty, that authorises the Commission to intervene only when national policies are inadequate or insufficient.

On the other side, EC (2004a) falls short of exploring other crucial goals underpinning the quest for API interoperability – those implied by global standards races and trade policy. In fact, EU strives for establishing its own standards face to the US and Asian competitors, while trade policy foresees early and strategic standardization as a main tool of intervention. Putting priority on these international issues inevitably reduces scope and degrees of freedom for diverging member states policies, and – above all – for technologically neutral approaches. Finally, another important clash arises between trade and media policies: while standardization and trade policies usually build on the consolidation of a few big European champions, this outcome patently conflicts with market competition and media pluralism targets.

The responses to the public consultation on EC (2004a) highlight how ITV stakeholders – even those within DVB – deeply differed in their perceptions and interests about API interoperability and the necessity of its mandatory standardization on MHP. Moreover, a few crucial points raised by the Commission services about the respective role of market forces and public authorities towards ensuring interoperability over the technological life-cycle of ITV (see EC, 2004a; pp.27-28) remained unanswered.

In detail, the position of the European Broadcasters Union (see EBU, 2004) appeared the most straightforward. EBU claimed that, although there could be different types of interoperability, the focus should be maintained on European citizens: interoperability should be defined as their possibility to access the full range of available ITV services, offered in a competitive arena. While recognising the

potential utility of PCF and other alternatives (such as content re-authoring or broadcasting in multiple formats), EBU pointed out clearly that only open standards (not limited to MHP, but also extending to other simpler solutions, such as MHEG-5) guarantees citizen-level interoperability. Moreover, EBU warned the Commission against a minimalist approach bound to ensure interoperability solely within the digital terrestrial (henceforth, DTT) platform (as suggested by its predominantly national regulation), on the grounds that interoperability limitations significantly affect also satellite and cable. Then, a series of suggestions was spelled out, regarding how to implement Artt. 17(3) and 18 of the Framework Directive: sunset dates by which only API systems would be allowed, recommendation of MHP for ‘green field’ markets and new ITV platforms, and obligations aimed at guaranteeing the public release of service information and source code.

On the other side, operators coming from the pay-TV, TLC and IT worlds showed a more liberal and market-oriented attitude to interoperability, claiming that publicly-mandated standardization would have chilled private innovative efforts – in particular those aimed at introducing early proprietary solutions to address perceived market opportunities. Moreover, they claimed that interoperability should have been demand-driven (since successful applications will be naturally offered on any API) and, if a preference were to be expressed, it should have been for portable content formats, rather than for decoder-level interoperability. More generally, they argued that access rules (based on antitrust law) would be sufficient to guarantee pluralism and cultural variety; and that these goals should be primarily achieved via private negotiations between operators.

Clearly, both approaches fail to capture the entire complexity of the issue. Briefly, the EBU’s approach seems particularly utopian in envisaging tough regulatory burdens on private ITV operators; a main example is when EBU calls for safeguards against new proprietary systems, such as the DRMs, which are indeed an irreversible move of the industry face to the Internet-related piracy challenge. On the other side, the pay-TV and TLC industry’s claims appear simplistic, on several grounds. First of all, ITV interoperability involves several public and merit goods, whose provision cannot be, by definition, driven by the private demand. Further, their confidence on the effectiveness of access rules in ensuring pluralism and cultural variety is misplaced, for obvious reasons: first, access rules are mainly a safeguard for market competition, which does not imply market pluralism; second, cultural variety, as other public interests, includes a social and public good profile not entirely accounted for by private negotiations, and might also involve a PBS’s (public broadcasting service) remit. Finally, the EU CAS interoperability story, viewed in perspective, reveals how access rules’ effectiveness can result severely limited (see, for example, the assessment made by Helberger, 2005).

More fundamentally, the public consultation did not help to disentangle the various trade-offs and conflicting goals implicit in the EU policy for ITV interoperability. On one side, the EU push for decoder standardization and horizontal markets (mainly functional to its competition and trade policies) was best served by mandated standardization on MHP, but this “command” approach would not have respected the primary competence entrusted to national broadcasting policies. On the other side, a stronger emphasis on the latter could have jeopardised the common market, because decentralised and diverging public intervention could

differently impact national markets and operators, leading to selective and distorting state aid interventions. As we demonstrate in a related paper (see Matteucci, 2008a), this is what happened in Italy.

