



Ecuador: Wireless Networks as an Opportunity for Access to Broadband and Development¹

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Introduction

Ecuador is one of the countries with the lowest broadband internet penetration rates in the region, a mere 2.7%. Despite the creation of an institution to guarantee universal access and the formulation of plans to promote connectivity, internet access is concentrated in two main cities with high population densities.

The emergence of wireless technologies, especially Wi-Fi, offers an alternative for internet access in areas that are unprofitable by market standards and lack infrastructure. The new Ecuadorian constitution and the reforms being undertaken by the government in the framework of a new model of state activity, aimed at putting rights into practice through strong state involvement in the provision of services and infrastructure, should create a favourable environment for the implementation of the concept of universal access.

The telecommunications sector accounted for 7% of Ecuador's GDP in 2008. The new regulatory framework should transform telecommunications into resources for development and instruments for the participation of new and varied social actors.

The failed privatisation process

The reform of the telecommunications sector in Ecuador, which had been a state monopoly for 20 years, was based on a model of privatisation that ultimately was not implemented, due to interference and disputes on the part of the country's de facto powers: political parties and influential economic groups.

Economic cannibalism inevitably marked a process that left the state telecommunications sector greatly weakened, forced to contend with a fixed-line telephony system suffering serious technological underdevelopment and an unsatisfied demand for 1.5 million lines, in a state of undercapitalisation and with no significant participation in the more profitable segments of the telecommunications market.

Legal reforms aimed at bringing the telecommunications sector in line with the neoliberal vision that dominated economic policies in the region began in 1993 with the Law on State Modernisation, Privatisation and Public Service Provision by the Private Sector.³

This law was aimed at promoting demonopolisation, free competition and concessions for public service provision and permitted the transformation and subdivision or liquidation of state companies. The first consequence of the new law was the concession of mobile service provision to the private sector, implemented that same year.

The 1995 Law to Reform the Special Telecommunications Law⁴ or Law 94, which established the conditions for the implementation of the Modernisation Law and has been modified on four occasions, is the law currently in force. The consequences of this law for the state telecommunications company EMETEL were crucial: it was transformed into a chartered company and its shares were transferred to a Solidarity Fund.⁵

This was followed by the offer for sale of 35% of shares in the two regional companies resulting from the subdivision of EMETEL S.A. – Pacifitel S.A. and Andinatel S.A – through an international public auction. Bidders were offered a 60-month period of exclusivity.

Law 94 also permitted the purchase of 10% of the shares by officials, employees and workers from the now defunct EMETEL, and a 1997 amendment included the right of former officials, employees, workers and pensioners from the company to purchase 2.5% of the 35% of shares put up for sale.

³ Entered into force on 31 December 1993; regulations established 2 December 1994.

⁴ Law 94, R.O. 770 of 30 August 1995.

⁵ The Solidarity Fund, a public agency attached to the Presidency, was created to manage the proceeds of privatisations. It should have played a decisive role in the management of public telecommunications services, as the holder of 100% of shares in the formerly state-owned companies as of 1996, but its power depended on the support of the government in power, and the companies were generally managed autonomously.

The liberalisation of the sector was enshrined in the constitution adopted in 1998 – the year before the country’s financial collapse – which eliminated the concept of strategic sectors, including telecommunications,⁶ and thus their exclusive administration by the state.

From that time until 2005, there were a number of failed attempts to semi-privatise the companies or privatise their management, which were unsuccessful despite the fact that the conditions were improved several times over and numerous “facilitators” were hired, with the approval of the Inter-American Development Bank, to prepare the bid documents. This was followed by opening up participation in the process beyond national and international direct operators to partnerships between other types of companies and “qualified” operators.

Between August 1997 and 1998 there were ongoing disputes among government authorities regarding key issues in the process such as the valuation of shares and the procedures to be followed in auctions and/or tenders for bids, as well as a lack of unanimous support for the privatisation process from all of the country’s political sectors. The Constitutional Court, for example, ruled a number of articles in the Electrical Power System Law (a conceptual cousin of Law 94) to be unconstitutional.

As a result of these conflicts, the qualified operators, some of whom had formed partnerships with local investors (such as British Telecom and Korea Telecom), ended up withdrawing from the process.

These failed attempts at privatisation were undertaken without democratic debate, which would have served to properly inform the public about the grounds for the decisions adopted. However, it was the subdivision of the state telephone company EMETEL that was the worst error committed.

The prevailing view in the sector is that certain power factions wanted EMETEL split in order to have access to companies tailored to “the size of their pockets.” In the case of Guayaquil, important separatist forces are keeping the so-called “Singapore plan” – one country, two states – in cold storage, and they would no doubt benefit from controlling infrastructure. Successive government administrations have turned over responsibility for state

⁶ Political Constitution of the Republic of Ecuador, Title XII, On the Economic System, Chapter 1, General Principles, Article 249, in accordance with Article 244.

modernisation processes to representatives of powerful economic groups with links to markedly regional interests and above all to representatives of the Social Christian Party, which exercised heavy influence on state powers for two decades.

Opposition to privatisation by unionised public sector workers, which was particularly strong during the Durán Ballén administration, was successfully neutralised, and the privatisation drive further benefited from the systematic weakening of state enterprises through the deterioration of their public image nationally and internationally.

None of the government administrations approached the problems faced by the state-owned company from a state perspective in order to promote comprehensive restructuring and the injection of capital that would have enabled the major investments needed. Such an approach would have been fully justified, considering that in spite of its limitations, EMETEL was a profitable company that contributed significant resources to the public treasury (it was the country's third-ranking company in terms of tax payments in 1996 and rose to second place in 1997, according to Ecuador's Internal Revenue Service).⁷

⁷ "Impuestos a la renta a todos por igual", *Vistazo Magazine*, number 741, 14 July 1998.

Mobile telephony: Explosive growth

Market share by operator	%
Otecel	26.4
Conecel	70.1
Telecsa	3.5
Public sector	3.5
Private sector	96.5
TOTAL	100
Mobile teledensity = 79.15%	

Year	Population	Otecel	Conecel	Telecsa	Total
1994	10,536,567	5,300	16,620		18,920
1998	11,430,000	115,154	127,658		242,812
1999	11,667,000	186,553	196,632		383,185
2000	11,909,000	233,733	248,480		482,213
2001	12,177,675	375,170	483,982		859,152
2002	12,433,720	639,983	920,878		1,560,861
2003	12,695,858	861,342	1,533,015		2,394,357
2004	12,964,247	1,119,757	2,317,061	107,356	3,546,705
2005	13,239,049	1,931,630	4,088,350	226,352	6,246,332
2006	13,520,430	2,490,002	5,636,395	358,653	8,485,050
2007	13,808,563	2,582,436	6,907,911	449,630	9,939,977
2008*	14,103,624	2,948,082	7,822,832	392,000	11,162,914
*October					
Source: SUPERTEL (January 2009)					

Although mobile telephony has undergone massive and unexpected expansion, its benefits are not equally distributed. According to figures from the 2005-2006 Living Standards

Survey by the National Statistics and Census Institute (INEC),⁸ the more than eight million mobile telephone lines active at the time were used by only 38% of the population. Meanwhile, more than 70% of the mobile market is controlled by the dominant operator Conecel, a subsidiary of Mexican-owned América Móvil and owner of the Porta brand name.

It is commonplace to hear that in the telecommunications sector in Ecuador, only mobile telephony has been properly managed. But the goal of doing everything possible to ensure the development of competition in free market conditions led to the granting of mobile service concessions marked by three factors that were disadvantageous for the state: the total payment for the concessions, the rules surrounding tariffs and the cost of interconnection with state companies.

Concession contracts were signed in 1993,⁹ in August with Conecel and in November with BellSouth (whose operations were subsequently purchased by Telefónica de España, which operates nationally as Otecel and owns the brand name Movistar). The terms of the contracts were established based on the expectation of 100,000 subscribers by the end of the 15-year term of the concessions. In the face of current subscription figures (11 million subscribers out of a population of 14 million people in 2008), this “calculation error” is attributed to the drop in prices brought about by technological development and greater competition.

