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Regulatel/World Bank (PPIAF)/ECLAC Project on Universal Access for Telecommunications in Latin America

New Models for Universal Access in Latin America

(Summary of Main Report)

Peter A. Stern
David Townsend

August 2006

This paper is an abbreviated version of a comprehensive report resulting from a major study of universal access policies and programs including universal access funds in the 19 member countries of the Forum of Latin American Telecommunications Regulators (Regulatel). (The table of contents of the comprehensive report is annexed to this abbreviated report.) The study is a result of an agreement among Regulatel, World Bank (PPIAF), the Forum of Latin American Telecommunications Regulators (Regulatel) and the Economic Commission for Latin America and the Caribbean (ECLAC)[1] and was undertaken in 2005 and the early part of 2006 by an extensive team of local consultants and collaborators from the Regulatel member organizations[2], lead by Peter A. Stern, Lead Consultant with the collaboration of David N. Townsend, Specialist Consultant Economic Analysis,[3].

Several other consultants were actively involved during various stages of the project including José Monedero who helped with the analysis of the telecommunications sector and the universal access programs in the 19 countries, Caio Bonhilo, with technical matters in the study, Sonia Jorge with the coordination of certain local consultants and Viet Tran with the initial reflections on the gaps model

[1] Members of Regulatel actively involved in the study were Gustavo Peña (Secretary General) and Edwin San Roman (President of OSIPTEL and President of Regulatel in 2004 and 2005); from the World Bank, Eloy, Vidal, Rob Stephens, Juan Navas, Juan Galarza and their consultant Bjorn Wellenius and from the Economic Commission of Latin America and the Caribbean, Alvaro Diaz, Marcio Wholers and Martin Hilbert.

[2] Luis Bonifaz (informes de Perú, Panamá, El Salvador y Guatemala), Omar de León (informes de Uruguay y Paraguay), Salvador Ricourt (informes de la República Dominicana y Cuba), Gover Barja (informe de Bolivia); Judith Mariscal (informes de México, Honduras, Nicaragua), Eduardo Balen y Valenzuela (informe de Colombia), Humberto Abdalla Junior (informe de Brasil),Jorge Fritis (informe de Chile) y Roger Echeverria (informe de Costa Rica).

[3] Daniel Carletti (Argentina), Ing. Jaime Requena Garcia (Bolivia), Joel Garcia Freitas (Brasil), Daniel Cortés and Ricardo Hernandez (Chile), Juan Pablo Hernandez and Martha Castellanos (Colombia), Roberto Alfaro (Costa Rica), Eduardo Leyva (Cuba), Dr Hernan Leon and Mario Ortiz (Ecuador), Ovidio Hernandez (El Salvador), Aldo N. Bonilla (Guatemala), Lisbeth Castro and Gelbin R. Ponce (Honduras), Rodrigo de la Parra, Pedro Terrazas and Maria Dolores Muñiz (México), Edwin García (Nicaragua), Ing. Juan Oscar Duarte (Paraguay), Jorge Bossio (Peru), Indhira Jimenez (República Dominicana), Carol Dolinkas (Uruguay), and Laura Bernabei (Venezuela)

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THE CHALLENGE

Provide local access to the people of Huachupampa, Huarochiri Province, Peru (the village in the foreground) whose nearest point of access today is in the neighbouring village of Vicas, the village on the other side of the valley and which is less than 5 km. (as the crow flies) from Huachupampa. This was the distance used by FITEL, the universal access fund in Peru, as the target for providing accessibility within a reasonable distance of a public payphone.; however, it takes 4 hours by foot or 3-4 hours by car or truck (30 km) to get there! Televias Huarochiri, a new, privately initiated entrepreneurial driven regional telecommunications company, is currently building a new telecommunications network which will cover the whole of the province of Huarochiri including Huachupampa (see below).

Source: Ruddy Valdivia

INTRODUCTION AND ANALYTICAL FRAMEWORK FOR THE STUDY

Regulatel member countries have been world leaders in implementing universal access/service programs aimed at increasing access to telephones and the Internet in rural and unserved areas mainly through the implementation of universal access funds operating with a system of minimum subsidy tenders. Most have followed multiple universal access policies and programs using one or a combination of the following four general approaches.

1. Market liberalization combined with regulatory initiatives including universal access obligations and special regulations and conditions which favour projects and operations in uneconomic areas (almost all Regulatel member countries have adopted aspects of this approach);
2. Universal access fund programs (functioning in 12 out of 10 countries that have them);
3. Other financing methods and project initiatives by national, state and local governments, cooperatives, NGOs and others (13 countries);
4. State-mandated and controlled approaches using cross subsidies and other financing sources (3 countries).

Studies of “first-generation” public telephony and telecentre focused programs show that these have had a positive impact by providing a minimum but essential access in remote communities at affordable prices. They have also shown that there is a significant demand and willingness even in rural areas to pay for “individual” telephones such as cellular, fixed residential or limited mobility residential access lines.

The impetus for this study resulted from an agreement between Regulatel, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) and the Public-Private Infrastructure Advisory Facility (PPIAF) of the World Bank and is intended to assist members of Regulatel to develop and implement more effective, targeted and sustainable universal access programs aimed specifically at increasing private sector investment in telecommunications and information infrastructure in rural and low-income areas in Latin America. Its main purpose was to: (a) review and assess current and planned universal access programs in the 19 Regulatel member countries in terms of their

overall impact, satisfaction of demand for the services being provided and the costs and sustainability of the related investments; (b) develop a spreadsheet model to estimate the market efficiency and universal access gaps[4]; and (c) propose new models for universal access programs and projects in Latin America.

Each of the four general approaches to achieve goals of universal access was analyzed in terms of: (i) access growth, effectiveness of programs, efficiency and sustainability of projects over time and where possible the impact on larger socio-economic development goals; (ii) what worked well, and why; (iii) the key features, activities (including specific implementation details), terms and conditions that produced the most promising results; (iv) political, economic, technical and other problems; (v) responses to these; and (vi) lessons to be learned.