3.3. The Commission's main decisions. The first decision of the Commission (see EC, 2004b) built on this complex consultative process and on an impact assessment of the available policy options (see EC, 2004c). The EC (2004b) decision, however, was given only an *ad interim* validity. In fact, the Commission at that time considers that it is premature to reach an overall assessment of the effects of Art. 18(3): since the NRF implementation resulted delayed, the final assessment should have been re-scheduled for mid-2005. Second, for the moment being, the Commission does not detect any significant and substantiated threat to the free flow of information, media pluralism and cultural diversity – at least with reference to ITV services. Third, the Commission also notices that in the NRF Directives there is no explicit and binding definition of interoperability. As a result, this *ad interim* assessment is entirely focused on the necessity of mandating one (or more) open standard, or to elicit member states' intervention (see, respectively, Options 1 and 3 in EU 2004c; pp.8-14).¹⁹

Basically, the Commission argues that, first of all, mandated technical interoperability at the receiver level does not guarantee consumer-level interoperability, since content providers would still have to negotiate access to the ITV facilities. However, an even more impeding factor is the stranded installed base, regarding 25 million of interactive decoders, which should have been replaced or, in alternative, left without interactivity;²⁰ the resulting heavy cost burden would not probably be politically acceptable, says the Commission. Consequently, the only Option left is number 3, that of continuing the implementation of the provisions of Art. 18 (sections 1 and 2), by which member states encourage ITV operators to voluntarily adhere to open standards and legacy API proprietors to offer their services on FRAND terms.²¹ This minimalist approach to interoperability also caters for the need to experiment other forms of interoperability (portable content formats, voluntary migration to open standards, etc.), and that of letting a more robust demand for truly interactive services emerge; these two objectives are synergetic, because uncertainty on the ITV demand asks for a wide range of technical options, stressing those simpler and cheaper forms – such as presentation engines. As a matter of fact, consumer choice and technological competition between competing interoperability standards also features as two qualifying advantages delivered by Option 3.

As part of these provisions, the Commission explicitly lists a series of initiatives to be undertaken for the creation of a sustainable and affordable MHP receiver market:

¹⁹The alternative option of delegating member states to mandate is ruled out, since it would institutionalise market fragmentation in a way incompatible with the Common Market.

²⁰Backward compatibility of MHP is practically impossible, due to the complexity of this API. For example, software plug-ins enabling MHP applications to run on receivers equipped with previous APIs would be impeded by the insufficient memory and computing power resources available on this first generation hardware.

²¹This support does not rule out the possibility, foreseen by the Access Directive (Art.5(1.b)), that NRAs mandate FRAND access to incumbent API and EPG facilities for excluded third party operators.

- (1) constitution of a working group of member states and stakeholders for the coordination of MHP implementation (MHP Implementation Group).
- (2) temporary public subsidies for consumers to purchase MHP receivers; these subsidies should be technological neutral, temporally decreasing and conform to state aid rules. The Italian experience is mentioned as a first application of this measure.
- (3) listing of further open API standards in the Official Journal (starting with WTVML and MHEG-5).
- (4) monitoring the availability of proprietary technologies for licensing to decoder manufacturers, in order to promote the take-off of the market for universal (multiplatform) receivers.

In particular, measure 4) extends to other technologies (tuners and API) some sort of competition screening, which the CAS already enjoys in a fuller form. In fact, the latter receives a stronger protection by the Access Directive (Art. 6(1)), that specifically mandates FRAND access terms for CAS licenses, on behalf of decoder manufacturers.

On overall, while the list of admissible measures encompasses several important dimensions and criticalities encountered by technological diffusion, two critical profiles need to be highlighted, concerning measure 2): first, its object, since the measure is not targeted at the suppliers of interactive services, explicitly mentioned by Art. 18(1) and presumably being the weakest operators of the value-chain; second, its method, since it seems to have been suggested by the Italian practice, rather than motivated by a sound economic reasoning on its likely effectiveness. As a matter of fact, consumer subsidies are considered in the literature a rather blunt and distorting tool of market intervention and some Italian fringe operators were already claiming its anticompetitive effects in front of the EU Commission, while the latter was drafting the EC (2004b) communication; in fact, the Italian subsidization campaign was later sanctioned as illegal state aid.

