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The Telecommunication Standardisation Process: Can it be 'Reformed' to Support 'De-Regulation'?

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1   INTRODUCTION

The current conditions under which the telecommunication industry is 'governed' - in the dual sense of being both 'controlled' and 'enabled' - are described in a plethora of often ill-defined and frequently contradictory terms. One of the most ill-defined terms is 'de-regulation', implying that the role of regulation is diminishing, and that the quantity of regulations is lessening - implications that are contrary to fact in most instances. The widespread acceptance of 'de-regulation' as an operational concept in the telecommunication industry, however, has some especially significant ramifications as the technical configuration of both public and private networks becomes more decentralised - i.e. as the 'intelligence' controlling individual network functionalities becomes distributed throughout the network. One assumption supporting the 'de-regulation' concept is that technical co-ordination can now best be achieved through an industry-led standardisation process, rather than through the formal controls of a public administration or regulator. Timely, non-proprietary standards, it is argued, will keep the network environment 'open' to potential new market entrants. The distribution of network 'intelligence' throughout the public network, however, can only be achieved through the widespread deployment of specialised computer applications. This also distributes much of the control over the development and evolution of standards, as, increasingly, public network operators and equipment suppliers must share this control with computer and software vendors.

  All of this raises three immediate problems. *First*, although the technology bases of the telecommunication and computer sectors have converged, it is uncertain that the commercial cultures of the two sectors have converged to the extent that co-operation between them in defining standards will be possible or productive. *Second*, the computer sector does not have a

particularly strong record of producing and implementing non-proprietary networking standards. Indeed, many of the interconnection and interoperation problems that for years have bedevilled the private computer networking environment may well migrate to the public network arena. *Third*, as standards for public and private network environments converge, it will become more and more difficult to distinguish the attributes of what we now recognise as the 'public network' from amongst the myriad of private networks aimed at closed user groups.

This paper uses these three problems as the context for examining critically the relationships between technical standards, regulation, and the evolution of new network forms. The objective is to assess the industrial and political motivations for reforming the standardisation process, and to outline some of the problems that ensue.

2   TECHNICAL STANDARDS AND REGULATORY REFORM

Prior to examining the dynamics of standards and standards-making in the 'intelligent' network environment, it will be helpful if we first clarify some basic features of the regulatory environment for telecommunication, and then examine briefly some of the primary relationships between standards, regulation, and public policy.

2.1   The 'phantom' regulatory taxonomy

If we look critically at the terms 'regulation', 'de-regulation', and 're-regulation' in a European context, it soon becomes clear that the first term is historically ambiguous and that the latter two are redundant to a considerable extent. It was noted above that 'de-regulation' is already something of a misnomer as the amount of regulation is not decreasing, even if much of its focus is shifting from administrative and operational matters to commercial practices and market structures.

The term 're-regulation', however, is even more ambiguous, in that it carries the tacit assumption that 'regulation', by some broadly accepted definition, is already in place. Arguably, however, there is a difference between the rationales of regulating a private monopoly in order to protect the public interest from potential abuses of a privileged market position (the US rationale), and the appropriation of an entire industry by government administrations, on the premise that the only appropriate forum for the exercise of monopoly power is the public sector (the 'PTT' rationale).

Ostensibly, the European PTT system was directed at providing a 'public service', and it can be questioned whether 'regulation', in the common sense of 'market regulation', was ever actually applied. Indeed, it is probably more useful in the present circumstances to eliminate the 'de-regulation' and 're-regulation' terminology altogether. Perhaps the least ambiguous description of the European situation is that a set of regulatory institutions is now being constructed in order to 'regulate' for the first time a set of new or evolving commercial and industrial relationships.

In this process, the role of standards and the effectiveness of standards-making mechanisms is becoming pivotal to the regulatory agenda, and subject to intense scrutiny. Indeed, the use

of standards in a 'de-regulation' context is a contradiction in terms, in that, by nature, standards are a type of 'regulatory' tool. At issue is the *nature* of the act of regulation through standardisation, and its relationship to public policy goals.

2.2   Standards, regulation and policy

The imposition by a government authority of mandatory reference to industry technical standards - either as developed within the industry concerned or by some outside body - is an explicit act of 'external' industry regulation in that it restricts and/or directs the future actions of the implementors. However, even the use of entirely voluntary standards also constitutes an 'intervention' in a process that might otherwise have a different outcome. Voluntary standardisation is therefore also an act of regulation. Moreover, in institutional terms, both forms of regulation by standards can be closely linked. An industry can elect, for example, to develop and apply a voluntary standard in preference to having one imposed upon it by some external entity. Or, a public authority can agree to accredit industry-developed standards on the understanding that the industry actors are the only source of reliable information and expertise concerning a particular technology.