There are no common definitions of "universal access" and "universal services" among the Regulatel members. For the purposes of this study, which focuses on the former, they are defined as indicated in Box.1.

Box 1: Definitions of "universal access" and "universal service" used in this study

Universal access to telecommunications implies the reasonable availability of network facilities and services, in terms of geographic coverage and public access points, such that citizens and institutions, can obtain and the services within their local communities, either on a private or a shared, public basis. To achieve true "universal access" therefore implies that 100% of a designated population can obtain, at a minimum, public access to a defined service, through reasonably available and affordable public or community facilities, and those who are willing and able to pay full cost-based prices can obtain individual or household service on demand.

Universal service in telecommunications intends a more absolute condition, in which telecommunications services are delivered ubiquitously to households or individuals throughout an area, and thus are both accessible and affordable, with no practical impediments to subscription and usage. To achieve true "universal service" thus implies that 100% of a designated population is reasonably able to subscribe to and use a defined service on an individual, household or institutional basis.

[4] The "market efficiency gap" denotes the difference between the current level of service penetration and the level achievable in a well-functioning competitive market under a stable regulatory environment. The "access gap" denotes those situations where a gap between different population groups (urban and rural, high and low income) continues to exist even under efficient market conditions, since a proportion of the population cannot afford the market prices at which the service is offered. The access gap is defined with reference to a specific set of reasonable universal access objectives that can be adapted and customized to specific country objectives.

This abbreviated version of the main research report (i) reviews current universal access programs in Latin America in terms of the four approaches used to achieve universal access goals, (ii) outlines the "Regulatel" gaps model which was developed and used for this study, (iii) reviews recent innovative technology, financing, business, commercial and regulatory strategies for universal access projects, and best practices to achieve universal access and finally, (iv) presents our recommendations for universal access programs and funds in Latin America.

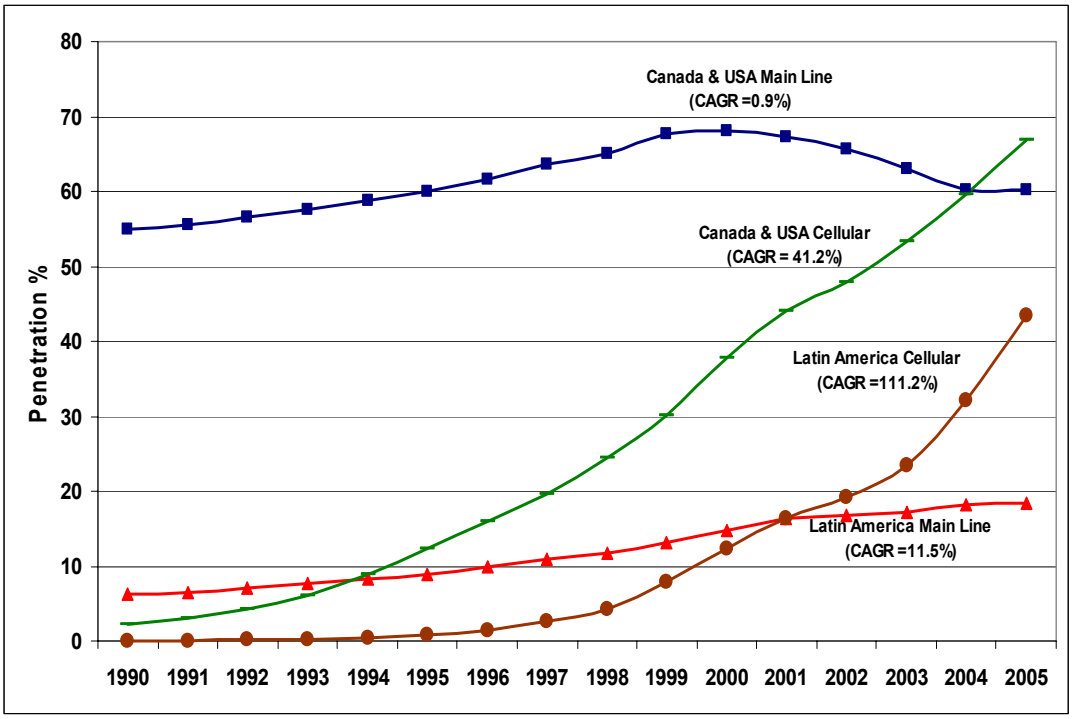
UNIVERSAL ACCESS PROGRAMS IN LATIN AMERICA

A. Market liberalization combined with regulatory initiatives including universal access obligations

When Honduras ended state owned HONDUTEL's fixed line exclusivity at the end of 2005 all Regulatel member countries except Costa Rica, Cuba and Uruguay had completely opened their telecommunications markets and, with the exception of Cuba, all had already introduced policies which have facilitated multiple competing operators and service providers in all sub sectors including mobile as a way to increase access. Most have at least 3 mobile operators (Honduras still has only 2). Brazil and Paraguay have in some cases 5 or 6 mobile operators in the country (Paraguay) or in a given area (Brazil), contributing to the relatively high mobile penetration rates in these countries.

Brazil, Bolivia, Panama, Mexico, Cuba and Venezuela have relied in a large measure on universal access obligations imposed on incumbent and new operators in conjunction with one or several of the other three approaches.

Liberalization policies have been quite effective in increasing fixed line penetration levels across Latin America with the compound annual growth rate (CAGR) for fixed lines since 1995 exceededing 10% in most countries. The growth in mobile penetration has been even more spectacular as Figure ES.1 shows. The reasons for this success are well documented and widely acknowledged: open markets encourage competitive entry, aggressive deployment of services, efficiency in operations, and creative pricing and marketing strategies, most to the benefit of the consumer.