For these concessions, the companies paid USD 2 million at the time of signing the contracts and a percentage of their annual turnover beginning in the second year, which would reach 70% in the 15th year. For Otecel, this would amount to USD 138 million at current values.¹⁰ Even worse, in November 1996 the Abdalá Bucaram administration accepted a final payout of USD 51 million to provide a capital injection for the Solidarity Fund, which was in the red. In comparison, in 2008 the total cost of new concessions was USD 700 million.

⁸ .Encuesta de Condiciones de Vida, Quinta Ronda 2005-2006. Pobreza y Extrema Pobreza en el Ecuador. Período: noviembre 2005-julio 2006, Instituto Nacional de Estadística. Available at: www.inec.gov.ec/pobreza/fpobre.htm.

⁹ Regulations for Cellular Mobile Telephony Service, adopted April 1993 and amended through Resolution 107-23-Conatel-96.

¹⁰ Carrión Gordón, H. (2007). Entorno Regulatorio de las Telecomunicaciones. Regulación e inversión en telecomunicaciones. Estudio de caso para Ecuador, DIRSI, p. 27.

The concession contracts included price caps on tariffs, which were established in US dollars, which means they were not affected by the successive currency devaluations that took place before and after the 1999 financial collapse. Moreover, the price caps were set artificially high to allow tariffs to be freely set in practice. As a result, mobile service prices in Ecuador were among the highest in the region and only the entry of a third operator in the mobile market led to a significant drop in tariffs in 2003.

Additionally, in the initial negotiations for interconnection with the fixed-line networks of Andinatel S.A. and Pacifitel S.A., the mobile operators were granted fees that proved onerous for the state-run companies. The fees initially established for the fixed-line operators to interconnect with the mobile networks were USD 0.23 a minute, a rate that remained in effect from 1993 until 2005. This caused heavy losses that have not been calculated, since the volume of traffic exchanged is kept secret as part of the commercial agreements. Although a rule was established for interconnection fees to be renegotiated every two years, there were no further negotiations during this entire period.

In this regard, Andean Community Decision 462, aside from stating that all telecommunications service providers are obliged to interconnect their networks, also stipulates that interconnection fees must be transparent, reasonable, cost-oriented and non-discriminatory. Although it is a member of the Andean Community, Ecuador's Interconnection Regulations¹¹ do not include these stipulations.

Currently, the National Connectivity Plan 2008-2010 calls for "establishing interconnection agreements with fees that maintain balanced development between mobile and fixed-line networks in accordance with the public interest."¹²

The reduction of mobile service tariffs in 2003 and migration to Global System for Mobile (GSM) technology spurred rapid growth in mobile telephony. The total subscription figures recorded in 2008 already surpassed expectations in terms of the number of active lines predicted for the year 2010 (see Table 3).

¹¹ Resolution 602-29-Conatel-2006.

¹² Fondo de Solidaridad *Plan Nacional de Conectividad 2008-2010*, unpublished.

Table 3. Predicted and recorded mobile subscription figures					
	2008		2009		2010
	Recorded*	Predicted	Recorded**	Predicted	Predicted
Otecel	3,122,520	2,768,320	3,260,036	2,807,215	2,813,106
Conecel	8,123,997	7,214,702	8,510,142	7,240,120	7,243,508
	303,339				
Telecsa		509,798	322,131	515,270	515,851
TOTAL	11,549,856	10,492,821	12,092,309	10,562,605	10,572,466
*December					
**April, according to the new definition of active lines by CONATEL					
Source: Based on figures from SENATEL and ASETEL (February 2009)					

Elimination of tariff rounding: A landmark decision for consumers

The elimination of the practice of rounding tariffs up to the nearest minute, which entered into effect in July 2000, was a landmark decision in the regulation of the mobile market. It saved end-users an estimated USD 2 billion, spurred the adoption of the Consumer Defence Law and accelerated the digitalisation of the state-owned fixed-line telephony network.

The process involved a legal battle that was initiated in February 1999 by Communications Superintendent Hugo Ruiz and ended with the Supreme Court of Justice ruling on the claim of constitutional protection lodged by Conecel and Otecel.

The overcharging of customers by between 25% and 30%, estimated by the Communications Superintendency (SUPERTEL), was denounced as unconstitutional and as a violation of the concession contracts and the recommendation of the International Telecommunication Union (ITU) that mobile service billing should be calculated in seconds and minutes.¹³ The arguments put forward by the companies, widely backed by Social

¹³ ITU recommendation ITU-T D.93 "Charging and accounting in the international land mobile telephone service", 1993.

Christian, Social Democratic and other legislators as well as influential newspapers and television stations, alluded to market practices, disincentives to foreign investment, alleged judicial insecurity and even a lack of competence regarding the issue on the part of the telecommunications authority.

The Public Defender's Office assumed the collection of a penalty of USD 20 million from the mobile companies. Subsequently, Superintendent Raúl Rojas Vargas, who attempted to collect the payment, was put on trial. In November 2007 a bill was drafted for enforcing payment.¹⁴

Tariff rounding was eliminated by the country's highest court. Ecuador was one of the first countries to adopt per-second billing, which is currently implemented in 40% of the world's countries.

The management of Alegro: A lost opportunity?

Alegro is the trade name of Telecsa S.A., the mobile subsidiary of the former Andinatel S.A. and now of the Corporación Nacional de Telecomunicaciones (CNT), the national state-owned operator formed through the merger of Andinatel and Pacifitel. Alegro has become a burden for CNT, absorbing part of its profits to remain in operation. In 2008, the number of subscribers to this state-run mobile telephony service dropped from 637,287 in June to 303,339 in December. In the five years since it entered the mobile service sector in 2003, it had only managed to capture less than 3% of the mobile market.

Entering the mobile service market was a strategic decision adopted by Andinatel S.A., which would involve seeking out a strategic partner that was knowledgeable about the mobile business and could provide start-up capital for the new venture. But during the Lucio Gutiérrez administration (2003-2005), the entire process became corrupted.

The management of the company and provision of the technology were granted to the same Swedish company, Swedtel, despite the fact that a better offer had been received. The

¹⁴ Bill 221 of 27 November 2007.

decision was made to adopt CDMA technology, at a time when GSM was becoming a world standard, thus locking the company in to a single supplier, Ericsson.

After this questionable start, the company disappointed its potential customers by entering the market before Swedtel had finished installing the network.¹⁵ After receiving requests for service by roughly 700,000 potential customers, Alegro had only managed to capture 107,356 customers one year later. However, “for the few who had coverage there were no handsets; it was a disaster that the company never recovered from,” according to an expert in the sector.

The terms of Telecsa’s concession contract were much harsher than those of its competitors, because the National Telecommunications Council (CONATEL) imposed a much stricter system of penalties on it.

Total market liberalisation without political stability

Table 4. Fixed-line telephony market 2008	
Market share by operator	%
CNT	90.45
Etapla	6.82
Others	2.73
Public sector	97.27
Private sector	2.73
Total	100
Fixed-line teledensity = 13.3%	

¹⁵ Swedtel was replaced by Via Advisors, which did nothing to improve the situation; the company remains in an ongoing legal dispute with CONATEL.

Table 5. Evolution of fixed-line telephony service								
Year	Andinatel	Pacifitel	Etapas	Linkotel	Setel	Etapatel	Ecutel	Total
1998	464,633	468,712	69,896					1,003,241
1999	515,304	538,628	74,914					1,128,846
2000	574,010	555,023	77,157					1,206,190
2001	654,428	588,631	77,717					1,320,776
2002	722,374	589,411	85,135					1,396,920
2003	812,359	624,679	93,662					1,530,700
2004	849,932	640,617	99,871	335				1,590,755
2005	887,636	686,952	103,808	1,172				1,679,568
2006	944,300	695,246	104,693	2,136	6,692	333	421	1,753,821
2007	980,870	712,502	105,807	3,649	12,664	602	602	1,816,772
2008	1,002,293	712,728	129,174	5,167	29,924	1,844	7,337	1,906,401
2009*	1,015,493	**717,717	130,681	5,531	35,311	2,243	9,173	1,916,149
*January								
**Does not include Cuenca, Palora, Paulo VI and Taisha								
Figures are as at December every year except where noted								
Source: SUPERTEL (January 2009)								

Fixed-line telephony has maintained poor rates of growth, currently reflected in a deficit of one million lines. Demand for the service is sustained due to a sense of "ownership" and the large difference between fixed-line and mobile tariffs (an average of 1.4 to 1.6 cents a minute versus 7 to 8 cents a minute).

