

# INTEROPERABILITY-CENTRIC PROBLEMS: NEW CHALLENGES AND LEGAL SOLUTIONS

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## Abstract

Whereas abandonment of detailed regulation is widely asserted to be the true way along with the fluctuations of the business models and emergence of IP-based services, there are still remaining unanswered questions about regulatory treatment of interoperability in the converging environment of ICT markets. While interoperability is covered under mandatory solutions under a number of Directives, i.e. Access and Framework Directives, how to understand and reinforce it within converging markets, i.e. new media, telecom and IT markets is unclear on part of regulators as well as many practitioners. While generally interoperability requirements are determined in a disjunctive manner in separate industries, convergence turns interoperability into a common problem against development of ICTs. In fact, not only technical compatibility problems but also competitive failures, economic inefficiencies, and hazards to consumer welfare would arise out of insufficient interoperability. As a matter of fact, developers of digital devices, software applications and multimedia services inevitably find themselves in a complex world where they have to find interoperability solutions to compete effectively in the marketplace. To reverse this situation, both intra- and inter-platform interoperability should be ensured with a holistic viewpoint of the ICT industry. In the paper, the individual policy choices pertaining to separate industries are being discussed primarily, and a set of inferences relating to interoperability-related problems are being put in place. In this regard, both general concerns and specific topics with regard to ensuring interoperability such as the NGN-related challenges, net neutrality discussions are being elaborated. As well, how (non-)interoperability is dealt with in new media and IT industries is touched in conjunction with the Commission's *Microsoft* decision as well as the relevant Community legislation. Ultimately it is asserted that, without diagnosis and cure of service-level interoperability challenges alongside network-level ones, neither newly-built NGNs nor IP-based convergence would not bring out the intended level of innovative end-to-end services at all.

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### I. Introduction

New challenges against traditional telecommunications services, including fascinating multimedia applications, triple-play bundle services, innovative business models emerging out of cross-border links between IT, telecom and media industries are getting faster. Actual and potential increase of converged services in conjunction with the construction of new generation networks as well as proliferation IP-based consumption/business models caused many regulatory fluctuations across the world. Whereas abandonment of detailed access obligations and traditional tariff control mechanisms is widely asserted to be the true way throughout this turbulence, yet are still remaining many unanswered questions about regulatory treatment of the referred new challenges. Amongst them, how to read and readjust the interoperability-related measures along with the increasingly convergent and IP-based competitive environment is arising as one of the most appealing questions faced by telecom regulators.

As a matter of fact, in building a convergence-oriented regulatory system, ensuring interoperability within and amongst the neighbouring markets is one of the most compelling issues to be handled. The concept of interoperability, whilst originating from the need to ensure global connectivity for communications, actually represents one of the main threads emerging out of multi-dimensional relationships between users of electronic communications, i.e. from mutual interconnection agreements to the interconnectivity requirements for IP-based communications skills. Notwithstanding the fact that the pace of transition to a single modernised all-IP network is getting faster and convergence is supposed to phase out traditional regulatory measures, interoperability-related challenges seem to continue to influence a variety of regulatory matters, i.e. from digital software industry to network level products. While an impulse of deregulation is echoed with the proliferation of VoIP, IPTV and peer-to-peer (P2P) services, interoperability concerns at various levels, i.e. newly emerging networks (e.g. next generation networks), technical platforms (e.g. conditional access system), digital decrypting technologies (e.g. digital right management) seem to stay in regulatory agenda even in the forthcoming decade.

Hence, a regulatory perspective is ought to be promulgated to respond to the interoperability-related challenges and user needs in the convergence-based Internet Age. Without meticulously setting the purpose of and the legal conditions that apply to the ‘interoperability’ phenomenon with particular regard to bottleneck-type network facilities, digital software technologies and products enabling interoperability, predictable convergence would be ill-founded at all. Connected with this fact is the lack of consensus on the extent to which interoperability requirements are ought to be imposed in various (converging) industries, at least at the EU level. In absence of well-designed Community criteria and adequate level of mandatory solutions, it would be unpreventable to face a fragmented, even manipulated environment particularly where market forces are insufficient to create a competitive marketplace.

While playing a role for spurring competition is normally attached to ‘interoperability’, it is hard to see a general statutory policy to create fully interoperable networks and services in relation to converging markets. The current EC regulatory framework provides with a number of tools to ensure interoperability, sometimes via specific solutions for particular areas, i.e. interactive digital television services, yet has to be reviewed and even readjusted to respond convergence-based needs. A holistic viewpoint is expected to cover not only physical and logical interconnection requirements mainly representing traditional forms of communications

but also regarding P2P services, PC-PC communications and IP-based business models. In this era, QoS-enabled communications through all kinds of networks, open and standardised interfaces accepted across the industry and NGN-compatible interactive multimedia services are of the potential to reshape the vision of national regulatory authorities (NRAs) in terms of interoperability-related measures.

While bringing out solutions, a macro viewpoint to be pursued by NRAs, should not re-erect new policy problems *vis-à-vis* technical and administrative enforceability, delineation of boundaries between different bodies of law, etc. However, there is a prevailing disaggregate European approach to problems of non-interoperability against the ICT industries. For instance, in telecom industry, from the very beginning standard-based interconnection agreements have been leading the vertical, (e.g. over one individual network) and horizontal, (e.g. between different network) relationships. While packet-switching is potentially aggravating the conditions of interoperability, traditional problems of interoperability are not liable to regulatory intervention except for a number of rare situations. On the other hand, in field of software industry, there are statutory mandatory interoperability solutions, and EU Commission's landmark decision, *Microsoft* could be asserted as a juncture point in this regard. In other cases, which involve cross-border debates between media and telecom such as conditional access, interoperability is increasingly outweighed by investment and innovation concerns, i.e. development of alternative networks, services and technologies, etc. These divergent paths pose difficulties for operators, investors and new entrants in respect of their respective business plans. As well, this fragmented structure demonstrates uncompleted face of legal convergence between neighbouring sectors.

In this study, the current needs for interoperability regime(s) in EU are being scrutinized in respect of different ICT sectors as well as the emerging/prevailing technical bottlenecks. Against the so-called needs, available tools under the EU framework are being pointed out, with the view to draw a picture of future steps to be taken by NRAs. As well, interoperability concerns are being evaluated along with the future modern networks and new IP-based technologies that are steadily converging. Taking into account the general legal picture, the conflicting aspects between trends of deregulation and interoperability concerns are being presented with specific examples. By the way, Commission's 2007 Proposal to revise the EU framework is also examined, where it is necessary to deal with the conflicts between law and the technology. Elaborating the uncompleted face of convergence in this area, legal policy

clashes along with disaggregated EU legislation and case-law are being discussed aiming to devise possible legal solutions to interoperability-centric problems.

## II. The Concept of Interoperability

Interoperability is a central concept within the telecommunications industry due to the fact that provision of any telecommunications service requires a co-operation between multiple software/hardware elements in order to make a signalling, namely a communication between two parties, possible. Not only could market players in telecommunications sector but also those acting in other neighbouring sectors such as digital media, information technology sectors not fulfil their purposes without external systems that are interoperable with those of their competitors. From this point of view, interoperability is one of the big challenges of the convergence, arising as a multi-level compatibility problem, specifically at the levels of network, service, content and terminal equipment. For example successful proliferation of mobile content requires co-ordinated development of networks, handsets, operational and usage restriction systems, and content formats.<sup>1</sup> In order to ensure a positive user experience, the handset's physical features as well as the operating system and software tools necessary to run protected or non protected content applications must work all together.<sup>2</sup>

'Interoperability' phenomenon is enshrined under the EC Treaty, which links building of open and competitive markets to '*promoting the interconnection and interoperability of national networks as well as access to [trans-European] networks*'.<sup>3</sup> Thereby, contribution to the establishment and development of EU-wide networks *in the areas of transport, telecommunications and energy infrastructures* by promotion of interoperability is laid down as one of the Community-wide objectives. How to deal with this concept in different sectors differs as to the needs and understanding of market actors, which usually find an echo within the case-law, i.e. *Microsoft* case and the relevant legislation. In fact, the concept of interoperability is inseparably related to the 'convergence' between media, telecommunications and information technologies within which a variety of business models relying on newly emerging access and interconnection relationships is frequently seen.

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<sup>1</sup> European Commission, i2010 Information Space Innovation & Investment in R&D Inclusion, The Challenges of Convergence, Discussion paper, 12.12.2006, p. 22.

<sup>2</sup> *Ibid.*

<sup>3</sup> Consolidated Version of the Treaty Establishing European Community, C 321 E/37, Article 154.

Convergence has the potential to turn lack of interoperability into a common problem against development of ICT sectors. Not only technical compatibility problems but also competitive failures, economic inefficiencies, and hazards to consumer welfare would arise out of insufficient interoperability. Interoperability, being equivalent to neither ‘compatibility’ nor ‘co-operation’, has a more extensive meaning, comparing to each. Devices, in particular application programmes, are interoperable when, in addition to communicating with each other, they can also execute together a common task.<sup>4</sup> Not only co-operation but also running towards the common task should be attributable to interoperable systems. Both physical and logical connection between the parties should be established to achieve end-to-end connectivity<sup>5</sup> that ultimately ensures interoperability. To that end, interoperability of services requires the use of common standards and protocols, or else the use of a conversion function that can map between different services.<sup>6</sup>

Standardisation, together with alternative tools, i.e. open access regimes, voluntary agreements to disclose proprietary interfaces, would effectively respond to interoperability-requirements. In this regard, how to optimise the needs of market players and to ensure consistency with relevant rules and legislation identifies the roadmap to follow within each sector. For instance, while whether or not opening source codes should be encouraged and/or forced in order to enable a level playing field between market players is generally referred to as the current debate in information technology (IT) markets, telecom industry predominantly turns its face to standardisation efforts to ensure interoperability. Interoperability concerns also differ in broadcasting sector, where standardisation efforts lag behind deployment of new technologies, proprietary interfaces, etc.

Thus, how to understand and elaborate the concept of interoperability in separate sectors differs according to the needs of each market, and this point of view constitutes the essential focus of this paper. Before analysing interoperability needs prevailing in each sector, standardisation and other related phenomena are being explained below.

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<sup>4</sup> Paul L. Nihoul and Peter B. Rodford, *EU Electronic Communications Law: Competition and Regulation in European Telecommunications Market*, Oxford University Press, 2004, p. xlvii

<sup>5</sup> For explanation of ‘end-to-end connectivity’, see *infra* note 33 and 38.

<sup>6</sup> Serge J. H. Gijrath, *Interoperability Revisited: How Far Does the Duty to Negotiate Access and Interconnection Extend?*, *Computer and Telecommunications Law Review*, Vol. 12, Issue 1, 2006, p. 15.

### III. Standardisation

In order to ensure interoperability, a fundamental set of standards is generally needed by the implementing parties who wish to communicate each other. In public telecom industries, which are designed so as to ensure end-to-end connectivity, standardisation is considered as an imperative. Thanks to the standardisation and technical development, global telephone network is now serving more than one billion subscribers across the world. The World Wide Web (WWW), being another global network, has developed with a breathtaking speed and is the most powerful candidate to lead the information society. In development of this global network and accompanying hardware and software systems, standardisation had played a crucial role.

Standards may be established cooperatively by industry participants (through standard-setting organizations (SSOs)) or they may be de facto or naturally occurring, as a result of widespread market adoption without any official recognition, e.g. the Microsoft Windows operating system.<sup>7</sup> The policies and procedures of SSOs usually ensure that standards are developed in open environment, whereby each participating member has the opportunity to contribute to the scope of the standard, its development, and compatibility with others.<sup>8</sup> For instance, technology standards developed primarily by the ICT industry through open processes, such as USB interconnections, Ethernet, TCP/IP, XML, Wireless LAN technology, Web Services, etc., are truly enabling interoperability at the technical layer.<sup>9</sup>

While standardisation is directly linked and very much contributes to ‘interoperability’, other mechanisms such as (bilateral) implementing interface protocols could not substitute standardisation for a number of reasons. First and foremost, meticulously designated standards usually reflect needs and interests of industry stakeholders. Though with various degrees of successful usage and implementation, standards mirror the experience and the information gathered across the industry. However, it should be noted that standardisation process is not neutral against the technologies, systems or procedures commonly used in the

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<sup>7</sup> Erica S. Mintzer and Logan M. Breed, How to Keep the Fox Out of the Henhouse: Monopolization in the Context of Standards-Setting Organizations, *Intellectual Property & Technology Law Journal*, September 2007, Volume 19, Number 9, p. 5.

<sup>8</sup> Damien Geradin, Standardisation and Technological Innovation: Some Reflections on Ex-ante Licensing, FRAND, and the Proper Means to Reward Innovators, *Kluwer Law International*, 29 (2006) 4, p. 511-2.