Source ITU WTI 2005

Figure 1
Growth of main line and mobile penetration rates in North America (Canada + USA) and in Latin America between 1990 and 1995

Brazil's universal access fund (FUST) has so far collected nearly US$ 2 billion but disbursed none of it. Yet it has attained among the highest fixed and mobile penetration rates of Regulatel member countries. 11.4 million new telephone lines and nearly 400,000 new payphones were added since sector was liberalized during the latter part of the 1990s achieved through a combination of liberalization measures and the imposing of obligations on the 6 operators who have concessions in the "public" regime[5]. As a result, by the end of 2005, a population of 157.5 million (86 %) living in 44,000 population centers (out of a total of approximately 50,000) now has access to an individual or a public telephone This includes 3 million people living in 27,000 localities with less than 300 inhabitants. Mobile penetration has increased from 1.75% in 1996 to over 36% in 2004 in

[5] In spite of this Hélio Costa, Brazil's communications minister, recently criticized the insufficient increase in fixed line telephony coverage since privatization. According to him only 71.6% of Brazil's population has access to a fixed line telephone compared with 82% of the population that has garbage collection services and 97.2% that have access to electricity. Only 50% of Brazilian municipalities have cellular mobile telephone coverage. In the minister's own state, Minas Gerais, only half of the 853 municipalities have mobile coverage. See Business News Americas, Govt defends choice of Japanese digital TV standard - Brazil Tuesday, October 3, 2006.

a competitive environment where there are at least four operators in most of the 10 regions into which Brazil has been divided for this service.

Yet not everyone has benefited equally from this market-driven expansion of networks. Much of the effort of competitive operators has been concentrated in the metropolitan areas of these countries. In Guatemala, for example, only one of 22 departments, Guatemala City, with a fixed line penetration of 25%, is above the national average of 7.26% (2.87% in 1995) and several departments have penetration rates of less than 2%. In El Salvador 10 of 14 departments are below the national average of 8%. The policy in Bolivia has so far benefited almost exclusively the 43 urban (> 10,000 inhabitants) and the 1,553 larger (between 350 and 10,000 inhabitants) rural localities where most fixed and mobile subscribers are found. At the end of 2004 there were only 265 fixed and/or mobile lines in the remaining 27,773 localities which accounted for nearly 27% of the population at the end of 2004 and none in the 25,222 rural communities with less than 200 people.

B. Universal Access Funds

The highly publicized and successful universal access fund programs in many Regulatel member countries, the earliest ones of which have been functioning since the mid 1990s, have become standards worldwide for the design and implementation of mechanisms for channeling targeted subsidies toward universal access objectives[6].

While these programs resemble each other in the way subsides are processed, they can be distinguished by their legislative underpinnings, administration, source of funds, the types of projects that are funded, criteria for their selection, types of operators implementing them and conditions and obligations imposed on them. There is a variety of differences in the way universal access projects are identified, developed and funded. All projects in Colombia, Paraguay, Dominican Republic and until recently in Peru originate with the government or the entity responsible for administration of the fund. In Brazil, Chile, El Salvador and Guatemala projects are requested and/or proposed by the community, the municipality or by an operator/entrepreneur. These proposals are

[6] The first universal access fund in Latin America was established in Colombia in 1994. This was followed by funds in Chile in 1995, Paraguay, El Salvador and Guatemala in 1997, the Dominican Republic in 1998, Peru, Brazil, and Colombia in 2000, Mexico in 2002, and Nicaragua in 2004. Panama amongst others is contemplating establishing and implementing a similar fund program.

reviewed, evaluated for their appropriateness, further developed and clarified, and prepared for the funding process by the fund administrator. In almost all cases, whether the project is originated from the top down or from the bottom up, funding is established through a minimum subsidy auction.

Twelve of the 19 Regulatel member countries (Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Nicaragua, Paraguay, Peru, the Dominican Republic and Venezuela) have adopted some version this universal access fund approach as a core element of their telecommunications policies. They are not, however, all fully operational as yet. Argentina has not established its Fondo Fiduciario del Servicio Universal (FFSU) foreseen in a decree adopted in 2000[7] . In Brazil there has been controversy over how the large amounts of cash which have been accumulating currently at the rate of R$ 600 million (= US$ 250 million) each year in the Fundo de Universalização do Serviço de Telecomunicações (FUST) are to be spent. No universal access fund was foreseen in Mexico's 1995 telecommunications law; however, a temporary fund for "social and rural coverage" mentioned in the 1995 law, has been established. Like in Chile it receives its funding from the State's Consolidated Revenue Fund. In Bolivia a regional development fund (Fondo Nacional de Desarrollo Rural or FNDR) but not a universal access fund has received money from frequency assignment fees, penalties and other; however, none of the accumulated funds has been spent so far. There had been plans to establish a universal access fund, Fondo de Acceso y Servicio Universal, in Bolivia but parliament was compelled to reject the proposed legislation because of a strong lobby by operators. In El Salvador the fund serves both the electricity and telecommunications sectors but has so far funded only electricity projects because the fund administrator (FINET) believes that universal access goals in the telecommunications sector are being met sufficiently well by private operators. In Nicaragua, posts are included along with telecommunications in the fund.

Most universal access fund programs in Latin America have so far emphasized the building the physical infrastructure to connect rural and remote localities by subsidizing the installation and operation of public payphones and public access telecentres; however, some have also funded Internet access and in some cases cellular mobile network projects and many of the more recent universal access fund programs now

[7] Decreto Nº 764/2000, el cual establece la liberalización total del mercado de telecomunicaciones en la República Argentina a partir del 9 de noviembre de 2000

encompass more than just basic public access to traditional telephony and seek to emphasize institutional and community access to a full range of ICTs including access in schools and in public institutions at the regional and national levels allowing people to reap the benefits of e-learning, e-health, e-commerce and e-government. An important lesson being learned from this is that universal access fund programs which emphasize or have so far emphasized physical infrastructure construction and therefore connectivity should in the future be coordinated with the broader national ICT agendas and initiatives.

Universal access fund programs have produced mixed but generally positive results for the countries that have actively implemented them. Box 2 summarizes the significant achievements in some of these funds. Although there are many salient characteristics of well operating and successful funds, a number of key beneficial elements that stand out.

Box 2: Achievements of universal access fund programs in Regulatel member countries

- In Chile 25,000 payphones have been installed in about 8,000 population centers since the Fund (Fondo de Desarrollo de las Telecomunicaciones) was established in 1995. Close to 2.7 million people are benefiting and it is estimated that there are less than 150,000 people (1% of the population) without access to a basic telephone. Between 1995 and 2000 rural telecommunications operators invested US$ 161 million in universal access projects. Of this US$ 22 million (13.6%) was provided from the Fund.