One year later, the Commission finalises its review on API interoperability in EU (see EC, 2006a). Once again, the Commission believes that it is not necessary to mandate any compulsory API standard for the roll-out of ITV, but rather that member states should continue to promote open interoperable solutions and build their policies on industry-consensus. This time EC (2006a) presents a synthetic and more factual Communication, which however spells out a clearer vision of the likely ITV developments: more systemic, less technological deterministic and more rooted on sound economics.²² In short, it stresses that the first EU priority now should be to accelerate the spectrum switch-over to DTV, which would act as a precondition enabling investment, the introduction of suitable business models and the eventual take-off of interactive services, driving automatically the diffusion of open APIs. Finally, the Commission adds that it will complement the entire process promoting European DTV standards in other regions of the world: this point clearly demonstrates the existence of an ambitious trade policy agenda.

²²Despite its brevity, one can pick out in several passages of EC (2006a) the main stylised facts identified in technological diffusion studies, where the adoption of a new technology is related to supply-side and demand side conditions, subject to institutional constraints.

Basically, this new assessment builds on the logical framework of EC(2004b), while it adds updated market evidence and the findings of the MHP Implementation Group.²³ EC (2006a) comments on a series of market facts, updated at end-2005. First, it notices that the EU DTV roll-out, after a number of false starts, is gaining momentum. Second, that the demand for ITV has proved less dynamic than originally forecasted, and that the most successful applications have been in the commercial area (rather than in E-government), although being purely limited to trivial applications (gambling, quiz games and so-called ‘reality shows’), mostly featuring local interactivity (or enhanced broadcasting).

Further, the Commission points out that the main promising ITV development concerns Italy. Here, more than 2 millions of MHP-interactive decoders were sold²⁴ (while the diffusion of “zappers” remained negligible), and the Commission argues that this success can be explained by the following factors (see *ibidem*, p. 6):

- (1) the voluntary agreement of Italian broadcasters to use MHP,
- (2) the introduction of the subsidy scheme for interactive decoders by the authorities,
- (3) the definition of common specifications for the implementation of the MHP standard.

According to the Commission, all the three elements were fundamental and synergistic. In fact, even within the deployment of an open standard (like MHP), diverging implementations might compromise effective interoperability; instead, in Italy relevant players – says the Commission – proved to be very collaborative, as they agreed both to adopt MHP and to implement it with common specifications. Moreover, the financial and marketing support of the Italian Government was also deemed relevant.

As a counterfactual, the Commission notices that the same degree of stakeholders coordination experienced in Italy did not materialize in Germany, nor in the Northern EU markets, despite the early market consensus: in fact, as illustrated in section 3.1, these two areas originally were the most MHP supportive.

Going to the less positive sides of the Italian experience, the Commission correctly recognises that, notwithstanding this good diffusion performance, MHP penetration did not deliver the expected take-off of interactive services; however, the reasons picked out, in our belief, miss the very essence of the problem.²⁵ Moreover, the Commission also regrets to notice that the sensible price reduction engendered by the Italian campaign did not spill over into other EU markets, where the higher price charged for MHP decoders continued to act as a significant barrier.²⁶

²³See point 1 in the above list of measures; this Group is aimed at benchmarking member states’ situations and exchanging ideas and best practices.

²⁴EC (2006a)’s data on MHP decoders probably refer to Dataxis (2006), updated at September 2005. These data slightly over-estimate actual market sales, as collected by industry national sources (see below). The latter, in turn, overestimate the actual decoder usage rate.

²⁵The main reasons hypothesized by the Commission are: the reluctance of consumers to connect the decoder to the TLC socket (being the latter distant from the TV set) and frequencies scarcity, which impeded the deployment of spectrum-demanding interactive services.

²⁶Also on this point, additional market evidence supports a further and even more negative conclusion: that in Italy the decoders’ prices were maintained artificially high by the public subsidy, favouring manufacturers and retailers collusion.

In the margin, EC (2006a, p.7) mentions the progress of other standards – such as MHEG-5 and WTVML – that wait for inclusion in the Official Journal. Then, it considers the situation of the installed base of proprietary APIs noticing that, so far, it did not receive any complain concerning their licensing conditions.

A few considerations on the Commission’s line of reasoning are needed.

First, upon closer examination, the stakeholders coordination experienced in Italy should be explained by different and rather uncomfortable motivations, rooted on the high concentration of the Italian TV market and its peculiar situation, where the main private media tycoon also serves as Prime Minister and can appoint the board of its main competitor, the PSB RAI.²⁷

Second, the fact that the Commission did not receive any antitrust complaint on proprietary APIs licensing might be also motivated by their unattractiveness, or even by the enduring immaturity of the ITV market.