<sup>9</sup> White Paper, European Interoperability Framework, ICT Industry Recommendations, Brussels, 18 February 2004, p. 14, <http://www.comptia.org/issues/docs/interopwhitepaper0204.pdf>.

industry, and this situation might create anti-competitive impulses resulting in restrictions over standardisations process. From his point of view, there sometimes arises risk of collusion (e.g. companies using the SSO to facilitate price fixing) as well as risk of exclusion (e.g. companies using the SSO to freeze out a competitor) whilst adopting a standard.<sup>10</sup> In order to eliminate such risks, SSOs apply a number of safeguards before and during the standardisation processes. For instance, many SSOs require participants to notify the standards body of the existence of intellectual property that they hold that is related to the standards under consideration and to commit to licensing intellectual property determined essential to using the standards on reasonable and non-discriminatory terms.<sup>11</sup> Second, either implemented by voluntary agreement of the parties or stipulated by law, mutual protocols specifying the specifications, interfaces, etc. to be shared between two parties would be time-consuming and ineffective in terms of costs, and thus are far from ensuring interoperability in an efficacious manner when compared with widely-accepted standards. Third, competitive drivers in a marketplace to reap the potential consumer benefit are unleashed in a robust and unrestricted manner within a free-riding environment where software codes, etc. are rendered open to third parties. While Open Source Software (OSS) movement so far has been subject to public debate from a number of perspectives, open and standardised software codes are indubitably of the potential to ensure ‘interoperability’ at the highest level, enabling follow-on innovation as well as new entrances to software industry.<sup>12</sup>

Generally speaking, industry standards can take three forms, first; market-driven mechanism as was the typical case in computer industry, second; imposition of standards by governments as commonly faced in old telecommunications regimes, third; sponsoring private industry

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<sup>10</sup> Mintzer and Breed, *supra* note 7, p. 5. See also Peter Grindley, Leonard Waverman, David J. Salant, Standards Wars: The Use of Standard Setting as a Means of Facilitating Cartels Third Generation Wireless Telecommunications Standard Setting, *International Journal of Communications Law and Policy*, Issue 3, Summer 1999. The authors point out the restrictive behaviours mandated by EU governments in standard-setting procedure that would create cartel, in relation to the process by which 3G standards were defined across the Europe, and articulate their views as follows: “[W]hen a few manufacturers are able to dominate a key standard setting body, those manufacturers can effectively tip the network, to the disadvantage of rivals”.

<sup>11</sup> Adam Biegel, Rod Ganske and Jon Jurgovan, Broadened Antitrust Liability for Abusing Standards-Setting Process, *Intellectual Property & Technology Law Journal*, December 2006, Volume 18, Number 12, p. 4.

<sup>12</sup> Open Source refers to a particular kind of licensing arrangement which allows developers to build on existing source code; Open Standards on the other hand refers to a kind of technical framework which companies can agree on together in order to ensure greater interoperability for their product. The key difference is that Open Standards retains the important commercial incentives to innovate by maintaining Intellectual Property rights. It is also asserted that “[O]pen Source Software tends to use, and often helps to define, open standards and publicly available specifications. OSS products are, by their nature, publicly available specifications, and the availability of their source code promotes open, democratic debate around the specifications, making them both more robust and interoperable.” (White Paper, 2004, *supra* note 9, p. 5 and 34)

consortia for standardisation alike the case in digital TV industry.<sup>13</sup> While, standards are considerable as tools for innovation and creative destruction, intrinsic values of standards differ according to marketplace; and generally can we say more the number of participants accepting a given standard more benefits do they receive for using the standard. With regard to the Global Information Infrastructure (GII), it is almost inconceivable that the networking externalities' associated with mass communication can be achieved without some minimum level of standardisation.<sup>14</sup> The key is not to standardise everything but only to standardise those elements that are absolutely essential for the degree of interconnection required to advance the GII.<sup>15</sup>

As having a crucial role in building GII from the very beginning, importance of standardisation is lasting even in an increasing manner in convergence-based Internet era. This is because increasing number of software/hardware facilities that myriad service providers require to carry out their activities are parts of the convergence puzzle, and solving this puzzle by making them available to third parties is essential for the achievement of the fullest connectivity and interoperability between networks and services. More explicitly, users' freedom of choice between creative multimedia appliances, technologies, devices, etc. depends upon securing interoperability, i.e. between interfaces of different systems, technologies, network components, etc. Where longer-term stability is needed to build a complex system in an evolutionary way, standards are essential; they are also needed to help create a mass market by giving consumers sufficient confidence; and they are needed where a public interest exists, e.g. to protect the rights of minorities.<sup>16</sup>

On this basis, standardisation is widely considered by regulatory regimes as a competitive, efficiency-increasing and consumer-welfare improving tool that ultimately increases multi-level interoperability. Likewise, it is highly encouraged under the current Electronic Communications Regulatory Framework (ECRF), whereby particular emphasis is given to ensuring interoperability in specific areas, e.g. interactive digital television services, digital TV sets, etc. In order for consumers to reap the full benefit from standardisation process, by

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<sup>13</sup> Hernan Galperin, Can the US transition to digital TV be fixed? Some lessons from two European Union cases, *Telecommunications Policy*, Vol. 26, 2002, p. 5.

<sup>14</sup> Peter Cellarius, Interoperability: the key to competitive supply in the Global Information Society (GIS), *Computer Standards & Interfaces*, 20 (1998), p. 126.

<sup>15</sup> *Ibid.*

<sup>16</sup> Volker Jung, Infrastructure and open platforms-the backbone for the global information society, *Computer Standards & Interfaces*, 20 (1998) p.168.

and large market players are invited to lead the process by reaching an industry-wide voluntary agreement.<sup>17</sup> Yet, convergence means different levels of competitive markets and a multi-dimensional environment through which every stakeholder pursues his interest. Since this complicated market structure would harden the standardisation process, especially at levels of services and applications. Sometimes it falls quite complicated and long-lasting to achieve market-led standards through voluntary agreement, and this fact requires giving way to statutory mechanisms for mandatory (interoperability) solutions.

Given the fact that convergence means deepening a simultaneous focus on separate industries, below is given a comprehensive legal analysis on converging ICT sectors with particular regard to telecommunications. To that end, European treatment of interoperability matters in relation to specific needs, technical and operational requirements of each ICT industry is being elaborated to infer a number of conclusions against the convergence-based business trends.

#### **IV. Interoperability in Telecom Industry**

Interoperability, as implied above, is dealt with specific terms and understanding in separate industries because each market demonstrates different structural and operational features which firms have to consider in carrying out their activities. It seems that different market needs with regard to interoperability are, and so far have been a driver for European legislator to adjust interoperability requirements. Following the analogy of the presumed disjunction, below primarily telecommunications industry, and thereafter media and IT industries are being analysed for the purpose of determining how interoperability needs are specified and met in each industry.

##### **IV.A. Basic Forms of Interoperability and Leapfrogging Approaches under EC Law**

Interoperability, having an extendable character to any network industry, is a concept which has been developing through telecommunications networks from the very beginning.

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<sup>17</sup> It is stated that “[S]tandardisation should remain primarily a market-driven process. However there may still be situations where it is appropriate to require compliance with specified standards at Community level to ensure interoperability in the single market” (Directive (EC) 2002/21 of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services, [2002] OJ L108/33 (Framework Directive), Recital 30, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0033:0050:EN:PDF>).

Reflecting both the needs of global information society and those of market players, ‘interoperability’ traces back to harmonisation measures under EC law. Harmonisation measures in EU were taken in the form of ONP<sup>18</sup> Directives, which essentially aimed to bring about a level of standardization across EU countries, i.e. from licensing scheme to regulations on access and interconnection. Though interoperability directly goes to ‘interconnection’ between telecom networks, it is also related to universal service, consumer needs, conditional access systems and other issues of telecom regulation. In ensuring interoperability with regard to such issues, primarily ONP Directives and subsequently 2002 Directives played an important role. Considering this fact, the so-called EC Directives are being dealt within an analytical viewpoint emanating from the basic assumptions to a complex world of convergence in this section of the paper.

#### **IV.A.1. Interoperability Regime in Pre-ECRF Period**

Before introduction of the current ECRF, particularly during the years of transition from monopolisation to competitive markets, interoperability issues were rather straightforward for they were being handled from the perspective of incumbent network(s). Due to the fact that telecommunications services were being provided through networks of incumbents who were acting as either legal or de facto monopoly, interoperability was a secondary issue to be tackled by incumbents in EU countries. However, number of interoperability requirements increased after the enactment of the ONP Directives, which resulted in competition in supply of networks and services. Even though compatibility among incumbents’ network standards and specifications was the main concern throughout the 1990s, competitive and more heterogeneous and complicated relationships tended to lead the interoperability requirements after ONP Directives. Therefore, interoperability regime in pre-ECRF period could be examined within a classified manner within which ONP Directives could be seen as a juncture.

In fact, prior to competition introduced at various levels, i.e. fixed telephony, mobile and cable markets, ensuring interoperability between service providers was deemed as a matter of achieving global connectivity on a country-to-country basis. Since there were voluntary

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<sup>18</sup> Open Network Provision (ONP) is defined in the ONP Framework Directive as ‘the harmonisation of conditions for open and efficient access to and use of public telecommunications networks and, where applicable, public telecommunications services and the efficient use of those networks and services’. (Council Directive 90/387/EEC of 27 June 1990 on the establishment of the internal market for telecommunications services through the implementation of open network provision, OJ L 192/1 (ONP Framework Directive), Art. 2)

bilateral agreements between governments to ensure communications, forcing incumbents to make their networks compatible with other corresponding networks was outside the European regulatory agenda. International telephony services were requiring a limited level of interoperability, and this was purely horizontal at that time. Even for more complex interoperability relationships between networks, i.e. between GSM-PSTN, the so-called horizontality and lack of real competitive forces were still valid. As a conclusion, until introduction of the ONP Directives interoperability was subordinated to other regulatory matters, i.e. liberalisation, universal service, etc.

The scope of the ONP programme was initially limited to issues of access to the network infrastructure and ‘reserved services’ provided by the incumbent operator.<sup>19</sup> Afterwards, concept of ONP enlarged so as to cover the areas that were already liberalised and opened to competition. Determining the scope of and the conditions that apply to ONP programme, ONP Framework Directive provided that access to public telecommunications networks and already-liberalized public telecommunications services would be provided on the basis of non-discriminatory, objective and transparent conditions published in an appropriate manner.<sup>20</sup> It stipulated that access could be denied only on the basis of “essential requirements” depending on general public interests, which have a derogative non-economic character.<sup>21</sup> The principles defined in the ONP Framework Directive were later refined and applied to various telecommunications services, i.e. leased lines,<sup>22</sup> interconnection<sup>23</sup> and voice telephony<sup>24</sup> with further ONP Directives.

After enactment of ONP Directives, interoperability issues expanded so as to incorporate technical and commercial imperatives that are required to ensure an increased number of

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<sup>19</sup> Ian Walden, *European Union Communications Law* in Ian Walden and John Angel (eds.) Telecommunications Law and Regulation, Oxford University Press, 2<sup>nd</sup> Edition, 2005, p. 126.

<sup>20</sup> ONP Framework Directive, *supra* note 18, Art. 3.

<sup>21</sup> Essential requirements, which seem non-exhausted in the context of ONP Framework Directive, are stated as follows: (i) security of network operations, (ii) maintenance of network integrity, (iii) interoperability of services, in justified cases, and (iv) protection of data, as appropriate.

<sup>22</sup> Council Directive 92/44/EEC on the application of open network provision (ONP) to leased lines, [1992] OJ L165/27.

<sup>23</sup> Directive 97/33/EC of the European Parliament and of the Council on interconnection in telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP), [1997] OJ L199/32.

<sup>24</sup> Directive 95/62/EC of European Parliament and of the Council on the application of open network provision to voice telephony (ONP), [1995] OJ L131/6; Directive 98/10/EC of European Parliament and of the Council on the application of open network provision (ONP) to voice telephony and on universal service in a competitive environment, [1998] OJ L101/24.

access and interconnection agreements between competitive service providers. ONP scheme helped to create a level playing field between new entrants and incumbents on the basis of certain principles, i.e. non-discrimination, transparency. However, competition concentrated on provision of end-user services through traditional public switched telephony networks, and interoperability was considered as a sub-matter of interconnection which service providers using the same network require. In this regard, fully interoperable services were sought by new entrants to compete on equal foot with the incumbents.

Reflecting the needs of the market and the society, the essential goal of the Interconnection Directive was articulated as “ensuring adequate *interconnection within the Community of certain networks and interoperability of services* essential for the social and economic well-being Community users”.<sup>25</sup> Until the implementation of the Interconnection Directive in Member States, there was no harmonized access and interconnection policy in the EU, and each Member State took a different approach.<sup>26</sup> In order to guarantee sufficient level of interoperability as well as to create a harmonised implementation of access/interconnection policy across the Europe, the said Directive envisaged a number of measures, which sometimes could not be reconciled with a market-based competition measures.

At the first place, Interconnection Directive obliged all operators having significant market power (SMP operators) to provide interconnection.<sup>27</sup> At the second place, the Directive set out the conditions that apply to interconnection obligation via implementation of certain principles, e.g. non-discrimination, transparency and cost-orientation<sup>28</sup> as well as some additional obligations, e.g. preparation of reference offer, a cost accounting system,

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<sup>25</sup> Directive 97/33/EC of the European Parliament and of the Council on interconnection in telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP), [1997] OJ L199/32 (Interconnection Directive), Recital 7).

<sup>26</sup> Emma McCormack, Access and Interconnection in Ian Walden and John Angel (eds.) Telecommunications Law and Regulation, Oxford University Press, 2<sup>nd</sup> Edition, 2005, p. 224.