- In Colombia eighty five percent of 22,242 population centers with more than 150 inhabitants now have at least one Rural Community Telephone. This is benefiting an estimated 5 million people. Colombia's Compartel program, operational since 1999, has also subsidized the installation of Internet Community Access Centres which are accessible to an estimated 5.2 million people of which, it is estimated, 2.5 million are school children.

- In Paraguay since 2000 a total of 2,844 payphones has been installed in 2,109 localities with a total subsidy of US$ 10.7 million (US$ 3,762 per payphone or US$ 5,073 per locality) from the universal access fund (Fondo de Servicio Universal). Various cellular mobile and other companies won minimum subsidies in three different auction phases to install and operate these payphones. The following three criteria were used to select the localities: (i) less than 400 inhabitants; (ii) presence of one primary school and availability of commercial electricity; and (iii) without an automatic telephone exchange.

- In Guatemala FONDETEL, the universal access fund, has subsidized the construction of more than 5,500 telephone connections including pay and residential telephones in nearly 2,000 population centers at a cost of US$ 8 million since 1998; however, it is estimated that of these today only 20% are providing adequate service[8].

- In the Dominican Republic, CODETEL, the dominant fixed line operator, Verizon Dominicana, installed 500 public payphones in 2001 in the poorest provinces under an FDT (Fondo para el Desarrollo de las Telecomunicaciones) project. A local new entrant, BEC Telecom, completed installation of 1,750 payphones in August 2005.

- In Peru close to 10,000 population centers have been provided with a payphone, of which 6,500 have been subsidized through FITEL, the universal access fund, with the rest having been installed by the incumbent Telefonica del Peru to meet its universal access obligations and also on its own initiative. As a result the average distance that anyone has to walk in Peru to reach a telephone has dropped from 56 km to 5.7 km. The total subsidy paid out for the four FITEL programs has been just under US$ 60 million or about US$ 8,000/locality or US$ 1,000 per person in these localities. FITEL has also been providing subsidies to other types of projects including a rural health network in the Province of Alto Amazonas, an agrarian information system and community telecommunications network project in the Chancay – Huaral Valley north of Lima[9], a privately initiated and operated regional telecommunications company in Huarochori Province west of Lima[10] and a small community based operator or micro-telco in the Department of Junin.

[8] This is as a result of inadequate planning and structuring of projects, poor timing of subsidy flows and, above all, the complete lack of any kind of supervision.

[9] The Chancay-Huaral agricultural Information project originated and developed by the association of farming communities in this fertile but arid valley some 80 km north of Lima, the capital to better manage their farming activities and especially the distribution of scarce water resources and to provide access to ICT for their children.

[10] Huarochiri Province (6000 km^2, located in the Andes mountains with 60,000 inhabitants, 64% of whom live in urban areas and where currently there are only 22% of its 32 districts where there are people who have telephones in their homes and where only 19% of the territory has mobile coverage. This project will provide inhabitants in an entire province in the Andes with a whole range of fixed and mobile voice, Internet and video services using an extremely economical network design and a unique form to commercialize these services.

Projects which originate in the communities that will be benefiting from the services to be provided or with the entrepreneurs/operators that will be taking risks, rather than those designed primarily by distant bureaucrats and regulators, have shown considerable promise. One of the reasons that the Chilean model has generally been successful is, in part due to its demand-driven nature. Also in Peru since 2004 small operators can request subsidies for their self initiated projects.

A top-down approach can also very successful for large scale projects with a national scope where subsidies for thousands of access points have been awarded in each auction. Chile and perhaps to a smaller extent Guatemala have been able to combine one-time auctions involving many access points with a "bottom-up" approach to identifying requirements. Bottom-up (or demand driven) projects for which subsidies are eventually awarded through auction are feasible when they originate with the potential users (communities, municipalities, towns, etc.) but it is unlikely that entrepreneurs or operators will propose projects for which they may not end up being selected.

Given the particularities of projects in rural, remote and underserved areas, regulators are contemplating more favorable regulatory and other conditions for rural operators in Peru and elsewhere. These include, inter alia, revision of regulated tariffs and interconnection charges and arrangements ensuring that prices reflect the higher costs of providing service in rural areas; little or no spectrum licence and usage fees to encourage investment in rural areas; reducing coverage obligations for rural operators; and facilitating and speeding up the process of getting a licence. (See below).

In spite of these successes, however, the functioning of most of these funds has been far from perfect. A major problem with most of these funds has been their inability to effectively disburse money collected to finance universal access projects. With the exception of Paraguay all or a large portion of what has been collected has remained unspent[11]. It has in certain cases taken up to 4 or 5 years to finance the first universal access project. There are five basic reasons for this. The first is political and results from governments' either failing to pass enabling legislation or holding back approvals for funds to be spent or failing to put into place a mechanism for collecting and disbursing funds,

[11] In Chile no money is collected from operators or anyone else. Like in Mexico universal access projects in Chile are financed out of the National Treasury.

secondly, there is the considerable amount of time required to elaborate, evaluate and implement projects to be financed out of these funds; thirdly, since these projects are often considered by governments to be public investments they are subject to the same lengthy and bureaucratic approval process as any other project funded from public funds; fourthly, the regulator does not attach high priority to universal access; and fifthly, disbursements from universal access funds may be subject to in additional constraints established by outside institutions such as the International Monetary Fund.

