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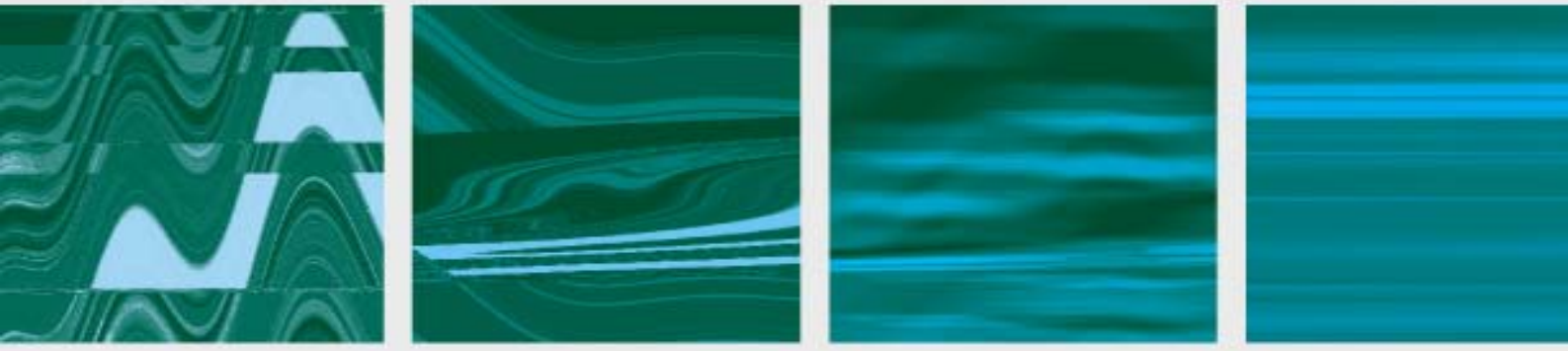
«Normalisation et régulation : interactions et enjeux»

«Standardisation and regulation : interactions and issues»



ART Autorité de Régulation des Télécommunications
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Standardization and Regulation
Interaction and Issues

Standardization is driven by the market players on a voluntary basis and is closely linked to the optimization of trade in a global society. It is a response to a number of factors such as market liberalization, changes in technology, competition etc and is becoming an unavoidable process in an ever increasing number of areas, underpinning advances in the overall economy as a result.

Historically, standardization has been at the heart of the universal telecommunications system. The first world conference to establish a worldwide standard for telegraphy took place in Paris in 1865, 10 years before the telephone was invented. As a result, the ITU which followed on from this conference is the oldest organization specializing in bringing nations together in a common organization. The technological and regulatory changes in recent years have not caused this approach to be questioned. To the contrary in fact, they have increased the strategic nature of this upstream activity. Opening the telecommunications market to competition has increased the number of players and value chains. Standardization encourages the establishment of new economic models which benefit the network and services industry. However, a standard or a specification is never neutral and is influenced by the parties intervening in the process. It can also be a powerful promotional lever and as such reinforce market acquisition strategies.

The Regulator applies the principal of technological neutrality which has been confirmed within the future European Regulatory framework. However, he must also stay attuned to the issues and consequences of standardization which impact the prospects for market development and the rate at which it will develop. Being upstream from the regulatory process, it must also take into account the goals of competition.

Recent events have highlighted the issues and the interaction between standardization and regulation. After outlining the ties between standardization, the regulatory process and regulation, this document will illustrate the difficulties encountered by using the examples of mobile networks and services on the one hand and the development of the Internet and telecommunications networks on the other.

1. The regulatory process, regulation and standardization

Standardization helps to remove technical entry barriers and open up new markets and economic models. It indirectly creates economies of scale and requires multiple representation to be able to respond to the goals of competition i.e. operators, equipment suppliers, service providers, intermediaries and government departments. The financial crisis that this sector is experiencing reinforces the essential contribution that standardization (closely linked to the regulation process) makes in the development of the networked society

1.1 The regulatory process, the customer and standardization

The regulatory process is positioned primarily as a downstream user from the standardization process : mandates conferred on European standardization organizations, Community authority guidelines or Commission study groups etc.

It is because of this that the "frame" Directive (EC 2002/21) for electronic communication networks and services confirms that standardization essentially remains a market driven process. It reinforces the European institutional organizations CEN, CENELEC and ETSI in their role and encourages the use of standards or specifications which have been adopted by these organizations or, in their absence, by world authorities. The ITU, ISO or IEC ensure service inter-working and enhance the end user's freedom of choice.

1.2 Standardization – a modern regulatory "tool"

Standardization is a key element in economic and commercial exchange (opening new markets, establishing economies of scale etc) and is regularly at the heart of problems confronting the Regulator. Beyond the questions associated with the management and regulation of the frequency spectrum, there are several recent examples which illustrate the interaction and issues linking standardization and regulation.

- The UMTS deployment timetable remains dependent on the interworking of several regional standardization organizations.
- The settlement of the dispute between Liberty Surf and France Telecom over the connection point to the local loop operator's network, highlighted the inadequacies of standardization at this level,
- The recommendations for the development of mobile Internet services (published by the Authority in November 2000) underlined the importance of standardization where remote mobile terminal pre-programming is concerned. In this context, proprietary functions slow down the development of a competitive service market.
- The ENUM protocol which originated with IETF, pinpoints what is at stake when numbering, addressing and naming systems converge.

Standardization precedes the Regulatory timetable which is focused on short term structural issues e.g. inter-connection catalogue, settlement of disputes etc. It makes use of its various components (institutions, forums, Internet governance –see annex) to condition and structure the market via the product documentation. These bodies account for as many political and technical consultative groups as those under the mandate of the Regulator.

1.2.1 Mandatory consistency between standardization and regulation

The Regulator intervenes in the standardization process in a limited way, via certain institutional organizations, to defend principles linked to the establishment of economic models, freedom of choice for the user, future management of spectrum and numbering resources, the interpretation and compliance with mandatory requirements etc. By calling on previous national consultations, the Regulator remains an indispensable player given the requirement for consistency between standardization and regulation.

Standardization effectively provides a multiple supplier choice (for terminals, infrastructure equipment and network) via standardized interfaces thereby contributing to lower costs, service and network inter-working etc. It also contributes to compliance with mandatory requirements (efficient spectrum use, absence of interference, security etc), as well as to compatibility between competitors' systems as well as to the development of consistent numbering and addressing rules. Proprietary options on the other hand will seek to beat the standardization process, limiting the possibilities of market competition as a result and slowing down its development through the introduction of incompatible systems. Standardization is synonymous with a wide variety of contributions and that fact that it remains open to the goals of competition. It provides the opportunity for a wealth of players (operators, equipment suppliers, service providers) to contribute to the market development.

Even if standardization is guided by the market, certain basic rules are essential to the success of the process. i.e. transparency, openness, impartiality, continuity, access to publications, rules for patents, efficiency, responsibility and consistency. A framework of co-regulation implies compliance with the criteria of transparency, openness, the guarantee of multiple contributions and consensus. This observation is entirely applicable to standardization, which by drawing on a European foundation recognized worldwide, must stay open to the goals of competition between operators and service providers as well as between equipment suppliers to allow the economy to develop.

1.2.2 Standardization –a long term trend indicator.

The standardization infrastructure is a myriad of "sensors" providing indications of market trends and rates of development which would in some circumstances be difficult to detect otherwise. Standardization, in the broad sense of the term, is an observatory (for players' game plans, new technologies etc) which has a direct relationship with research and development strategies and activities. These latter define the market evolution and the future relationships between the players.

Monitoring the standardization process allows the Regulator to establish guidelines and reference points for future discussions. These different "sensors" provide a certain visibility with respect to the market evolution, the game plans of the players and phenomena such as excessive promotion with respect to the state of research and development. In a technological environment which is becoming more and more complex and which covers the totality of electronic communication networks, there is no question as to the requirement for this sort of activity. In fact, it needs to reinforced and enhanced from an economic, legal and financial point of view.

2. From GSM to UMTS

Analysis of the UMTS standardization process, which has drawn heavily on the foundation of European GSM expertise, unquestionably sheds light on the actual timing and the prospects for worldwide development of third generation mobile.