More fundamentally, the Commission’s empirical analysis on the APIs diffusion appears rather short-sighted, since the numbers clearly show the market prevalence of the two simpler non-supported APIs, over the subsidized MHP: MHEG-5 and WTVML, by 2005, managed to total respectively 5 and 7 million units sold.²⁸ Moreover, their inclusion in the Official Journal has come after the market acceptance, while for the MHP the contrary holds: consequently, one has to conclude that even open standards may in practice differ for the degree of spontaneous market acceptance and the timing of the public support.

In other words, no all the open standards supported in the EU have happened to be really market-driven, the main example being the MHP.

4. A CRITICAL ASSESSMENT OF ITV AND MHP

Official EU-harmonised data available at the time the Commission issued the second review of the state of ITV interoperability (EC, 2006a) could have legitimated a less optimistic view of contemporary ITV developments. Basically, Dataxis (2006)’s data were confirming that the overwhelming share (97%) of the MHP installed base was still accounted for by Italy. As a consequence, the EU installed MHP base was mainly terrestrial, as shown in table 2 (with a share of 94% of the total MHP stock, by 2005, 3Q). Moreover, MHP were representing a small share of total APIs in EU (7.4%, equal to 3.5 million units). Further, the future did not look better: table 2 also shows that the most natural candidate for benefiting from MHP interactivity - the IPTV platform - in 2005 was still in its infancy, having an installed base of just 1,2 millions units and relying only on “other APIs”, delivering no interactivity or simply enhanced broadcasting.

The situation has not significantly changed in the last years. More recent data suggest that MHP is still in the middle of the ford, and highlight that its geographically distribution continues to follow the same path, as in 2005. According to table 3, the MHP diffusion within EU continues to be accounted for mainly by Italy (92%), while Belgium follows at a great distance (only 6%). Even at the world

²⁷For a detailed examination of the Italian policy on DTV and ITV, together with a fuller evaluation of its decoder subsidization campaigns, see Matteucci (2008a).

²⁸Curiously, MHEG-5 and WTVML diffusion data are briefly mentioned in footnotes, while those of MHP are not presented at all in the EC (2006a) text. The latter only presents DTV diffusion data, by platform.

level, MHP diffusion is limited and strongly concentrated in two countries: Italy (with a share of 69%), and, for very different reasons,²⁹ South Korea (25%).

Table 2. API penetration and composition by DTV platform in EU in 2005: units and shares

	Cable	Satellite	Terrestrial	IPTV	Total DTV
UNITS					
Proprietary API	4,448	21,070	483	0	26,001
Other API	3,533	3,377	9,877	1,226	17,953
MHP	190	020	3,316	0	3,526
SHARES					
MHP penetration	2.3%	0.1%	24.2%	0%	7.4%
MHP stock composition	5.4%	0.6%	94.0%	0%	100%

Notes: data refers to 2005 3rd Quarter. Units figures in absolute numbers in thousands. EU-27 coverage. "Proprietary API" includes: OpenTV, Mediahighway (NDS), Liberate (now Seachange), Microsoft TV. "Other API" includes: HTML, MHEG-5, and others with limited ITV features enabling mostly a basic EPG. Source: Dataxis (2006; p.11).

Table 3. Ranked worldwide diffusion of MHP platforms, mid-2008: units sold and market % in the top-5 countries

	MHP (thousands)	MHP world share	MHP EU share
Italy	5,600	69.3	92.1
South Korea	2,000	24.7	-
Belgium	391	4.8	6.4
Finland	50	0.6	0.8
Austria	40	0.5	0.7
Top-5 installed base	8,081	100	100
World Installed base	8,081	-	-

Notes: Other countries might present negligible shares of diffusion not yet covered by this MHP survey. Source: our computations on official DVB-MHP data, updated at June 2008.