Table VI.7 Total amounts collected and disbursed since the beginning of the fund in each country

Country	Fund	Started	Total amounts collected and disbursed by end 2005 (US$)		Disbursed/ Collected
Bolivia	FNDR	1996	Collected	$43,461,797	0%
			Disbursed	$0	
Brasil	FUST	2001	Collected	$1,772,129,956	0%
			Disbursed	$0	
Chile	FDT	1995	Disbursed	$29,981,000	100%
Colombia	FCM	1994	Collected	$448,599,640	37%
			Disbursed	$165,995,817	
Ecuador	FODETEL	2001	Collected	$997,977	0%
			Disbursed	$0	
El Salvador	FINET	1998	Collected	$32,701,810	0%
			Disbursed	$0	
Guatemala	FONDETEL	1996	Collected	$17,943,154	43%
			Disbursed	$7,756,518	
Mexico	FCST	1995	Disbursed	$25,300,064	100%
Nicaragua	FITEL	2004	Collected	$3,278,559	0%
			Disbursed	$0	
Paraguay	FSU	1998	Collected	$12,966,954	96%
			Disbursed	$12,485,360	
Peru	FITEL	1994	Collected	$143,063,602	32%
			Disbursed	$45,076,256	
Republica Dominicana	FDT	2001	Collected	$65,654,341	16%
			Disbursed	$10,774,157	
Venezuela	FSU	2001	Collected	$113,220,392	0%
			Disbursed	$0	

We are proposing three approaches to make universal access/service funds more effective:

1. Change the rules where necessary to give fund administrators (independent boards or commissions) greater autonomy to disburse funds without reference to further ex ante approval as is the case today in Chile where the Council for Telecommunications Development (Consejo de Desarrollo de las Telecomunicaciones) has complete autonomy with respect to the administration and management of the Telecommunications Development Fund. Once it has decided which projects will be given up to tender no further approvals, permits or other types of confirmations are needed before the project is implemented. Its decisions are based on an evaluation of each project's eligibility as determined and recommended by the staff of the fund. Projects receiving funds without need for approval beyond that of an autonomous board or commission should still be subject to reporting during construction and ex post auditing once the project has been implemented as is the case with other government funded project.

2. Implement a structured approach for developing and vetting universal access projects eligible for funding and consider adopting some procedures (to the extent they are applicable to the telecommunications sector in Regulatel member countries) from the electricity sector in Ecuador and El Salvador where projects in designated regions are developed jointly by local government authorities and electricity distribution companies and advisors of the fund. The process of developing and approving projects is subject to well defined procedures and strict timetable and a large part of the work in identifying and planning these bottom-up type projects is done "in the field" by engineers and other professionals of the companies that will eventually be implementing them working from the start with staff of the fund. The turn around time is quite short12. There are also strict reporting requirements and getting projects approved depends in part on performance with previous funded projects.

3. Adopt a venture oriented financing mechanism whereby universal access funds are restructured so that a portion can be used for micro financing operations including for loans, equity participation in projects and/or the implementing telecommunications company, grants or a combination of these. This approach which is consistent with and particularly well adapted to the entrepreneurial driven, new technology and business model type of project that this study recommends

[12] In El Salvador a project is typically completed and paid for within 4 months of being approved.

should be promoted and supported in furthering the objectives of universal access policies, is explained in greater detail below (Financing innovations).

Operators and manufacturers who are important stakeholders in universal access fund programs participated actively in this study. Some of their observations and recommendations are summarized in Box 3.

Box 3: Observations of operators and manufacturers

- Governments and fund administrators should ensure that operators, service providers and manufacturers have a clear understanding of government policies, needs and priorities with respect to universal access as for example, the types of services and technologies or the different models of regulation which they may consider to be most appropriate for rural and isolated areas.

- Different rules (mainly administrative) which apply at the federal, state, and municipal level in countries cause difficulties for operators who generally operate nationally or regionally. In many countries operators lament that there is a real lack of coordination among these different levels of government.

- High levels of taxation such as in Brazil where telecommunications are considered by many tax officials as a luxury service discourage the use of and investment in the sector. Policy makers, regulators and fund administrators need to evaluate and understand the long term impact of taxes on achieving universal access goals. Also, operators and manufacturers would like to see certain tax incentives applied to the development of networks and services in remote areas.

- Coordination among donors and institutions for universal access projects and e-government and other ICT strategies is essential for the development of the sector. A central clearing house to avoid duplication could be very useful as could a central depository of key data like the World Bank's data base of all development projects of the WB, USAID, and others. (www.developmentgateway.org). In this respect Regulatel's Sistema de Indicadores Regionales is a step in the right direction.

- It is important that governments remove time consuming bureaucracy in the administration of universal access funds and which should be fully transparent.

- In an era of convergence a fragmented market in which individual services are treated differently is no longer appropriate. An obsolete regulatory framework produces uncertainty and disincentives to investment while encouraging opportunistic behaviors in some "small" operators. Regulators should recognize and make allowances for convergence (between fixed and mobile) and the different modes of delivery of essentially the same services be it via copper local loop, wireless or cable and give operators the flexibility of offering bundled services and all inclusive pricing. The regulatory framework should be such that it provides an incentive to investment and promotes innovative uses of new fixed and mobile technologies.

- Policy makers and sometimes regulators need to understand the implications of VoIP which may reduce operators' revenues but at the same time provides other opportunities. Regulators need to decide if and how VoIP is to be regulated.

Universal access fund programs have produced mixed but generally positive results for the countries that have actively implemented them. Box 2 summarizes the significant achievements in some of these funds. Although there are many salient characteristics of well operating and successful funds, a number of key beneficial elements that stand out.

Projects which originate in the communities that will be benefiting from the services to be provided or with the entrepreneurs/operators that will be taking risks, rather than those designed primarily by distant bureaucrats and regulators, have shown considerable promise. One of the reasons that the Chilean model has generally been successful is, in part due to its demand-driven nature. Also in Peru since 2004 small operators can request subsidies for their self initiated projects.

A top-down approach can also very successful. for large scale projects with a national scope where subsidies for thousands of access points have been awarded in each auction. Chile and perhaps to a smaller extent Guatemala have been able to combine one-time auctions involving many access points with a “bottom-up” approach to identifying requirements. Bottom-up (or demand driven) projects for which subsidies are eventually awarded through auction are feasible when they originate with the potential users (communities, municipalities, towns, etc.) but it is unlikely that entrepreneurs or operators will propose projects for which they may not end up being selected.