Even now, mobile services on 2nd generation mobile networks are being enhanced and the number of value chains is increasing. This gives an insight into the potential for third generation mobile. In this context, interoperability and freedom of choice for the user are two inseparable fundamentals for market development in a competitive environment. The collaboration of the market players within a standardization process, open to a wide variety of inputs, would appear to be indispensable given the economic and social issues at stake and the financial situation of the players concerned. When the UMTS network effectively becomes operational, the mobile services, which have resulted from this process, will undergo a logical transformation towards richer features. In doing so, they will benefit the overall network economy.

2.1 UMTS construction and outlook

2.1.1 The selection of the UMTS radio interface by ETSI

Although the third generation mobile frequencies were identified by the International Telecommunications Union in 1992, it wasn't until January 1998 that European industry switched over to third generation mobile. It was the date that ETSI, the European Telecommunications Standardization Institute selected the radio interface which would follow on from GSM i.e. UMTS along with its two components W CDMA and TD/CDMA. It was a compromise between the forces that were present at the time. Despite the fact that the W CDMA and TD/CDMA interfaces can be linked to the European ACTS FRAMES (Advanced communications technologies & services Future Radio Wideband Multiple Access)[1] research programs, the definition of the W CDMA interface that the research and development teams at DoCoMo, the Japanese operator, have been working on for a number of years, is more advanced than the TD/CDMA interface which was the result of a last minute alliance between certain GSM equipment suppliers. The W CDMA interface which is already in operation in Japan is still ahead.

The European regulatory timetable will therefore undergo an acceleration that is incompatible with the state of research and development. A Community decision published end 1998 set the milestones and provided stimulus to the mobile operators who will operate the third generation mobile networks.

2.1.2 UMTS – a member of the IMT 2000 family

The selection of the UMTS radio interface by ETSI in 1998 (despite the fact that GSM had just begun to tap the consumer market European-wide) was the result of timing constraints imposed by the ITU. As part of the worldwide selection process, the regional standardization bodies submitted proposals which depended on regional migration constraints . At the beginning there were no less than ten proposals of which two were European i.e. UMTS and DECT. A debate on the commercial implications of the future multimedia mobile led to the selection of five IMT 2000 radio interfaces (see fig. 1 below). This was a long way from the

[1] Figure 1 source: ART

original objective of a single system. The ITU decision satisfied all the regional groups by maintaining the possibility of migrating existing second generation systems.

UMTS along with its two radio components W CDMA (FDD –UTRA FDD mode) and TD/CDMA (TDD - UTRA TDD mode) associated with the evolution of the GSM core network, was included in the IMT 2000 family :

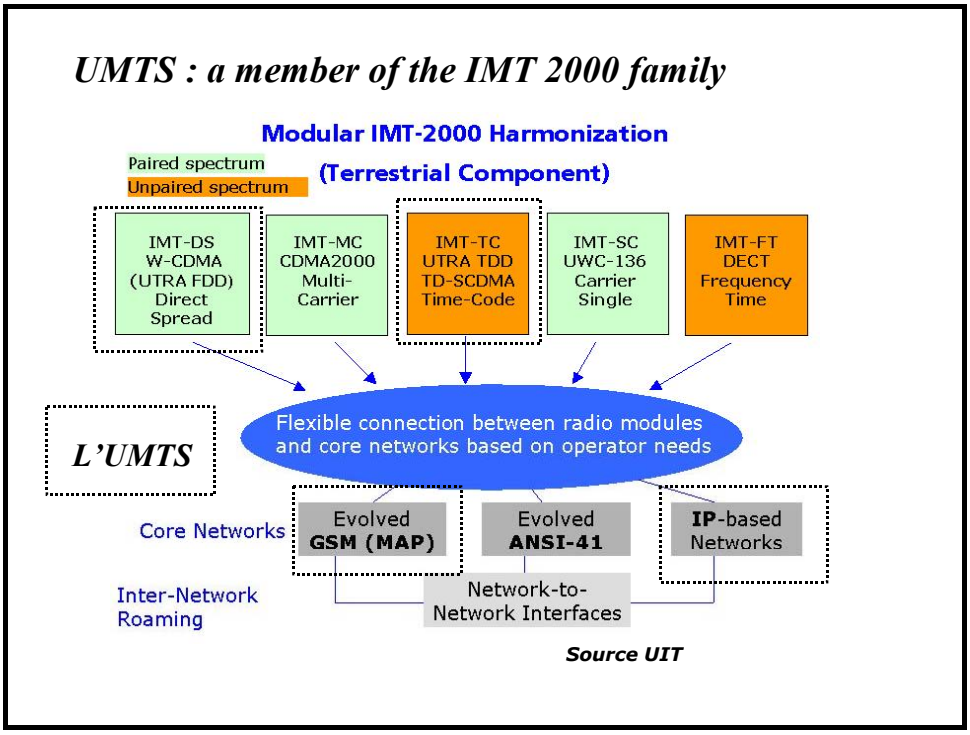


Figure 1

Several other components of the IMT 2000 family are worth noting :

- The radio interfaces CDMA 2000 (evolution of the IS 95 standard and main GSM competitor), UWC 136 (evolution of the TDMA IS 136 standard implemented in the US and including EDGE) as well as the ANSI 41 core network which was compatible with these two radio interfaces.

- The TD-SCDMA (mode TDD) radio interface proposed by China and linked to the evolution of the GSM core network.

Referring to the IMT 2000 family establishes a de facto competitive situation between the different elements.

Finally, two major organizations, external to the ITU structure and still very active, are making their mark by drawing up specifications for certain IMT 2000 family components.

- The 3GPP (third generation partnership project)[2] for UMTS (FDD and TDD modes), TD/SCDMA and GSM evolution (including GPRS and EDGE) brings together the

[2] www.3gpp.org

members of the following standards organizations : ETSI (Europe), ARIB and TTC (Japan), CWTS (China), TTA (Korea), T1 (US)[3]

- and 3GPP2[4], the mirror organization for CDMA 2000 which brings together the following standards organizations : ARIB, TTC (Japan), CWTS (China), TIA (US), TTC (China)[5].

Table 1 : IMT 2000 interfaces and standards organizations

ITU RSPC IMT 2000 interfaces		Standards organizations
IMT-2000 DS	UMTS component paired WCDMA frequency bands (FDD mode)	3 GPP
IMT-2000 TC	Components of unpaired frequency bands : UMTS (TDD mode) TD CDMA and radio interface proposed by China TD SCDMA	3GPP CWTS (TD SCDMA)
IMT-2000 MC	CDMA 2000 : CDMA network evolution	3GPP2
IMT-2000 SC	Evolution of IS 136 (TDMA) networks primarily deployed in US – UWC 136	3GPP
IMT-2000 FT	DECT	ETSI

Source ART

2.1.3 Alternative migration paths towards third generation mobile

Standardization sets the logical migration path towards third generation mobile which has been drawn up from the foundations of the 2nd generation specifications and agreed by the Industry.

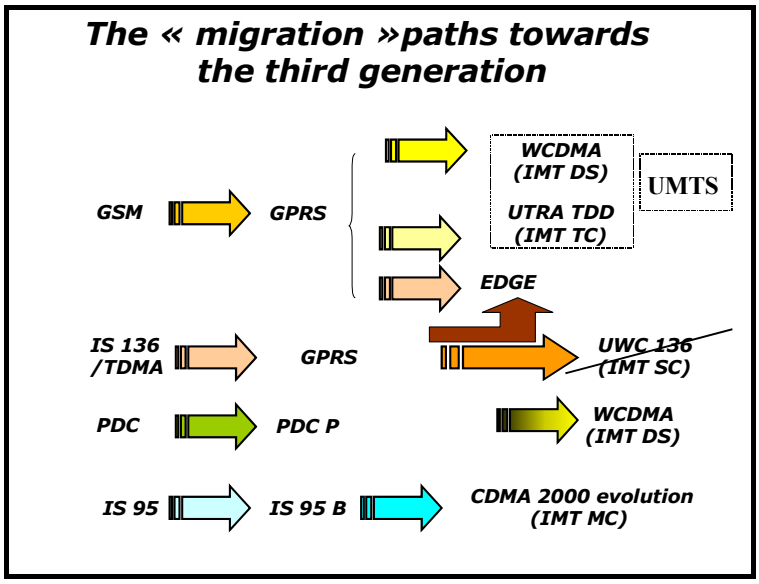


Figure 2 **Source : ART**

The second generation mobile footprint is a decisive factor for the following generation given that the rollout rate is determined by the migration policy of the mobile operators. In a difficult economic context, the operators who are already under pressure from the financial markets are going to look at every possible way of protecting their second generation

[3] www.3gpp.org/Management/OP.htm
[4] www.3gpp2.org
[5] www.3gpp2.org/Public_html/Misc/PartnersHome.cfm

investments as well as their customer base so that they can have a "seamless" transition. A new entrant will align with the regional trends so that he can capitalize on the resulting economies of scale.