Moreover, additional evidence from DVB confirms that in most of these countries MHP services have been deployed on non-interactive platforms: in Italy, Finland and Austria on DTT, while only in Belgium MHP services have been mostly deployed on digitised cable. This fact is technologically incoherent, since MHP is

²⁹The Korean case is not explored here, being rather peculiar, and not representative of the European situation. Korea has rolled out DTT services on a different transmission standard (ATSC), launched in 2001. So far, MHP services in Korea are mainly satellite-based. Moreover, the country is enjoying an extensive roll-out of broadband networks, potentially ensuring cheap and full two-way interactivity; IPTV services are about to be licensed.

mostly useful for truly interactive platforms: however, section 3.2 provides an institutional explanation for it.³⁰

The awareness of the Commission about the diffusion difficulties encountered by MHP has recently increased. In May 2007, DG Information Society tackled directly the issue with a letter to the DVB consortium, explicitly calling for initiatives to foster its adoption. In particular, the letter questioned the current DVB's IPRs policy for MHP, and stressed the need for a timely disclosure of the licensing terms of those IPRs essential to implement the MHP specifications (see Eltzroth, 2007).

While the formation delay and the management of the MHP patent pool could have partly dampened the MHP diffusion, and deserve a fuller separate treatment (see Matteucci, 2008a), we believe that a substantive explanation of the story of the EU ITV and its policy goes well beyond the shortcomings of the MHP licensing practice; rather, it calls for a more comprehensive and systemic interpretative framework. This analysis can be framed under three main areas.

1. *Technological limits of MHP and ITV projects*

The first relevant obstacle for the feasibility of any EU standardization policy covering the whole TV industry is that the presence of different TV platforms implies different technological potentials for two-way interactivity. Basically, along a continuum, we go from terrestrial TV (having no return channel built-in) through satellite (where a wireless return channel is technically possible but still too costly for households) to end up with cable and IPTV (both DSL and fibre optic), which embed a broadband wireline return channel, enabling fast and complex interactive applications.

A second main point, raised in various consultations and documents, concerns the decoder. It says that MHP is too complex a specification for the first generations of 'dumb' DTV decoders; in fact, since the MHP software is based on the Java virtual machine software, it needs a more intelligent decoder than the market prevalent design. As such, MHP decoders inevitably require more memory and superior microprocessors (the CPU in figure 1), thereby pricing much higher than other simpler interactive alternatives.

2. *Economic profile of the MHP and ITV projects*

A first point stems from the installed base rationale stressed in studies on technological diffusion. According to the literature (see again Katz and Shapiro, 1994, Gandal, 2002), diffusion contests between two versions of the same technology (old and new) are likely to experience strong inertia in the presence of network effects and compatibility issues – both forward and backward.³¹ This problem also affected the API choice, and none of the evaluated policy options attracted a sufficient consensus, being thwarted by some relevant stakeholders (see section 3.2). A generalised fast migration to MHP was considered unjustified and costly by most cable operators (see ECCA, 2003), but to a lesser extent also by the same broadcasters (see EBU, 2004). Most radical positions were put forward: major IT players (see Microsoft, 2003) even contested the very need for API (or decoder level) interoperability, in favour of content portability (content-level interoperability). This

³⁰Section 3.2 highlighted that, among broadcasters, the main supporters of MHP were the FTA terrestrial ones, which typically do not control the technical platform. Only in Italy they are vertically integrated into the transmission infrastructure, without binding antitrust limitations on spectrum.

³¹Backward compatibility of MHP, for example, is technically impossible (see also *supra*).

alternative solution was first acknowledged also by the Commission services (see EC, 2004a, commented in section 3.2), but has never been given significant public support, comparable to API interoperability.

Secondly, common sense analysis suggests that, while simple (or enhanced broadcasting) ITV loosely competes with existing PC and Internet-based services, two-way ITV purports to offer the same functionality, so that the latter qualifies as a closer competitor of Internet. Considering the large installed Internet base and the arrival of Internet TV, it is very unlikely that two-way ITV services will soon emerge – if they ever will.³² The last consideration is reinforced by the fact that most of the ITV roll-out has occurred on low or non-interactive digital platforms (respectively satellite and terrestrial), which present a clumsy and burdensome interactivity profile. Another layer of difficulty lies on the user interface (the remote control) ergonomics, which is far from being a user-friendly and performing terminal for interactive services.

Third, concerning the debate on the exorbitance of FRAND terms, often associated to open standards, the literature so far has been rather sceptical, both about the very existence of the problem and the proposed remedies (see Geradin, 2006). In particular, despite the diffuse claims that FRAND terms might indeed result financially unsustainable for complex standards and for emerging and systemic markets, a certain lack of evidence has weakened this opinion. As a matter of fact, we believe that the MHP case is a good first example of supportive evidence. The analysis presented in this paper reinforces the diffused claims that Via Licensing's³³ fee structure for MHP was unbearable for broadcasters (see Screendigest, 2006; pp. 82 and 117). An indirect confirmation comes from the fact that, following these claims and the low diffusion performance of MHP, Via Licensing in June 2008 has announced its intention to remove completely for FTA broadcasters the requirement to pay MHP patent licence fees.