Given the particularities of projects in rural, remote and underserved areas, regulators are contemplating more favorable regulatory and other conditions for rural operators in Peru and elsewhere. These include, inter alia, revision of regulated tariffs and interconnection charges and arrangements ensuring that prices reflect the higher costs of providing service in rural areas; little or no spectrum licence and usage fees to encourage investment in rural areas; reducing coverage obligations for rural operators; and facilitating and speeding up the process of getting a licence. These are discussed below.

Some other problems and difficulties identified in this study related to: organization and operation of universal access funds, universal access project design and planning, and project implementation. These are detailed in the full report. Boxes 4, 5 and 6 summarize, respectively, the attributes of successful universal access programs and funds; the

attributes of well designed universal access projects; and guidelines for performance indicators used in output based aid (OBA) schemes

Box 4: Attributes of successful universal access fund programs: BEST PRACTICES

Successful universal access fund programs are characterized by:

- Clearly defined objectives, strategies and plans derived from public consultation with all stakeholders and which take into account the national ICT agenda (if there is one) and its role in the social and economic development of the country;
- Clear, solid and unambiguous legal and regulatory framework including strong provisions that prevent funds from being used for other purposes;
- Consistency among various pieces of legislation which concern universal access;
- Well defined role of the regulator and administrator of universal access fund programs;
- Clearly defined and transparent process and procedures for requesting and obtaining subsidies whether through a minimum subsidy auction or other method;
- Strong and continued political and administrative support
- An administrative and regulatory environment and fund structure which:
  - facilitates and actively promotes the deployment of new services and technologies including new fixed and mobile broadband technologies;
  - encourages the development and involvement of small, independent, decentralized, community based telecommunications companies and cooperatives;
  - encourages and facilitates the development of demand-driven, entrepreneur initiated projects;
- Flexibility to cater for changing circumstances including new technologies, services delivery methods and other developments;
- Clearly defined funding obligations with some flexibility to cater for changing circumstances but with any changes being subject to prior consultations with those most directly affected and with other stakeholders;
- Strong and effective leadership at both the policy and implementation levels and a high degree of autonomy for the fund administrator;
- Transparent and participative process of identifying projects and awarding of subsidies
- An effective mechanism for receiving and acting quickly on user complaints;
- Sustained but not excessive project supervision and follow up
- Provision for pre-selection of bidders to ensure that only experienced operators and service providers can participate in bids;
- An efficient internal management characterized by minimal paper work and an unencumbered decision making process;
- A method and formula for disbursing funds which will reduce the financial burden on operators receiving subsidies but not leave the administrator without adequate means to control the implementation and operation of each project;
- Provisions for asking for and receiving essential data needed by the fund administrator to control, follow up and plan projects.

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Box 5: Attributes of well designed universal access projects: BEST PRACTICES

Well designed universal access projects are ones which:

- take into account:
  - basic project parameters such as availability of electricity, rights of way, local sensitivities, the ability of users to pay, etc;
  - optimal backbone capacity requirements;
  - other competing and/or complementary infrastructure projects
  - the potential impact of competing technologies
  - particularities of the community and region to be served including its topography, economic activity, income, population density, local politics and other constraints.
  - the cost to rural operators of various local, state and federal taxes, licence, spectrum usage and other fees, performance bonds, missed target penalties, borrowing, reporting requirements and the transaction costs of administering the subsidies;
  - operators' need for predictable cash flow;
  - the need for an optimum balance between public and private sector contributions and risk sharing.
- have clearly defined conditions and requirements imposed on operators and service providers including quality of service obligations (e.g. maximum number of rural stations that can be out of service at any one time; the maximum amount of time required to repair a station that is out of service;……) and a minimum set of qualification required for administrators of rural telephones, telecentres and rural telephone companies;
- allow operators/service providers complete freedom to choose any technology they wish to deploy so long as it meets quality of service, interference and type approval requirements;
- permit other non-subsidized services to be provided;
- contemplate providing one stop shopping for all service licences;
- have licence conditions with certain flexibility to cater for changing technologies and circumstances;
- have performance indicators which take into account the particular circumstances under which rural operators have to provide service;
- are accompanied by business plans which confirm their sustainability during the life of the project (Each project should be subject to a cost-benefit analysis to determine its benefit to the people who will be served)

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Box 6: Guidelines for performance indicators used in output based aid (OBA) schemes

Performance indicators for OBA schemes should:

- focus on the needs of users in rural and remote regions of Latin America, including when service should be available and when it does not need not be available, what charges should be applied and what means there are for people to pay;
- be quantifiable and calculated according to a clearly defied formula, which diminishes or eliminates any element of subjectivity;
- not be administratively and financially burdensome for the operator to gather and process;
- have penalties which are in proportion to the cost and inconveniences suffered by users;
  have indicators designed to encourage the operator to improve quality and invest; and take into account operational and maintenance difficulties and costs involved in or resulting from accessing, operating and maintaining some remote and difficult locations. They should, for example, recognize and make allowances for batteries which cannot be recharged until the sun returns and for very remote stations whose maintenance is very difficult and expensive.

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C. Other financing initiatives

A number of other universal access programs have been introduced not through the country's universal access fund or as a result of universal access obligations imposed on operators, but through the financing initiatives of national and local governments, non-governmental organizations (NGOs), local associations, other civil society and public interest groups, and sometimes the private sector. Many have had positive results for increasing access and are worthy of study and potential emulation. Often these projects have their origins directly within the communities or with interest groups that eventually stand to benefit from the connectivity which has been provided.

Many of the more recent projects have an agricultural and fish farming focus and an objective of promoting the development and use of ICT in this sector by educating, facilitating exchange of information, providing market and other information, strengthening the productive capacity, and promoting exports and diversification of product markets for the indigenous and other farmers in these largely agricultural regions. Often they have also resulted in introducing ICT into the education system in these regions. Their objectives have been attained through a variety of actions including the installation of

community telecenters, information centers and connections to the Internet, education programs for farmers and students and services of translation into local tongues.

Examples of purely private initiatives (with no subsidies) falling under this category are the 30,000 or so privately financed, established, owned and operated “cabinas publicas” in Peru inspired from a model created by the Red Cientifica de Peru (RCP) in 1993. These are self-sustaining, do not require subsidies and have been widely emulated especially in Bolivia, Ecuador and Argentina.