For this reason, all third generation license holders in Europe are tending towards UMTS and W CDMA.

2.1.4 Competition between GSM and CDMA systems

The worldwide competition between the GSM and CDMA systems will continue with the third generation. The dominant position of the CDMA (WCDMA, TD/CDMA et CDMA 2000) technologies makes forecasting difficult, despite the fact that the migration paths and rates are largely determined by the type of existing network and the standards.

GSM relies on a very large footprint and has a presence in more than 150 countries. Partnerships which have been developed between certain European and Asian players should reduce the effects caused by the discontinuity of the third generation. In any case, the base of GSM countries and in particular GPRS should provide the equipment suppliers with continued growth for several years yet.

Finally, the UMTS deployment in Europe will benefit from being complementary to second generation networks as requested by the operators despite some delay (logical when the standardization timetable is examined). The European base will also be the starting point for conquering new markets based on the foundations of GSM, GPRS and then UMTS.

2.1.5 UMTS timetable

The reality behind the UMTS timetable has recently become clear. It reflects the operational steps inherent in the launch of a new system that has its basic principles and development closely linked to standardization. The 3GPP timetable provides a lesson in this respect which should be fed back into the overall research and development process.

There are several successive steps between agreement on the specifications and the commercial launch of the equipment on the market. For example : product definition, system design, development (software, circuit, support, ASIC components, manufacturing process, management, maintenance), integration, validation, interconnection and interworking tests, field trials, validation of series production. The standardization "game plan" is an iterative process, which has to constantly anticipate and adapt to research trends and the state of equipment development. The specifications undergo a series of amendments depending on the inconsistencies and different interpretations before being finalized. This process can take up to 18 months with a corresponding delay for the series equipment production. Finally terminals which adapt themselves to the network and service platform characteristics need to be setup and validated for the various infrastructures which have been deployed. This results in the volume production being delayed several months with respect to the infrastructure equipment and a corresponding delay in the theoretical deployment process.

3GPP Specifications :
The GSM to UMTS Roadmap

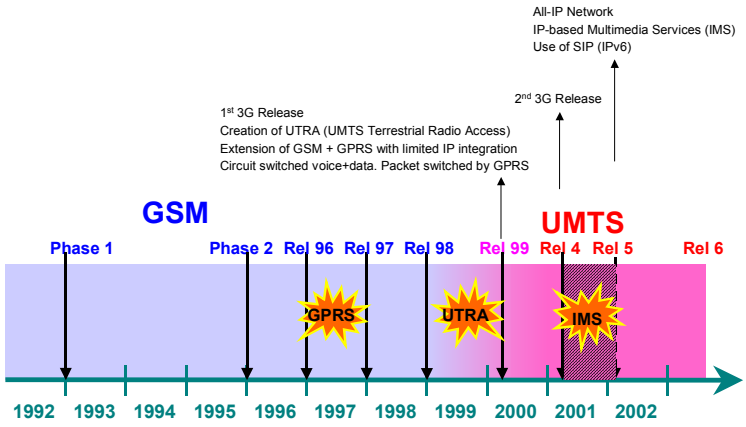


Figure 3 **Source : ETSI**

UMTS has been developed in partnership between the regional standards organizations within 3GPP and has benefited from the quality of the European methodology which is recognized worldwide. The initial deployment and operation of network equipment in Europe has begun despite the fact that certain functions (GSM-UMTS in particular) are not yet available. The Japanese mobile operator has anticipated the outcome of the standardization process and launched third generation services ahead of time. These services are at present different from the European approach (second and third generation networks are not complementary).

The standardization process is of course far from being over. Successive versions of UMTS are being developed (see ART study – Next Generation Networks –NGN). The interaction between terrestrial and satellite services and between cellular and high speed roaming access (WLAN) is the subject of discussions on the fundamental principles. In each case, the associated frequency plans remain closely linked to the standardization process in both the short and medium term. This means that the situation has to be constantly monitored. There are already contributions for the fourth generation mobile. However, the quality of the European approach as far as standardization is concerned remains a guarantee of long term success for UMTS.

2.2 The development of mobile services in a competitive environment

There are still open questions concerning the development of future mobile services and their associated economic models in a competitive environment. They are decisive issues for the coming months prior to the launch of third generation mobile networks.

Mobile services are becoming an increasing part of our economy and the networked society. Third generation mobile will not simply be limited to the music and games market and each user will want to have access to his own world of services. New value chains will emerge progressively as the mobile services value chain interacts with other existing value chains.

The approach that has been adopted for “data oriented mobiles” is diametrically opposed to that of second generation systems which were standardized from end to end to ensure stability

and interworking. Services which have been pushed to the edge of the network can be accessed via multiple gateways. GPRS is slowly transforming the mobile network into a "pipe". This tendency will continue with UMTS. Neverthless, all players (including the mobile operators) must be able to find their place in the value chains.

There is a gray area concerning the interaction between the mobile networks and the services equipment world. Mastering this area gives control over the service and rate of rollout on the one hand and the end user on the other.

The debate surrounding the first WAP services has highlighted the problems of interworking and freedom of access to the service ("Wap lock"). The deliberate promotional activity of several important market players prior to the standardization process being clarified and completed has produced a result which is contrary to that initially sought. The lack of perfect interoperability prevents networking which in turn reduces the potential of the service. (cf. SMS services). Commercial operation of a network is difficult in the absence of adequate standards or specifications. A similar risk exists for forthcoming mobile services i.e. new generation MMS and WAP. In this case, the principles of interoperability between all the elements in the service chain and the principle of freedom of choice for the end user are fundamental pre-conditions for the development of a competitive situation.

The standardization process responds to the issues which arise from these problems and its output supports the market development. The fact that the process is transparent and open to all concerned means that upstream consultation and negotiation between the industry players can be consistent with the goals of competition.

2.2.1 The interoperability stakes

The success of i-mode in Japan is partly due to the inter-working between terminals and services on the one hand and terminals and the network on the other.
For example the mobile operator controls the terminal specifications and the ergonomics of the partners' sites. This leads, among other things to the terminal manufacturer being dependent on the mobile operator. In a competitive marketplace which stimulates mobile operators, service providers and equipment suppliers to be innovative, standardization, with all that it implies in terms of inter-working and freedom of choice for the end user, has a key role to play in establishing the market development conditions and, to a larger extent, the overall European mobile service economy.

The interoperability guarantee pinpoints several criteria associated with the standardization process.

- Specification and standards quality : low risk of differing interpretations, consensus among the players, upstream compatibility, investment durability,
  Identification of equipment interfaces,
- Agreement between players on "mandatory" and optional specifications.
- Adherence to the above documents (result of consensus) by the majority of market players (equipment suppliers/operators),
- The availability of test and certification procedures to ensure compliance with the specifications.

The interoperability possibilities can be destabilized by several factors.

In the mobile area the service specifications and standards come from several organizations : 3GPP, WAP forum, IETF, LIF, Wireless village, etc each producing material at their own rate. Any collaboration based on the organizations' respective areas of expertise is likely to cause overlap in certain areas. The test and certification procedures are driven by different bodies depending on where the specifications originated. In addition, the existence of proprietary standards cannot be excluded. This can lead to a terminal using the 3GPP specifications (transferred to ETSI) for the network and protocol aspects as well as WAP forum standards, Java standards etc.