<sup>27</sup> A specific reference to interconnection was not made under the Directive provision, whereby a more extensive obligation was put in place. The so-called obligation was set out in the following manner:

Organizations authorized to provide public telecommunications networks and publicly available telecommunications services as set out in Annex I [*organizations carrying out either fixed public telephone networks or leased line service or public mobile telephone networks/services*] which have significant market power shall meet all reasonable requests for access to the network including access at points other than the network termination points offered to the majority of end-users. (Interconnection Directive, *supra* note 25, Art. 4/3)

<sup>28</sup> Interconnection Directive, *supra* note 25, Art. 6 and 7(2).

accounting separation scheme.<sup>29</sup> Although the role of NRAs was stated as supervising and - if necessary - interfering with the interconnections agreements in Preface of the Directive,<sup>30</sup> the powers that the Directive gave to NRAs go beyond supervision and commonly used tools for intervention. This is because NRAs were empowered under the Directive to intervene on their own initiative or at the request of one party, in order to specify issues to be covered in an interconnection agreement, or to lay down specific conditions to be observed by one or more parties to such agreement.<sup>31</sup> The powers given to NRAs by the Interconnection Directive include -albeit to be used in exceptional cases- requiring changes to be made to interconnection agreements already concluded, where justified to ensure effective competition and/or interoperability of services for users.<sup>32</sup>

All the referred duties and rules enshrined under the Interconnection Directive demonstrate the importance given to the ‘interoperability’ and the EU-wide effort to achieve it even by extending the traditional ex ante rules. This is clearly why interoperability is deemed essential by the European legislators for the achievement of the principle of ‘any-to-any connectivity’,<sup>33</sup> which means that any user can communicate with any other user, even if they

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<sup>29</sup> Interconnection Directive, *supra* note 25, Art. 7 and 8.

<sup>30</sup> Interconnection Directive, *supra* note 25, Recital 5.

<sup>31</sup> Interconnection Directive, *supra* note 25, Art. 9 (3).

<sup>32</sup> Interconnection Directive, *supra* note 25, Art. 9 (3). In case negotiations failed within the time limits set in advance, NRAs was also authorized to take steps to conclude an interconnection agreement between the parties [See Art. 9 (5)]. Another power given to NRAs to be used exceptionally is set out under the Article 9 (6) of the Interconnection Directive. According to the said Directive provision, in cases where organizations which are authorized to provide public telecommunications networks and/or publicly available telecommunications services have not interconnected their facilities, NRAs, in compliance with the principle of proportionality and in the interest of users, shall be able, as a last resort, to require the organizations concerned to interconnect their facilities in order to protect essential public interests and, where appropriate, shall be able to set terms of interconnection.

<sup>33</sup> Rather than ‘any-to-any connectivity’, references are usually made to ‘end-to-end connectivity’ under Community and Member States legislation. See Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities, 24.4.2002, OJ L 108/7, (Access Directive), Art. 5(1), <http://eur-ex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0007:0020:EN:PDF>. Similarly, Section 74 of the UK Communications Act defines the specific types of access conditions which may be imposed, making *specific reference to the goal of ‘securing end to end connectivity for end-users’*.

The so-called ‘[e]nd-to-end connectivity’ refers to the facility:

- (a) for different end-users of the same public electronic communications service to be able to communicate with each other; and
- (b) for the end-users of different such services to be able to, each using the service of which he is the end-user, to communicate with each other (Ian Lloyd and David Mellor, *Telecommunications Law*, Lexis Nexis UK, 2003, p. 105-106)

use different networks or equipment.<sup>34</sup> According to this viewpoint, both vertical and horizontal types of interoperability needs are required to be met, and standards-based interconnection agreements are expected to be concluded to ensure global connectivity between users of telecommunications networks. To that end, particular importance was given to using the same communication protocols, i.e. Open Systems Interconnection (OSI) in lieu of creating a competitive marketplace. That is to say, ensuring adequate access and interconnection and securing *interoperability of services* essential for the social and economic well-being Community users was the main policy objective in relation to the context of Single Market during 1990s, even after ONP Directives. Especially before the publication of 2000/2887 Regulation on Unbundled Access to the local Loop<sup>35</sup> following ONP Directives, competition goals were subordinated to creation of a Single Market in field of telecommunications networks and services. In this regard, during the pre-ECRF period, market-based remedies were extended to unique solutions to ensure sufficient level of interoperability which was generally conceptualised and designed over the networks of incumbents.

#### **IV.A.2. Interoperability Regime in Post-ECRF Period**

The former (pre-ECRF) regulatory measures including ONP Directives were far from giving a clear signal towards creation of a multi-layered, dynamic and convergent environment whereby the universal demand for advanced multimedia services as well as ubiquitous communications has been met in a competitive manner. Lack of an effective and flexible legal framework that is adaptable to changing needs of global information society and of the converging markets was a deficiency on the European side. These factors, being accompanied by other impulses such as European governments lagging behind US policy makers in terms of broadband penetration, open access policies, etc. drove the European legislators to enact a new regulatory framework. Given the so-called policy objectives, EU Authorities adopted a comprehensive, technology-neutral framework, under which all transmission networks and services are covered under the same regulatory umbrella.

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<sup>34</sup> See Nikos T. Nikolinakos, *EU Competition Law and Regulation in the Converging Telecommunications, Media and IT Sectors*, *Kluwer Law International*, 2006, p. 385.

<sup>35</sup> Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop, published on May 12<sup>th</sup> 2000, O.J. L 336/4, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000R2887:EN:NOT>

New ECRF is predominantly based on competition law methodology, particularly by means of market analysis and the concept of proportionate regulation. Meanwhile, interoperability, being pursued an objective of legacy networks, business models, etc. was also maintained as one of the objectives of ECRF. This stems from the ongoing fact that interoperability relates to the global connectivity needs as well as is being a pre-condition for a successful interconnection to be realised. Given these facts, interoperability is encouraged under the ECRF for provision of electronic communications services, both in general and for the purpose of specific end-user services. Whereas interoperability for interactive digital television services and enhanced digital television equipment is encouraged as specific end-targets, obligation to provide interconnection in case of inadequate end-to-end connectivity represents the general concern of ‘interoperability’ under ECRF.<sup>36</sup> While the latter issue to be dealt with by NRAs in relation to provision of interconnection is set out as one of the derogative safeguards (to be applied as a former type stringent intervention without regard to existence of SMP) under Article 5(1) of the Access Directive, another obligation with regard to *provision of specified services needed to ensure interoperability of end-to-end services to users, including facilities for intelligent network services or roaming on mobile networks* is specified under the Article 12(1) to be exclusively imposed on SMP operators.

The general viewpoint with regard to how to secure the interoperability under the ECRF, which was enshrined in the following paragraph, could help understanding how to approach the abovementioned obligations:

*Interoperability is of benefit to end-users and is an important aim of this regulatory framework. Encouraging interoperability is one of the objectives for national regulatory authorities as set out in this framework, which also provides for the Commission to publish a list of standards and/or specifications covering the provision of services, technical interfaces and/or network functions, as the basis for encouraging harmonisation in electronic communications. Member States should encourage the use of published standards and/or specifications to the extent strictly necessary to ensure interoperability of services and to improve freedom of choice for users.*<sup>37</sup>

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<sup>36</sup> See Access Directive, *supra* note 33, Art. 5(1). According to this provision, as far as either (i) ensuring end-to-end connectivity or (ii) ensuring accessibility for end-users to digital radio and television broadcasting services specified by the Member State is concerned, the national regulatory authorities are allowed to impose certain types of obligations to relevant operators including non-dominant ones. In the first case obligation to provide interconnection; in the second case obligation to provide access to application program interfaces and electronic programme guidelines is enshrined therein to be used by NRAs.

<sup>37</sup> Access Directive, *supra* note 33, Recital 9.

The above extract, underlying the importance given to interoperability under the ECRF, deliberately leaves an extensive discretion to be used by NRAs to ensure interoperability between existing networks and services. Hereby, specific (homogenous) access products are kept outside the ultimate objective of interoperability on the ground that the concept of interoperability is promulgated to create multi-platform, multi-provider environment allowing product differentiation as much as possible. On the basis of the rationale and main parameters of ECRF, e.g. principle of technological neutrality, it would be asserted that the environment supposed to be created via ECRF includes myriad ways for provision of data as well as voice-based services through packet-switching or circuit-switching systems.

At this point, interoperability could be seen independent of how and what to transmit, providing the transmission is done through electronic communications networks, pursuant to the ECRF. Even not specified under ECRF, this viewpoint would be deemed to follow the principle of ‘technological neutrality’ and the convergence-based innovations. More explicitly, digital compression and signalisation in combination with intelligence of software and network facilities bring about interoperability between services, irrespective of the subject-matter (e.g. data, voice, video) of the transmission between the communicating parties.

Actually, intelligence stems from the achievement of ‘end-to-end connectivity’<sup>38</sup> through TCP/IP protocols which govern the traditional public switched telephone networks (PSTN) and transform it into a private, seamless and amorphous network by means of packet-switching. With packet-switching system, an autonomous, self-organising and open platform is enabled to emerge out of the powerful combination of adaptive routers, digital signalling, ubiquitous computers and servers. Ultimately, we could mention a fruit of interoperability of different hardware and software elements enabling a meaningful connection between two communicating systems and/or networks.

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<sup>38</sup> What ‘end-to-end connectivity’ refers to in the Internet world could clearly be figured out by the following passage:

“[T]he Internet was designed as a “dumb” network. Its central function – implemented via the TCP/IP protocols – is to pass packets of data, via “pipes”, along a chain of “nodes” until they reach their destination. The nodes do not ask questions about the sender of the packet, the recipient, or its content; they simply receive them, analyse the address information and pass them on to the next node. This dumb network treats all packets equally – a principle referred to as “bit parity” and often encapsulated in the phrase “end-to-end” design (J. H. Saltzer, D. P. Reed and D. D. Clark, ‘End-to-End Arguments in System Design’, M.I.T. Laboratory for Computer Science, <http://web.mit.edu/Saltzer/www/publications/endtoend/endtoend.txt>)”

Uniformity between computing languages of two sides, i.e. via TCP/IP protocols brings about the opportunity to design an IP-based global multimedia communication system that would take the place of circuit-switched networks. Such a replacement would be regarded as an important signpost for policy makers engaged in field of electronic communications. This is because packet-switching enables transmission of any type of data as well as voice across the Internet cloud with more and enhanced functionalities, i.e. in terms of storage, communicative skills. In fact, peer-to-peer and PC-to-PC communications, e.g. VoIP, video-conferencing would shake the ground of traditional type of telecommunication services, and this trend would culminate with construction of all-IP networks in lieu of PSTN networks enabling the combination of the cost advantages and wide-ranging functionalities of IP networks with quality of service (QoS) advantages of PSTNs.

As a matter of fact, transmission technology is changing towards all-IP networks, i.e. Next Generation Networks (NGNs),<sup>39</sup> which is quite different from an overlay Internet network. While the former is constructed to meet all the transmission needs, e.g. both data and voice with the view to have a functionality of a public network, the latter, by its nature, is purely a private network with limited functionalities particularly with respect to QoS. In order to achieve the target of a publicly available NGN, a different network topology that requires a less number of interconnection nodes and reveals a seamless, service-neutral network design will inevitably be confronted in future. One of the most prominent attributes of this newly emerging network is the separation between transport and service levels. To say in a simplified manner, in an NGN environment networks simply will be conveying data while services are going to be controlled by software programs embedded in ubiquitous computers.

Hence, in the NGN core, the migration to IP will serve to decouple the application from the network, facilitating triple-play service provision and also enabling third party application service providers to compete with the network operator in the provision of services.<sup>40</sup> In view

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<sup>39</sup> NGN is defined by the ITU-T Study Group 13 as follows:

“A Next Generation Network is a packet-based network able to provide telecommunications services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related Technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users” ([http://www.itu.int/ITU-T/studygroups/com13/ngn2004/working\\_definition.html](http://www.itu.int/ITU-T/studygroups/com13/ngn2004/working_definition.html)).

<sup>40</sup> J. Scott Marcus and Dieter Elixmann, Regulatory Approaches to NGNs: An International Comparison, wik-Consult GmbH, p. 3-4, <http://web.si.umich.edu/tpcr/papers/2007/800/Regulatory%20Approaches%20to%20NGNs%20v1.2%20FINAL.pdf>

of this fact, NRAs may have to ensure that interconnection is possible at specific functional levels, i.e. transport and service levels in a reasonable, non-discrimination, transparent manner, both vertically and horizontally. However, operators who have market power may not have an incentive to open their networks to competition at the service level having the intent to limit use of these capabilities, and this affects the ability of independent service providers to integrate their services into the NGN platforms.<sup>41</sup> All such problems including possibility of emergence of new bottlenecks as well as potential problems regarding implementation of new standards will be faced by NRAs and other market players migrating to NGNs.

Throughout this trend, the discussions surrounding interoperability would have to be changed from the perspective of physical and logical interconnection requirements to more complex vertical/horizontal interconnectivity problems. In this environment, standardisation would capably arise as an unusual problem in cases where core NGN networks are being run without fastidiously crafted interfaces, i.e. those solely designed to integrate core NGNs to each other. It should be noted that migration to NGN will be carried out gradually; actually for an extended period, which could easily exceed ten years, old circuit switched networks will co-exist with new packet-based infrastructures.<sup>42</sup> Considering that different types of interconnection agreements will co-exist for the predictable future, potential problems regarding transition period, i.e. in relation to market analysis, access/interconnection obligations as well as the predictable problems unique to all-IP networks, i.e. QoS standards would make market players having to consider a new competitive era with new interoperability requirements.