The total opening of the fixed-line market became effective in January 2002 on the basis of a law popularly known as the Trole Law,¹⁶ which modified for the fourth and final time the Law to Reform the Special Telecommunications Law and established free competition across all segments of the market. This measure brought Ecuador into line with the Andean Community agenda of liberalising trade in services.¹⁷ In 1999, the Andean Committee of

¹⁶ Ley 2000-4 or the Law for the Economic Transformation of Ecuador, R.O. 43 of 13 March 2000.

¹⁷ Decision 439: General Framework of Principles and Rules for Liberalising Trade in Services in the Andean Community.

Telecommunications Authorities (CAATEL) agreed on the liberalisation of all communications services, except radio and television, as of 2002, and initiated a process to harmonise rules and regulations to create an Andean common market.¹⁸

In September 2002 the first concessions for fixed-line telephony service provision were granted to Ecutel (owned by Telmex since 2007) and Setel, which continue to use the state-owned fixed-line network infrastructure. With no major investment in the sector, fixed-line telephony service experienced practically inertial growth and the market remained concentrated under the state duopoly. In 2008, these duopoly operators merged into CNT, which currently controls 93% of the fixed-line market. Four private operators and Etapa (a municipal public company that operates only in Cuenca) account for barely 7% of the market all combined.

In this context there were further attempts at the privatisation of fixed-line services in 2001 and 2003, marking the culmination of another period in which it proved impossible once again to implement the reform model. These events took place in the midst of the period of the greatest political and institutional instability ever faced by the country, with four different administrations taking power since 2000 until today. During this time, there have been six different presidents appointed to CONATEL and seven national secretaries of telecommunications.

The lack of political will to control state enterprises, corruption, the incompetence of administrators lacking adequate qualifications, unnecessary increases in personnel and the disproportionate benefits established in collective contracts meant that CNT inherited a disastrous legacy when it was formed: 5,000 employees and expenditures on wages and salaries that represent 40% of its total budget.

¹⁸ Decision 462: Provisions Regulating the Integration and Liberalisation of Trade in Telecommunications Services in the Andean Community granted Ecuador a deadline after 2002 to liberalise telecommunications services.

A new institutional model in the making

The unequal and insufficient growth in telecommunications and information and communications technologies (ICTs) in general and their limited contribution to the country's social and productive development are due to a legal framework described as "inadequate, obsolete, incoherent and rigid,"¹⁹ which does not properly address technological advances and was basically designed to strengthen the processes of privatisation and market liberalisation and to diminish the state's role in the sector.

The year 2008 marked a change in direction in telecommunications reforms. The new constitution, which entered into force on 20 October, establishes telecommunications as a strategic sector:

Strategic sectors, subject to exclusive decision and control by the state, are those which due to their importance and scope have decisive economic, social, political or environmental influence and should be geared to the full development of rights and the public interest. The strategic sectors are considered to be... telecommunications... (article 313). ... The state has responsibility for the provision of the public services of... telecommunications... and will guarantee that their provision responds to the principles of compulsoriness, generality, uniformity, efficiency, responsibility, universality, accessibility, regularity, continuity and quality. The state will ensure that prices and fees for public services are equitable and will establish their control and regulation (article 314). ... The state will establish public enterprises for the management of strategic sectors (article 315). ... The state will be able, in exceptional cases, to delegate the exercise of these activities to the private sector and the popular solidarity economy in cases established by the law (article 316).

Putting these principles into practice, from a regulatory viewpoint, will require the harmonisation and unification of a set of laws not only related to telecommunications but also to consumers' rights, the environment, state administration, competitiveness and foreign trade, in addition to hundreds of other pieces of legislation such as regulations, municipal bylaws, CONATEL resolutions and specific technical standards.

¹⁹ Modernización del Sector de Telecomunicaciones, Secretaría Nacional de Planificación y Desarrollo (Senplades), 2008, a public document supplied in digital format upon request.

Until now, there has not been sufficiently forceful legislation to foster and promote universal access and defend the rights of end-users. For example, more effective regulations are needed for the quality of internet service, since the existing ones are not applied.

Today, however, the country is gearing up to discuss the model of modernisation to be established through a new law. The current government has announced the drafting of a bill for a new Organic Law on Telecommunications and the Information Society, which would promote the software industry and group together all of the elements involved in the interaction between ICTs and society and the economy. The proposed law would also concentrate institutional powers for the sector under a ministry responsible for issuing policies and another agency responsible for regulation and control.

Internet and broadband

The Superintendency of Telecommunications released the following national statistics on 31 March 2009:

1. There are currently 179 internet service providers (ISPs) in Ecuador (in 1998 there were 14).
2. There are 145,697 subscribers to switched line (dial-up) internet service (43% of total subscriptions) and 195,111 subscribers to non-switched or dedicated line (broadband) service (57%).
3. The penetration rate for non-switched or dedicated lines is 1.7% (in a national population of 14,405,793). The total number of subscribers to all types of internet service represents 2.98% of the population, compared to a Latin American average of 3.4%.
4. A full 82.14% of active non-switched lines are concentrated in two provinces – Pichincha (49%) and Guayas (33,14%) – and in highly urbanised areas.
5. If there are 5 internet users for every dial-up subscriber and 6.2 users for every broadband subscriber, then the total number of internet users in Ecuador is 1,938,174, or 13% of the population. The number of broadband internet users would be 1,209,689, or 8% of the population.
6. Three operators – CNT, TVCable and Alegro – account for 78% of internet users. These operators also provide wholesale carrier services.
7. Service costs have dropped significantly for the most popular internet package: the price of Andinatel's ADSL service with download/upload speeds of 128/64 kbps fell

from USD 39.90 in January 2007 to USD 18.00 as of January 2008. The company's new "Fast Boy" service offers speeds of 256/64 kbps for USD 24.90, while Satnet offered 100/75 kbps service for USD 19.90 in 2008 and now offers 150/75 kbps for the same price.

8. There are a total of 297 registered cybercafés operating across the country.

International connectivity and the delayed adoption of broadband

Costly and insufficient international connectivity has been a major obstacle to the development of broadband access in Ecuador. With the recent direct connection to the Emergia submarine cable system and the completion in 2010 of the upgrading of the Pan American cable system, the country will have two more economical means of international backbone access. This will help resolve the problem of the high cost of international connectivity, which means that the fees charged to end-users will depend on the rates charged by carriers, service providers and last-mile operators.

Through the banking sector, Ecuador became the second country in Latin America, after Chile, to gain access to the internet.²⁰

In the 1990s, the privatisation scheme prevented investment in the development of public companies and the commercial exploitation of new technological developments was seen as part of the package for attracting investment.

Until the introduction of free competition in 2000, broadband service provision was restricted to Andinatel, Pacifitel and two private operators, Suratel and Impsat. The cost of dial-up internet service through a satellite connection was USD 1.50 a minute.

Until 2004, Ecuador was connected to the NAP²¹ of the Americas in Florida through various indirect links, and was obliged to pay transit fees at each interconnection point. In addition

²⁰ UNDP (2001). Informe sobre Desarrollo Humano Ecuador 2001. Las Tecnologías de Información y Comunicación para el Desarrollo Humano, Quito, p. 4.

to high prices for end-users, the bandwidth capacities leased were just enough to cover basic needs and did not allow for upgrading service or lowering service fees.

The former Emotel entered into partnership with the Pan American cable consortium (in operation since November 1998) when the system's capacity was almost saturated, and was thus only able to lease capacity equivalent to 6 STM-1, but by 2005 its capacity had expanded to 18.9 STM-1.²² The Pan American cable is a 7,500-kilometre fibre-optic cable with a direct link between Punta Carnero in Ecuador and the coast of Florida in the United States.