As the service offering is enhanced (the terminals, which mirror the service function and are becoming increasingly complex), integrate those functions which correspond to these new conditions and become irreversibly transformed. The European Regulatory framework stimulates innovation in the terminal area and reinforces this basic tendency. (Directive R&TTE). Validation and certification against the standards and specifications becomes strategic issue when a system is being launched.

Operators have difficulty controlling the terminal profiles despite having an undeniable influence over central purchasing bodies in the case of certain major players, and, despite the guidelines of the GSM association. (M-services recommendations). Recent activities by influential, if not dominant, mobile market players in these related markets increase the uncertainty.

Interworking will become a major pitfall for third generation mobile and upcoming GPRS services unless there is prior co-ordination between all the industry players (operators, equipment suppliers, software publishers).

This has resulted in the industry initiative which seeks to refocus the activities of the various mobile forums and concentrate on the service "bricks" independently from the network: The WAP forum and LIF, SyncM1 and Wireless Village within the Open Mobile Alliance (OMA) has a more structured basis and is consistent with the 3GPP activities with which there are synergies. It is focused on the network and protocol issues which appears to be a major step forward and will lead to a certain stability in the standardization process. All the Telecom and Computer industry players are taking part and have expressed their commitment to open systems which will in turn guarantee the balance between the different market elements. This approach takes longer but in contrast to a proprietary approach, will open up market development possibilities in a competitive environment to the benefit the overall economy.

Similarly, ETSI is organizing interoperability sessions for the different areas of third generation mobile which must be supported and extended even (see for example) www.etsi.org/plugtests/02UpcomingEvents/MEXE/mexe_home.htm).

The success of mobile telecommunication services and systems has been built on a concerted and standardized approach between the players. The financial crisis affecting this sector, does not change this. To the contrary, upfront negotiation and consultation between all the players (supported if necessary at a national level), is an indispensable part of the process of developing products and services and ensuring interoperability for competitive services.

2.2.2 Freedom of user choice

The first discussions on WAP services pinpointed the inadequacy of the standardization process in supporting freedom of user choice (see the ART recommendation for the development of mobile Internet –Nov. 2000). This question is likely to be raised again with GPRS (which allows content sites to be accessed more quickly), once the terminal numbers become significant.

The success of UMTS is closely linked to the upfront discussions between all the players in the value chain. In the first instance, having a wide variety of inputs (GPRS services included) into the standardization working groups is still the best way of guaranteeing that the market development principles of competition will be taken into account sufficiently early.

The European ETSI standardization methodology is backed by worldwide renowned expertise in the mobile area. Standardization strategy and products have evolved in the face of the worldwide UMTS context to the benefit of the European industry and economy without having lost sight of their founding principles. The necessary background work is continuing in this area. In the service area there are some strategic dates coming up in the short term independently of the mobile evolution towards the third generation. There are a number of key issues which cannot be avoided over the coming months i.e. value chain crossover, the economic balance between the players as well as the quality of the specifications and certification procedures. In this context, and with a view to preparing future short and long term developments, the Regulator can only but encourage the participation of new players in the mobile networks and services standardization process to ensure that competition principles are taken into account from the outset.

3. The Internet challenge

Telecommunications networks are undergoing profound changes as a result of increasing use of the Internet, broadband and multimedia services. In this area the fundamental problems surrounding market evolution and development in a competitive environment are now being discussed in standards organizations (e.g. link between IP address management, naming, numbering, IPV6 transition, evolution of telecommunications networks towards new generation networks).

After quickly highlighting the issues surrounding the ICANN reform, this section will outline the ART position on IP addresses and domain names as previously described in the report covering regulation adaptation issues for IPv6 migration and new generation networks.

3.1 Internet resource management – a reform in progress

The management of Internet resources is largely based on the US heritage from the 60s. Since then, the Internet has gone well beyond the academic community and its worldwide character requires management which is open, transparent and which represents the various private, commercial as well as public interests.

The creation of ICANN in 1998 (see annex) represented the first step towards openness and transparency. However the management model could be improved as it is still open to criticism and relies on an annual agreement with the American State Department. Reforms were initiated beginning 2002 for which the broad principles are now known.

The increasing integration of the Internet and its associated protocol into future telecommunications system components means that the management of Internet resources also requires worldwide collaboration. The ITU has in fact revised Resolution 102 (Minneapolis 1998 – Marrakech 2002) covering the management of Internet address and domain names and has highlighted the questions of public interest related to these rare resources. ETSI is contributing to the reform process for European standardization.(see www.etsi.org/icann/home.htm) .

The balance of the future ICANN structure (which implies a new distribution of the various groups on the Board of Directors) still appears to be a delicate subject despite assurances of transparency by the Evolution and Reform Committee. (see www.icann.org).

The various existing structures will be regrouped and will possibly have their objectives and status modified within the organization. For example the Protocol Supporting Organization (PSO) will give way to a Technical Advisory Committee which will also have its representation reviewed.

In the coming weeks, the representation of the future ICANN Board may bring the discussions to a head within the various organizations that consider that they should be represented. The Nomination Committee (Nomcom) has the majority of seats in the future ICANN. Certain bodies such as ETSI (which currently has two representatives on the ICANN Board) may have their position weakened following the introduction of selection "filters" in the form of ICANN "satellite consultative committees" which will designate representatives i.e. Governmental Advisory Committee, Security Advisory Committee, Root Server System Advisory Committee, Technical Advisory Committee.

When it comes to Internet resources generally (as outlined in the ART report on regulation adaptation), it may be desirable to setup a national co-ordination structure so that the French position can be prepared from as broad a base as possible. To give any significant weight to the French position it would have to taken to European level or to the relevant international standards organizations wherever possible .

3.2 Domain names and IP addresses

It is clear that IP is being used increasingly for the provision of telecommunications services (high speed internet access, mobile internet). This tendency is currently being accelerated not only by the increase in IP traffic due to the penetration of Internet services but also by the technological innovations which allow IP networks to support real time applications. These evolutions materialize in the form of new services integrating voice or video and by the appearance of new service providers. The control of numbering, naming and addressing resources when implementing truly convergent projects appears to be necessary as is a close co-operation between the Authority and the organizations managing Internet resources (essentially domain names and IP addresses).

3.2.1 Domain names

The Authority has already been involved in actual cases where permission has been sought for the introduction of innovative communication services linked to the management of Internet domain names. A case in particular is the ENUM protocol project which covers the conversion of E164 telephone numbers into Internet domain names. (defined in the IETF[6] RFC[7] 2916) This type of project involves significant co-ordination between the E.164 numbering resource management authority (ART) and the Internet domain name management authority (AFNIC[8])

On a number of occasions, the Authority has spoken in favor of a legal framework to strengthen the domain name management organizations in France of which AFNIC is the foremost.

The draft Information Society law for which the Authority was consulted in May 2001, defines a legal framework for the management of first level domain names corresponding to the French country code. It makes provision for the designation of domain name management organizations by the Telecommunications Minister following consultation of users and relevant professionals.

The Authority has suggested elsewhere on several occasions that it be closely involved in domain name management through representation on the Board of Directors of those organizations which have been designated to manage French domain names.

The operators are increasingly proposing networks and services based on IP or linked to the Internet. Domain names have significant implications in the development of networks and communications. (an area in which the Authority has been given responsibility by law). Representation on Internet domain name management organizations would mean that the

[6] The Internet Engineering Task Force
[7] Request For Comment
[8] Association Française du Nommage Internet en Coopération

Authority would be better placed to take network and communications services development objectives into account.

3.2.2 IP addresses

IP addresses are currently managed by ad hoc organizations inherited from the days when the Internet was first set up. They operate in a self-regulating mode between players.

In Europe, RIPE[9] defines the management rules and assigns the IP address blocks. The Authority monitors the work carried out in RIPE, notably for the development of IPv6 address management rules and address assignment policy for mobile Internet.

The IP address assignment and management model is significantly different from that used for numbering resources. However it has operated until now without giving rise to any criticism that justify radical changes.

