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Abstract: The expansion of broadband speed and coverage over IP technology, which extend over transport and terminal access networks, has increased the demand for applications and content which by being provided over it, uniformly give rise to convergence. These shifts in technologies and enterprise business models are giving rise to the necessity for changing the perspective and scope of the Universal Service and of the regulation frameworks, with this last one based in the same principles as always but varying its application. Several aspects require special and renewed attention, such as the definition of relevant markets and dominant operators, the role of packages, interconnection of IP networks, network neutrality, the use of the spectrum with a vision of value for the citizenship, the application of the competition framework, new forms of licensing, treatment of the risk in the networks, changes in the regulatory authorities, amongst others. These matters are treated from the perspective of the actual trends in the world and its conceptual justification.

Keywords: Broadband, network investment, convergence, open access, regulatory change, convergent regulation, IP interconnection, relevant markets and convergence operators, network neutrality, spectrum, bilateral markets.

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1. BACKGROUND AND CONTEXT OF TELECOMUNICATIONS DEVELOPMENT

In the last years three phenomena have been produced which feedback each other and create a new context for the development of telecommunications:

- The expansion of the deployment of diverse accessibility technologies for fixed and mobile broadband, which allow data rates which support all applications and content. This expansion reduces the costs and increases the demand for these services, both for entertainment and as support for social and economic development.
- The convergence of content providers and applications over the same networks and the same terminals, which generates a stimulus for the use of these networks by improving the user experience, and scale economies with important additional cost reduction.
- The definition of government policies which stimulate the deployment and use of these networks, progressively categorizing these policies to hold the same hierarchy as those for access to education, health, justice, etc.

The joint advance of these three phenomena, along with their feedback, are strongly modifying the behavior of the markets from the perspective of offer and demand, provoking among other consequences the need for a revision of the regulations with a different degree of profoundity in their perspective depending on each country.

From their inception onwards, regulations had common patterns in every country, based mainly on the regulation of services as separate networks (fixed, mobile, data), and with the main objective of defense and promotion of competition and of the provision of a universal service which is considered extremely elementary from the actual perspective (telephony for everyone).

Ahead of the environment sketched at the beginning, while the basic principles of regulation, competition, and universality are maintained, the greater complexity of the application of these principles has generated various currents of analysis and proposed solutions which substantially differ between countries. It would be enough to take a look at the reach of universalization and its objectives for observing that diversity: open access broadband to every home in Australia, carrier broadband in Argentina, Brazil, Colombia, and New Zealand, governmental stimulus to private enterprise in Chile and USA, as well as cases of different nature in Latin America and the world. In each and every case the method of funding and its regulation differ, but it always attempts to favor and exploit, rather than to interfere through private investment.

In this work we attempt to bring the key aspects in this development to the realm of analysis: unique or multiservice licensing, IP interconnection, network neutrality, the definition of the markets and the dominant operators, the incidence of content, the new efficient management of the spectrum, the management of the national broadband networks, among others.

We observe the perspective of different tendencies in countries, and we consider documents from the International Telecommunications Union such as the following: Optimal or Ideal Practice Guidelines from the GSR 2010 and the GSR 2011, Intelligent Regulation for a Broadband World in Trends 2012, Competition and Regulation in a Broadband World in 2012, and Regulatory Aspect of Transnational Telecommunications in a Connected Society in Trends 2013.

2. SUMMARY

In the process of development of broadband networks we observe that extraordinary investment is required in countries with well supplied markets by a large amount of providers which do not have the necessary scale for these huge deployments. In many cases, even the largest operators cannot find the regulatory conditions which stimulate these high risk investments, which demand specific rate of return greater than the average return of operators of this industry.

This is how the need for intervention of the state arises both in developing and developed countries.

The open access to these national broadband networks may be a compliment which allows several service providers to access essential resources in non-discriminatory conditions. In many cases it is impossible to conceive these networks without open access, such as when there is state financing, and so enable the development of downstream competition.

The sharing of infrastructure between operators is an important factor in the facilitation of efficient deployment, as long as it doesn't imply non competitive conducts of the ubiquitous broadband networks.

As far as regulation itself goes, and due to convergence, it is necessary to redisgn the policies and regulations for a transition to the new economy in which products

and services from various industries converge, some of them unregulated by the telecommunications authorities such as that of content, finance, and others.