With the view to ensure interoperability between networks and services, under the ECRF is there a number of available regulatory tools, as stated above. Yet, though admitting that “[i]nteroperability is an evolving concept in dynamic markets”,<sup>43</sup> ECRF does not specify how to adapt to NGN type developments and solve the related problems. As well, interoperability is not elaborated within a layered structure that tends to be the future vision of provision of

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<sup>41</sup> See ERG (Final) Report on IP Interconnection, Project Team on IP-Interconnection and NGN, ERG (07) 09, 2007, p. 23-25, [http://www.erg.eu.int/doc/publications/erg\\_07\\_09\\_rept\\_on\\_ip\\_interconn.pdf](http://www.erg.eu.int/doc/publications/erg_07_09_rept_on_ip_interconn.pdf)

<sup>42</sup> See also J. Scott Marcus and Dieter Elixmann, Regulatory Approaches to NGNs: An International Comparison, *Communications & Strategies*, No. 69, 1st Quarter 2008, p. 39.

<sup>43</sup> Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive), 24.4.2002, OJ L 108/51, Recital 30, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0051:0077:EN:PDF>.

newly emerging networks and services. Lack of a perspective incorporating such kinds of structural changes would result in the conclusion that EU legislation lagging behind the breathtaking technological developments. The general idea of ensuring interoperability with regard to end-to-end connectivity would, to some extent, respond the future problems including the bottleneck problems. However, in face of the steadily-changing and IP-inclusive character of telecom industry, a more expansive regulatory perspective, which does not necessarily mean a more interventionist approach, is inevitably needed in terms of interoperability requirements.

#### **IV.B. Interoperability from the Perspective of NGN Networks**

Growth of NGNs and the new achievements of IP-based network architecture would offer a high-speed, mobilised, private and multi-functional service web. Benefits of such newly emerging NGNs involve provision of convergent, innovative, competitive services extending from high-speed broadband to more personalised and converged service packages.<sup>44</sup> Notwithstanding these promising developments, there inevitably will arise interoperability issues due to a wide variety of protocol variants, network topologies, and media codec that are to be used in the context of NGN environment.

The key points to be considered in handling NGN-related interoperability problems are the service intelligence being decoupled from the network and the thoroughly realising fact of convergence across the NGN core. Since transport, control and service layers can be technically and commercially separated from the widely-supported perspective of NGN design, interoperability issues in this context are also supposed to be considered in a separated

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<sup>44</sup> Types of services that can be offered by NGNs include:

- **voice services:** It will be possible to make calls over an NGN from either a telephone or a ‘softphone’ on a PC. Calls are carried more efficiently because they no longer each need their own dedicated line and can share bandwidth with other types of data;
- **digital television delivered using IP (known as IPTV):** IPTV is expected to be a major commercial driver for NGNs worldwide, although the UK already has relatively high penetration of non-IP digital TV services through Freeview, cable and satellite;
- **converged services:** These combine different services running on the NGN. For example, a customer could have a single mailbox that collects together voicemail, text messages, e-mails and video mails;
- **personalised services:** Communications providers are already offering ‘bundles’ that combine broadband, TV, phone and mobile services. With NGNs, customers can have finer control over the services that they purchase, and be billed for all services through a single system;
- **mobility services:** The ability to access services from anywhere enhances flexible working. An employee could have much easier remote access to work telephone and data systems and choose whether to have calls routed to a fixed line, mobile or laptop (Parliamentary Office of Science and Technology, Postnote on Next Generation Telecoms Networks, No. 296, December 2007, p. 1, <http://www.parliament.uk/documents/upload/postpn296.pdf>).

form. In order to ensure interoperability of NGN services at the highest level, a wide range of interoperability requirements extending to different service and control layers as well as network hierarchy is eventually needed to be implemented by the market players.

The physical and logical connections within the concept of interoperability could hypothetically be figured out within a five-layered approach where *user interfaces* are run between *applications* and *carriers* on the one side and *network interfaces* are run between carriers and (IP-based) *networks* on the other.<sup>45</sup> Yet, approaching the issue by simply categorising the interface points into two via a vertical point of view could not be sufficient to figure out NGN architecture and related functionalities. The global NGN architecture consists of interconnected core networks belonging to different carriers, with endpoints connected through attached access networks, and gateways to non-NGN networks.<sup>46</sup> That is to say, both vertical and horizontal interface points are shaping NGN architecture, whereby a number of layers,<sup>47</sup> within each of which a number of interoperability requirements are inhering, is inevitably to be confronted by NGN actors.

To remark as a general point, interoperability requirements occur both vertically, i.e. between the different layers of a telecommunications network and horizontally, i.e. within a layer of a network,<sup>48</sup> and this fact is more relevant to NGNs. All the articulated requirements (vertical-horizontal) necessitate both identification of the technical end-points to be connected each other and a careful consideration with regard to the degree of interoperability *strictly necessary to [...] improve freedom of choice for users* as laid down under ECRF.<sup>49</sup> At this juncture point of view, interoperability could be attributed to intra- and inter-platform competition as well as to standardisation and pro-active compatibility solutions.

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<sup>45</sup> See Jan van Cuilenburg and Pascal Verhoest, Free and equal access: In search of policy models for converging communications systems, *Telecommunications Policy*, Vol. 22, No. 3, 1998, p. 178.

<sup>46</sup> ERG (Final) Report on IP Interconnection, 2007, *supra* note 41, p. 13.

<sup>47</sup> It is generally acknowledged that there are three layers in an NGN architecture: service layer, control layer and the transport layer.

<sup>48</sup> Gijrath, 2006, *supra* note 6, p. 16.

<sup>49</sup> See Access Directive, *supra* note 33, Recital 9.

In order to respond the so-called regulatory needs, i.e. sustainable competition in an NGN environment, a sufficient level of interoperability through open and standardised interfaces must be realised. In this regard, application programming interfaces (APIs)<sup>50</sup> between

- i. customer premises equipment and NGN access networks,
- ii. NGN networks
- iii. NGNs and other networks, e.g. PSTN/ISDN, Internet
- iv. Third party application provider equipment and NGNs<sup>51</sup>

will have to be ensured to be ‘open’ in order to reap the full benefit of convergence-based NGN applications. In the NGN world, main function of APIs is to ensure higher-level applications, e.g. IP multimedia services to be translated by the lower levels, e.g. control-transport levels. Considering that the interface points could be deemed as logical gateways amongst the layers of NGN as well as functioning as the communicating language for myriad of services, networks to work together, a narrow perspective deepening the need simply for technical interoperability falls insufficient in terms of the policy objectives of NRAs.

Given that building of a global multimedia communication system depends on a satisfactory level of vertical/horizontal interoperability, undertakings carrying out their activities via different NGN platforms must be able to speak out the same language through interoperable networks and services. From a broader viewpoint, in order for vendors/operators to provide their equipment/services in a competitive manner that is typified with economies of scale and scope, not only intra- but also inter-platform interoperability should be achieved. Neither intra- nor inter-platform interoperability should be overwhelmed by, or even lag behind, the other. Otherwise, universal compatibility successfully based upon the interoperability between NGN-enabled applications and those of legacy networks as well as interoperability amongst NGN networks would not be possible. It should be noted that the high penetration figures of popular Internet applications owe its success to the universal compatibility achieved via TCP/IP-enabled networks as the global users of these networks understand each other through an open and standardised network structure.

As a matter of fact, rather than interoperability between equipments of different vendors to be used in NGNs, interoperability between network facilities of different NGN operators has the potential to trigger regulatory concerns. Vendor interoperability, which enables NGN

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<sup>50</sup> Application programming interfaces function as the operating language between one operating system and a software program configured in order to provide an electronic communications system. Also see *infra* note 82.

<sup>51</sup> ERG (Final) Report on IP Interconnection, 2007, *supra* note 41, p. 14.

providers to use equipment from different vendors, is the backdrop to which further levels of interoperability are attached and the competition is flourished as such. Regarding the equipment to be coupled with networks, the parties, e.g. network and equipment providers usually agree on the interfaces to be adopted. The facts that SSOs have been addressing this level of interoperability from the very beginning and that markets of equipment are generally unaffiliated from the other markets are important factors facilitating vendor interoperability, and even removing this matter from the regulatory agenda to a great extent.

While extending the interoperability from vendor level to the network level, it gets more complicated to allow one operator to access another operator's NGN and/or its associated facilities. Since interoperability in respect of NGNs requires both transport and service interconnection, any service provider should conform to the interface protocols and/or specifications divulged by the NGN provider(s) to provide such interconnections. In case different NGN providers dictate different protocols or specifications, horizontal and inter-platform interoperability would be hampered. In effect, lack of inter-platform interoperability could lead to a fragmentation at the international-European level, and evasion of this possibility mostly inheres under the duty of SSOs. In the direction of NGN deployment global standardisation is of critical importance as the accessibility of interfaces embedded within the NGN networks could permanently and effectively be guaranteed via widely-accepted standards.<sup>52</sup>

Absence of widely-accepted standards would also trigger lack of vertical interoperability, which is represented by denial of access to provide services on an individual (NGN) networks. While incumbents' general duty to provide with interconnection and access to specific network elements currently disseminate concerns with regard to successfully usage of NGNs, the question of whether the so-called obligations are going to be maintained in an NGN environment has yet to be answered, in conjunction with the consultation/legislation processes at the EU level. Saving that handling denial of access problems is less problematic as regulatory inclination is towards ensuring open access to various levels of network hierarchy, vertical as well as horizontal interoperability problems are more sophisticated to be

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<sup>52</sup> ETSI has adopted SIP signalling protocol (the references are ETSI ES 283003/TS 124229 standards) as the unique protocol for NGN interoperability. Besides the specification of interworking function between SIP-based networks and traditional circuit-based telephony network is defined in ETSI ES 283027/TS 129163 standards. Traditional PSTN network operators including incumbents plan to migrate towards NGNs, relying more on the ITU and ETSI as relevant standardization bodies, while independent ISPs and ITPs continue to develop their IP networks towards multi-service networks, relying more on the IETF as standardization body (ERG (Final) Report on IP Interconnection, 2007, *supra* note 41, p. 4 and 47).

solved. This is also persuasive considering that the integration of new services into an NGN requires strong coordination with the NGN provider and assignment of complicated protocols in contrast to ensuring interoperability in traditional circuit switch networks, i.e. through SS7 protocols at certain interconnection points.

The so-called complicated relationships are supposed to be deepening at the service level, which is more sensitive to end-to-end QoS and inclined to be more fragmented in absence of interoperability. Notwithstanding the fact that the end-to-end innovative services have the potential to drive the development of NGNs as well as the Internet architecture, enabling a certain level of service-awareness and QoS-enabled end-to-end connectivity is of critical importance for the success of NGN. By contrast, IP-based services are generated in the terminals and/or edge servers, and there is no service-aware data transmission in an IP-based network. As such, logical and physical interconnection at the core network level is characterised by the absence of the service-related signalling.

On the other hand, there is a trend from pure IP networks towards more intelligent and receptive NGNs, by using techniques such as prioritisation, resource reservation and admission control to ensure deterministic quality for a multitude of services,<sup>53</sup> which would guarantee a certain level of QoS. Notwithstanding, assuming the targeted level of QoS has been achieved, it still remains to see an NGN environment that immunised from interoperability problems. More explicitly, although NGNs differ from a pure IP network for the former has a more centralised network structure containing call agents that function as soft switches, this restructured modern IP-based networks do not dismiss interoperability problems at all.

When coming from vendor and network-level to control and service-level interoperability, a more fragile and responsive (non)-functionality between software applications could be faced by NGN actors. For instance, in case where an operator is denied access to the Session Initiation Protocol (SIP) servers because access seeker has not been given the relevant specifications, media codec, etc. and/or has not been authenticated in advance, service interoperability could be said to have been hindered. By and large, at the service level could arise bottleneck type problems out of implementing walled garden software systems, proprietary interfaces, etc. Not only could service/application functions but also control

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<sup>53</sup> ERG (Final) Report on IP Interconnection, 2007, *supra* note 41, p. 5-6.

functions, i.e. running bearer capabilities, admission control mechanism, security filtering function as a barrier against deployment of NGN-compatible services. Such kinds of potential bottleneck/foreclosure problems exhibit the fragility as well as complexity of service-level interoperability problems. At this stage, anyone would remind the question as to what degree of interoperability should be targeted at different layers of NGN.

Primarily saying, for NGN operators to be capable to offer multi-functional services not only transport but also control and service-level interoperability is to be encouraged within the NGN world. Notwithstanding the given need to monitor actual and potential problems of the market, the NRAs should refrain from unnecessarily intervening. In situations where emergence of new bottlenecks is possible, NRAs need to be more alert, and impose an obligation if necessary, so to as to prevent market foreclosures. To that end, a comprehensive viewpoint ought to be pursued in conjunction with the possible ex ante remedies to be adopted to eliminate market failures.