Nevertheless, if the IP protocol is to become widespread in network and communications services then IP address management is not without implications for the regulator.

The number of terminals requiring an IP address for connection is increasing due to the growth of permanent high speed connections and third generation mobile applications. This phenomenon has shown the limits of IP address resources and accelerated the introduction of a new version of the IP protocol (IPv6) which will increase the number of available addresses. New players will require IP address assignments. The question of address shortage mainly concerns Europe and Asia because the United States has a significant stock of IPv4 addresses (for historical reasons) .

In this situation, it would seem to be important that the regulators and, at the very least, the European Commission show that they are monitoring the issues related to IP address management (even if they are not involved directly) and that these questions haven't been left completely to "auto-regulation". Moreover, the presence of the Authority in the RIPE meetings has been encouraged and favorably received by the few French players which have participated in the working groups.

As far as the Regulators and the European Commission are concerned, the problems posed by IP address management are exactly the same as those for numbering resources i.e. continuation of objective transparent and non discriminatory allocation conditions (which should not create entry barriers for new players nor slow down development allowing dominant positions to be created).

A further step beyond simply following the RIPE and ICANN proceedings would be to "cement" the principles of objective, transparent and non-discriminatory IP management in a European directive. The objective would not be to go from the "auto-regulation" model to one which is closer to the telephone numbering resource model but to exercise control over the "auto-regulation" model.

3.3 The transition to IP v6

[9] Réseaux IP Européens.

The Internet is at the heart of a progressive but inescapable evolution towards the Information Society. Today the diversification of Internet access modes (low and high speed, fixed, roaming and mobile) leads to new uses and encourages innovative new services and applications. There is an irreversible trend towards this form of communication being used by all sectors of the economy.

All equipment connected to the Internet has a unique address allowing it to be identified i.e. the IP address. However, the development of the Internet (which relies the IPv4 protocol) is currently under threat due to the address shortage which is more acute in Asia and Europe than in the United States. Furthermore, this protocol was initially developed for research networks and the armed forces and was not designed for commercial use. Despite the solutions developed over recent years and in particular by the IETF, the overloading of the routing tables (responsible for routing the packets across the network), the gaps in security, and the management of roaming type mobility have penalized new service opportunities (voice over IP for example). The transition to IP V6 has become inevitable. This section reviews the broad outline of a study on this subject published by the Authority last Summer.

3.3.1 The future of the Internet is an immediate issue

Because of the address limitations, the future of the Internet has become an immediate issue. It highlights the problems associated with the migration towards the new version of the Internet protocol : IPv6. Under these circumstances several Community initiatives[10] designed to promote industry initiatives and encourage the Member States to support the migration to IPv6, have responded to efforts by Asian government organizations to support the deployment and use of the new protocol. The United States have kept a low profile on this issue to date.

The transition to IPv6 will be long with introduction only just beginning in experimental, research or academic networks. It would seem that market players will have to prepare themselves for the co-existence of the two protocols for a number of years.

The transition to IPv6 is taking place in the wider context of Internet organization governance reform (ICANN) and the rebalancing of those structures concerned with policy questions of general interest. In particular, the future Internet management body will have to decide on the strategic question of DNS IPv6 root-servers which are indispensable for large scale rollout of an IPv6 network. It will also have to address the issues arising from the fact that the two protocols will have to co-exist over a number of years in a situation of regional address resource disparity.

3.3.2 IPv4 address shortage disparity

Because of the historical and current IPv4 address allocations, the shortage is not the same from region to region. This explains the attitudes of the different players. The North American zone benefits from an undeniable advantage due to the allocation of addresses in the pre-commercial phase of the Internet on the one hand, and the resources which have been allocated to this zone but not yet assigned on the other. (see above).

Table 2 – Address allocation by geographic zone (10/2001)

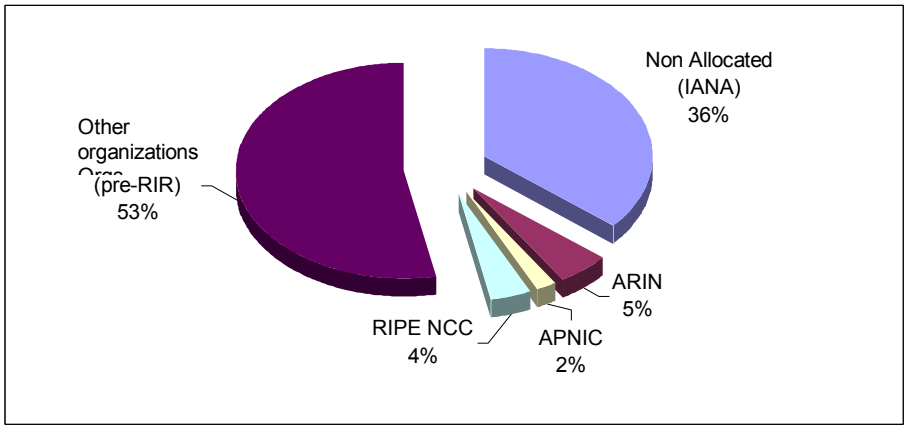
Regional Internet register or	Allocated resources	Available resources (allocated but not

[10] Commission communication on action priorities for IPv6 migration, Orientation of European Telecoms Council of Ministers June 2002, IPv6 task force

geographic zone (excl. RIR)			assigned)	
	% of total	Number(millions)	% of total	Number(millions)
ARIN – America, Southern Africa	50.69 %	2 177	9.12 %	392
RIPE NCC – Europe, Africa (North), Asia (West), Middle East	11.65 %	500	4.89 %	210
APNIC – Asia-Pacific	6.16 %	265	2.40 %	103
Non allocated resources	31.5 %	1 353	31.5 %	1 353
TOTAL	**100 %**	**4 295**	**47.91 %**	**2 058**

Source : IDATE

Figure 4 – Allocation of IPv4 addresses (11/01)



Source : RIPE NCC

3.3.3 Communication appliances, wireless and mobile services

Several trends could accelerate the forthcoming transition to the new protocol particularly in areas where the address shortage is most acute. i.e. the various forms of high speed access (fixed and WLAN roaming), connected electronic equipment, the multiplication of communication appliances. The first generation GPRS and UMTS networks (as for the first 2G and 3G mobile Internet systems in Japan) use the existing version of the protocol based on the 3GPP standards and considered to be more reliable and richer in terms of equipment and applications. Nonetheless, only IPv6 can respond to the constraints of services requiring permanent end-to-end connections.

In view of the favorable position of European industry in mobile systems[11], the European Commission has placed wireless communication at the center of the migration strategy for new generation Internet and IPv6.

3.3.4 IPv6 at the edge of the network

The momentum which will be created by the multiplicity of communication appliances as well as the multitude of Internet access modes (low and high speed, roaming or mobile) will eventually lead to the introduction of IPv6 on the edge of the network and in the access segment. This migration must stay transparent to the end user with the exception of new service innovations which are like to be generated.

[11] Commission communication 21/02/02 Action priorities for migration to new IPv6 Internet protocol.

3.3.5 ETSI is contributing to the development of IPv6

Even if the standardization process appears to be stable in so far as the first pre-commercial trials are concerned, the large-scale launch of IPv6 based on fixed and mobile synergies has to underpinned by an overall, coherent standards corpus. The European Commission has placed an order with ETSI for the evaluation of existing specifications and interoperability issues with existing systems as a result of its contribution (New Generation Internet :Migration to IPv6 –COM (200296)

Finally, the European Telecommunications Standards Institute regularly organizes interworking tests between equipment suppliers so that certain protocol implementations can be validated. The third event which took place in Sophia Antipolis in September last year was a resounding success and totally lived up to the participants' expectations.

3.3.6 The regulatory issues

The arrival of IPv6 could lead to increased competition in existing markets relying on Internet access, but it could also create bottlenecks particularly in the operating systems or in the IP backbone at the end of the deployment phase. In addition, the IP address allocation procedures differ from the number allocation procedures in that the principle of separating the regulatory and operational functions is not applied. It is this principle which in practice, ensures that the principles of objectivity and non-discrimination are truly guaranteed. At the very least, this needs to be monitored by the Authority.