For the ex-ante intervention in a convergence environment, the cumulative criteria established in the recommendation of relevant markets from the European Union remains valid:

1. First criteria. Presence of strong non-transitional obstacles to the access to the market, either of a structural, legal, or regulatory nature.
2. Second criteria. Markets whose structure does not tend towards effective competition within the pertinent time horizon. The application of this criteria implies the examination of the situation of competition behind these obstacles for access. It applies a prospective vision.
3. Third criteria. If the application of the legislation about competition does not allow to adequately tackle the flaws of the market.

In that framework of the existence of innovation and technological advancement in markets forces additional precautions regarding the ex-ante intervention due to uncertainty about the evolution of the situation, including potentially imperceptible future competitors, which will not allow these criteria with to be applied with certainty.

In a convergence environment the main question which emerges when attempting to secure the competition is: how are the markets and the significative market power defined? The identification of relevant markets, prerequisite for the analysis of competitive behavior, requires considering the convergence due to the users visualizing the telecommunication services as a vehicle for accessing other services, content and applications. This way, the services which are to be analyzed are integrated with services from several industries. The identification of the operators with significative market power exhibits similar peculiarities to those which arise when defining markets.

Due to the evolution in the field of network interconnection, IP interconnection for multimedia services should be taken progressively in consideration starting from the current situation of interconnection with the objective of providing Internet access. This matter is the subject of recent work with very important discrepancies between operators and regulators, mainly in economic aspects.

Network neutrality ensures the possibility of offering services transparently with different broadband specifications, and avoid the artificial discrimination in the use that the customers give it.

The conversion of certain telecommunications infrastructures into platforms, such as the case of ISPs, makes it necessary to review economic regulation criteria which take into consideration different economic aspects in contrast to those of unilateral markets.

Finally when it comes to spectrum, a very scarce resource in the low frequencies, it is subjected to the requirements of its use for broadcasting and for mobile services, mainly broadband. It is necessary to find a balance based on the value of final services, including the intangible values for society.

In conclusion, telecommunications find themselves in the middle of an interesting period of innovative development unlike anything previously seen, which requires a set of factors such as the ones indicated to be taken into consideration. Contrary to what was observed before these changes, there is no unique recipe of policies but instead a plethora of applicable policies for different circumstances, over the basis of principles such as that of competition, in which each country will find the optimal path for dealing with these challenges.

3. ANALYSIS

3.1 Evolution of the networks

Networks, with their current evolution, are in no condition for withstanding a rapid growth of services, content, and applications which require much higher bandwidth. It is therefore necessary to make astounding investments where as a result of having taken the correct actions in areas of competition amongst regulation and policy makers, competing fragmented enterprise markets lack the power to withstand the said investments at a large-scale, and in high-risk conditions.

Several countries like Australia which is perhaps the country with the most ambitious plan, have taken the decision to develop national fiber optic broadband transport and access networks for reaching the end user. The investments in these networks are very large. For example, the national Australian broadband network will cost 43,000 million Australian dollars (US$45,000 million). In other countries these processes are leading to the partial re-nationalization of the infrastructure with the objective of obtaining scalable economies and preferential interest rates on the loans for the State. In other cases incentives for investment aimed at network operators are created and the aspiration is to maintain competitive offers or the combina-

tion of public and private efforts for example in Argentina, Chile, and Brazil, as well as in other countries. Or also soft credits to the private sector like in Korea or Japan. Developing countries cannot generally afford the application of important state efforts, so they tend to establish incentives for investment through means which are relative to the fixation of prices associated to open access.

At any rate, there is no room for doubt as far as open access goes that it is essential for the cases of the national broadband networks which are financed totally or partially with public funding. Open access also ensures, independently of the origin of the investment, that there will not exist an inefficient duplication of the networks and the strengthening of competition and investment in networks in the long term. At any rate, the application of this instrument without public funding must be meticulous in order to avoid the disincentivizing of investments.

In the case of the European Union we should also add that the states must not subsidize networks which could possibly be developed independently of any subsidies under conditions of competitive offers. This definition forms part of the policies aimed at preventing the distortion of the markets from state incentives.