The problems begin to occur when the process of developing voluntary standards by industry becomes linked with government regulatory frameworks and public policy objectives. Voluntary standards can be used to achieve public policy goals, but there is no natural affinity between these goals and voluntary standards (Breyer 1982; Reddy 1990). Indeed, to pursue public policy goals with voluntary instruments is often to invite additional measures of uncertainty as to the possible outcomes.

Voluntary standardisation is not a random process, but it is frequently subject to a range of internal and external pressures that are beyond the direct control of governments and publicly accountable regulatory agencies (Hawkins 1995). In terms of policy expectations, a 'bad' outcome from an industry standardisation process is often compounded in that, by delegating this degree of regulatory power to the private sector in the first place, the publicly accountable body may lose a considerable measure of ability to correct outcomes that are suboptimal in terms of achieving policy objectives (Baggott 1986).

Voluntary standards occupy an especially troublesome position as tools of industrial policy. The aim in this instance is to achieve much more than technical co-ordination and the attendant economies of scale and scope that are commonly assumed to flow from technical co-ordination through standards (Lecraw 1984; Hawkins 1995a). As industrial policy tools, voluntary standards are expected also to define and consolidate discrete technology initiatives, and to commit producers and consumers alike to co-ordinated trajectories of technological development.

European Union (EU) standardisation policy in the information and communication technology sector has always had a strong industrial policy focus (Barry 1990). In the telecommunication sector, this has yielded a limited number of positive outcomes of which the Global System for Mobile communications (GSM) is probably the most prominent. It has also resulted in two very negative general consequences. First, the EU has imposed virtual production quotas on the European standards development mechanism, which, while congruent with

policy aims for the sector, are not always compatible with the capabilities and strategies of European firms. This has resulted in a proliferation of standards that no one wants to use. Second, confusion over the industrial or political origin of the standards programme, and over the eventual implementation status of the standards produced (i.e. voluntary or mandatory), has led to doubts about their technical content and quality (Hawkins 1993).

2.3   Standards and the changing focus of telecommunication regulation

In examining the changing relationship between standards and regulation in today's rapidly evolving network environment, it is important to identify two basic regulatory phases. In the *first phase*, regulation (in a variety of forms and by a variety of definitions) was based on the assumption that monopolistic and oligopolistic structures were the only logical paradigms for the provision of telecommunication services.

Thus, prior to the pressures for technological and structural change that began in earnest in the 1980s, most telecommunication 'standards' were, in effect, little more than internal procurement specifications as worked out between individual monopoly public network operators and preferred, often vertically integrated, equipment supply firms. The exceptions occurred at the international level, where technical 'recommendations' were agreed in the international consultative committees (the CCITT and CCIR) of the International Telecommunication Union (ITU), and in various regional associations of public network operators like the European Conference of Posts and Telecommunications Administrations (CEPT).

This process was highly 'internalised' within the telecommunication sector, and direct participation was exclusive to recognised national public network operators. The result was the preservation of national idiosyncrasies in the technical configuration and service base of the public network.

The *second phase* of regulation flowed from such major events as the divestiture of AT&T, the privatisation of British Telecom, liberalisation measures in Japan, and the official embrace by the EU of the principle of competitive, pan-European telecommunication markets. In this case, the policy focus shifted from preserving monopoly structures to officially discouraging them. This new rationale was bolstered by a sustained period of rapid and radical technical change in the industry, and the resulting commercial potential of a much expanded service base.

Acceptance of the principle of liberalisation, however, has not been matched by practice. With few exceptions, most European countries preserve some variant of the PTT system. With respect to the technical co-ordination of networks, however, public policy-makers have for the first time actively begun to promote the elimination of administrative and technical idiosyncrasies in national public networks. Pressure is now applied for the development of more standards that refer to general network attributes on both sides of an international interface, and that are oriented to international application from the outset.

Thus, the standards development mechanism is now 'externalised' to a considerable extent. During the 1980s, 'regional' standards organisations began to appear that allowed for direct, independent participation by telecommunication equipment suppliers as well as network operators, and by many non-traditional actors in the sector - computer firms, software develop-

ers, consultancies and so forth (Hawkins 1992). The current process is now mostly harmonised with the principles of voluntary consensus standards development as practised in other major industries.