The new protocol is suitable for widespread distribution of the Internet. Going beyond the address resources (which will reduce the notion of "scarce resource"), the intrinsic IPv6 characteristics will be capable of meeting the constraints imposed by new applications i.e. roaming, security, real time, end-to-end service quality and the commercial development of the Internet in the overall economy. In all cases, the Authority is not only committed to creating awareness with regard to new topics but also to promoting the development of the Internet and encouraging competition in the various forms of access. It will be devoting time and attention to the debate which the deployment of the new protocol will inevitably generate at both National and European level. It is already participating in the National IPv6 task force which has just been created.

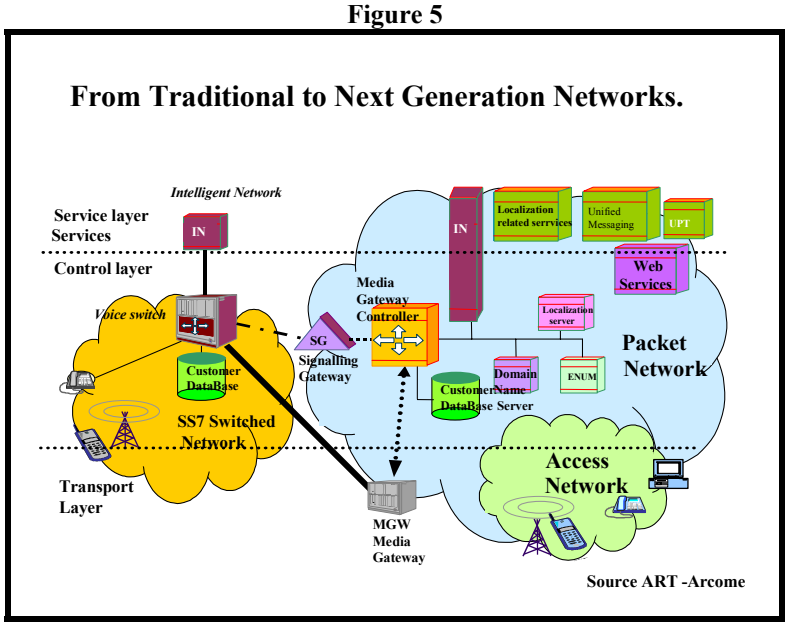
3.4 Next generation networks

There are several background trends (deregulation and the introduction of competition, development of new services, evolution in the use of the access network and the arrival of broadband) which have brought about a progressive transformation of telecommunications networks towards Next Generation Networks (NGN). This has been the subject of major debate in the standards organizations such as the ITU, ETSI, 3GPP and the various forums, despite the unfavorable economic circumstances in the industry and the cautiousness of the operators in terms of investment. The connection between future electronic communication networks and the existing fixed and mobile networks will be decided as from now. This will condition the future economic models as well as the service access modes.

3.4.1 No single NGN definition

Today there are several superimposed architectures corresponding to the different telecommunications networks. (switched telephone network, low and high speed internet access, IP backbones, mobile network). Certain intelligent network elements and transmission links could possibly be mutualized. NGN (for which there is no single definition) can be characterized by : a shared core network for all access and service types, open standardized interfaces between the different network layers (transport, control and services), support for user adaptable interfaces as well as variable access network capacity and type (see below).

Figure 5



3.4.2 A lengthy and unavoidable migration

Even if it appears inevitable, the migration to the new networks will be long (possibly 10 to 20 years) due co-existence requirements with traditional architectures. This migration has already started in some cases and raises a number of issues depending on the type of operator i.e.incumbents versus new entrants, fixed and/or mobile networks. Over and above the advantages of multimedia services, the players are also taking into account the state of the existing infrastructure as well as acquisition and operational cost benefits ; all within the constraints of rapid return on investment.

The transformations which the access network is undergoing to support high-speed development, along with the evolution of mobile networks towards data, will influence the speed at which these networks will be introduced given that the architecture has to be redefined as a function of the existing networks. There are of course, several solutions for which the structure is dependent on the interworking conditions with the existing networks. In the short term, competing solutions could pose end to end interoperability problems (to the detriment of services) due to the fact that the solutions will have their own functionality, be at different levels of maturity and the that standardization process is incomplete. This evolutionary process has inherent problems in a number of areas i.e. organization of cohabitation between networks, service continuity, continuity or introduction even, of granularity in terms of quality of service as well as the interconnection level and type.

3.4.3 Towards redefined roles ?

Terminals adapt themselves to the new service medium and include new functionality which authorizes dialogue with the service platforms or other terminals of the same type. This transformation is closely linked to that of the network given that the trend in distributed services architecture is to move the service intelligence to the terminals.

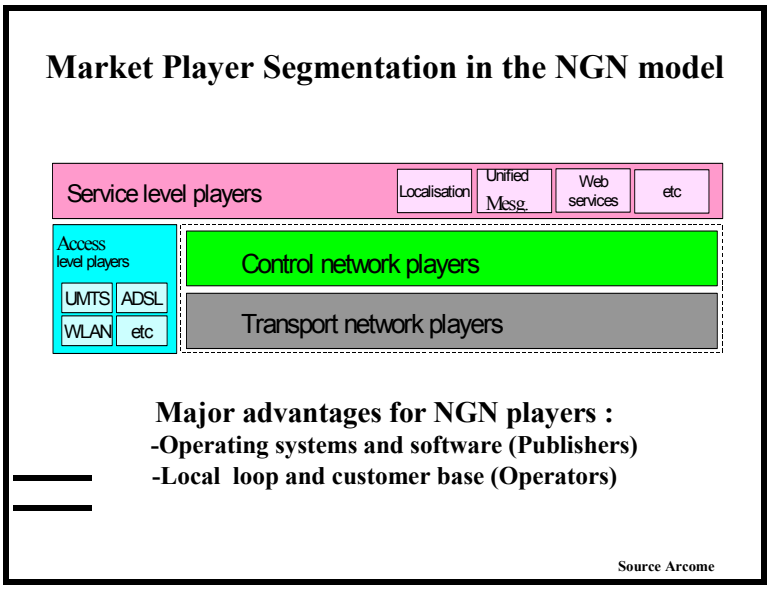


Figure 6

Certain software publishers (and in particular those supplying operating systems) plan to take advantage of this so that they can play a major role in the service offering. The redistribution of the intelligence to the terminal will mean that these new networks will cause a major transformation in the relationships between the players and in particular between the operators and the service providers where, amongst other things, control of the customer base determines the revenue possibilities. The customer base, which has been historically an asset of telecommunications operators, will become multi-dimensional and will be the means by which certain players (software, service and content providers) will seek to legitimately position themselves.

Role sharing and revenue redistribution between players will determine the success of next generation networks and the service evolution. In view of this, the operators will seek control over the data flows so that they can segment their offer and not be reduced to the status of "common" pipe suppliers. This observation highlights the issues surrounding the definition of the interfaces between the network operators and the service providers (control/service interfaces). There presently appear to be two opposing alternatives in the discussions related to next generation networks. The first effectively announces standardized interfaces between network operators and service providers prefiguring increasing competition in this area. The second, which is being promoted primarily by a software player, puts the terminal at the center of the service offering, with the network becoming transparent in nature. In these circumstances, the role of organizations such as the ITU or ETSI would appear to be essential to coordinate the different initiatives, encourage interoperability and define the tools which will allow the value to be shared between the players.

The uncertainties surrounding the availability of standardized interfaces lead the Authority to keep a watchful eye on questions related to freedom of user choice and the establishment of an open competitive model. However the migration in the area of electronic communications

networks will also create new regulatory work i.e. operator identification, players' rights and obligations, market analyses etc. The Authority has just published a study on this subject as input to the initial thinking on the immediate issues of migration to next generation networks (see site : www.art-telecom.fr).