3.2 Evolution of the markets due to bandwidth deployments

Bandwidth provokes important changes in the perspective of the telecommunications market. They can be summarized in the following aspects:

1. New and different market conditions arise which do not perfectly fit within the traditional regulatory conceptions, but they do fit in with their principles.
2. It becomes necessary to apply the principles of technology and service neutrality, as well as the introduction of a unique or multiservice license through simple documents and procedures.
3. The principle of promoting and defending competition, as well as that of equity by which it is procured that telecommunications favor all citizens, are the same, but the procedures for their application are becoming subtle and sophisticated, as well as greatly prospective.
4. The definition of relevant markets, mainly due to bandwidth, requires different procedures because of multiple reasons related to technology, services, and other aspects which are also changing.
5. The procedure for defining providers and operators with SMP requires other factors to be considered which would not be considered traditionally. Relevant markets are more complex due to a technological convergence and the different and variable perceptions of the

users regarding substitution, which simultaneously depend on the degree of maturity of the users and of the content and application services at their disposal.

6. There is no longer a simple Association of service/technology/platform/dominance.

7. Broadband allows packages which today may be the result from commercial policies based on efficiency (not anticompetitive) which are also part of the definition of the markets.

8. In the analysis of dominance it is necessary to consider thew services which are provided over the network in a package format. TV + BA + telephone line, extending the vision of regulators to previously unregulated services such as television.

9. There are convergent packages on the other hand (pay-per-view TV, telecinema, and broadband all over the same cable) and non-convergent (mobile telephony, and direct television from home), which require distinct treatments.

10. The markets change as a result of variations in the conditions that define them, the entry of new services and content, and others.

11. Relationships between enterprises which may be operating as bilateral or multilateral platforms will also arise, which change the vision of the analysis of the market and the dominance within it.

12. The reaction time of regulators in the application of corrective measures is very important because of the changes of the conditions of the markets. One can never regulate for the past.

3.3 Licensing

As far as licenses go, the tendency is towards the granting of licenses which adapt to the convergence and the transition towards next-generation networks. They are generally multi-service or general licenses. In these cases it is preferable for the license to be as simple as possible, resting the conditions for operation upon regulation and law.

General or unified licenses are such that whoever obtains one may use it with the desired technology to provide all possible services. This is a powerful mechanism for enterprises to scale the provision of value for their users, and definitely for the country. On the other hand, the granting of licenses which are subjected to the legal and regulatory framework in effect should be free and according to demand, except in the cases in which limited resources are required, such as the radio-electric spectrum.

Multiservice licenses are granted for a broad set of services, and they grant the user permission to use whichever technology and infrastructure he desires. This type of license is more flexible than service licenses but not as flexible as unified or

general licenses. This type of license can still be a limitant for convergence considering that, for example, you can grant a multiservice license for telecommunications but you may require a separate license in order to provide content services.

3.4 Network neutrality

Network neutrality is a concept which greatly concerns regulation and the operation of Internet access providers around the world.

While the interpretation is not exactly identical in every country, the following aspects which we understand to respect the rights of the users, of Internet access operators, and of content, applications, and service providers in a balanced way are distinguished:

1. The freedom of operators to offer the commercial plans that they wish for their services should be preserved, provided that they are non-discriminatory and within the current regulatory framework, allowing them to sell services limited in speed, information transfer, schedule, etc.
2. For every commercial plan, operators must clearly inform their clients and potential clients about the characteristics of the offered service, including the network management policies and their impacts towards the quality of the service, traffic limits, speed limits, etc.
3. The service access operators must not discriminate in the availability of the service to different content, applications, and service providers, including those which they own or are otherwise related to them.
4. For every commercial plan hired by the end-user or the content, application or service provider, the Internet access operators should not block, interfere with, discriminate against, reduce or degrade the capacity of any person to use an Internet service to access, use, send, publish, receive, or offer any content, application or legal service through Internet. It should also not limit users in the connection of a device of their choice as long as it does not infringe upon any legislation or causes damages to the network.

3.5 IP Interconnection

IP interconnection for multimedia services should be taken progressively into consideration due to its evolution, parting from interconnectivity aimed at increased Internet access. The demands are completely different according to the transported

services than for simple interconnection of Internet access. Regulators should begin evaluating the convenience of opportunity of advancing progressively towards an IP interconnection, without substantially altering the market, ensuring the interoperability over many layers and end to end connectivity, guaranteeing at the same time that every service offered in a level may be factored and that it will reach the client in a different level. Regulators should also consider important to define certain standards of quality which established operators must guarantee to interconnected incomers and on a wholesale level.