Without regard to the costs related to NGN deployment, the so-called modern and simplified networks could evade stringent regulation, i.e. conventional remedies regarding call origination/termination. However, considering the costs in relation to set-up and reconfiguration to be incurred as a consequence of the rearrangement of NGN architecture, it is clear that NRAs should give incentives to NGN providers for a rate-of-return that would balance the conflicting interests of infrastructure investment and spurring competition. They must either view NGNs as network inputs for existing markets which must therefore be dealt with in the same manner as traditional network inputs (under the light of ‘technological neutrality’) or they are meant to refrain from regulating NGNs entirely (on the basis that NGNs constitute an ‘emerging market’).<sup>54</sup> In addition, it is also important to take the possibility of a geographic differentiation of remedies within a larger geographic (NGN) market into account.<sup>55</sup>

In the light of the abovementioned parameters to be factored into the evaluation to be done in relation to determination of NGN obligations, the roadmap to be followed by NRAs seems not straightforward and most presumably will differ with a slow pace. With regard to obligations

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<sup>54</sup> Simon Muys, *New Whines and Old Wineskins: Addressing the Challenge of Regulating IP-Based Networks and Services*, *Computer and Telecommunications Law Review*, 2006, Volume 12, Issue 3, p. 62.

<sup>55</sup> Giovanni Battista Amendola and Lorenzo Maria Pupillo, *The Economics of Next Generation Access Networks and Regulatory Governance: Towards Geographic Patterns of Regulation*, *Communications & Strategies*, No. 69, 1st Quarter 2008, p. 99.

to be imposed, the provision proposed by the Commission under its 2007 Proposal enlightens the way to follow in the context of NGN regulation. According to the newly proposed provision, undertakings providing electronic communication networks and services can be required to submit information concerning future network or service developments that could have an impact on the wholesale services made available to competitors.<sup>56</sup> As explained in the Preface of the Commission's Proposal,<sup>57</sup> this amendment is proposed to achieve transparency in respect of the updated information about the level of deployment, network hierarchy and the incurred costs concerning modern networks including NGNs. Although the so-called proposal ensures NRAs being equipped with background information for imposition of ex ante remedies, it falls insufficient to demonstrate how to deal with the interoperability issues surrounding migration to the NGN and devise the related steps to be taken. From this point of view, Article 5(1), 5(4) and 12(g) of the Access Directive would be run together to secure the ultimately intended level of interoperability, particularly in case of failure of market-led initiatives. Alternatively, co- and self-regulatory mechanisms and co-operative organisations such as Network Interoperability Consultative Committee<sup>58</sup> could be efficacious in overcoming interoperability problems of NGN.

#### **IV.C. Interoperability from the Net Neutrality Perspective**

Internet Age promises many developments by which the borders of neighbouring sectors are being blurred and cross-border digital applications, i.e. between media and telecommunications are being more apparent. In fact, non-linear type P2P services, e.g. VoIP and linear type multimedia applications, e.g. IPTV are quite demanding within the meaning of converged modes of communications.<sup>59</sup> This mainly relates to the fact that Internet architecture, which is based on a number of protocols that assure interoperability across the

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<sup>56</sup> Proposal for a Directive of the European Parliament and of the Council amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and services, and 2002/20/EC on the authorisation of electronic communications networks and services (presented by the Commission), Brussels, 13.11.2007, COM(2007) 697 final 2007/0247 (COD), Art. 1(5) replacing Article 5(3) of the Framework Directive, [http://ec.europa.eu/information\\_society/policy/ecomms/doc/library/proposals/697/com\\_2007\\_0697\\_en.pdf](http://ec.europa.eu/information_society/policy/ecomms/doc/library/proposals/697/com_2007_0697_en.pdf).

<sup>57</sup> *Ibid*, Recital 8.

<sup>58</sup> The Network Interoperability Consultative Committee is a pan-industry body that acts as a co-ordination forum in which key players in the telecommunications sector (communication providers, service providers, manufacturers, the regulator, etc) address and agree necessary technical arrangements for interconnection and interoperability for networks and services in the UK (See <http://www.nicc.org.uk/>)

<sup>59</sup> For a brief information about the distinction between linear and non-linear services see *infra* note 77.

industry, enables innovative end-to-end services that are persistently taking place of traditional circuit-switched services.

Proliferation of IP-based service types and business models drives many service providers including incumbents to use overlay Internet network as the basic transmission medium. Revenues from voice telephony and particularly long-distance calls have been in decline for a number of years, but the rapid acceleration of VoIP at both residential and enterprise level is fuelling a rush by telecom operators to explore new business models.<sup>60</sup> This trend, along with NGN deployment, would promise a prospect of business model which is cost-effective, more reliable than pure IP networks and inclusive of any type of convergence-based service. Notwithstanding, a number of potential problems with regard to ensuring QoS is capable to threaten the diligence of market actors, particularly content providers. This is because newly emerging routers are enabling inspection of data packets, with the view to prioritise specific kinds of content as well as to pursue an efficient traffic management, on part of Internet Service Providers (ISPs). With particular aim to prioritise affiliated web sites, applications, etc., ISPs could directly or indirectly degrade QoS of specific types of data conveyed by their switches, i.e. by delaying them reaching to their destinations or by leaving an insufficient bandwidth to the so-called data.<sup>61</sup>

Those types of acts involving de-prioritisation of unaffiliated content are often referred to as forming an ‘access tiering’ and are characterised as detrimental to a neutral and non-discriminatory Internet by the people who support the concept of ‘net neutrality’ which is a US-born theory under debate. The possibility of such acts affecting consumer behaviours, Internet freedom and end-to-end innovative services including video-streaming and entertainment sites such as Skype, eBay, etc. prompted many US scholars to discuss whether

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<sup>60</sup> Muys, 2006, *supra* note 54, p. 60.

<sup>61</sup> This possibility is articulated in the testimony submitted by L. Lessig to the Senate Committee on Commerce, Science and Transportation by the date of February 7, 2006 as follows:

“Imagine a network owner with the ability to provision a network that is providing 6 Mbps to its customers. Initially, that capacity is the effective space for broadband application competition. Imagine then that the network begins to offer “speed lanes” to particular video providers. These channels effectively reduce the capacity for broadband application competition. In this context, video providers have the incentive both to secure for themselves sufficient bandwidth to guarantee quality service, and the incentive to guarantee that no one else, or at least, no one not paying the access fee, be able to provide that network service. Thus, working with the network provider, large video companies could secure sufficient provisioning to enable their content to be served while leaving insufficient bandwidth to other competitors” (Lawrence Lessig, Testimony of Lawrence Lessig, C. Wendell and Edith M. Carlsmith, Senate Committee on Commerce, Science and Transportation, Hearing on “Network Neutrality”, 07.02.2006, p. 8, <http://commerce.senate.gov/pdf/lessig-020706.pdf>)

access tiering is to be prevented or not. Among those discussions, telecom companies such as AT&T, Verizon and Comcast argue that the increasing demands placed on the modern Internet require a level of investment that can and will only occur if the Internet is efficiently commercialised by implementing a “user pays” model for the use of their networks.<sup>62</sup> At the other side of the discussion, content and service providers such as Google, Intel, Yahoo!, eBay, Amazon assert that access tiering threatens the core values and social utility of the Internet and that governments must intervene to prevent access tiering from occurring.<sup>63</sup>

As a matter of fact, access tiering would have many types, i.e. from blocking/delaying attempts to customer/application based discrimination. For example, a tiering which envisages a differentiation between service level agreements (SLAs) according to the type of broadband service, e.g. distinction between VDSL and ADSL, is ought to be favoured in order to spur competition and consumer welfare. Otherwise, no one could mention broadband competition based on differentiated high-speed service packages which are expected to guarantee a variety of speed and SLA levels against different consumer needs. Besides, network constructions and upgrades hinge upon the actual and potential consumer demands responsive to varying inclinations of different customer groups, e.g. the distinctive needs of residential/business customers. However, an access tiering shaped specifically in order to favour individual content providers, e.g. commercially valuable web sites rather than specific types of applications, e.g. video-conference, IPTV would be detrimental to freedom of choice and to the growth of innovative content services. More explicitly, should an ISP run a delaying/blocking policy by taking into account pre-defined rules and/or by labelling specified content, e.g. unaffiliated VoIP services, IP-based innovations and consumer trust towards Internet will eventually be harmed.<sup>64</sup> In order to prevent such harmful practices from occurring, it should be ensured that Internet content be free and circulate without interruption, except for unequivocally-defined security reasons or for monitoring viruses, spam e-mails, spywares, etc. What the interesting point to be discerned here is the determinant character of ‘interoperability’ and how crucial it is to secure end-to-end connectivity through Internet

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<sup>62</sup> Paul Ganley and Ben Allgrove, Regulating Internet - Net neutrality: A user’s guide, *Computer Law & Security Report*, Volume 22, 2006, p. 455.

<sup>63</sup> *Ibid.*

<sup>64</sup> In regard to such type of an access tiering, the famous US case, *Madison River*, would be given as an example. The case relates to Madison River Communications, being a small ISP, blocking its DSL customers from using a specific VoIP service which itself was competing. After a complaint brought by Vonage before the FCC, Madison River no longer continued its former policy and agreed to stop blocking as well as to pay \$15,000. (Madison River Communications, LLC, Order, DA 05-543, 20 FCC Rcd 4295 (2005), [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DA-05-543A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-05-543A1.pdf)).

applications. That is to say, without ensuring interoperability throughout the Internet cloud and dismissing access tiering type acts, one may concern about the future of Internet applications, at least with respect to the QoS level that were normally existing.

From this point of view, establishing a consumer-protectionist link between ‘interoperability’ and the Internet applications would be favourable in order to fully reap the benefits of WWW. This is also compelling for the reason that Web 2.0 content is leading to creation of a globalized public sphere through Internet.<sup>65</sup> This convergent environment is characterized by active involvement of end-users and users’ freedom of choice.<sup>66</sup> Not only consumption but also participation of consumers within the Internet world gives the way for a creative *social networking* that has the potential to take the place of other platforms of communications, broadcasting, etc. More explicitly, abandonment of traditional forms of communications/broadcasting is accompanied by the powerful position of end-users who are increasingly becoming producer of the content itself alongside consuming it. User-generated content, as such, is driving the development of Internet world and demonstrates the increasing importance of ensuring interoperability across the IP networks.

As a matter of fact, while the desirability of an ‘end-to-end’ architecture for the IP networks is a matter clearly in relation to interoperability of networks and services, approaching interoperability within the understanding of securing connection between separate far ends would not satisfactorily meet consumer demands with regard to enhanced and innovative Internet applications. As implied above, ensuring ‘interoperability’ in this context must be

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<sup>65</sup> This fact is articulated by Commissioner Reding as follows:

“Web 2.0 technologies (horizontal connectivity and communication tools) make it much easier for more producers to take part in the production and distribution of knowledge; cheap and abundant computer processing makes it easy to produce and adapt content; and powerful search engines that make it possible to find interesting and relevant material. But fundamentally, the special value of *social networking* is that the more people use it, the better the service becomes” (Viviane Reding, *The Disruptive Force of Web 2.0: how the new generation will define the future*, SPEECH/06/773, 2006, <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/06/773&format=PDF&aged=0&language=EN&guiLanguage=en>)

<sup>66</sup> In the new converged digital environment, the aim of the supplier, broadcaster or service provider is simply to deliver the content in a convenient user-friendly manner, leaving many of the consumption choices to the end-user: navigation and search modes and multiple ways of accessing content in ‘pull’ business models, where the consumers chooses what he or she wishes to view, as opposed to the traditional ‘push’ mode of traditional electronic media, where the broadcaster or service provider determines the schedule. Screen Digest Ltd, CMS Hasche Sigle, Goldmedia GmbH, Rightscom Ltd, *Interactive content and convergence: Implications for the information society - A Study for the European Commission (DG Information Society and Media)*, October 2006, p. 25, [http://ec.europa.eu/information\\_society/europe/i2010/docs/studies/interactive\\_content\\_ec2006\\_final\\_report.pdf](http://ec.europa.eu/information_society/europe/i2010/docs/studies/interactive_content_ec2006_final_report.pdf)

tackled with the view to guarantee not only interconnection between the communicating parties but also freedom of consumers to produce all types of content (except harmful ones such as child pornography, security-threatening web sites, etc.), to upload them, to participate in social networking websites, virtual groups, and contribute to building of the future information society. From this viewpoint, concept of interoperability must be re-visualised according to the potential needs of the GIS that drives the development of the WWW.

From the perspective of the ICT industry, interoperability can be simply conceptualised as a means of connecting two or more “end-points” with a “wire”, where a “wire” means an exchange of data using data and communications standards.<sup>67</sup> Yet, a high level of end-to-end innovative services and participatory consumer behaviours could not be guaranteed by the referred form of interoperability. Ironically, the ‘best-effort’ practice is widely considered to be sufficient to provide Internet services through implementing TCP/IP protocols. While such an approach is well suited to traditional Internet applications, e.g. e-mail and web browsing, in which delays of a quarter-second are unproblematic, it is less well suited to applications that are less tolerant of variations in throughput rates, such as streaming media and Internet telephony.<sup>68</sup> Moreover, the packet anonymity inherent in TCP/IP restricts the ability to add security features designed to foster e-commerce or to protect against viruses and the other hostile elements that are proliferating on the Internet.<sup>69</sup>

From a holistic point of view, proliferation of viruses, spam e-mails, spywares or other types of harmful content must be dealt with in another context of (content) regulation whereby the ongoing efforts to stimulate broadband competition must be intensified by NRAs in order to obviate the net neutrality discussions in the consumer-driven Internet Age. The fact that creation of an open and competitive single market for online content is stipulated as one of the main targets of EU’s i2010 initiative<sup>70</sup> also makes the debate of net neutrality subordinated to ensuring effectively competitive broadband market, which ultimately would assure a

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<sup>67</sup> White Paper, 2004, *supra* note 9, p. 11.