Conclusion

The telecommunications sector is experiencing a profound financial crisis bringing with it rationalization and cost structure optimization. However the momentum in this sector relies on several structural factors : growth in traffic volumes, development of competition, lowering of costs and tariffs and the creation of new user requirements by offering a rich variety of services. Standardization is intrinsically at the center of these factors with standards and specifications facilitating open models and the entry of new players i.e. operators, service providers as well as the multiplicity of equipment suppliers on the market. They contribute to lower costs and tariffs through economies of scale as well as to innovation and competition between suppliers. They also contribute to the creation of new services and user applications by encouraging interoperability between the different elements in the value chain and favoring freedom of choice for the user. A dynamic competitive sector requires standards. For this reason, the involvement of all the players in the standardization process can only help reinvigorate the economic activity and stimulate the possibilities for continued growth.

The global nature of trade reinforces the influence of standardization at the international level as demonstrated by the ITU in the telecommunications sector. Europe must play a role by putting forward dynamic proposals and ensuring harmonization between the different constituent countries. The ART is committed to the various areas for which it has the necessary competence. Meanwhile, these new issues do not remove the need for the European or even National standardization levels. To the contrary, they pinpoint the fact that standardization is unavoidable. European standardization contributes to the construction of the global economy, is recognized worldwide and regularly attracts new members.

Standardization precedes the regulatory process and is the first meeting point for the market players. It must continue to facilitate new market dynamics through open competition by providing innovative products and services.

Annex : The standards galaxy – Focus on several standards organizations

As outlined in the frame Directive "Electronic Communications" (EC/2002/21), the standardization process is largely driven by the industry and the market. The standards bodies largely outnumber the institutional standards organizations such as the ITU and ETSI. The number if documents which shape the market is increasing : reports, recommendations, specifications, guidelines, norms, guides, etc... The representation methods vary depending on the bodies concerned and have a strong influence on the operation of the structure and on the type of document that is produced.

This annex presents a summary of some of the forces present and gives an outline, which can only be simplified given the observable and indirect interaction between all the structural forms .

A.1. The Institutional Standards Organizations

Institutional standardization is organized sectorially (general, electro-technical, telecommunications) in a 3 level framework : international, regional and national (see fig. 1). It is particularly characterized by adherence to the following principles : transparency, openness, impartiality, continuity, access to publications, patent rules, efficiency, responsibility and consistency[12].

Figure 1 **source: ART**

A.1.1 The International level :

The ITU

The International Telecommunications Union (ITU) is an international organization located in Geneva and is part of the United Nations. Under its auspices, governments and the private sector coordinate telecommunications networks and services worldwide. It is divided into three areas : ITU-R (Radiocommunications), ITU-T (Standards) and ITU-D (Development). It brings together 189 Member States, 656 members from the different sectors (operators, industry), as well as 36 associate members.

The ART participates in two ITU-T commissions which deal mainly with regulatory aspects. i.e. Study Group no. 2 which covers the operational aspects of service provision, networks and performance, service definition, numbering, mobile routing) and Study Group no. 3 which covers tarification and accounting principles as well related political and economic questions. It also takes part in the working proceedings of the Special Study Group (SSG) and leads the national consultation committee ITU-CFCT. It is also involved in the radiocommunications ITU-R and development ITU-D sectors.

The ISO has a multi-discipline role and brings together the national standards organizations. There is an agreement with between the ITU and the ISO to co-ordinate the work of the two organizations.

[12] voir ETSI GA#38 doc 14 Strategic Guideline 3

The IEC is the equivalent of ISO in the area of electricity and electronics. It embraces the national representative committees in this sector. In France there is the UTE ;

JTC1 is a mixed committee which is common to ISO and IEC and deals with information technology. It has an agreement with ITU-T.

The ART does not participate in international bodies such as the ISO, IEC and JTC1.

A.1.2 The European level :

The three standards organizations recognized at Community level are : European Telecommunications Standards Institute (ETSI), The European Committee for Standardization (CEN) and the European Committee for the Coordination of Electrical Standards (CENELEC) –see Directive EC/98/34 The "frame" Electronic Communications Directive implicitly confirms the status of these three organizations.

The CEN has a multi-sectorial mission. The CENELEC covers the electrotechnical area and ETSI covers the telecommunications sector in the broad sense including issues related to broadcasting.

ETSI differs from the other two European standardization structures by having full time members from the CEPT geographic zone i.e. equipment suppliers, operators, service providers, government departments. It also includes associate members and observers.

ETSI has 912 members from 54 countries (+4.5% compared to 2001). The members are divided up as follows :

- 672 full time members from 35 European countries situated in the ECPT zone (European Conference of Postal and Telecommunications administrations)
- 49 observers ;
- 191 "associate" members from 19 other countries.

ETSI has significantly increased its associate membership over recent years to encourage policies which are adapted to the constraints of globalization. They now have virtually the same rights as permanent members. Its intention is to be able to respond to what are sometimes contradictory requirements i.e. develop European standards which are applicable in the worldwide market (even though the Institute is not an international standards organization recognized as such by the WTO).

The work is carried out by the sectorial players in technical committees. Only 8% of the members are from government departments. The ART participates in the ETSI strategy groups in collaboration with the Industry secretariat who is a member of the Institute (Board, finance committee, OCG) and follows the work of several of the Institute's technical committees i.e. ERM, SES, SPAN, 3GPP, Tiphon (see www.etsi.org)

We should finally mention that in a number of areas (establishment of partnered standardization projects, involvement in Internet policymaking (ICANN), interoperability sessions, agreements and partnerships with the forums and regional standardization structures etc) ETSI policies are seen as being innovative and are a reflection of the upheaval in standardization that is taking place in the telecommunications sector.

A.1.1 The National level :

AFNOR is a non-profit making association which drives the overall national standardization process and patronized by the Industry Ministry . It also represents ISO and CEN in France. AFNOR has delegated national electrotechnical standardization to UTE which is a non-profit making association. The French ETSI Committee coordinates the position of the French ETSI members during voting (see comelec.afnor.fr/servlet/). The Authority takes part in the working proceedings of this organization which is institutionally attached to AFNOR and presided over by the Industry secretariat.

A.2 The Forums

The scope of standardization activities regularly extends beyond the institutional standardization structures. Various industry forums or coordination groups (for specifications, technology promotion, lobbying etc) revolve around the international, regional or national institutional organizations and have more and more influence. The balance of power varies from group to group and often depends on the founding members. Finally, there is no consistency as far as operating rules, entry conditions etc are concerned between any of these structures which are mainly located in the US.

Overall, these structures[13] respond to four distinct requirements :

- Identification of standardization requirements : UMTS forum, Mobey forum, Radicchio, etc.
- Specification drafting and preparation :DSL F, ATM F, 3GPP, 3GPP2, WAP forum, OMA, etc.
- Interoperability tests between products from competing equipment suppliers : IMTC, QoS, WiFi, etc.
- technology promotion : IPV6 forum, Hiperlan Forum, UMTS forum, MWIF, 3G.IP, UWCC, CDG,

Operator associations (GSM association, etc.) and equipment suppliers' associations (GSA, WECA etc.) participate in the definition of standardization requirements and provide feedback for the issues raised in these structures.

AFNOR has just created a forum watch group "standarmedia" to provide information to national players on its products and activities. (www.standarmedia.org) . ETSI has a simplified forum watch that deals with ETSI related topics (webapp.etsi.org/forawatch).

A.3 Internet governance

The Internet has generated its own governance structures on the fringe of the bodies mentioned above to deal with technical and political issues . There is a distinction between the technical structures (IAB, IESG IETF, IRTF) and those dealing with administrative functions which have political implications (ISOC, IANA, ICANN) These structures are still a matter of specialists. They have established their own operating rules which are a long way apart from those of the institutional standardization organizations. Only ICANN and ISOC are private, non-profit making companies.

[13] voir www.standarmedia.org

Keeping the Internet under control is largely a matter of control over the political (ISOC, ICANN) and technical (IETF) organizations.

A.3.1 ICANN

ICANN's[14] original mission was to take over the Internet administration from the American government and to internationalize its management, deal with problems related to security and stability (root server systems, first level domain name registers, domain name system etc) as well as global DNS interoperability, multilingual domain names etc. ICANN is also the forum for virtually permanent discussions concerning user representation, taking into acount public policies, electoral structures, supporting bodies, Registry representation etc.

Due to criticism over its lack of transparency and government patronage it has undertaken organization reforms which are entering their final phase at the time of writing.