Officially, this new regional regime is directed at making the ITU process more efficient and responsive. The three major regional bodies - T1 in the US, the Telecommunications Technology Committee (TTC) in Japan and the European Telecommunications Standards Institute (ETSI) - are committed in principle to feeding co-ordinated regional positions into the ITU processes. The new ITU Standardisation Bureau, however, now allows for direct participation by the same kinds of constituencies as represented in the regional bodies. Promises to maintain the ITU as the highest international telecommunication standardisation authority - a rather vague distinction in today's technological and service environment - still beg the question of how to differentiate the respective 'missions' of the ITU and the regional bodies to an extent sufficient to prevent costly duplication of their respective activities.

There have been diverse reactions to this new environment. National public network operators face an acute dilemma. On the one hand they have a considerable interest in promoting standards that continue to protect their established sources of revenue, or that give them advantages over new entrants in expanding the service base. On the other hand, increasing opportunities to become involved in international market ventures provide incentives to opt for more 'open' network structures.

For very different reasons, the reaction of non-traditional actors in the telecommunication sector to the new regime is also mixed. There is support in principle for the opening up of the process, but dissatisfaction with its responsiveness, and with the residual domination of the process by incumbent actors (OECD 1995). The result is frequently that standardisation programmes of relevance to public network environments, but in which actors in the computer sector are the technology leaders, are siphoned off into private computer industry consortia that can be less accessible and responsive to participants from the public network arena.

The incentive to support the regime centered in T1, TTC and ETSI is perhaps strongest among established telecommunication equipment suppliers. High and costly R&D intensities, related both to existing and new product lines, are increasing the pressures to open up new international markets. These new markets are usually much less vertically integrated than long-established markets, thus increasing the incentive for equipment suppliers to agree on international standards.

The real question is whether 'standards', as developed in the present environment, are in fact a new phenomenon in telecommunication. In many respects, the 'standards' as produced by ETSI or T1 are instruments of a different order to the old CCITT or CEPT 'recommendations', and they reflect a fundamental re-ordering of many institutional relationships in the industry.

3   STANDARDISATION AND NETWORK EVOLUTION

As networks become more 'intelligent', in the sense that the service provision and network management functions become resident in decentralised computer applications, the role of

standards expands from merely enabling interconnection and interoperation, to determining the conditions under which this distribution of 'intelligence' will be configured and to what effect. In this context, the source of the standards - public network operators, equipment suppliers, computer vendors and so forth - becomes a new and critical factor. This point can be illustrated by looking at virtually any new development in network technology, but space permits only a look at a couple of key examples.

The Asynchronous Transfer Mode (ATM) represents the first step in an approach to networking that might eventually eliminate altogether the requirement for large, centralised switching facilities. In the process, ATM and its successors could also eventually circumvent the 'intelligent network' architecture as being presently implemented by many national public network operators. Although originally conceived in the public network arena and formally defined in the CCITT, ATM has appeared first in private data networking applications. The lead standardisation body is now the ATM Forum, a US-based private consortia in which the principal actors are (mainly US) computer and software vendors. Arguably, primary control over perhaps the most significant philosophical change in the configuration of large networks, public and private, has already been wrested away from the 'traditional' telecommunication sector.

The second example is Computer-Telephony Integration. Although CTI is made possible in the first instance by CCITT Signalling System 7, control over the protocols for PC-based CTI applications has been concentrated in the computer sector, and current standardisation initiatives are being spearheaded by a handful of specialist companies. In 1993, the US firm, Dialogic, succeeded in organising an international advisory council around its nominally proprietary Signal Computing System Architecture (SCSA), and now claims that over 350 firms world-wide support this standard. SCSA is independent of hardware and software vendors, and claims now to support a full range of telephony services in distributed computer network environments. Links between CTI, integrated broadband networks, and ATM-style network configurations portend major changes in the service and control environments of the public network, but public network actors appear to be influencing this process in only minimal ways.

The prospect of a network with fully distributed switching and management functionalities creates a new kind of standardisation problem if some semblance of a 'public network' environment is to survive. The historical situation has been for private networks to begin as 'add-ons' or 'overlays' to the public network infrastructure. We may eventually be faced with an environment that is an accumulation of basically private networks, within which a level of non-discriminatory 'public' access can only be assured by regulatory means, tied closely to assuring the provision of non-proprietary standards for key network interfaces.

4   CHANGING PERCEPTIONS OF THE STANDARDISATION PROCESS

Traditionally, standards developers and implementors alike have viewed the process in terms of '*milestones*'. Standards were perceived generally as technical documents that appeared at controlled intervals, and that defined agreed common approaches to technology implementa-

tion at distinct developmental stages. In telecommunication, the 'milestone' approach was perhaps appropriate to the old analogue technical environment that tended to evolve in slowly paced and relatively discrete increments, and in which there was close co-operation between operators and suppliers over long periods of time with respect to network planning and design.