In this context it is necessary to also seek evolution towards new modes of payment between operators when networks are completely IP and interconnection happens between these networks, but at the same time in a progressive way to adhere to the economic equation predicted by the telephony operators and to avoid generating disruptive changes which could damage the service provision. It is understood that the principles of orientation to costs and competition within the current framework remain in effect, but careful analysis is being conducted to figure out which are the new cost vectors and especially which are the new economic compensation models: B&K (Bill and Keep), IPNP (Initiating Party Network Pays) and RPNP (Receiving Party Network Pays). Everything happens in an environment of interconnection prices which sharply drop worldwide.

3.6 Risk management in the deployment of new networks

There are several aspects to consider regarding risks in the development of broadband infrastructure. When regulators opt for establishing precise control, or open access related control, it is necessary to take into consideration that not every cost calculation focus is equivalent. Some tend to put more risk over investors than others, which makes it necessary to approximate performance as closely as possible to the real values or to assume the risks which the calculations themselves imply.

An alternative to the costs methodology is to establish conditions, or trigger clauses, which will activate changes in the controlled prices according to demand. Another alternative is to allow larger margins of return in the initial periods and to reduce these margins towards the future, when the enterprise who took the initial risk is already beginning to face cost reductions because of technological or scale developments, and competition begins to appear.

Whatever the case may be, and as a general rule, it is important that regulatory conditions will adjust as much as possible to the expectations of investors and to the policies defined by the country, in order to avoid destroying incentives for

investment. Those mechanisms which allow some type of adaptation to demand are well received by investors.

More generally the implementation of a price above the WACC as a payment for the consolidation of all of the risks is an additional methodology.

In general, traditional models do not correctly take into consideration the high risks of new investments in networks with high initial investment and long periods of repayment which have an uncertain demand. Because of it they are not compatible with an incentive policy for the development of infrastructure. The risk of failure, which is assumed to be asymmetrical by the investors, makes the cost of opportunity greater than the WACC calculated as usual without considering the additional risk. The opportunity rate of capital for economic regulation should take into consideration the risks which lie above the WACC. The WACC takes into consideration the averag risks of the industry with relation to the country where it takes place. This methodology does not include risks which locally affect certain investments and which are above the industry mean.

Procedures relative to investments are hard to manage because allowing return values greater than the WACC may generate image problems and medium-term commitments. One alternative is to grant so-called "regulatory vacations" under strict conditions and during a certain period in which neither supply nor economic obligations are established.

These vacations, if adopted, must be accompanied by the regulator in order to avoid cross-subsidies which may arise from charging high prices, beyond that which corresponds to the assumed risks, with the goal of subsidizing competing services. This aspect must be analyzed with respect to the rights of the competition.

This is the principal difference in contrast to the regulation of traditional technologies for which everything was more predictable, both because of the national background and because of international experiences.

Another aspect to be considered is allowing the differentiation of prices according to the commitment that the access requester assumes this option has resulted in anticompetitive conducts.

The risk sharing through coinvestment encourages investment and is very effective in the sense that those who participate compete downstream, for example by deploying fiber, mounting towers and even radio bases (RAN sharing), etc.

3.7 Convergence and its effect. Regulatory authorities

With convergence the limits of the market are pushed back and they may come to include services from other nonregulated industries, which also implies more extensive considerations in the evaluation of the Dominant Operator.

It is observed that the market power may come from services which are alien to the usual services of ICT regulation, and on the other hand its evolution is hardly predictable. In particular, audiovisual services may be sold over broadband infrastructures. For this reason, the identification of problems that justified the ex-ante regulation must be more careful.

The application of correct and timely incentives is important for promoting the development of investments which support the increasing broadband demand. Under these conditions, before prospectively regulating ex ante for all possible cases, it seems convenient to regulate ex post mainly over the basis of the rights of the competition without completely giving up ex ante regulation.

Because the provided services are the main vector of broadband demand, the concern of regulators falls both in connectivity itself and also in the services that traditionally fall outside of the regulatory reach of ICT.