<sup>68</sup> Daniel F. Spulber and Christopher S. Yoo, Network Regulation: The Many Faces of Access, *Journal of Competition Law and Economics*, Volume 1, Number 4, December 2005, p. 657.

<sup>69</sup> *Ibid.*

<sup>70</sup> Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Brussels, 1.6.2005, COM(2005) 229 Final “i2010 – A European Information Society For Growth And Employment”, p. 4-5, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0229:FIN:EN:PDF>

sufficient bandwidth for all the content providers. At this point, a solution incorporating the primary aim to satisfy consumer needs in the Internet Age, and to that end creation of competitive broadband market extending to the last mile (local loop) to secure long-term and sustainable competition is ought to be seen as the blueprint to eliminate the potential non-neutral/discriminatory practices.<sup>71</sup>

Yet, a number of regulatory measures to safeguard consumers against such types of practices would be appropriate in order to exclude any potential anti-competitive and harmful access tiering. Drawing a compromise point of view, the proposed amendments enshrined under the Commission's 2007 Proposal represent a balancing approach between preventive rules against access tiering and granting incentive to market differentiated products.<sup>72</sup> Whilst not directly envisaging a ban on access tiering, the Commission clearly wishes to provide NRAs with a number of safeguards against discriminatory acts of ISPs in respect of QoS parameters. In particular, empowering NRAs *to prevent degradation of quality of service by setting minimum quality levels for network transmission services for endusers* is a totally new provision unequivocally giving the signal to the industry against the non-neutral activities. Proposed

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<sup>71</sup> See also Christopher T. Marsden, Net Neutrality and Consumer Access to Content, *SCRIPT-ed*, Volume 4, Issue 4, September 2007, p. 409-410, <http://www.law.ed.ac.uk/ahrc/script-ed/vol4-4/marsden.pdf>

<sup>72</sup> Under the so-called Proposal, a number of articles of the Universal Service Directive are proposed to be amended as follows:

- Article 1(12) amending the Article 21(5) of the Universal Service Directive reads "*Member States shall ensure that national regulatory authorities are able to oblige undertakings providing electronic communications services and/or networks to provide information required in accordance with Article 20(5) to customers in a clear, comprehensive and easily accessible form*"
- Article 1(12) amending the Article 20(5) of the Universal Service Directive reads "*Member States shall ensure that where contracts are concluded between subscribers and undertakings providing electronic communications services and/or networks, subscribers are clearly informed in advance of the conclusion of a contract and regularly thereafter of any limitations imposed by the provider on their ability to access or distribute lawful content or run any lawful applications and services of their choice*"
- Article 1(13) amending the Article 22(3) of the Universal Service Directive reads "*In order to prevent degradation of service and slowing of traffic over networks, the Commission may, having consulted the Authority, adopt technical implementing measures concerning minimum quality of service requirements to be set by the national regulatory authority on undertakings providing public communications networks. These measures designed to amend non-essential elements of this Directive by supplementing it shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 37(2). On imperative grounds of urgency, the Commission may use the urgency procedure referred to in Article 37(3)*" (Proposal for a Directive of the European Parliament and of the Council Amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on consumer protection cooperation (presented by the Commission), Brussels, 13.11.2007, COM(2007) 698 final 2007/0248 (COD), [http://ec.europa.eu/information\\_society/policy/ecom/doc/library/proposals/698/com\\_2007\\_0698\\_en.pdf](http://ec.europa.eu/information_society/policy/ecom/doc/library/proposals/698/com_2007_0698_en.pdf))

amendments to hinder such activities are also readable as an effort to ensure interoperability between networks and services; that is Commission, considering the usability of implicit methods, e.g. delaying, degrading QoS which may damage interoperability, lays down a set of safeguards to exclude the possibility of access tiering. This also means construing interoperability in an extensive manner to accomplish the targets of EU's i2010 initiative on the one hand, and to dismiss the possible harmful attempts against development of WWW on the other. From this point of view, interoperability in the Internet Age could be seen as the emanation point to review and extend the regulatory measures not only to safeguard the end-users but also integrate them into the IP-based social network of Internet.

## **V. Interoperability in other ICT Industries: EU Perspective on Information Technologies and Media**

Considering the fact that network industries are susceptible to interoperability problems, other ICT industries than telecom such as new media and IT markets are also worth being considered under interoperability-related debates. Since the so-called sectors are undergoing convergence at various levels, e.g. service, market levels, the ongoing convergence among the said ICT sectors would make the interoperability needs and concerns converged at all. However convergence of the regulatory measures is predictable neither for the moment nor for the predictable future, and there seems less or more a continuity of the existing disjunction in relation to the ICT sectors, i.e. media, IT and telecom.

### **V.A. Media Industry**

It is clear that TV broadcasts, in the way every citizen has known them in the last half of the century, have been *non-excludable* and, to a large extent, *non-rival*.<sup>73</sup> While traditional TV services have started to be replaced with new modes of broadcasting that requires using conditional access and d-box systems, end-users have started to command their styles to receive TV programmes. No longer have they had to receive the automatically transmitted TV programmes, and they became able to choose whatever they wish to watch on the screen. This is why digitalisation and newly emerged business models, e.g. IPTV are leading the way end-users are reshaping their modes of media consumption. As such, ubiquitous TV sets, PC screens, mobile handsets and consumer electronic devices are increasingly being turned into

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<sup>73</sup> Luca Di Mauro, Regulation of digital TV in the EU: divine coherence or human inconsistency? in Martin Cave and Kiyoshi Nakamura (eds.) Digital Broadcasting – Policy and Practice in the Americas, Europe and Japan, Edward Elgar, 2006, p. 205.

end-user terminals for interactive media applications and download services.<sup>74</sup> In line with such convergence-based developments, the Television Without Frontiers Directive (TWFD),<sup>75</sup> which was put into force in 1989 aiming to harmonise the domestic laws applicable to broadcasting activities across the EU, have undergone a review process, and the so-called process resulted in enactment of the new Audiovisual Media Services Directive (AMSD) in December 2007.<sup>76</sup>

Though the enactment of AMSD provoked a more converged environment between media and other ICT sectors by the adoption of graduated regulation whilst extending a number of the basic standards to newly-emerged media markets,<sup>77</sup> any abandonment of separate rules (for telecom and media sectors) is not seen on the agenda of EU legislators. Forbearance from applying unified rules for converging industries mostly stems from the fact that media sector, if not fully, having a societal character mixed with public policy arguments alongside fast-moving Internet-based developments. For instance, media applications including those run through IP network are deemed by many more vulnerable to possible clashes with public policy issues, i.e. with the notion of public service broadcasting (PSB), than telecom activities. This relates to the fact that media sector is seen as one of the basic mediums for democratic participation of citizens and their development in civil, cultural and moral terms.<sup>78</sup> Furthermore, certain programmes and/or channels are supposed to be accessible across the

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<sup>74</sup> Screen Digest Ltd, CMS Hasche Sigle, Goldmedia GmbH, Rightscom Ltd, Interactive content and convergence: Implications for the information society - A Study for the European Commission (DG Information Society and Media), October 2006, p. 26, [http://ec.europa.eu/information\\_society/eeurope/i2010/docs/studies/interactive\\_content\\_ec2006\\_final\\_report.pdf](http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/interactive_content_ec2006_final_report.pdf)

<sup>75</sup> Council Directive 89/552/EEC of 3 October 1989 on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities, OJ L 298, 17.10.1989, as amended by Directive 97/36/EC of the European Parliament and of the Council, OJ L 202/60, 30.07.1997

<sup>76</sup> Directive 2007/65/EC of the European Parliament and of the Council of 11 December 2007 amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities, OJ L 332/27, 18.12.2007 (AMSD), [http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l\\_332/l\\_33220071218en00270045.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l_332/l_33220071218en00270045.pdf)

<sup>77</sup> AMSD provided for a substantial difference to TWFD with its graduated regulatory approach involving a system of two-tiered services; on the one hand '*linear* audiovisual media services' which are deemed to replace the traditional broadcasts, on the other hand newly-formulated '*non-linear* audiovisual media services' for which a lessened regulatory approach is adopted. While linear services mainly correspond to traditional scheduled television broadcasts which are supplied via point-to-multi-point delivery platforms, non-linear services are used to express on-demand services that are supplied on the basis of viewer's individual request and are delivered via point-to-point mechanism.

<sup>78</sup> AMSD, *supra* note 76, Recital 3.

country whereby a number of qualitative and quantitative standards is put in order to filter harmful content as well as to enrich the TV programmes.<sup>79</sup>

TV programmes contributing to democratic society from the very beginning makes convergence-based arguments sometimes invalid, and turns content-related open access issues into a more sensitive form of regulation. Though relying on competition law principles, ECRF admits the peculiarity of open access/interoperability matters relating to digital TV content, by acknowledging that “Competition rules alone may not be sufficient to ensure cultural diversity and media pluralism in the area of digital television”.<sup>80</sup> This acknowledgement seems to have influenced European legislators in respect of the regulation of access to conditional access services (CASs) since 1995.

Access barriers mainly come from owners of integrated receiver decoders (IRD) called ‘set-top boxes’<sup>81</sup> as well as providers of other digital software embedded in IRDs, e.g. application programme interfaces (APIs),<sup>82</sup> electronic programming guides (EPGs).<sup>83</sup> They would potentially reject, or aggravate the conditions that apply to, the use of their technical platform services in order to deter third parties from transmitting their broadcasts to intended viewers. Set-top boxes, which function in the opposite way to modems, translate digital signals into

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<sup>79</sup> In this context, public service broadcasting (PSB) is seen as the safeguard for the ‘non-commercial’ aspects of broadcasting, producing a wide range of programming that caters to different interests and groups, as well as providing good quality, innovative programming (Lorna Woods, Broadcasting, Universal Service and the Communications Package, Vol. 7, Issue 5, *Info*, 2005, p. 30). ‘PSB is a broad and widely-interpretable term which corresponds to a number of central tenets. The core attributes of PSB identified by some study groups of European Broadcasting Union as well as commentators are diversity, universality and impartiality (Richard Collins, *From Satellite to Single Market - New communication technology and European public service television*, Routledge, 1998, p. 62).

<sup>80</sup> Access Directive, *supra* note 33, Recital 10.

<sup>81</sup> [S]et-top box is the device required for reception of digital television services. Its main task is to decompress and decode the data stream so that a normal audio-visual signal can be sent to the television (Alexander Scheuer and Michael Knopp, Digital Television Glossary, (Supplement to Susanne Nikoltchev (eds.) Regulating Access to Digital Television, IRIS Special, European Audiovisual Observatory, Strasbourg, 2004, p. 16-17).

<sup>82</sup> API is an operating language configured as an interface between the operating system of a set-top box and digital applications that offer end-users a variety of (multimedia) services. In order for a service provider wishing to reach a consumer base bound with a pay-TV subscription, its application(s) must be compatible with API of the set-top box used for the pay-TV offering in question.

<sup>83</sup> EPGs, which constitute an important component of CASs, are a kind of electronic menu enabling end-users to navigate through the list of digital applications, i.e. TV channels, and select one of those that best fit their needs according to the given information. They can also be used to order pay-per-view, pay-per-event per time services, to purchase goods and services and, in some cases, for Internet access if the digital receiving equipment has a built-in/attachable modem connected to a telecommunications network (Dermot Nolan, Bottlenecks in pay television: Impact on market development in Europe, *Telecommunications Policy*, Vol. 21, No. 7, 1997, p. 603)

analogical understandable signals for television sets,<sup>84</sup> and function as a digital gateway for broadcasters. They, with other hardware (e.g. smart card) and software (e.g. encryption system, subscriber management functions) components, constitute CASs,<sup>85</sup> which all together enable authorised end-users to receive and view the content delivered to the user terminals, i.e. TV sets.

Questions of interoperability and open access issues in eyes of European legislators have so far revolved around how to regulate access to CAS and its components in order to facilitate distribution of digital television services. In this regard, both Advanced Television Standards Directive and Access Directive required Member States to ensure that CAS operators *offer to all broadcasters, on a fair, reasonable and non-discriminatory basis, technical services enabling the broadcasters' digitally-transmitted services to be received by viewers authorised by means of decoders administrated by the service providers.*<sup>86</sup> Remarkably, the open access requirement concerning CASs is imposed on all the CAS providers without regard to their market power. Besides, mandatory access scheme is exclusively connected with provision of CA services for digital television services, but not for other ICT services. That is to say, it does not apply to bottleneck type CA services other than those devised for the provision of digital television services, i.e. encryption systems for Internet and other individualised communications services. In any way, it is notable that CAS regulation is kept outside the concept of 'proportionate regulation' which is lying at the heart of the ECRF, most presumably aiming to ensure the same opportunity for "every citizen" to view digital TV services through set-top boxes.

Not only is enabling fair, reasonable and non-discriminatory access to CASs but also opening the proprietary APIs and/or EPGs embedded within the set-top boxes to third parties enshrined amongst the measures that would be resorted pursuant to ECRF.<sup>87</sup> According to the Article 5(1) of Access Directive [with reference to Annex I, Part II of the Directive], NRAs -

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<sup>84</sup> Carles Llorens-Maluquer, European Responses to Bottlenecks in Digital Pay-TV: Impacts on Pluralism and Competition Policy, *Cardozo Arts & Entertainment Law Journal*, Vol. 16, Issue. 557, 1998, p. 559.