The International institute for Communications and Development (IICD), a Netherlands based NGO, which has been involved in community access projects in Bolivia, Ecuador and elsewhere concluded that it is possible to implement sustainable small scale universal access projects in rural areas of Latin America under certain conditions. It conducted an extensive analysis after three years and found that there is a strong local demand from farmers, small businessmen, the education communities and local governments and even individuals ensuring that such community based connectivity solutions can greatly enhance the universal access policies sought by the governments in these countries. The important lessons from IICD’s critical assessment of its own projects are summarized in the main report and have also been transposed into recommendations of this present study.

D. State controlled mandates

In Costa Rica and Uruguay initiatives for providing universal access come not from the government or the telecommunications regulator but from the administration of the monopoly operator, namely, ICE in Costa Rica and ANTEL in Uruguay, acting on their own initiatives. These have involved installing public payphones, extending coverage of the fixed telephone network in the entire territory, and ensuring that basic telecommunications services are affordable. ANTEL has implemented various information society and ICT projects either on its own or in coordination with different government ministries, local governments and the private sector and civil society, including telecentres, education centres and a comprehensive e-government program. In Costa Rica RACSA, the value added services subsidiary of ICE, has established free telecentres in post offices throughout the country. These countries have the highest fixed penetration rates among Regulatel member countries and have achieved nearly 100% national

network coverage through deliberate cross subsidization In both countries local rates are quite affordable. They have among the highest per-capita GDP levels in Latin America, which certainly contributes to the economy's and the government's ability to invest in infrastructure, even in the absence of private market competitive forces.

On the other hand, Cuba and Honduras, where the state-run approach has yielded far less successful results, have far lower income levels, and hence fewer internal resources with which to finance such investments. They have the lowest mobile penetration rates of the 19 and among the lowest fixed penetration rates; however, in Cuba a particularly successful computer and Information Technology (IT) education initiative has been the Joven Club de Computación y Electrónica which are more than 600 training centres (including 5 mobile units) offering free IT (computers and electronics) instruction to anyone of any age that wants it. Since the start of the program in 1987 nearly 900,000 children, young people, workers, retirees and others have been trained. The JCCEs have also served as a place to confirm technical and professional qualifications in IT, develop specialized software as, for example, the tourism industry, identify talented young people for a career in computer science and IT, web development and communications.

THE REGULATEL GAPS MODEL

Theoretical aspects: Market and access gaps

Among the key theoretical and economic foundations for the analysis of this study, and particularly for the spreadsheet model used to assess levels of telecommunications development and impacts of universal access policies, are the concepts of "market efficiency" and "market gaps" and "access gaps". These notions have been gaining wide acceptance within the telecommunications policy and economics field as the best framework for understanding the interplay of market forces, regulatory decisions, and financial constraints on the development of telecommunications markets, especially among lower income and higher cost areas and populations. Figure 2 illustrates in detail the relationships and terms that define this "gap" theory, with explanations of the key concepts and principles below.

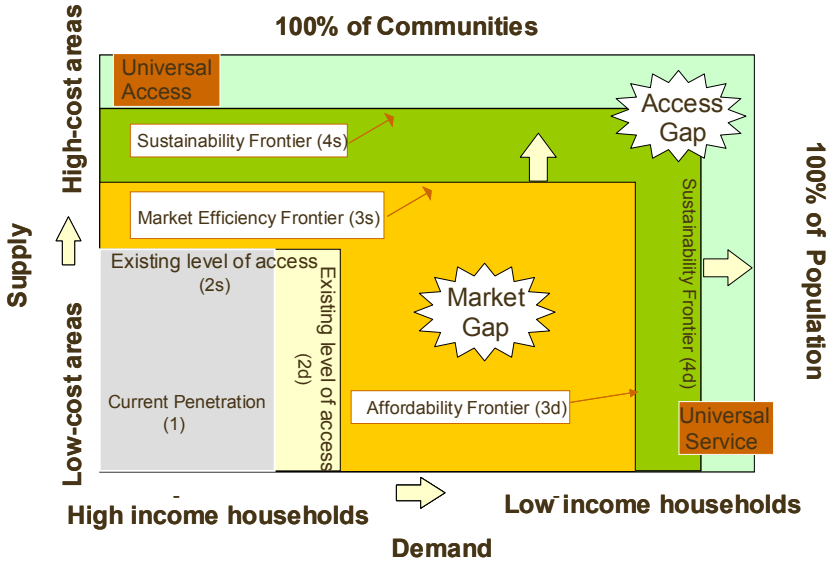

Figure 2
The Gaps Model

The diagram represents any market for any telecommunications service. The y-axis is the supply side, and the x-axis is the demand side, with the top border representing 100% of communities (i.e., geographic population centers) within the region or country being examined, and the right border representing 100% of the population, typically expressed as households. The gray box (1) showing "current penetration" represents the degree of actual subscribership or usage of the service in question at present, as a percentage of total households within a given geographic population center. The light yellow border (2) represents the existing level of "access" to the service. (On the supply axis, access and penetration are the same, as this axis measures network/service availability by population centers; whereas on the demand axis, penetration is unlikely to equal availability, as there are households that may be covered, but may not purchase the service).

The direction of decreasing supply tends to correlate with higher costs of providing service, while the direction of decreasing demand tends to correlate with lower incomes. (There may be exceptions to these general trends.) The bulk of this study and of most research and policy analysis regarding universal "access", focuses on the y-axis; that is, the supply-side availability of network and service coverage to population centers; however, increasing attention is beginning to be paid to demand-side questions, affordability, and the notion of true universal "service," at least for some basic services.

The “market gap”, as shown in the diagram, represents areas in which market conditions should allow for the profitable commercial provision of a given service, if non-economic barriers were eliminated. The “access gap” represents areas where it would be uneconomic for commercial operators to provide service on their own. In most countries, there still remain market gaps and access gaps, which prevent many populations and geographic regions from obtaining simple access to telephone and Internet services, even on a shared community basis. While the affordability of services for those within reach of networks (and hence concerns about universal “service”) is also an issue, and is becoming a higher priority for many countries, this primary focus upon initial access to networks and services in all regions has generally taken precedence in the policies and initiatives of countries throughout Latin America.