In view of the likely interaction between addressing, naming and numbering, The ART is actively following the issues raised within ICANN.

A.3.2 ITEF

ITEF is an international structure within ISOC and is open to all players interested in the evolution of the Internet architecture and the correct operation of the network. It covers standardization of a number of functional areas concerned with the Internet protocol i.e. architecture, new generation protocol, network management, operational requirements, routing, transport security and services.

A number of working groups are brought together and coordinated by one or two directors. There are three annual plenary IETF meetings which bring together more than 1000 participants to make decisions on fundamental Internet standards issues. The IETF operating rules are the opposite of a traditional standardization organization (participation without title, no voting, no national representation, no weighting etc.) (see http://www.isoc-gfsi.org/)

IETF's position in the standardization of this sector is becoming more and more strategic due to the increasing use of the Internet protocol in telecommunications networks and services.

As a result of the interaction between this organization and the institutional organizations (ITU and ETSI), the European administrations in the broad sense of the term (Ministries, Regulators) are aware of the influence of the IETF's work and its consequences for market development i.e. ITU, ETSI.

A.3.3 The W3C :

The W3C (World wide web consortium) is on the fringe of these structures and responds to standardization objectives linked to development of the web. W3C consists of more than 500 member or affiliated organizations.

[14] http://www.gouvernance-internet.com.fr/

Glossary

2G : second generation mobile system (GSM, CDMA, TDMA (IS 136), PDC)

2.5 G : intermediary mobile system between 2G and 3G (bit rates less than 100kbps -GPRS, CDMA 2000 1x)

3G : third generation mobile system called IMT 2000 by the ITU

3 GPP : Third generation partnership project – standardization structure which produces UMTS specifications (UTRA FDD and TDD modes including TD/SCDMA) and GSM evolution (including GPRS and EDGE) bringing together the members of the following standards organizations : ETSI (Europe), ARIB and TTC (Japan), CWTS (China), TTA (Korea), T1 (US)

3 GPP 2 : Third generation partnership project 2 – standardization structure which produces specifications for CDMA 2000 and IS 41 (core network protocol) evolutions as well as the interface between the 3GPP radio access points and the revised of IS41. It brings together the following regional standards organizations : TIA (US), ARIB and TTC (Japan), CWTS (China), TTA (Korea).

CDMA : Code division Multiple Access. Developed by the armed forces around 30 years ago. The company Qualcom transformed this technology for commercial use and holds a number of patents.

CDMA (IS 95) :second generation mobile system developed by Qualcom using CDMA access mode –used in the 800, 1700, 1900 *(450, 700, 1800, 2100)* MHz frequency bands.

CDMA 2000 : 3G evolution of CDMA (IS 95) –also known as CDMA MC (multi-carrier)

CDMA 2000 1x : first version of CDMA 2000 using 1.25 MHz duplex channels and providing average bit rates between 40 and 70k bit/s – voice and data system.

CDMA 2000 3x : version of CDMA 2000 which uses three 1.25 MHz duplex channels

DNS : Domain Name System – used in the Internet to simplify equipment identification

EDGE : Enhanced Data rates for Global Evolution, new radio modulation method for GSM and TDMA (IS 136) networks. Combines circuit mode and data (maximum 384 kbit/s)

GPRS : General Packet Radio Service – evolution of GSM for packet data transmission – operates in the GSM bands – bit rate around 20 to 40 kbit/s (first phase)

GSM : Global system for Mobile Communications; second generation mobile system developed in Europe mid 80s/beginning 90s. GSM uses a TDMA access radio interface combined with frequency division multiple access (FDMA). uses the 900, 1800, 1900 (450) MHz bands – oriented voice and circuit mode data.

IMT 2000 : ITU term for the 3rd generation mobile family

NGN : Next Generation Networks – telecommunications network evolution based on Internet protocol

PDC : Personal Digital Cellular –second generation mobile system used in Japan ; uses a TDMA type radio interface

TDMA : Time Division Multiple Access. Radio access mode used for 2nd generation mobiles (GSM, PDC, IS 136)

TD/CDMA : Time Division / CDMA – radio access mode using the 5 MHz frequency band– combines TDMA and TDD radio access modes- uses a single time shared carrier (frequency) for transmission and reception. (one of the UMTS radio access modes) –theoretical bit rates higher than W CDMA

TD/SCDMA : Time Division / CDMA – Synchronous Code Division Multiple Access -radio access mode uses 1.6 MHz channels– combines TDMA and TDD radio access modes- uses a single time shared carrier (frequency) for transmission and reception.

TDMA (IS 136) : second generation mobile system used mainly in US (formerly known as D-AMPS) – uses the 800 and 1900 MHz frequency bands

UMTS : Universal Mobile Telecommunications System. 3G system standardized by ETSI via under the 3G partnership project along with other regional standards organizations.

UTRA FDD : Universal Terrestrial Radio Access Frequency Division Duplex – term used for the UMTS W CDMA radio interface within 3GPP. Requires paired frequency bands.

UTRA FDD : Universal Terrestrial Radio Access Time Division Duplex – term used for the UMTS TD/CDMA radio interface and TD/SCDMA (narrow band UTRA TDD) within 3GPP.

W CDMA : Wideband CDMA –radio interface for UMTS and for the DoCoMo and JPhone 3G system in Japan – uses 5 MHz duplex channels. Also known as CDMA DS (Direct Sequence) – one of the UMTS access modes – combines circuit mode (64 kbit/s) and packet mode (64, 144 kbit/s, 384kbit/s) initially.

WLAN : Wireless Local Area network. Generic term for different high speed radio access modes in the 2.4 GHz to 5 GHz frequency bands.

Useful links

International Telecommunications Union (ITU) : www.itu.int
International Telecommunications Union - Radiocommunications : www.itu.int/ITU-R/
International Telecommunications Union - Telecommunications : www.itu.int/ITU-T/
International Telecommunications Union - Development : www.itu.int/ITU-D/
International organization for standardization (ISO) : www.iso.ch
International Electrotechnical Commission (IEC) : www.iec.ch

European Telecommunications Standardization Institution (ETSI) : www.etsi.org
European Committee for Standardization (CEN) *:* www.cenorm.be
European Committee for the Coordination of Electrical Standards (CENELEC) : www.cenelec.org
ICT Standards Board ICTSB : www.ict.etsi.org

French Standards Association (AFNOR) : www.afnor.fr
ETSI French Committee (CF-ETSI) comelec.afnor.fr/servlet/
MiNEFI Mission for Information Society Standardization Strategy
www.telecom.gouv.fr/msn/index.htm

Internet Engineering Task Force (IETF) : www.ietf.org
The Internet Corporation for Assigned Names and Numbers (ICANN) : www.icann.org
World Wide Web Consortium (W3C) : www.w3c.org
French Group for Internet Standardization (GFSI) : www.isoc-gfsi.org
European IP Networks (Ripe) : www.ripe.net
French Association for Cooperative Internet Naming (AFNIC) : www.nic.fr

3GPP : www.3gpp.org
3GPP2 : www.3gpp2.org
OMA : http://www.openmobilealliance.org/
LIF : www.locationforum.org/
Syncml : www.syncml.org/
Wireless Village : www.wireless-village.org
UMTS forum : www.umts-forum.org
GSM association : www.gsmworld.com

AFNOR Standarmedia forum watch : www.standarmedia.org
ETSI Forawatch forum watch : webapp.etsi.org/forawatch
Forum Services : www.forapolis.com

Standardization, Regulatory and Regulation : www.etsi.org/public-interest
ETSI e-standardization portal : portal.etsi.org/Portal_Common/home.asp
ETSI contributions to the ICANN reform process : www.etsi.org/icann
ETSI patent database : webapp.etsi.org/ipr
ETSI interoperability tests (plugtests) : www.etsi.org/plugtests,
Transposition : webapp.etsi.org/transposition
e-Europe : www.e-europestandards.org
EESSI : www.ict.etsi.org/eessi/eessi-homepage.htm

Global Standards Collaboration GTSC : www.gsc.etsi.org

Global Radio Standards Collaboration : www.rast.etsi.org