<sup>85</sup> See also Natali Herberger, Access to technical bottleneck facilities: the new European approach, *Communications & Strategies*, Vol. 2, No. 46, 2002, p. 34.

<sup>86</sup> Directive 95/47 of the European Parliament and of the Council of 24 October 1995 on the use of standards for the transmission of television rights, 95/47/EC, OJ L 281/51 (Advanced Television Standards Directive), Article 4 (c); Access Directive, *supra* note 33, Article 6(1).

<sup>87</sup> The main difference between them is that while the former obligation is directed to all CAS operators without respect of they are enjoying SMP or not, the latter one (related to APIs & EPGs) could be possible through decisions of NRAs who are given discretionary power on the issue.

to the extent *that is necessary to ensure accessibility for end-users to digital radio and television broadcasting services* specified by the MS- shall be able to impose obligations on operators to provide access to APIs and EPGs on fair, reasonable and non-discriminatory terms.<sup>88</sup> Given the widely-interpretable formulation of the said provision, it seems that Member States are given a wide discretion on whether or not to impose an access obligation as regards APIs and EPGs. How to use this discretionary power is also related to the policy objectives pursued by the NRAs, who are in position to balance the investment incentives of the manufacturers, e.g. providers of CAS and TV sets against the needs of small broadcasters and citizens to use an open API in order not to incur extra cost for alternative set-top boxes.

While interoperability solutions are considered crucial to stimulate inter-platform competition, open access to the exclusively controlled technical platform is considered necessary to create the conditions for intra-platform competition.<sup>89</sup> Although both types of competitive models complement each other, ensuring interoperability via open and standardised APIs is eventually needed to enable consumers to achieve the fullest connectivity to digital multimedia applications and benefit from them at the highest level. To realise that target, development of standards to allow interoperability of digital interactive television services has thus far been the very subject-matter of discussions across Europe. EU-wide standardisation efforts hitherto concentrated on set-top boxes and in particular APIs. Whereas Commission refrained from mandating any (open) API for digital interactive television services, an agreement led by market forces to implement an open and standardised API has not been accomplished across the EU yet.

Under the Article 18(1) of Framework Directive, it is set out that Member States should encourage digital TV providers and equipment manufacturers to adopt an open API. To ensure interoperability of digital interactive television services, implementation of mandatory standards and specifications is enshrined as the last resort in case market-driven efforts have not satisfied the policy objectives laid down under Article 18 of Framework Directive.<sup>90</sup> Pursuant to the said Directive provision, Commission published two documents setting out its

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<sup>88</sup> Access Directive, *supra* note 33, Article 5(1)(b).

<sup>89</sup> Natali Helberger, *Controlling Access to Content - Regulating Conditional Access in Digital Broadcasting*, *Kluwer Law International*, 2005, p. 153.

<sup>90</sup> To mandate standards, Commission, following a one-year-lasting review after the entry into force of the Framework Directive, should conclude that interoperability and freedom of choice for users have not been adequately achieved in one or more Member States, (Framework Directive, *supra* note 17, Article 18(3)).

position in regard to interoperability objectives.<sup>91</sup> Both two documents revealed Commission's reluctance to mandate any standard regarding digital set-top boxes, as well as demonstrated that Commission persistently relies on market dynamics for a standard like Multimedia Home Platform (hereinafter "MHP")<sup>92</sup> to be implemented across the EU markets.

Though a level of harmonisation was ensured through open access scheme, i.e. by mandating granting third party access to CASs across the EU, a competitive and fully converged media market seems far from being achieved in the short term. While a number of reasons could be raised to explain this situation, it is clear that lack of interoperability measures also affected the diligence and sustainability of media markets. Even though disjunctive rules designed for separate industries are seen necessary for the ongoing civil, democratic and cultural needs of citizens, (mandatory) interoperability solutions that are capable to respond to convergence-based consumer needs are inevitably needed in order for a European market leading the GIS to be realised. Otherwise, a fragmented structure amongst ICT industries that are supposed to converge would make undertakings facing bigger problems of compatibility, lack of universal applicability, etc.

## **V.B. IT Industry and *Microsoft* Decision**

One of the tempting and ongoing debates across the globe is the controversy with regard to implementation of open software conditions within the IT industry where at the same time anti-circumvention laws and copyright legislation bring about a number of liabilities for market players. Considering that absent such kinds of rules would result in a fragile market tending to be non-innovative, there is an inescapable correlation between creative intellectual productions and Free/Open Source Software (F/OSS) movement which favours open, but not necessarily free, access to some of the key software.<sup>93</sup> As such, it is generally deemed that

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<sup>91</sup> See Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions *on reviewing the interoperability of digital interactive television services pursuant to Communication COM(2004) 541 of 30 July 2004*, COM(2006) 37 final, 02.02.2006, [http://ec.europa.eu/information\\_society/policy/ecomms/doc/info\\_centre/communic\\_reports/interoperability\\_idtv/comm\\_pdf\\_com\\_2006\\_0037\\_f\\_en\\_acte.pdf](http://ec.europa.eu/information_society/policy/ecomms/doc/info_centre/communic_reports/interoperability_idtv/comm_pdf_com_2006_0037_f_en_acte.pdf); Commission Staff Working Paper, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on interoperability of digital interactive television services - Extended Impact Assessment COM(2004)541 final, 30.07.2004, [http://ec.europa.eu/information\\_society/policy/ecomms/doc/info\\_centre/communic\\_reports/interoperability\\_idtv/sec\\_2004\\_1028.pdf](http://ec.europa.eu/information_society/policy/ecomms/doc/info_centre/communic_reports/interoperability_idtv/sec_2004_1028.pdf)

<sup>92</sup> MHP is the open standard for APIs of set-top boxes developed by a consortium (Digital Video Broadcasting group) delegated by Commission in 1993, whose members consisted of European equipment manufacturers, broadcasters, national regulatory authorities, and software developers.

<sup>93</sup> There are also other incentive mechanisms and processes that could spur innovations in the software industry. *Motivations of individuals and firms, open source software movement, competitive dynamics between*

F/OSS movement is one of the key parameters reinforcing innovative and interoperable software programs alongside the proprietary digital software developments that are supported by wide-spread intellectual property rights (IPRs) and copyright/patent legislation. As a matter of fact, there has been an unprecedented expansion of IPR protection to a whole new range of products in the knowledge economy,<sup>94</sup> and this trend would undermine follow-on and cumulative innovations to the extent that software and hardware can not be coupled effectively in a marketplace.

Since the question of whether and how hardware and software may be coupled depends on the interfaces, they are the most important elements of a computer system regarding interoperability and compatibility.<sup>95</sup> Accordingly, the knowledge of the interface codes of a computer system is indispensable for a hardware or software producer since that is the only way of ensuring the necessary information exchange.<sup>96</sup> While, co-operation between market actors is supposed to bring out the intended level of interoperability and innovation, this conclusion can not always be reached without enabling them to have alternative interoperability solutions that extend to mandatory solutions. While there is a wide variety of SSOs engaged in IT standardisation, one of whose aims is to ensure a satisfactory level of interoperability, there are alternative solutions to ensure interoperability within the IT industry where standards could lag behind the dynamic needs of users. That is to say, because standards are accepted by SSOs in long timeframes by following strict procedures, standardisation may fail to respond to dynamic interoperability needs in an expeditious manner. The alternative way forward, thus, would be to establish interfaces that provide the minimum set of required protocols and tools to achieve the purpose of interoperability.<sup>97</sup>

The so-called promulgated idea of interoperability finds a different version of formulation in the EC Software Directive. Software Directive<sup>98</sup> has already set out the conditions that apply

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*proprietary and open software development systems, and complementarity between software products* are the main impulses to bring out stimulation of innovations in the software industry. (Simonetta Vezzoso, The Incentives Balance Test in the EU *Microsoft* Case: A Pro-innovation “Economics-based” Approach, *European Competition Law Review*, 27(7), 2006, p. 387-388).

<sup>94</sup> Steven D. Anderman, The competition law/IP ‘interface’: An Introductory note, in Steven D. Anderman (eds.), Cambridge University Press, *The Interface between Intellectual Property Rights and Competition Policy*, 2007, p. 8.

<sup>95</sup> Ulrika Bath, Access to Information v. Intellectual Property Rights, *European Intellectual Property Review*, 24 (2002) 3, p. 141

<sup>96</sup> *Ibid.*

<sup>97</sup> European Commission, Discussion paper, *supra* note 1, p. 22.

<sup>98</sup> Directive 91/250/EEC on the legal protection of computer programs, [1991] OJ L122/42, (Software Directive).

to the decompilation<sup>99</sup> right, in order to ensure an interoperability environment throughout the Europe. The so-called right constitutes one of the exceptions to the EU copyright legislation which inheres under the duties of member states who are obliged to transpose Community Directives into their domestic laws. Article 6(1) of the Software Directive sets out an exceptional decompilation right to be applied to reverse engineering<sup>100</sup> acts, with the aim of ensuring mutual-functionality of non-interoperable computer programs.

According to that provision, authorisation from the right-holder of a computer program is not required for *reproduction* or *translation* of the program in question provided that these acts are “indispensable to obtain the information necessary to achieve the interoperability of an independently created computer program with other programs”. Directive strictly restricts the application of the decompilation right to “the parts of the original program which are necessary to achieve interoperability”.<sup>101</sup> However, had the information necessary to achieve interoperability previously been *readily available* to the unauthorised persons, Article 6 of the Software Directive would be impossible to be applied.<sup>102</sup> Even when the referred conditions are fulfilled, the said provision could not be used “for the development, production or marketing of a computer program substantially similar in its expression, or for any other act which infringes copyright”.<sup>103</sup>

The decompilation right offered by the Software Directive allows reverse engineering rights to some extent although it contains no provision for compulsory licensing as such where the copyright coincides with an industrial standard, apart from the special cases of collecting societies.<sup>104</sup> Correspondingly, said limitation to the EU-wide copyright protection on computer programs does not have the same effect as a provision for a compulsory license because there is no enforcement process incorporated in the decompilation right to gain

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<sup>99</sup> *Ibid*, Article 6(1). Decompilation allows a software engineer or programmer to access the original source code, or a version as near as possible to the source code, so that he can appreciate the ideas and principles underlying a computer program, how the program functions and the interfaces of the program (Tanya Aplin, *Copyright Law in the Digital Society*, Hart Publishing, 2005, p. 166).

<sup>100</sup> ‘Reverse engineering’ is the industry’s term for the analysis of a competitor’s program by examining its coding and structure in order to develop programs which either compete with the program which has been analysed or interface with that program. (John Abbot, *Reverse Engineering of Software: Copyright and Interoperability*, *Journal of Law and Information Science*, Vol. 14, 2003 (published in 2005), p. 12).

<sup>101</sup> Software Directive, *supra* note 98, Article 6(1)(c).

<sup>102</sup> Software Directive, *supra* note 98, Article 6(1)(b).

<sup>103</sup> Software Directive, *supra* note 98, Article 6(2)(c).

<sup>104</sup> Steven D. Anderman, *The competition law/IP ‘interface’: An Introductory note*, in Steven D. Anderman (eds.), *Cambridge University Press, The Interface between Intellectual Property Rights and Competition Policy*, 2007, p. 19

compulsory access to interface codes where they prove elusive.<sup>105</sup> In fact, the given right to decompile an existing computer program to reach its binary codes is limited by its nature in ensuring the level of competition in a marketplace where software developers are in a difficult position to design alternative products capable to compete against a copyright-protected computer program which is used as the *de facto* standard across the industry.

Following comparably the same analogy described above, Commission adopts rather a comprehensive view to create new competitive impulses which, it most presumably thinks, could not effectively be ensured via the Software Directive. In lieu of the *passive* interoperability solution that is stipulated by the Software Directive, which concerns about neither enforcement nor a pre-defined level of innovation, Commission favouring pursuit of an *active* interoperability policy approach which it clearly articulated in *Microsoft* decision,<sup>106</sup> and somehow formulates in its Discussion Paper on application of the Article 82.<sup>107</sup> In *Microsoft* case, which originated from Sun's complaint that Microsoft had been leveraging its dominant position in client PC Operating Server (OS) market to work group server OS market by refusing to supply the interface information (a set of full specifications ensuring interoperability between Windows OS servers and non-Microsoft work group servers) to himself.

Considering the anticompetitive effects of the Microsoft's policy to retain itself the so-called interfaces, Commission required Microsoft to disclose interface information that would allow non-Microsoft work group servers to interoperate with Windows PCs and servers.<sup>108</sup> Not only the Commission's decision but also the upholding CFI's judgment<sup>109</sup> gave strong signals in favour of 'follow-on innovation' and 'interoperability' for market players acting in software industry; yet both have to be reconciled with a macro viewpoint that incorporates the ultimate goal of software innovation which is expected to be non-centralised and sustainable. This reconciliation problem also stems from the fact that *Microsoft* decision over-steps the

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<sup>105</sup> *Ibid*, p. 17.