The evidence that 'milestones' were actually observed in this sector, however, is tenuous. The fact, for example, that the CCITT recommendations were worked out in a small, concentrated expert community, meant that they could be 'phased in' to ongoing network planning processes while still in draft form, and that flexibility could be built in to the recommendations in order to accommodate existing 'national conditions', at least in the larger telecommunication markets.

In the very dynamic digital environment facing the industry today, the 'standard' has become a very much more 'fluid' instrument of technical and commercial co-ordination. In essence, standardisation should now be perceived much more as a 'process' rather than as a 'state'. Increasingly, industry actors become involved in standardisation not to define discrete conditions as fixed in time, but, as illustrated in Figure 1, to determine on a dynamic basis the benchmark below which the parallel development of technology is perceived to be inefficient, and/or technology-based competition is perceived to be redundant (Tassey 1991; Hawkins 1995b).
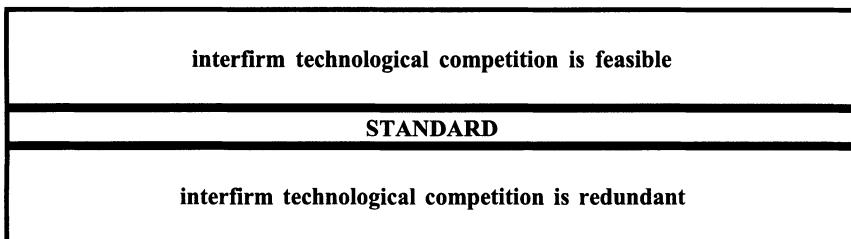
interfirm technological competition is feasible
STANDARD
interfirm technological competition is redundant

Figure 1

In the current commercial and technological environment, it makes more sense for firms to support a '*mapping*' approach to standards. In an environment of technical change, this approach is orientated to the maintenance of levels of inter-firm agreement on what constitutes the generic aspects of the technology. Thus, although 'milestones' still serve a function, it is now more accurate to perceive standards as 'living documents' and standardisation as an ongoing and dynamic process of information exchange between competing firms, rather than as a process orientated completely to achieving specific and documentable agreements (OECD 1995).

4.1   Pressures on the standardisation process

Given that many telecommunication standards have always been prone to flexible implemen-
tation conditions, the most significant new factor is that sponsorship of these standards now
emanates from a much greater and more diverse range of sources. This results in pressures
from many directions for 'reform' of the process. The problem in many instances is that there
is a lack of perspective concerning (1) the limitations on what the standardisation process is
actually capable of achieving, (2) the internal conditions necessary for the process to yield
successful outcomes of any kind, and (3) the nature of the institutional relationships between
standardisation organisations, industry and government. As a result, the outcome of 'reform'
to date has been mostly confusion.

   Pressures related to 'de-regulatory' assumptions and expectations have encouraged greater
participation in the standards process, but, correspondingly, have also made consensus agree-
ments more difficult to achieve (Besen 1995). Moreover, public sector expectations of the
process - especially on the part of the EU - have been overwhelmingly 'milestone' orientated
(European Commission 1990).

   The 'standards problem' has been perceived, by industry and government bodies alike, in
terms of the 'need for speed' in the face of rapid change in technological and market condi-
tions. Whereas few would argue with the premise that standards-making can be improved
somewhat by organisational adjustments, concentrating these adjustments on project manage-
ment objectives, and the production of increased quantities of documents runs contrary to the
nature and purpose of standardisation in dynamic technological and commercial environments
as described above.

   Part of the rationale for the proliferation of private standards consortia in the computer sec-
tor is that by concentrating participation among key industry actors, and by restricting the
scope of a consortia to a limited range of technologies, positive outcomes from the standardi-
sation process should appear more quickly, and rapid implementation of the standards should
be assured. Problematically, however, evidence is accumulating that consortia are in many
cases no more or less efficient than committees in the already established standards develop-
ment organisations, and that uncertainty about the balance of sectoral inputs into the consortia
leads to 'legitimisation' problems as the standard enters the market.

   Most importantly, the mere proliferation of standards organisations at national, regional and
international levels, has created a major co-ordination problem, and there is evidence that this
is leading to a reluctance on the part of individual firms to maintain or increase their support
of voluntary standards initiatives (OECD 1995). The point is rapidly being reached when the
costs of co-ordinating non-proprietary standards are perceived to be approaching the costs of
dealing with the very proprietary standards that they are supposed to supplant or prevent.