More fundamentally, any IPR licensing cost should be compared against its revenue generating potential. At the moment, the interactive services' market potential is undetermined. Further, since many national terrestrial switch-off dates have been postponed and the EU has envisaged a new possible term for 2010-12, also the take-off of interactive services is likely to be significantly retarded.

Similarly, the digitalization and roll-out of the most performing interactive DTV platforms is late (cable and IPTV), while the Internet TV – a close TV substitute viewed by PC – is progressing faster (the user-generated content phenomenon being its main example). Moreover, digital cable and IPTV nowadays strive to create a sustainable business model but, according to business' sentiments, interactive services do not seem a significant “killer application” and consumers' willingness to pay for them is negligible. Paradoxically, the most promising market for interactive services, Internet TV, is out of the scope of Art. 18 of the Framework Directive, since the latter does not cover DSL-based services.

³²The main dilemma is for the diffusion of private services, which mostly rely on internal profitability. The main question is how to launch sustainable T-commerce or T-banking services when much more performing alternative options (E-commerce and E-banking) are already in place.

³³This company administers the licensing programme on behalf of the patent pool, mainly composed of Comcast, Open TV, Panasonic, Philips Samsung, Thomson and Time Warner Cable.

3. *Institutional and policy mismatches*

First, a few conceptual inaccuracies seem to undermine the foundations of the EU quest for interoperability through open standards. First of all, EU law and the Commission documents remain vague on the basic concepts. While the NRF does not provide any binding definition for interoperability, the Commission does not unambiguously specify what open standards are; however, since both concepts are multidimensional (see again Krechmer, 2006, West, 2003), the logical framework of the policy remains vague and leaves scope for risky analogies, such as that between open standards and open source.

In fact, a fundamental point is that open standards do not coincide with open source.³⁴ A first obvious reason is that typically open standards also include hardware components, whose IPRs are usually covered by patents, rather than copyrights. Occasionally, open standards may contain open source components, but in general they encompass a wider range of possible licensing schemes for its software components. Moreover, even open source is not univocally classifiable, since it features dozens of different software licensing schemes.

Indeed, the two phenomena differ for several characteristics: for our purposes, a main element is their interoperability potential. In fact, standards naturally evolve because of technical change, and might fall prey of stakeholders' enclosure strategies: typically, IPRs holders strive to direct the initial specification or its implementations towards the inclusion of technological elements covered by their own patents or copyrights, for a variety of reasons: to gain control over its technological evolution and interoperability profile, to exploit the associated monopoly rents or others (reputation, etc.). Consequently, an initially open standard can evolve into a series of semi-open or even proprietary implementations, which might undermine its initial degree of interoperability and turn it into a *de facto* closed standard, similar to a proprietary one. On the contrary, the OSS movement maintains a stronger emphasis on ensuring interoperability between specifications and derivative works, while being less demanding in terms of economic remuneration. A main example is given by the General Public License (GPL, henceforth), which is very restrictive concerning the right of developing derivative works,³⁵ while being free in terms of economic conditions.

Going into the policy rationale, on overall, the EU policy-making, despite its legitimate concerns for interoperability and pluralism in ITV, did not express a sound grasp of API techno-economics. In fact, notwithstanding the rich consultation process and the consensus-based approach, the final political synthesis of the Commission failed to highlight a crucial factor – the likely crowding-out effect exerted on the policy by the differences existing between the value chains of ICT and broadcasting and, within the latter, between the different business models (FTA and pay-TV) and levels of vertical integration. These differences appear frequently underestimated in the Commission documents, or even hidden under the surface of a generic rhetoric on digital convergence. In particular, the Commission fails to consider that the economic incentives towards the promotion of platform interoperability, open standards diffusion and even the final digital switchover are not

³⁴For example, MHP is based on Java software, which is not open source.

³⁵In fact, the GPL forbids the possibility of modifying the original source code in a way that the new implementation loses some degree of interoperability with the previous OSS applications.

aligned between FTA and pay-TV operators, mainly due to the different markets served: ‘mass’ for FTA TV versus ‘large niche’ for pay operators.