Broadband networks behave like platforms. The analysis of competition should consider this particularity of the business models at work.

Control and power to abuse the domain through the control of infrastructures and derivative services is no longer established, as has traditionally been the case, but is instead tied to the control of, for example, "must-have" content. This content is such that users will have a hard time ignoring it, such as the case of football or baseball. Video and other services and applications should be considered while evaluating markets and dominance.

Following this trend, several countries have looked for convergence regulators which begin to understand matters which didn't previously concern them, although this is not necessarily the only or best path to take. The situation generally varies according to the country, and due to differences in origin there is no unique recipe for dealing with matters which include efficiencies and potentially anticompetitive conducts.

Some regulatory authorities are receiving the order of also managing radio transmissions and content. Example: Thailand, Australia. Other countries have ex-

panded these mandates by constituting multi-sectorial agencies which regulate more services than ICTs. Examples: Denmark, where all commerce related activity were concentrated, Hong Kong, where telecommunications and broadcasting were fused together. There are several countries with convergent ICT and broadcasting regulators such as: Austria, Bahamas, Canada, Chile, etc.

3.8 Relevant retail markets

The reach of the services within a market is determined through an assessment of the sustainability of both offer and demand as well as the geographical reach. In this process the Test of the Hypothetical Monopolist is used. This will not be covered in detail as there exist abundant and well known information regarding this.

Broadband access is only one mean which allows access to a variety of services, and allows producers to distribute their services. This is the heart of convergence, it allows to visualize broadband networks as interaction platforms between providers and consumers.

The analysis of the markets is affected by the services required by the users. The technological differences matter only in relation to services which may be obtained through them, their velocity, their mobility and their symmetry parameters.

The role of marginal clients. The definition of the market should take into consideration marginal (non-captive) clients, which are those groups which are large enough to be candidates to pass the hypothetical monopolist test. It is through these marginal clients that the competitive limitations which a provider imposes upon another are determined.

Because providers are still able to discriminate between clients without identifying them through commercial plans, it may be necessary to expand to various sub markets for a single service as well as to offer different plans.

Chain of substitutability. Marginal clients may generate a substitutability chain. FTTH marginal clients may move towards VDSL due to an increase in price above the competition's level, and the same thing may happen with the VDSL and ADSL markets. Therefore all three form part of the same market. Marginal clients generate this chain which originates from the fact that the definition of the market is mainly based on the conditioning factors of prices which a service imposes upon others through the chain.

Geographical reach. Geographical reach permits refining the regulatory process by excluding zones in which competition exists.

Asymmetric substitutability. Sometimes it is observed that services from a market A are substitutes of another market B, but not the other way around. In this case the services from market A, impose restrictions on the behavior of service providers in market B but not conversely, for example in ADSL – FTTH. In this case two markets are defined.

Packages. The situation arises for making the decision of including or excluding packages in markets. Services included in packages influence the decision of clients with regards to the determination of the substitutability and therefore they influence the reach of the market. Considering the connectivity and service packages may be an efficient way of dealing with coordination in cases of service driven broadband demand. However, it may be concealing aspects relative to the difficulties of the client for changing provider and therefore may affect the correct definition of the market. Among the difficulties to be considered we find:

a. Difficulties of the clients in the comparison between packages.

b. Difficulties when abandoning the package and migrating some of the services to another provider. At the very least a transaction cost exists.

One way of facing the situation when defining markets is to observe whether the clients are prepared for discarding the package in the event of an increase in price in order to hire individual services.

The European Union indicates that if evidence exists that a significant amount of (marginal) clients is willing to migrate to other individual service providers, these services must integrate the same market.

In this case, as always, it is necessary to begin with the competition price in order to carry out the test. The price of competition is fixed considering the costs saved by the package and scope economies. Parting from the current price is incorrect because it may be a high price in relation to costs, and therefore when carrying out the hypothetical monopolist test we arrive to the conclusion that individual services are part of the same relevant market, which would not be true if we start from the competition price.

Another concern regarding price compression originates from the great discounts in regulated service package (broadband) as well as unregulated (television) services, even when the individual price of broadband passes the compression test.

Assuring enough margin between wholesale and retail prices of the individual service does not guarantee that there will not be compression through packages when the discount is large. An inflated price for the individual service may steer clients towards the package, generating problems for new businesses to compete in the individual services market.