<sup>106</sup> Commission Decision of 24.03.2004 relating to a proceeding under Article 82 of the EC Treaty (Case COMP/C-3/37.792 Microsoft), <http://ec.europa.eu/comm/competition/antitrust/cases/decisions/37792/en.pdf>. (Commission's *Microsoft* decision).

<sup>107</sup> DG Competition European Commission, DG Competition discussion paper on the application of Article 82 of the Treaty to exclusionary abuses, Public consultation, Brussels, December 2005, (Discussion Paper), paras. 241-242. <http://ec.europa.eu/comm/competition/antitrust/art82/discpaper2005.pdf>

<sup>108</sup> See Commission's *Microsoft* decision, *supra* note 106, Art. 1(1) and 5(a).

<sup>109</sup> Judgment of the Court of First Instance (Grand Chamber) of 17 September 2007, *Microsoft v Commission*, (Case T-201/04), See <http://curia.europa.eu/en/content/juris/index.htm>. (CFI's *Microsoft* judgment).

classical boundaries of the interface between IPRs and competition policy in the context of Article 82 EC Treaty,<sup>110</sup> Connected with this over-enthusiastic approach, is another fact that Commission resorted a remedy which includes update obligation<sup>111</sup> as well as sharing of interface information.<sup>112</sup> Not only is included simply stopping the denial of access to the so-called interface information which was found anti-competitive but also ordering Microsoft to make available to third parties all of its interface information that underlie Windows domain architecture so as to encompass the new forms of copyright-protected server products within the Commission decision.<sup>113</sup>

In justifying mandated disclosure, Commission seems to have regarded the proprietary specifications embedded into the Microsoft servers as *de facto* standard, being unsatisfied with either open software standards or decompilation right that can be invoked under the Software Directive. This is because Commission concluded that Microsoft abused its dominant position on client PC OS market by refusing to supply the so-called interface information to third parties (e.g. server vendors), considering that none of other alternative tools was substitutable with interoperability information in order to compete viably in the market.<sup>114</sup> To put differently, the available standards and/or the reverse-engineering option

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<sup>110</sup> For the discussion of whether and to what extent *Microsoft* decision went beyond the criteria and the boundaries set by the European Court of Justice, see Mehmet Bilal Unver, Does A ‘Rule of Reason’ Analysis Emerge out of Interoperability-Centric Concerns Under EC Law?: A Critical Analysis in Light of EU *Microsoft* Case, *International Journal of Communications Law and Policy*, Issue 12, Winter 2008, [http://www.ijclp.net/12\\_2008/pdf/unver.pdf](http://www.ijclp.net/12_2008/pdf/unver.pdf)

<sup>111</sup> See Commission’s *Microsoft* decision, *supra* note 106, Art. 5(b), reading “[M]icrosoft Corporation shall ensure that the *Interoperability Information* made available is kept updated on an ongoing basis and in a *Timely Manner*”.

<sup>112</sup> By means of the remedy, Microsoft is rendered into an *active* position to prepare a sophisticated plan so as to make contracts with *any undertaking having an interest in developing and distributing work group server operating system products* (Commission’s *Microsoft* decision, *supra* note 106, Article 5(a)).

<sup>113</sup> The following paragraph reveals to what degree the Commission intends to force Microsoft to share its interoperability information:

“[F]or the sake of clarity, since only the core work group server tasks of file, print and group and user administration are essential to compete in the work group server operating systems, the only refusal at stake in this Decision is a refusal to provide *a full specification of the protocols underlying the Windows domain architecture*, which organises the way through which Windows work group servers deliver work group server services to Windows client PCs” (Commission’s *Microsoft* decision, *supra* note 106, para. 566).

<sup>114</sup> Commission in its comparative analysis referred to three categories of technical tools (the use of open industry standards supported in Windows; the distribution of client-side software on the client PC; and the reverse-engineering of Microsoft’s products) which Microsoft alleged could substitute the interoperability information that Sun demanded, and concluded that none of them is a viable solution for companies willing to compete with Microsoft on the market for work group server OSs. (Commission’s *Microsoft* decision, *supra* note 106, paras. 667-691).

defined by the Software Directive are considered insufficient to meet the goal of competition law enforcement.

Notably, reverse-engineering that could be conducted within the context of Software Directive, does not embody obtaining information relating to interfaces which are not relevant to a *functionality* not already incorporated in that independently created program.<sup>115</sup> The issue of ‘functionality’ which ensures the compatibility of computer programs lies at the core of the Directive’s rationale to set out the decompilation right.<sup>116</sup> It is notable that, the aim of ensuring compatibility between computer programs does not entail creation of a new computer program via using the decompiled interface information. As opposed to the approach pursued by the Commission in *Microsoft* case, under the so-called decompilation right is not envisaged a pro-active approach that envisages a projection of innovative services through involvement into the implementing interface data underlying domain architecture of a computing network.

Commission aspiration to open Microsoft’s interface information enabling software vendors to create fully interoperable server products demonstrates that concentrated market structures in IT industries would successfully be dissolved via structural remedies extending to long term enforcement processes with the view to ensure that the market players would be able to compete on equal foot.<sup>117</sup> Though it could be considered that through such a structural remedy the aspired innovative marketplace would be achieved artificially and for a limited period, it is clear that mandating disclosure obligation so as bring out almost the highest level of interoperability is what the EU Authorities wish to achieve, via using the available legal tools, even by extending them.

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<sup>115</sup> Robert Hart, Interoperability Information and the Microsoft Decision, *European Intellectual Property Review*, Issue 7, 2006, p. 362.

<sup>116</sup> Hart describes the level of compatibility intended by the Software Directive as ‘multi-vendor interoperability’. He however stresses that the Directive’s wording does not refer to the full functioning of all the elements of the programs with which the independently created program is required to interoperate (*Ibid.*).

<sup>117</sup> *Microsoft* decision implies that Commission aims to “[e]nabl[e] competitors to achieve *the same degree of interoperability* with the Windows domain architecture as Windows work group server operating systems do” (See Commission’s *Microsoft* decision, *supra* note 106, para. 669). Hereby, it is important to note that Commission establishes *a link between its innovation formulation and interoperability policy*. According to the Commission,

“[I]f Microsoft’s competitors had access to the interoperability information that Microsoft refuses to supply, they could use the disclosures to make the advanced features of their own products available in the framework of the web of interoperability relationships that underpin the Windows domain architecture” (Commission’s *Microsoft* decision, *supra* note 106, para. 695).

To sum up, to enable users to achieve the fullest connectivity to software applications and benefit from them at the highest level, mandating disclosure of minimum set of interfaces seems to be pursued as an effective measure in the EU, at least with respect to fastly-growing IT markets. While the concept of interoperability has a variety of degrees,<sup>118</sup> it is apparent that choice of EU Authorities for dynamic markets could be pro-active rather than a ‘wait-and-see’ approach, and to that end, traditional role of competition law would be replaced with an expanded approach in absence of governing legal rules that effectively respond to the interoperability-centric industry needs.

## VI. Conclusion

It is well-known that needs of the users evolve from traditional modes of communications into newly emerging trends that are characterised by IP Protocols, NGN-compatible facilities, etc. This evolution, along with the real competitive forces, is bringing out new policy problems *vis-à-vis* identification of the balancing points between investment and spurring competition as well as between dynamic/static efficiencies. The referred policy choices reveal a common phenomenon called ‘interoperability’, which is usually treated pragmatically without a projection of future needs of the global information society. In today’s technology-driven world, industry standardisation, device interoperability and product-compatibility have become critical to promoting innovation and competition.<sup>119</sup> And the so-called critical interoperability requirements have, from the very beginning, been dealt with from the viewpoint of handling the imminent compatibility problems and postponing the potential ones to the future.

While the current interoperability policies are delineated by the presumed fact that disjunctive needs require disjunctive remedies, it is frequently underestimated that neighbouring ICT industries require common remedies. While multilaterally-accepted standards evade the problems of compatibility to an important extent, interoperability must not be considered equivalent to standardisation. It is note-worthy that interoperability, in relation to electronic communications, refers to a higher level of functionality of interconnection of networks,

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<sup>118</sup> Likewise, the CFI considers ‘indispensability’ as a phenomenon having varying degrees and that the ideal level of interoperability is the one by which a server running a non-Microsoft work group server OS is able to act as a domain controller within a Windows domain using Active Directory and is capable of participating in the multimaster replication mechanism with the other domain controllers (CFI’s *Microsoft* judgment, *supra* note 109, paras. 390).

<sup>119</sup> Geradin, 2006, *supra* note 8, p. 511.

namely the level of applications and services.<sup>120</sup> A holistic perspective, as such, necessitates implementation of alternative and coherent measures in order to solve convergence-oriented interoperability problems.

Considering that the electronic communications networks are the common medium for any type of transmission content, e.g. data, voice, broadcasts to be conveyed; interconnection with, and access to, such networks, especially those of the incumbents, are regulated with the view to ensure end-to-end connectivity in the community. This fact, to an important extent, dismisses the problem of interoperability at the network level, though leaving back some political questions, i.e. how to increase consumer choices while imposing open access, to regulators. Such questions, which reveal a number of policy problems with regard to how to balance intra-platform and inter-platform interoperability, mainly relate to the technical platforms, i.e. proprietary interfaces designed for broadcasting rather than a whole network.

When climbing up from network to service level, there arise bigger problems of interface compatibility, universal applicability and a corresponding fragmented market. However it is crucial that, without decoupling network facilities with the widely-accessible software applications, building all-IP networks as well as digitalised modern technical platforms would be meaningless as the convergence falls ill-founded and uncompleted. As well, favouring net neutrality would not be meaningful in an environment where multi-layered end-to-end connectivity requirements are not met. That is to say, ensuring a transparent, non-discriminatory conveyance of data would unleash its full benefit provided that the potential barriers against the interoperability at both network and service levels are eliminated. To illustrate, the development of the service market is deeply troubled by the phenomenon of convergence, and the corresponding development of CA systems suggests that the future lies in advanced set-top boxes capable of controlling access to broadcasting as well as a wide range of interactive service applications.<sup>121</sup> However, under ECRF, CA services are regulated following an intra-platform viewpoint with an exclusive treatment for the digital television services, whereas other decrypting technologies, e.g. digital right management, authentication services, computing technologies are kept outside the scope. As a conclusion, interoperability at the service level has been born unhealthy, revealing the uncompleted face of convergence.

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<sup>120</sup> Pierre Larouche, *Competition Law and Regulation in European Telecommunications*, Hart Publishing, 2000, p. 380.

<sup>121</sup> Helberger, 2002, *supra* note 85, p. 40.

Similarly, with regard to DRM systems which music right-holders usually create to prevent unauthorised usages and downloads from the web, there is no mandatory interoperability solution within the Community measures.<sup>122</sup> Notwithstanding the fact that creation of a proprietary DRM system by each right-holder is of the potential to lock-in consumers to different software applications and devices, i.e. portable music players such as iPods, European legislators seem to be satisfied simply with encouraging interoperability of different copyright technologies in that context. This fact, when compared with computer and telecommunications industries, demonstrates how interoperability problems are dealt with in a disaggregated manner across the whole ICT industry.

However, convergence turns lack of interoperability into a common problem in relation to development of ICTs. In fact, not only technical compatibility problems but also competitive failures, economic inefficiencies, and hazards to consumer welfare would arise out of insufficient interoperability. As a matter of fact, developers of digital devices, software applications and multimedia services inevitably find themselves in a complex world where they have to find interoperability solutions to compete effectively in the marketplace. Without help of the EU-wide pre-cautions they would find themselves in an ocean typified with unconnected communications islands.

To transform the abovementioned fragmented structure into a fruitful, harmonised and efficient marketplace, NRAs should be more alert to prevent potential problems from inhabiting permanently within the ICT environment. Commission's *Microsoft* decision in this regard constitutes a landmark case which could influence other related markets. However, though the said decision reveals the Commission's aspiration to ensure a high level of interoperability within the IT sector, the methodology used and the targeted end-points, i.e. an optimised level of innovation might make anyone somehow ambivalent in terms of its far-reaching effects. In fact, it illustrates an over-zealous measure over-stepping the cross-borders between different governing bodies of law, i.e. intellectual property and competition laws. As well, the *Microsoft* decision reveals a unique interoperability policy design with specific aims of follow-on innovation, by which available tools under the Software Directive have been rendered ineffective.

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<sup>122</sup> Under Directive 2001/19/EC, interoperability of different systems created for copyright protection is just encouraged (See Directive 2001/19 of the European Parliament and of the Council of May 22, 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, OJ L167, [2001], Recital 54).

Although it is a widely-admitted fact that static legislative rules so many times fall insufficient to deal with fast-moving industrial problems, the method to overcome interoperability-related challenges should not be upsetting the already-set rules without meticulous future projection. Hereby, a balancing problem continues to inhere under the duties of NRAs, who should react after considering far-reaching effects of a possible decision. Pro-activeness sometimes clashes dynamic character of ICT markets. Yet, dynamism will, and needs to, meet a convergent marketplace; and this viewpoint should drive regulators in their decisions. By not responding to emerging challenges with over-enthusiastic remedies, but by pursuing a forward-looking approach, they should act. To that end, inter-platform interoperability should complement intra-platform interoperability regardless of the type of the technology, software, equipment by different undertakings. To remark in a nutshell, without diagnosis and cure of service-level interoperability challenges alongside network-level problems, neither newly-built NGNs nor IP-based convergence would not bring out the intended level of innovative end-to-end services at all.