5   CONCLUSION

As is so frequently the case, the seemingly 'obvious' question in the title of this paper, turns
out to be the 'wrong' question. The seeds of its demise lie first in the ambiguity surrounding

the term 'de-regulation', and then in the questionable tacit assumption that 'self-regulation' through technical standards is necessarily a sufficient (much less complicated and more responsive) alternative to formal regulation where the basic configuration of the public network is at issue. The matter of 'reform' is similarly ambiguous in the light of the many contrasting perspectives that exist concerning the quite radical change that has already occurred in the standards-making mechanism for telecommunication.

As the structure of the telecommunication industry began to be widely questioned in the early 1980s, and as the goal of a 'liberalised' regime began to be promoted by a number of governments, the basic *problématique* was articulated in terms of how to maintain the technical integrity of the public network in the face of the rapid entry of new actors and technologies into the formerly tightly controlled environment of the public network. The public sector concern at that time was that 'the market' might not yield the appropriate standards in a timely enough way to support the new regulatory objectives focused on encouraging liberalised conditions for entry into telecommunication markets. As it turned out, the problem is not that industry does not produce the standards, but that they produce them in numbers that are so great, and in organisations that are so numerous, that implementation of the standards becomes uncoordinated.

In order to maintain any semblance of a public network environment in the future, the challenge is to re-link the production of standards with the planning and co-ordination of networks in the new regulatory environment. For this to be accomplished, the fiction that voluntary standardisation can somehow act as a surrogate for more direct forms of regulatory action must be discarded, and the internal and external regulatory functions of standards must be recognised and brought into balance. In this endeavour, a new role for public sector intervention must be defined, one that is focused on the task of encouraging mediation within the diverse and widening spectrum of actors and interests in the contemporary telecommunication industry.

6   REFERENCES

Baggott, R. (1986) 'By Voluntary Agreement: The Politics of Instrument Selection', *Public Administration*, Vol. 64, Spring, pp. 51-67.

Barry, A. (1990) 'Technical Harmonisation as a Political Project', in G. Locksley, (ed.), *The Single European Market and the Information and Communication Technologies*, London: Bellhaven.

Besen, S. M. (1995) 'The Standards Processes in Telecommunications and Information Technology', in R. Hawkins, R. Mansell and J. Skea (eds.), *Standards, Innovation and Competitiveness: the Politics and Economics of Standards in Natural and Technical Environments*, Cheltenham: Edward Elgar, 1995, pp. 136-146.

Breyer, S. (1992) *Regulation and its Reform*, Cambridge Mass.: Harvard Univ. Press.

European Commission (1990) Commission Green Paper on the Development of European Standardization: Action for Faster Technological Integration in Europe, COM(90) 456 final, Brussels, 8 October.

Hawkins, R. (1995) Standards for Communication Technologies: Negotiating Institutional Bi-
ases in Network Design', in R. Mansell and R. Silverstone (eds.), *Communication by De-
sign: The Politics of Information and Communication Technologies*, Oxford: Oxford Uni-
versity Press (forthcoming).

___ (1995a) 'The Public Sector Role in the Development of Information Technology Stan-
dardization Strategies', *OECD STI Review,* Summer, (forthcoming).

___ (1995b) 'Standards-Making as Technological Diplomacy: Assessing Objectives and
Methodologies in Standards Institutions', in R. Hawkins, R. Mansell and J. Skea (eds.),
*Standards, Innovation and Competitiveness: the Politics and Economics of Standards in
Natural and Technical Environments*, Cheltenham: Edward Elgar, pp. 147-159.

___ (1993) 'Changing Expectations: Voluntary Standards and the Regulation of European
Telecommunication', *Communications & Strategies*, No. 11, 3rd Quarter, September, pp.
53-85.

___ (1992) 'The Doctrine of Regionalism: A New Dimension for International Standardiza-
tion in Telecommunication', *Telecommunications Policy*, Vol. 16, No. 4, May/June, pp.
339-353.

Lecraw, D. J. (1984) 'Some Economic Effects of Standards', *Applied Economics*, Vol. 16, pp.
507-522.

Organisation for Economic Co-operation and Development (1995*) ICT Standardisation in the
New Global Context*, Paris: OECD Directorate for Science, Technology and Industry,
Committee for Computer and Communications Policy, DSTI/ICCP(95)2, 29 March.

Reddy, M. N. (1990) 'Product Self-Regulation: A Paradox of Technology Policy', *Techno-
logical Forecasting and Social Change*, Vol. 38, pp. 49-63.

Tassey, G. (1991) 'The Functions of Technology Infrastructure in a Competitive Economy',
Research Policy, Vol. 20, pp. 345-361.

7   BIOGRAPHY

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