3.9 Dominant operators or operators with significative power in the market (SMP)

The most important factor in shifting the vision of the existing methodology for determining Significant Market Power (SMP) is that of packages due to convergence.

OTT services may modify relevant markets and therefore may increase or diminish the SMP of broadband providers. Especially indispensable ("must have") services for users, when provided by selected networks, give rise to a vertical relationship which should be taken into consideration when evaluating SMP. In this case there is no control over infrastructure but there is control over the service which is provided over it. It is a relationship in which the provider of the services charges additionally for giving exclusivity. The overprice which the user pays, if that were the case, goes mostly to the provider of the content since the broadband provider is obtaining an exclusivity advantage over its own services.

Regulatory decisions relevant to obligations about access for avoiding dominance should take into consideration the access to content as well as the access to the infrastructure.

In the evaluation of SMP it is necessary to consider the possibility which other providers have of successfully replicating the packages, be it the same or a different competitive package.

If replicating package proves difficult, competition problems will arise. Replicability should be analyzed on a case by case basis and conclusions are not generalizable.

Replicability depends upon: the architecture of the network belonging to the operator with SMP, the imposed wholesale obligations and their implementation, the infrastructure of alternative operators and the access to content.

3.10 Relevant wholesale markets

The greatest threat for the collapse of the retail market resides in the wholesale level. If adequate regulation measures are taken in this level, effective competition at the retail level may be achieved. These markets establish limitations within retail markets without direct regulatory intervention, through the open access at the wholesale level.

The theory behind this concept is the investment ladder. It is clear that a broad offer of wholesale services facilitates retail competition, but nevertheless there isn't enough evidence that this will facilitate investment in competitive infrastructure. Intermodal infrastructure is widely generalized in Latin America.

Considering that wholesale demand is derived from retail demand, retail substitutability should be considered when defining wholesale markets.

Packages in wholesale markets. When retail markets are developed where packages matters, the package is to be considered in the definition of the corresponding wholesale markets. One alternative, like the one taken by the United Arab Emirates, is to make wholesale and retail markets correspond, both in individual services and in service packages, and to include their provision of services to third parties on the basis of the services and packages offered at the wholesale level.

3.11 Bilateral markets

Internet access providers, or ISPs, are those which provide access for end-users of the network. Through the ISP, the user may download and use content, applications and services. Until recently this market was unilateral and the ISP mainly turned towards the user in the sale of services and also towards the upstream Internet access provider for the purchase of global access.

With the recent expansion of content distribution networks (CDN), which began to request hosting directly from the final ISPs, in other words those which have access to the users, these ISPs begin to operate within a bilateral market.

We observe the introduction of the concept of unilateral markets ("single-sided markets"), which are those that we find usually, in order to distinguish them from multilateral markets ("multi-sited markets"), which have a different treatment and which are presented in this case with the emergence of CDNs. Multilateral markets

involved at least two groups of agents which interact among them through intermediaries, called "platforms", in this case ISPs, and in such a way that the benefit of one of the groups from joining the platform depends on the size of the rest of the groups which integrate it. The economic surplus may be created or destroyed during the interaction between the different groups. In this case platforms, when they must take decisions regarding prices or investments, must take into consideration the interaction between the demands of the different groups. The economic analysis carried out by regulators which ignore the correct wrist sticks of a multilateral market may lead to errors, such as determining that a price is predatory when in reality it is not. Operators may develop anticompetitive policies in a multilateral market, but it turns out to be necessary to be more careful to characterize them.

These characteristics of ISPs should be taken into consideration in the regulation of aspects related to them.

In general we observe that the conditions of competition mechanisms of self-control of CDN prices play a part in this market. These mechanisms affect end-users in spite of the fact that the ISP has exclusive access to them. Because of this, the stance of regulators is usually to observe and wait.

3.12 Impact of convergence in the radio-electric spectrum

The following are the basic principles within which spectrum management policy is usually established.

- Technical efficiency in the usage. It includes the improvement of management, relocalization, and spectrum recovery tools, establishing minimum conditions for the use of the bands, efficiency indicators, etc.
- Economic efficiency. To define, in a justified manner, adequate limits in order to allow development in the first place, and at the same time avoid concentration. Rebalance command-and-control models, common use, and exclusive market-oriented rights.
- Social efficiency. Within the framework of the previous principles it is necessary to consider that a balance must exist between economic efficiency and social efficiency. The main consequence is that part of the spectrum may and should be destined toward social ends and government use, according to defined policies but maintaining the cost of opportunity (value) of these attributions visible.