Through an initiative undertaken by the former Andinatel, an upgrading of the Pan American cable link has been underway since late 2006. The main effect of this upgrading has been a decline in prices: the monthly rate for an Indefeasible Right of Use (IRU) capacity of 1 STM-1 was over USD 1 million and is now around USD 300,000.

As a result of the upgrading, CNT's international capacity will be increased 26.66 times (from 6 STM-1 to 160 STM-1). This will involve a change in equipment to systems that use wavelength division multiplexing (WDM) technology.

Energia, the submarine cable division of Telefónica International Wholesale Services (TIWS), installed a landing station in Punta Carnero that involved an investment of USD 35 million and has been in operation since November 2008. In exchange for authorisation from CONATEL, TIWS will provide 200 Mbps of internet connectivity (1.4 STM-1) free of charge to the Fund for Telecommunications Development in Rural and Marginal Urban Areas (FODETEL). This cable forms a ring around Latin America, stretching from Lima and around the Pacific Coast until reaching Florida.

Some experts, including the Association of Internet, Value-Added, Carrier and Information Technology Service Providers (AEPROVI), expect internet service costs to drop 40% thanks to the Energia cable. However, within the architecture of internet service provision, real costs are not necessarily reflected in the rates charged to end-users.

²¹ NAP stands for network access point, an interconnection point for internet service carriers through a high-speed international link that guarantees the bandwidth and capacity leased.

²² Solines, J.C. (2006). Presentation at the Open Forum on Quality and Costs of Internet Service in Ecuador, February.

During 2008, only CNT reduced its internet service rates, by an average of 38.61%.²³

Free competition in internet service provision with no quality control

The regulation of internet service providers has long been subject to controversy over the quality of service. On 14 September 2006 CONATEL issued the Regulations on Quality of Internet Value-Added Service,²⁴ which establishes the following indicators of quality of service:

1. Minimum number of telephone lines available for switched-line access
2. Rate of congestion
3. Total use of available bandwidth
4. Index of user complaints about the service provider.

Service providers are thereby expected to have at least one line for every ten subscribers and bandwidth congestion of no greater than 90%. The regulations also oblige operators to provide users with information on service conditions on an ongoing basis, as well as to submit quarterly reports to SUPERTEL with monthly breakdowns of indicators.

However, these regulations have not been applied due to the opposition of operators, who claim that they “raise operating costs.” The prevailing opinion in the sector is that “the best quality control is competition” and that “customers can choose the operator that best suits them.”

Despite the fact that internet service provision was opened to free competition in 2001, the country’s 100-plus internet service providers suffer from dependency on the quality of the

²³ “Se reducen las tarifas de banda ancha”, El Ciudadano magazine, number 10, 15- 30 November 2008, p. 2.

²⁴ Resolution 534-22-Conatel-2006.

backbone network, the slow administrative handling of permits and the scarcity of capital for the high investments needed for links with carriers.

The consequence is that consumers cannot compare parameters of quality relative to prices. For its part, SUPERTEL requires proper sampling methods to verify the operators' reports. It is currently formulating new quality standards through dialogue and consultation with stakeholders.

Some operators and other stakeholders in the sector have proposed the elimination of taxes on value-added telecommunications services, as well as the reduction or elimination of duties on personal computers and end-user equipment in general.

From universal access to ICTs in public policies

Both during the decade of the privatisation process and after its ultimate failure, the prevailing thinking focused on leaving connectivity in the hands of the market and the political will of each administration to take on the challenge of universal access.

State companies were transformed into public corporations and operated like private companies, establishing plans for expansion based on profitability and losing sight of social dimensions and universal access. The deployment of both telecommunications and internet services responded solely to the criteria of profit-making.

Since 2002, there have been a number of public policy instruments formulated that are aimed at promoting ICT access, deployment and use as tools for development. However, these ambitious plans have either been dropped, discontinued, or in the worst of cases, translated into frustrated megaprojects like PROMEC or the so-called Project K.²⁵ Even when they have been declared official state policies, as in the case of the National Connectivity Agenda (June 2002), they have not been backed by the necessary resources or well-defined institutional support, aside from granting a dominant role to FODETEL.

²⁵ In 2004, FODETEL and SENATEL formulated plans for "Project K, Internet Access for All". Slated to begin in 2007, the project involved the establishment of 5,000 telecentres throughout the country to serve educational centres, rural local governments, settlements on the northern and southern borders and 38,000 scattered and remote settlements. The project was never implemented.

The last decade has also seen the approval of a Universal Service Plan (July 2003), two National Telecommunications Development Plans (2000-2005 and 2007-2010) and the 2008-2010 National Connectivity Plan adopted in 2007 and recently extended to 2012. Under the leadership of CONATEL, a White Paper on the Information Society was drafted in 2006 but never made an official policy.

The 2002 National Connectivity Agenda was motivated by the Agenda for Connectivity in the Americas and Quito Action Plan (December 2001), which were formulated at an intergovernmental meeting organised by the Inter-American Telecommunication Commission (CITEL) and recognised the digital divide in the region. To promote the fulfilment of the national agenda, the National Connectivity Commission was created,²⁶ comprising the presidents of CONATEL and the National Council for the Modernisation of the State (CONAM) and the ministers of education, health, agriculture, tourism, the environment, defence and the economy. The commission met only twice.

All of these plans and policies have more or less defined the same strategic focus areas: infrastructure for access, tele-education, telehealth, e-government and e-commerce.

Their implementation is guided by the principles of equity and universality. The role assigned to the government is that of promoter and facilitator of processes that are meant to be carried out by the private sector, civil society and, in practice, sectional (municipal) governments.

With regard to e-government, the Internal Revenue Service was provided with support to publish forms online and was the only institution that undertook a restructuring of institutional processes. Web portals were also set up for government agencies to comply with the Law on Transparency and Access to Public Information. An "internet for all" programme was also created with cybercafés and is ongoing, although its impact has not been evaluated. Together with the opening of the market to new competitors, a flat rate for internet service was established in June 2002, bringing prices down by 75%.

²⁶ Executive Decree 1781 of 21 August 2001.

The White Paper on the Information Society,²⁷ drafted in 2006, represented a significant step forward as a participatory process for the formulation of ICT policies. Headed up by CONATEL, it was the first effort to seek consensus on a national ICT for development strategy, according to an evaluation of the process by APC.²⁸

CONATEL became involved in the spirit of the World Summit on the Information Society and the Regional Action Plan for the Information Society in Latin America and the Caribbean, eLAC2007, and gathered together stakeholders from various sectors to discuss proposals that would serve as inputs for the future.

In 2007, the state was assigned with the role of fostering the conditions for achieving universal access through the updating of the National Telecommunications Development Plan.²⁹ Covering the years 2007-2010, and subsequently extended to 2012, the plan was the outcome of participatory discussion at thematic roundtables organised for the formulation of the 2007-2010 National Development Plan. It is a plan that assigns institutional responsibilities, but not resources.

As a complementary instrument, the 2008-2010 National Connectivity plan defines the public sector's principal objectives, policies and goals for the development of telecommunications infrastructure for the purpose of expanding ICT coverage to every corner of the country guided by the principles of geographical equality and social inclusion.

The Connectivity Plan establishes the following goals with regard to internet access: to increase fixed broadband penetration to 7% and the number of broadband users to one million, of whom 690,000 will be served by state-owned operators; to increase mobile broadband penetration from 0.4% to 2.46% by 2010 (350,000 users, with 150,000 served by Telecsa); and to reduce broadband prices by 70% for 512kbps (from USD 65 to USD 21 in 2010).

²⁷ Conatel (2006). "Libro Blanco. Estrategia para el desarrollo de la sociedad de la información en el Ecuador". Available at: www.conatel.gov.ec/website/conectividad/sociedad.php?cod_cont=280

²⁸ lac.derechos.apc.org/es.shtml?apc=he_1&x=5073350

²⁹ Conatel-Senatel (2007). *Plan Nacional de Desarrollo de las Telecomunicaciones 2007-2012. Uso de las Tecnologías de la Información y Comunicación para Establecer el Camino hacia la Sociedad de la Información y el Conocimiento*. Issued through Resolution 394-22-Conatel-2007, published in Official Register 175 of 21 September 2007.