Another fundamental contradiction contained in the ambitious EU Plan for API interoperability is that supportive policy is mostly needed at the beginning of the technological cycle, to cater for pluralism and cultural variety. However, in this early time frame the policy cannot distinguish market failures from technological failures: so, the possibility for a market-driven and technologically neutral policy (following the NRF) is severely restrained. Later, market evidence has confirmed that different platforms fulfil differently the same policy goals and economic sustainability criteria. While the market for simple (one-way) interactivity has gradually expanded and become profitable (for a recent account, see Screendigest, 2006), that for true (two-way) ITV services has not, and its techno-economic feasibility remains - even nowadays - largely unexplored.

Another layer of complexity underestimated concerns the inner geographical variety and complexity of the EU media landscape. Differently from the US, in EU one common policy is not likely to fit all member states. A negative antecedent of the EU policy was the policy for CAS interoperability (ex Directive n.47/95), which yielded modest results despite the intensive EU push³⁶ and the reinforced status of its normative provisions; the uneven national implementations and the ineffective antitrust enforcement were what mattered most.³⁷ Despite this low policy enforcement and performance, the CAS case was much simpler to regulate than API, since only pay-TV operators and fewer platforms were directly involved.

Going to the inner complexity of the EU ITV policy, we need to remind its tough trade-offs, which present potential conflicts with other bodies of the EU law and policy-making. As noted by EC (2004b), mandated interoperability (aimed at pluralism) might chill technological progress. However, there are other more fundamental trade-offs involved. First, trade policy and international contests for controlling global standards cannot be easily conciliated with competition policy and cultural pluralism, since the firsts frequently advocate a few big integrated national or EU-wide champions. Moreover, the implementation of the NRF has been uneven and its coherence with other bodies of EU law – in particular with content regulation and pluralism, residually contemplated also by Art. 18 of the Framework Directive – highly shaky, requiring further assessment.

Moreover, despite the initial regulatory impetus on API interoperability, the policy leverages of the EU institutions remain limited and mostly ineffective, with respect to the promotion of media pluralism and cultural variety. In fact, member states continue to be primarily entrusted with major content regulation competencies.³⁸

³⁶After a debated and painful legislative process, the EU institutions stroke the compromise mandating the CAS interoperability and compulsory third party licensing, but leaving operators to choose between two technical alternatives: either *simulcrypt* or *multicrypt*.

³⁷Many incumbent operators, choosing the *simulcrypt*, have managed to maintain a stronger bargaining power and have profited from a larger degree of discretionary power on interoperability terms; on overall, they tried to delay as much as possible interoperability with rival offers. Italy provides an illuminating case.

³⁸As also recognised by the Commission, “more significant elements in the media pluralism debate lie within the competence of member states, notably media ownership and control” (see EC 2004b, p. 9).

In this particular case, the Commission was induced (apparently from the Italian case) to legitimise rather blunt and distorting policy tools, such as monetary consumer subsidies, while the complexity of the policy mix should have suggested to rely on soft and pre-market instruments (such as R&D subsidies, publicly stated targets or institutional suasion and coordination): those usually advocated by the Commission (DG Competition) during state aid control.

The latter two points are well represented by the Italian case, which well demonstrates how complex and unrealistic policy projects might yield unintended and sometimes paradoxical consequences, even for the basic goal of promoting pluralism (see again Matteucci, 2008a).

5. CONCLUSIONS

The story of the ITV interoperability regulation in EU is a good example of the difficulties the policy-maker encounters in forecasting technological developments and framing appropriate normative and institutional solutions.

Pushed by the European Parliament, the Commission has been entrusted by the NRF with a complex role of scrutiny of the degree of interoperability of interactive services via TV, and to the promotion of open standards. In particular, open standards were deemed as the most appropriate solution to achieve decoder-level interoperability, and to avoid that proprietary strategies dampen the ITV take-off with a variety of anticompetitive conducts.

In fact, some proprietary IPR strategies may restrain access of third party to crucial IPRs, thereby retarding innovation and fragmenting the market into diverging incompatible solutions. As a matter of fact, the logical foundations of the EU focus on open standards rest on their peculiar IPR status, which should ensure wider knowledge dissemination and the public commercial availability of the embedded essential patents and copyrights, while at the same time guaranteeing a fair IPR protection to the inventor and innovation incentives for derivative works. In fact, contrary to proprietary standards, the IPRs contained in open standards cannot be discretionary denied to third party and are publicly offered at FRAND terms of licensing.