The main concepts to be evaluated and considered are presented in the moment when we define the methodology and objectives of the spectrum management in response to the presence of convergence.

One of the most urgent matters for spectrum regulators is to find a way in which to sustain the increase in the use of the spectrum driven by wireless broadband. The usual spectrum management procedures are being questioned regarding securing a more efficient use of this scarce resource. One aspect that must be highlighted is the granting of permits or licenses which make the rules of spectrum usage more flexible. The administrative methods are being replaced increasingly by market focuses which attempt to apply economic criteria in order to achieve the highest value which the use of the spectrum can provide in each case. When the flexibilization refers to licenses which are currently in effect, it is necessary to ensure that the rights acquired by other operators are not being affected. Regulators should monitor whether an action of this kind will provoke unforeseen competitive imbalances or extraordinary profits.

An important matter within the analysis of spectrum management is related to its use for broadcasting or for services which converge over broadband. There is a trend for the adequate use of the spectrum for broadband access for broadcasting, subtracting importance to the first. In a convergence environment, in which content begins to flow over broadband (often times wireless), it is important to analyze the greater value for society regarding the use of the spectrum in these low frequencies. The main aspect is that payments issued for its use are generally smaller for broadcasting than the value of said spectrum for society, or the value which society assigns to it. From the perspective of the market, an inconsistency is generated which is nevertheless explained within reasonable limits by the intangible value that this usage has for the citizens. With the advancement of the usage of other media and the advancement of convergence, the need arises to better analyze this traditional policy. When multiple platforms are able to transport content, the separation of the spectrum for broadcasting and other uses results fundamentally artificial. The objective should be to determine what the most efficient use for this scarce resource is.

These concepts posed the need to consider a unified framework for assigning and managing the spectrum independently of its destination. This ensures a better understanding of the efficient use of the spectrum and makes it possible to react with promptness. The central concept is that the attribution should be fundamentally oriented by the management of the spectrum itself and not by the content, and that its value should be oriented towards the market. However, the scope of this strategy of profound change finds itself counteracted and limited by the introduction of the important intangible value of the use of the spectrum for ends relevant to public interest and cultural and social objectives. At any rate, it would be important to quantify and

publish the monetary value which the spectrum conceded for this purpose has, with the purpose of informing the society about the value which it provides. Policy should rise from the analysis of these values to a higher level of spectrum regulation.

As far as licensing goes, it is important to separate the license for the emission of content from the license for spectrum use. This provokes a more efficient usage of the spectrum while maintaining the obligations of radio diffusers. This separation also allows a more precise understanding of the value of the spectrum which is being used for Content diffusion. In any case we should seek to not leave unused spectrum during large periods of time as a result of excessive regulation, since this will mean that we are not taking advantage of its value for broadcasting or telecommunication services.

More generally, it becomes important to analyze the following matters and their application in presence of the change produced by convergence:

- To define a sustainable policy in the presence of convergence in order to ensure transparency and predictability.
- To ensure timely assignments to improve the exploitation and continuity of developed services.
- To seek the efficient use of resources in spite of changing requirements.
- To make the management of interfaces more efficient through procedures which relieve the regulators.
- To ensure the availability of radio-electric spectrum for public use.
- To fulfill international obligations.

Another aspect which requires attention in this time of mobile broadband expansion is that of spectrum caps which are established in order to avoid the hoarding of the service but which may restrict its development.

With the purpose of efficiently managing the spectrum and ensuring that the needs for the development may be satisfied in the future, many countries are creating national spectrum policies, either as part of a joint ICT/broadband plan or separately.

Policy authorities and regulators of the sector have begun to develop policies based on the market (for example, auctions, flexible use, migration within broadband, the shared use of spectrum and the spectrum secondary market), in order to complement or even substitute slow bureaucratic processes with administrative

management procedures. Furthermore, regulators have developed a variety of focuses to ensure that the services are extensively deployed, the spectrum is utilized in the most efficient way, and competition is encouraged.

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