In addition to strategic objectives and targets, these plans also include coverage and quality of service indicators and mechanisms for evaluation and follow-up. They consider the legal reforms needed to create a new institutional framework, as well as strategies to increase the efficiency of state companies and successfully confront the challenges of financing and implementing investment and preparing the population.

Finally, the new constitution adopted in 2008 enshrines the right to universal access to information and communications technologies (article 16) and establishes universality as a principle of the provision of public services, which are the responsibility of the state (article 314).

An institution for universal access

The creation of the Fund for Telecommunications Development in Rural and Marginal Urban Areas or FODETEL, financed with 1% of operators' revenues, has not had a significant impact on either fixed-line telephony or internet access, due to contradictions in its institutional framework, a lack of resources and the instability typical of the entire sector.

FODETEL's regulations conflicted with the National Telecommunications Secretariat (SENATEL) Regulations on Public Works, Procurement and Service Provision, which in turn were made obsolete by the need for adaptation to the new Organic Law on the National System of Public Procurement.

In August 2003 CONATEL approved both the group of services that constitute universal service and the Universal Service Plan, and FODETEL was incorporated into the SENATEL administrative structure. Since that time, however, this plan has not been updated. Despite the boost that the government at the time proposed to give to telecommunications infrastructure, by way of FODETEL, the resources available were not sufficient.

Between 2000 (when FODETEL was created) and 2007, a mere USD 90,000 was spent, and not a single project was executed.

FODETEL resources

In other countries of the region there are universal access funds which have the same purpose of providing service coverage in unprofitable areas and are also financed through contributions from operators. Except for Colombia, these countries require operators to turn over 1% of their gross revenues. (In Colombia, mobile operators contribute 5% of their turnover and value-added service operators contribute 3%.)

In Ecuador, when FODETEL was created in 2000, there were originally plans to collect 4% of operators' turnover. In the end, the amount was set at 1% of gross revenues so as not to increase the burden on operators, and thus to affect as little as possible the entry of new operators into the market. By law, this contribution should be stipulated in concession contracts.

There were some who called for establishing a differentiated contribution of up to 2% depending on how well established the operators were in the market, as a means of compensation for the "market flaw" of leaving unprofitable areas unserved.

Mobile operators did not begin paying their contributions until 2007, on the grounds that this obligation could not be applied retroactively and was not stipulated in the concession contracts they had signed in 1993. As for the state-owned fixed-line telephony operators, even though their concession contracts had been signed two years before the creation of FODETEL, they were obliged to pay the contribution, based on a revision of their concession contracts and a ruling by the attorney general.

The 1% contribution to FODETEL replaced the 4% contribution that Andinatel and Pacifitel were required to pay, in accordance with Law 94, to a fund created to subsidise telecommunications development projects in unprofitable rural areas, known as the Marginal Rural Fund (FRM).

Between 2000 and May 2008, a total of USD 2,492,634.77 has been paid into FODETEL. The amounts collected annually have increased from year to year, especially due to the contributions of Telecsa (USD 676,407.07) and carrier service providers (a combined total of 1,508,924.50).³⁰ The state-owned fixed-line telephony operators owe approximately USD 35 million to FODETEL: USD 15,762,121.7 for unpaid contributions of 4% of revenues to the FRM, and USD 20,113,308.97 in unpaid 1% contributions.³¹

As for the USD 14,636,294.63 owed by Andinatel for unpaid 4% contributions, the company has signed an agreement committing to provide free connectivity to more than 2,000 educational and social institutions.

³⁰ CONATEL/SENATEL telecommunications sector statistics:
www.conatel.gov.ec/site_conatel/index.php?option=com_content&view=article&id=24&Itemid=89

³¹ Carrión Gordón, op. cit., pp. 25 y 26.

Table 6. Effective contribution of 1% of turnover (in USD)			
Year	Total	By service	Total
2000-2001	658.53	Fixed-line telephony	74,559.12
2002	67,702.83	Mobile telephony	676,407.07
2003	202,892.74	Carriers	1,508,924.50
2004	318,454.09	Satellite space segment operators	40,492.72
2005	408,606.69	Trunking systems	77,583.86
2006	460,819.86	Communal system	14,020.79
2007	691,509.45		
2008*	341,990.58		
TOTAL*	2,492,634.77		2,492,634.77
*As at 30 May 2008			
Source: CONATEL			

The arrival in power of the current government marked a substantial expansion of FODETEL's potential. The contributions of mobile operators, increased submarine cable capacity and the adoption of innovative new regulations (by CONATEL on 12 March 2009) have created the conditions for FODETEL to invest resources while reorienting and expanding its management capacity.

The 1% contribution was included in new contracts with large mobile operators Otecel and Conecel that were renegotiated and signed for a fifteen-year term in August and November 2008. The quarterly contributions that they were required to begin making in April 2009 will bring the total amount of quarterly contributions up to a conservative estimate of USD 4.63 million.

Table 7. Projected quarterly 1% contribution in 2009 (in thousands USD)					
Operator	CNT	Movistar	Porta	Others	Total
Amount	1,100	1,300	2,000	230	4,630
Source: FODETEL					

In addition to these financial resources, FODETEL will also have 200 Mbps of connectivity contributed to the state by TIWS for social development and educational projects.

FODETEL's portfolio of projects, some of which have been completed while others are in progress, involved the investment of USD 19,983,171 in 2008. Projects undertaken with state companies represent a significant proportion of this amount, with CNT accounting for USD 15,798,282.

Changes in regulation

The most significant changes in the new regulations for FODETEL address three issues. First, they eliminated the five-million-dollar limit for operators to be able to discount their 1% contribution through the execution of projects. Second, they eliminated the requirement for approval of projects by the Administration Council prior to approval by CONATEL, which in practice was simply a duplication of procedures.³² And finally, they introduced the concept of social networks.

In addition, prior to this, another obstacle to the execution of projects was eliminated: the definition of marginal urban areas restricted to those identified by the INEC, which only includes those with a poverty rate greater than 60%. As a result, the definition of marginal urban areas in the Universal Service Plan (PSU)³³ was expanded to "public education centres, public medical care centres and non-profit social development agencies which do not have access to the services defined in the PSU or have access that is considered insufficient, with

³² The Administration Council is made of three members who are also on the board of directors of CONATEL: the national telecommunications secretary, the president of CONATEL and a representative of the National Secretariat of Planning and Development (SENPLADES).

³³ Resolution 511-20-Conatel-2003. Available: www.conatel.gov.ec/siteconatel/index.php?option=com_content&view=article&id=26&Itemid=87

priority placed on the areas sociologically classified as peripheral in the terminology used in national population censuses.”³⁴

Nevertheless, the approval procedure is still not to the liking of either private or state-owned operators, who consider it bureaucratic, complicated, lengthy and almost unnecessary. But for FODETEL, its role in controlling and harmonising project planning is not negotiable; it is one of its key functions. As a current director noted, “If we have implemented a project for USD 15,000 and they present us with one providing similar coverage and capacity for USD 80,000, obviously we are not going to accept it.”

Universal access and wireless networks in the new constitution

With the new constitution, internet access has moved beyond one more component of the Universal Service Plan to become a constitutional right.

Among its pioneering innovations with regard to communications-related rights, even by international standards, the 2008 constitution stipulates that “all persons, as individuals or as part of collectives, have the right to: universal access to information and communications technologies; and to access on equal terms to the use of radio spectrum frequencies for the operation of public, private and community radio and television stations, and to free spectrum bands for the operation of wireless networks” (Section Three, Communications and Information, article 16).

It also stipulates that “the state should promote diversity and plurality in communication by guaranteeing the allocation of spectrum frequencies through transparent and egalitarian methods...” as well as guaranteeing “access to free spectrum bands for the operation of wireless networks and ensuring that their use is predominantly guided by the public interest” (article 17).

These articles were the outcome of extensive collective discussion in Working Group 7 of the National Constituent Assembly, which drafted the chapter of the constitution addressing the

³⁴ Resolution 009-03-Conatel-2008 of 21 February 2008.

country's development model. Contributing to the discussion were inputs from a number of groups that had been working for years in the field of communication and ICT rights.