The first open specification selected for public support has been the MHP, a complex API standard needed to manage the most elaborate functions of the decoder, like interactive services and pay-TV. Consequently, the MHP has attracted strong political support and relevant public funds.

So far, updated market evidence shows a sluggish diffusion of the MHP, while other simpler versions of APIs spontaneously affirmed. Moreover, truly two-way interactivity mostly lacks on the existing DTV offers, and the market sentiments signal that advanced interactive services (T-commerce, T-government) are not considered a significant driver of DTV, while their close substitutes – carried by the Internet – increasingly take place among EU citizens.

When we turn to assess the EU policy on ITV interoperability, all the available evidence points to a substantial failure; ITV policy nowadays appears abandoned, after having attracted substantial public resources and attention.

The analysis of the failure uncovers several critical points and inconsistencies.

A main faulty dimension is the underlying technological vision. The very belief of rendering interactive the TV set is at least contentious, if not utopian. So far, different TV platforms enable different types and degrees of interactivity, so that

the idea that “one policy fits all” was basically wrong, and mainly constrained by the necessity to frame a technologically-neutral approach.

Another problematic dimension comes from treating homogeneously the entire broadcasting industry, which includes several business models and, according to the players, features different IPRs strategies and incentives to interoperability. The basic partition between FTA operators (MHP supporters) and pay-TV ones (opposers) was largely expectable, and should have been considered framing a different approach to interoperability, including also content portability. In fact, in the digital world achieving decoder level interoperability and coordination is more difficult, due to the higher number and complexity of the IPRs involved and of the licensing strategies.

In general, the complexity of the policy mix would have required only pre-market instruments (R&D stage), consensus-building processes and market-driven tools, and should have avoided monetary subsidies: the latter are a too blunt and uncontrollable instrument, which might irreversibly distort the markets.

The Commission’s endeavour, beside its inner technological complexity, was even complicated by the structure of EU Law, which separate infrastructure from content regulation, while interactive services fall in between. Moreover, while EU Institutions play a leading role in infrastructure regulation, content is mainly left to member states’ competence, following the subsidiarity principle. As a consequence, an issue of conflicting competences also arises in the ITV policy implementation.

Moreover, the entire policy-mix on ITV interoperability suffers from internal inconsistencies, imposed by the wide array of policy goals, spanning from infrastructural investment and market competition to pluralism and cultural variety, from strategic trade policy to innovation policy. Likewise, the possible conflicts between the EU ITV policy and the IPR policies – prevalently national – were substantially neglected.

Another main criticism arises from the tricky analogy sometimes associating open standards and open source: these ambiguities have substantially affected the EU and national policy-makers’ vision, and their policy soundness. Moreover, looking at the MHP story, one can detect a sort of institutional favour for this particular open specification, whose merits have been too early and uncritically upheld, while the following facts have uncovered various signs of IPRs mismanagement and strategic tactics by essential IPRs holders. On overall, while open standards continue to stand at the IPR management frontier and significantly contribute to the new paradigm of “open innovation”, they should not be uncritically and publicly up-held against market evidence of anticompetitive conduct or rent-seeking.

This paper wants to conclude with a more optimistic view on the prospects of ITV, and the possible scope for a more illuminated EU policy approach. Recent evidence suggests that Internet TV (that delivered via broadband and PC) is gaining momentum, while traditional TV falls behind. Perhaps the time has come to revive the original goals of the EU ITV policy – pluralism and cultural variety - but to inflect them in a different and more conducive domain – that of the Internet world. In fact, the prevailing IPR setting of the latter appears more favourable to open standards and open innovation paradigms, with respect to traditional broadcasting.

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Glossary of technical acronyms

API: application program interface
CE: consumer electronics
CAS: conditional access system
CPU: central processing unit
DTV: digital TV
DVB: digital video broadcasting
EPG: electronic programme guide
FTA TV: free to air TV
ICT: information and communication technologies
IPR: intellectual property rights
ISO: international organization for standardization
ITV: interactive TV
MHP: multimedia home platform
MHEG-5: multimedia hypermedia experts group
OSS: open source software
PBS: public broadcasting service
SSO: standard setting organization
NRF: new regulatory framework (for electronic communications)
UHF: ultra high frequency
UMTS: universal mobile telecommunication system
VHF: very high frequency
WTVML: worldwide TV mark-up language

NICOLA MATTEUCCI, MARCHE POLYTECHNIC UNIVERSITY, ITALY.