The Constituent Assembly recognised the development opportunities represented by the promotion of alternative, non-traditional technologies to meet the population's needs with regard to communication and the secure, rapid exchange of information.

Wireless networks were included in the Assembly's discussions because of such advantages as their operation in free bands of the radio frequency spectrum, their low cost and the possibilities of self-sustainability that they offer to beneficiary communities or organisations.

Wireless technologies had not formerly been widely considered as solutions for communities and stakeholders in the population segments underserved by the state in terms of telecommunications services. Now that they have been incorporated into the constitution because of their value as resources for development, the state will be obliged to incorporate these technologies in public policies and take them into account when defining new regulatory frameworks so that there are clear guidelines to facilitate their promotion and use.

This constitutional recognition signifies an opportunity for the development of the concept of universal access. Among the precedents to the new FODETEL regulations, the right to universal access to ICTs had been invoked as a motivation for the new formulation.

Community wireless networks: Sharing development through ICTs

It has always been said that in the structure of costs for internet access, the biggest burden is represented by international access. This does not hold true when it is a matter of correcting the market "flaw" of leaving geographical areas and social sectors that are financially unprofitable without service. When it comes to geographically remote areas that are not connected to public fixed-line networks, the most significant expense in the cost structure is the last mile, because without this basic access, prices become exorbitant.

In developing countries, wireless networks have proven to be key resources for achieving ICT deployment at low cost and with considerable coverage. The use of wireless technologies

that operate over free radio frequency bands – such as Wi-Fi – to cover the last mile has contributed to the growth of internet access in rural areas in Latin America.³⁵

While it is true that wireless networks can also utilise technologies such as satellite, microwave, cellular and fibre-optic links, among others, wireless networks that utilise the IEEE 802.11 (Wi-Fi) family of specifications use frequency bands considered free or open internationally, that is, 2.4 GHz and 5.7-5.8 GHz.

These bands are divided into channels that can be used simultaneously up to a point of density that is unlikely to be reached in rural or marginal urban areas. This debunks the argument frequently put forward by the private sector that “free bands become saturated.”

This wireless technology, which has been available in Ecuador for roughly ten years, has continued to undergo innovations in design that allow for increasingly greater transmission capacity. There are a variety of different brands of equipment on the market that have been successfully used to link points over distances of five to ten kilometres at very affordable prices.

There is a greater amount of equipment and devices available for the 2.4 GHz frequency band than for any other. The difference in price between internet access equipment operating in the 2.4 GHz frequency range and those operating in the 5.8 GHz range was roughly USD 300 in February 2009.

The technology makes it possible for almost any non-profit entity or person to deploy and share a wireless network. If the legislation allowed it, self-sustaining networks could also be operated. A “mini ISP” could recover the costs of installation and maintenance through the distribution of service from an access point.

Free and open source software is another resource that could potentially contribute to wireless networks through the development of alternative configurations that boost the capacity of equipment. For example, the Linksys WRT54GL wireless broadband router comes from the factory with proprietary software that limits its possibilities. If free software is installed instead – and this has been done using Linux and the corresponding antennas – it

³⁵ See for example the TRICALCAR project training materials at: www.wilac.net/modules.php?op=modload&name=News&file=article&sid=205

can be used to provide service to a community five to ten kilometres away. The government's decision to promote the use of free software in public administration through an official decree will expand the pool of qualified human resources with experience, knowledge and interest in this computing alternative.

Without wireless technology, the only means of internet access for rural areas was through a costly satellite connection. Three years ago, for example, an organisation of 10 micro-enterprises had to pay USD 300 a month for broadband internet access with a speed of only 128/256 kbps, plus USD 2,500 for the basic equipment, in addition to ten computers and ten radios. This year, their internet service costs only USD 80 a month through a wireless network operating in the 5.8 GHz frequency band, and with the money they are saving they can pay for the new antenna installed.

Community wireless networks can be built with the technology described above. These networks are defined as those which "permit wireless access to different types of resources and services available either on the internet or on a local network and which are characterised by being designed and implemented in the hopes of helping to improve the quality of life of communities."³⁶

Their potential is as great as the service needs of the populations who can benefit from them and which can be met through the shared use of ICTs. They can provide more timely access to a greater quantity and quality of information; facilitate business operations; enable the sending and receiving of information; increase and enrich communication among network members; support the undertaking of mutual benefit projects; provide a space for cooperative work; improve the quality of education, health care and services for vulnerable and/or marginalised groups such as young people, women, people with disabilities, ethnic minorities and the elderly; enable greater interaction with the state; and even enhance decision-making capacity and impact on community life.

Currently, one of the potential opportunities opened up by wireless internet access is the government initiative to democratise public procurement through an online system which allows anyone in the country to participate, through completely non-discriminatory

³⁶ Redes inalámbricas para el desarrollo en América Latina y el Caribe. Available at: <http://www.apc.org/es/pubs/issue/lac/redes-inalambricas-para-el-desarrollo-en-america-l>

procedures. Government programmes also promote the purchase of goods produced locally and nationally.

In view of the current international financial crisis and its recessive effect on the economy, the diversification of export goods and identification of the markets offering the best prices have become more of a necessity than ever for small-scale producers in rural areas. When no other means of connectivity are available in these areas, community wireless networks provide an opportunity to initiate or increase trade with markets abroad more easily and effectively.

In addition, now that many of the hundreds of thousands of Ecuadorians who have emigrated abroad have been left jobless and in debt, and need the remittances they formerly sent home to survive in their host countries, access to voice over internet protocol (VoIP) telephony is an ideal means of communication.

The wide-scale deployment of these networks as valuable resources for development faces two main obstacles: the lack of specific legislation on their use and excessive regulations regarding the use of radio spectrum frequencies. Finally, in order for these networks to be successful, it is essential to remember that the goal of their deployment is not merely to provide internet connectivity or access to ICTs, but rather to serve as technological tools for community development.

Eliminating legal obstacles

In Ecuador the deployment of non-profit wireless networks has been governed by four sets of regulations, which deal with operating licences, technical standards, radio spectrum frequency usage and rates and fees, respectively. The procedures required to meet the legal requirements for operating a wireless network were time consuming and costly. The FODETEL regulations, for their part, did not address the concept of social wireless networks, which made them an exclusive legal instrument.

With regard to the technical standards that must be adopted for the design of wireless networks, operators must comply with the Regulations for the Implementation and Operation

of Broadband Digital Modulation Systems,³⁷ which establish the maximum power ratings for antennas and the standards for the configuration of transmission equipment in a set of frequency bands that includes the typically free or open bands (2.4 GHz and 5.8 GHz).

For the use of free or open frequency bands, operators are not required to pay a concession fee, but they are required to pay a registration fee for their equipment. The rates are established in the Regulations on Concession Fees and Rates for the Use of Radio Spectrum Frequencies. These frequency bands are not genuinely free, because when the spread spectrum was adopted, the band most frequently used for wireless technology was 2.4 GHz, which was and continues to be allocated on a primary basis to the Armed Forces.

Table 8. Registration fees	
Type of link	Annual renewal fee
Point-to-point	USD 153 plus value-added tax
Point-to-multipoint	USD 78.32 (for each user up to a total of 50) and USD 153.60 (for a single user) plus value-added tax
Source: APROVI ³⁸	

The fourth and final legal requirement was to obtain an operating licence, a procedure governed by the Regulations on the Issuing of Operating Licences for Private Networks.³⁹

In accordance with these regulations, all of the users of the services must be members of the institution that owns the network (or the individual owners, where the case may be), which means it is prohibited to provide service to third parties.

Thus the only available option for legally operating a wireless network was to pay for an operating licence for a private network, even in the case of a private network with a social purpose in which infrastructure is shared and the network is sustained by equitable contributions from among the members, such as networks run by community members, youth groups or other civil society actors.

³⁷ Resolution 417-15-Conatel-2005.

³⁸ APROVI, "Identificación de factores que limitan el aumento de la penetración del acceso a internet y la disminución de costos", presentation made in July 2008.

³⁹ Resolution 017-02-Conatel-2002.

The only exception made is for rural networks operated by a group of different social organisations or of small or micro-enterprises which establish a cooperative arrangement to sustain the network.

These regulations were applied, however, to the wireless network created by Radio Latacunga, on the grounds that internet service was provided to all the churches in the area, since the radio station is owned by the Ecuadorian Episcopal Conference.

As a result, implementing the project required the payment of USD 3,000 for the operation of the three main links, that is, from the carriers to the antennas installed in Alausí, Guamote and Sigchos, in addition to USD 15 per month for each main link to operate these distribution points. Then again, if the same rules were applied as in the case of banks and companies in general, where a fee is charged per every user of the network, the cost of maintaining this community wireless network would have been unsustainable.

Private networks are prohibited from interconnecting with each other or with the public telecommunications networks, which limits the type of services that can be shared.

In summary, the only option for legally operating a wireless network aimed at community social development was by complying with regulations that were created in 2005 for profit-making entities and had the above-mentioned limitations. However, the concept of social interest networks established in the new FODETEL regulations could help to fill this legal void.

Social interest networks in the new FODETEL regulations

The new FODETEL regulations define “social interest networks” as “those that can be used by legal entities subject to public law for the exclusive benefit of a plan, programme or project of social interest, financed totally or partially by FODETEL, and which make it possible to connect different facilities owned by the state or under its control, as well as private institutions that have an educational, health or community purpose. Their operation requires authorisation granted by CONATEL, and in the case that spectrum frequencies are needed, an operating licence issued by CONATEL or the corresponding registration or authorisation. In all cases they will require prior reports from the National Telecommunications Secretariat and the presentation of a specific report detailing the network’s public or social interest” (article 2).

This definition coincides with definitions proposed by civil society organisations in participatory workshops, such as the Workshop on the Regulation of Community Wireless Networks held in December 2007 with the participation of telecommunications specialists.

The definition drafted at this workshop states: "A community network is a telecommunications network managed by an organisation that seeks to share services or infrastructure to pursue development objectives. They are networks approved by FODETEL." The drafting of this definition involved the participation of officials from the regulatory agencies – CONATEL, SENATEL, SUPERTEL, FODETEL – as well as representatives of telecommunications operators, civil society, consumer groups and stakeholder organisations.

There are networks already in operation that want to begin the "legalisation" process, and will thus serve to test the flexibility of the new FODETEL regulations to adapt to different organisational initiatives.

As of now, these networks are only authorised to provide data transmission and internet access services, but not telecommunications or value-added services (to prevent social networks from commercially marketing these services). Two of these networks can interconnect with each other, but they cannot interconnect with the public telecommunications network.

Areas that are currently unserved by the market are of no interest to the large operators because of their limited profitability, but the private sector is nonetheless opposed to the development of community networks, because they believe they could come to represent unfair competition.

This was a point of friction during the public hearings held to study the draft FODETEL regulations with operators, both carriers and internet service providers. Article 19 of the regulations allows for the potential establishment of preferential "social tariffs" in projects funded by FODETEL.

The regulations open up the possibility for social interest networks to obtain FODETEL financing: the beneficiaries must be concessionaries, licensees or beneficiaries of authorisation to operate social interest networks and can request financing for the total cost of the project.

The corresponding contracts include a description, schedule and timeline for the project, the parties responsible for it, a schedule of payments, compensation, control mechanisms, a schedule for reports prior to and during project execution, a commitment to the operation and maintenance of the network and corresponding guarantees, the management and custody of goods to be acquired with state resources, a system of penalties, mechanisms for dispute resolution, mechanisms for oversight and control by FODETEL and SUPERTEL, etc.

All other aspects are subject to the FODETEL regulations, such as eligible costs (subject to Chapter 4 of the regulations). On this point, the regulations provide considerable leeway, from the purchase of equipment to the undertaking of socio-economic studies.

Advantages of the regulations:

1. Until now, there was no special category for social interest networks, which were classified as private networks and obliged to pay USD 500 for an operating licence plus the fees for use of radio spectrum frequencies.
2. This is the only option for the legalisation of community wireless networks.
3. The regulations were formulated with a view to encompassing the widest range possible of social actors, on the condition that they are duly represented, which implies a basic degree of organisation.
4. The fact that wireless networks are permitted to share internet access despite the opposition of internet service providers is a major achievement. It is unfortunate, however, that telecommunications are limited to the network itself, since the establishment of a VoIP exchange would at least remedy the lack of telephone service in the area encompassed by the network, even though there is no connection with the public telecommunications grid. The option of making computer-to-computer calls requires both computers to be online at the same time and training in the use of applications such as Skype.

Disadvantages of the regulations:

1. They do not promote other community initiatives for connectivity through wireless links by new, less "institutionalised" actors.
2. There are still no genuinely free or open frequency bands in practice.
3. The required procedures and associated costs are a disincentive for initiatives.
4. They limit and slow down the deployment of wireless networks with the available technology.
5. There is a danger of over-bureaucratisation of the procedures.

Successful experiences with provisional legal solutions

In Ecuador at least three community wireless networks have been successfully implemented and projects administered by FODETEL are currently underway.

The largest of these wireless networks covers part of the central Sierra or highlands region, encompassing the provinces of Cotopaxi, Tungurahua and Chimborazo. It takes advantage of technological convergence to interconnect the internet and radio as means of communication. Internet service was incorporated as a value-added service by a community radio station, with the goal of enhancing and diversifying the work carried out for ten years by Radio Latacunga.

Through this network, information flows through live audio broadcasting between “community communication centres” equipped with an intranet system. As a result, indigenous and smallholder communities not only have access to the internet, but are also interconnected with outside actors, such as people who have emigrated from their own communities.

Another example is that of the Llakta Net telecentres network, a project coordinated by the Popular Radio Schools of Ecuador (ERPE), in which an access point is connected with repeater nodes through wireless technology.

The project began as an ERPE initiative and was completed with support from FODETEL, and is now fully operational. It is the largest project in which FODETEL has been involved until now, and although it is still too early to assess its impact and benefits from the point of view of end-users, it has already made it possible for local agricultural products to be placed on the European market.

The project encompasses the installation and operation of a network of 50 telecentres in rural indigenous communities in the province of Chimborazo. The role of the telecentres is to support the productive activities of the province’s rural population. They have been set up in five cantons: Guamote, Colta, Riobamba, Guano and Alausí.

According to the ERPE, there are direct and indirect beneficiaries of this project. The direct beneficiaries are the 4,961 students and 368 teachers in the province, while the indirect beneficiaries are the 18,690 inhabitants of 217 neighbouring communities and the 240,000 listeners of the ERPE’s radio stations.

The project’s components, in addition to connectivity, are equipment, training, content development and information dissemination.

As well as the ERPE and FODETEL, the project also involves the Bio Taita Chimborazo Organic Producers and Marketers Corporation (COPROBICH), selected rural communities, and CNT as the telecommunications operator.

The total cost of the project was USD 341,127.60, of which FODETEL contributed USD 245,400 and the ERPE and participating communities contributed USD 95,727.60.

The communities’ contribution is based on a model of sustainability for the two-year duration

of the project. During this time, the costs of operating the network will be funded through a monthly quota of USD 0.20 per family, a fee of USD 0.50 an hour for computer use, the contribution of 5% of profits from the sale of organic produce and fees from advertising by sponsors.

Table 9. FODETEL wireless network projects				
Entity/Area	Participants	Cost	Beneficiaries	Duration
TELECENTRE NETWORK IN SUPPORT OF PRODUCTIVE ACTIVITIES				
ERPE Chimborazo, rural indigenous communities (3)	COPROBICH Operator Communities	FODETEL: USD 245,400 ERPE and communities: USD 95,727.60	50 community centres	2 years
TELECENTRE NETWORK FOR INTERNET AND EDUCATION				
Municipality of Gualaceo University of Cuenca (1)	CNT	Equipment: USD 552,361 Internet access CNT: USD 107,100 from 4% and 1% FRM contributions	63 educational centres and social development organisations	5 years
PILOT EDUCATIONAL NETWORK				
Municipality of Montecristi (4)	Operator Provincial council Local government	Equipment: USD 293,647 Internet access CNT: USD 71,400 from 4% and 1% FRM contributions	48 educational centres	5 years
ESPOL Municipalities of Olmedo and Paján (4) Provincial Council of Manabí	Operator	USD 408,695	177 educational centres	5 years
CONNECTIVITY AND CONTENT NETWORK				
Municipality of Montúfar (6)	Operator MSP/MEC ESPE/UTPL	USD 393,455.38 CNT: 142,800 from 4% and 1% FRM contributions	81 educational centres	5 years

- | |
|---|
| (1) Includes training, content, equipment and dissemination |
| (2) Includes training, equipment and content |
| (3) Includes training and content |
| (4) Includes content |

Source: FODETEL

The other FODETEL projects shown in Table 9 have not yet defined models for sustainability because they are still in the “design and definition stage”. All FODETEL network projects are designed for the use of wireless technologies that operate in open frequency bands. The “social interest” classification is guaranteed by the fact that the projects are headed up by public law entities.

Impacts of the CAMARI network

The CAMARI information and communication system is an information and training network for producers working with the CAMARI-FEPP (Fondo Ecuatoriano Populorum Progressio) equitable marketing system, and was created with the support of the International Institute for Communication and Development (IICD).

The system uses a wireless network to connect organisations of small farmers and craftspeople with sources of information on products and services through internet access centres (community infocentres). It is now in its third stage of development and is currently in operation and in the process of obtaining legal status.

The system was created for the purpose of providing small farmers with up-to-date information on supply and demand, costs, prices and quality of agricultural products to help them plan effective marketing strategies. This will enable CAMARI’s member organisations to have a greater presence on the national market.

CAMARI’s equitable marketing system is a means of bypassing large and small intermediaries. Local intermediaries discourage attempts by local farmers to improve the quality of their produce by paying them based on weight alone.

The pricing policies of intermediaries are unfair because they pass their costs on to consumers to guarantee themselves a large and abusive profit margin. The dependence of producers on this traditional marketing system places them in a highly vulnerable situation in these times of economic crisis.

This is why it is especially important for CAMARI’s members to increase their sales volumes, and the information and communication system is a key tool for quickly gaining greater access to local, national and international markets in order to meet this urgent need.

During the time that the project has been underway, the community infocentres network has developed into an effective means of information and communication to support marketing efforts.

The system comprises three connection links in Cotopaxi, Bolívar and Chimborazo and four community wireless networks in the areas of Salinas, Guamote and Tixán. Eight infocentres were set up and equipped with computer equipment and connectivity through ADSL links.

The ICT tools used include internet access, a website, email and VoIP telephony (Skype) which are mainly used for the transmission of information for sales consultations and business opportunities.

The project has contributed to building local technical capacity through training and technical assistance for the infocentre operators. The infocentres are managed by people from the communities themselves, who have acquired the skills needed to provide service and assistance to small farmers through information and the use of ICT tools. All of the managers learned to formulate business and sustainability plans for the infocentres as part of a training programme.

The implementation of these business plans has contributed to expanding the services offered by the infocentres. During the second year of the project, the infocentre network was reinforced and integrated into the Camari Small Farmers Business System, which has a website⁴⁰ with the following features:

- Price reports on different markets and products
- Information on member organisations
- Information on the main products they sell
- A news section
- Documents and articles on technical subjects
- E-newsletters.

⁴⁰ www.negocios.camari.org

The installation of the wireless networks and community infocentres has also contributed to enhance coordination with local governments and other community service agencies through support and participation agreements with other local agencies that use ICTs.

This strategic alliance has provided community radio stations, village councils, cooperatives and primary and secondary schools with an effective infrastructure for internet, intranet and extranet access and even a virtual classroom. An infocentre model was established for training on subjects such as quality enhancement, post-harvest management, business procedures and assistance and support for the facilities and communications.

The impacts achieved in the implementation of the first two stages of the project are significant. The participating organisations successfully increased sales volumes and revenues in the marketing of their agricultural produce and crafts. In the project's second year, trade transactions between CAMARI and producer groups in the areas where the infocentres have been set up increased by 50%.

The information and communication system based on a community sustainability model has produced a momentum that has promoted ICT services and use on an ever greater scale. In addition, interaction between the project's infocentres has facilitated the exchange of information and experiences and their connection to the Infodesarrollo network.

An assessment of the project's outcomes also revealed the need to improve the system's price reporting interface, given the cultural difficulties in using website applications.

On the other hand, improvements in connectivity and the potential inclusion of new partners and users, as well as the diversification of services, highlight the need for a technical back-up team to update the applications and guide and accompany the process.

Experience-based proposals

Experiences in the implementation of socially oriented wireless networks, infocentres and telecentres have been used as examples to contribute to the formulation of legal regulations at public events held thanks to the impact of civil society and organisations that work to promote ICTs for development. These are some of the proposals put forward by the actors involved for consideration in the development of a legal framework:

1. The regulations should facilitate the operation of community wireless networks in open frequency bands to put the constitutional mandate of the right to universal access to ICTs into practice.
2. The regulatory framework should prevent the deviation of community service towards profit-making or monopoly aspirations, but without restricting or prohibiting

such services as the interconnection of VoIP telephony services with the public telecommunications network.

3. The regulations should unify the necessary permits into one single permit and facilitate the immediate entry of new partners, from the same community or neighbouring communities, in order to exploit the maximum potential of the networks.
4. As a form of test period followed by an impact assessment, two slices of the radio frequency spectrum in the 2.4 GHz and 5.8 GHz ranges should be completely freed for two years. There should be no need for registration in the 2.4 GHz frequency band, although registration would be needed in the 5.8 GHz band, which is used more, in order to prevent saturation and interference. Use of the 2.4 GHz band should be monitored to determine the purpose of this usage and if it benefits unserved areas. Finally, the impact assessment should determine whether this practice leads to spectrum congestion or “chaos” as some fear.
5. The regulations should make it possible to register networks with an online form.
6. There should be civil society oversight of FODETEL, CONATEL and SUPERTEL to address such issues as the politicisation of project approval and quality of service.
7. The regulations should promote the implementation of the connectivity principle of taking maximum advantage of infrastructure already installed.⁴¹
8. The government should foster the development of the telecommunication software industry in the medium term through SENACYT (National Science and Technology Secretariat) programmes and industrial policy. Although such initiatives are endorsed in policy, no concrete projects have been implemented in this regard.
9. Network security should be protected ensuring that free software applications do not infringe on intellectual property rights. Good practices such as public domain licensing (FDL or Creative Commons) should be used for text documents and other content.

⁴¹ APROVI op. cit.

10. There should be an assessment of the viability and benefits of pursuing such options as the One Laptop per Child programme, an international initiative created for developing countries that includes the provision of laptop personal computers at a cost of USD 100.
11. A large number of users connected to the internet at the same time could cause the network to crash if the bandwidth leased is too small. For this reason, it is important to build applications with self-generated content that is available within the network (for example, information related to the community's activities, health and education, open digital libraries, information and documentation databases) to limit the need to connect to the internet to search for information.
12. Networks offer the possibility of sharing maintenance and replacement costs instead of depending solely on individual cash flow. The diversification of the services offered increases the potential for achieving self-sustainability.
13. National and international experience in ICT deployment has shown that investment in these initiatives is essentially wasted unless two basic requirements are fulfilled: projects must be firmly grounded in the concrete needs of the community, and a model for the sustainability of infrastructure and services must be established so that they can continue providing benefits after the completion of the initial investment, which tends to come from foreign cooperation assistance or donations.⁴²
14. There is no single model to ensure economic sustainability, but a series of key points for developing an effective business model is provided in Chapter 10 of *Wireless Networking in the Developing World: A practical guide to building low-cost telecommunications infrastructure*.⁴³

⁴² For a more in-depth consideration of the different dimensions of sustainability (economic, legal, environmental and organisational), see: www.itrainonline.org/itrainonline/mmtk/wireless.shtml#Sustainability_strategies

⁴³ Available at: wndw.net