Application of the Regulatel Gaps Model: Comparative analysis of market efficiency and access gaps in Latin America

For this study, the project team developed an in-depth data collection and financial modeling methodology to examine the size and scope of the market and access gaps in Regulatel member countries, the Regulatel Gaps Model. This Model examines primarily supply-side conditions with respect to availability and gaps in community-level public access to telecommunications networks and services, specifically cellular voice telephone, public Internet, and broadband transmission. The results of this analysis measure the estimated levels of population coverage of these networks, and hence their accessibility to potential users within defined population centers (towns and villages), and the percentage of the population of a country or region that could obtain service.

Applying the Regulatel Gaps Model, we conducted both a “macro” comparison of the gap results for all countries for which sufficient market data were provided for the cellular mobile, Internet telecenter and broadband service markets, and a “micro” level analysis for a selection of countries for which detailed sub-national data were available.

Cellular mobile telephone service

Perhaps the most significant results relate to the extent of access to cellular mobile telephone service, as this service has become the de facto option for achieving voice telephone access throughout the region. Figure 3 illustrates the degree of access, and the

remaining gaps for this service - in terms of signal coverage of population centers by cellular networks – in the countries studied:

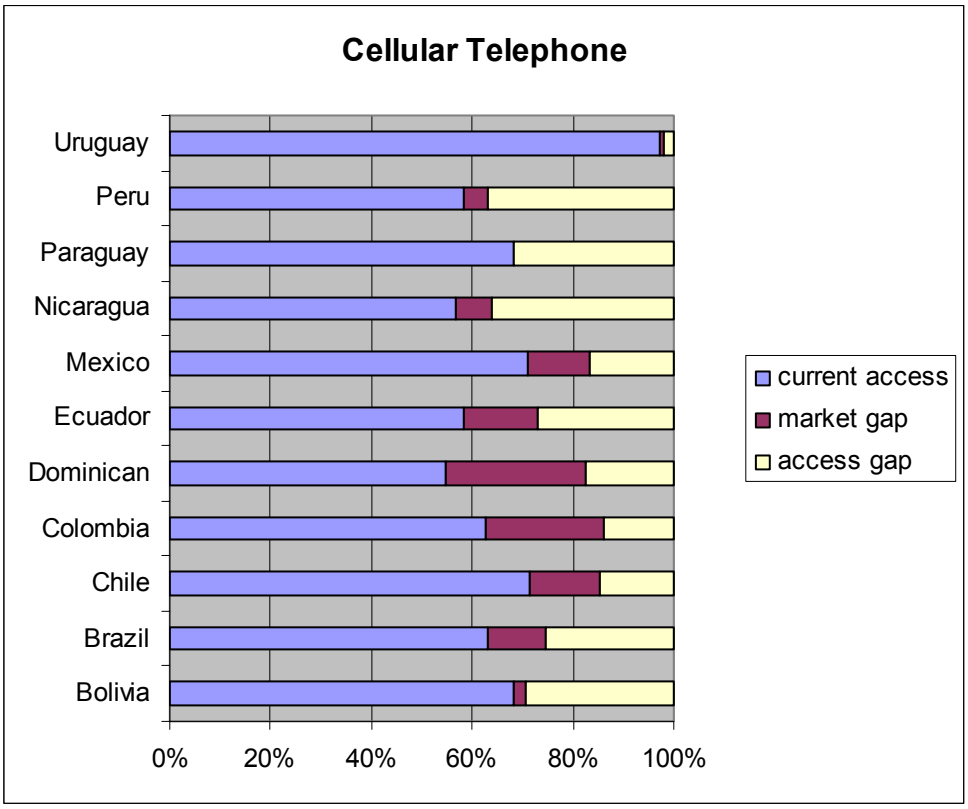

Figure 3
Regulatel Gaps Model results for cellular telephone access (coverage)

Cellular mobile networks have expanded rapidly throughout Latin America in recent years, and these trends are reflected in the data. On average, over 60% of the populations of the countries studied are now covered by cellular network signals, with several countries indeed indicating that network signal coverage already encompasses more than 70% of their population centers.

In most countries, an additional 10% to 20% of the remaining gap for cellular service access appears to be well within the market efficiency frontier, suggesting that over 75% of many countries' markets can be efficiently served by market-driven cellular network expansion. Given that many of the cellular networks in most Latin American countries have only been operating for a few years, and have generally been continuing to expand on their own initiative, there is every reason to expect that cellular coverage will increase in the near term to fill much of these economically viable market gaps. In some cases

further licensing or other regulatory measures to reduce barriers to such expansion may be required to reach the frontier.

The uneconomic access gaps for cellular coverage are in the range of 15% to 25% of the market in most countries, although the populations that they include are often the most disadvantaged, in terms of geographic isolation and low incomes. The source of these cellular access gaps is typically the higher costs of deploying both backbone and local transmission facilities in the remote, mountainous, and jungle regions of these countries, where sparse populations have little income, and other hindrances prevent the cost-effective establishment of network services. It is noteworthy, however, that many such areas are indeed included within the market frontier of these and other countries.

In sum, this analysis suggests quite strongly that the liberalization of cellular telephone markets in Latin America has had the expected and desired effect of spreading access to these services, and hence to voice telephony, quite widely throughout the region, without significant need for public financing intervention.

Internet and telecenters

The rapid growth of cellular voice services is beginning to be mirrored across Latin America by expanding interest in access to Internet connectivity, and the market results are reflecting this trend as well. Here the definition of “access” is more ambiguous, as most Internet services still depend upon fixed, wireline-based networks for connections to end users, although this situation is also changing. Also, whereas cellular phone service is now most typically an individual, private subscription/pre-paid service, Internet access for a large proportion of users – probably a majority in most Latin American countries – is more often a public access phenomenon.

The baseline results for such public Internet/telecenter access in the countries studied are shown in Figure 4.

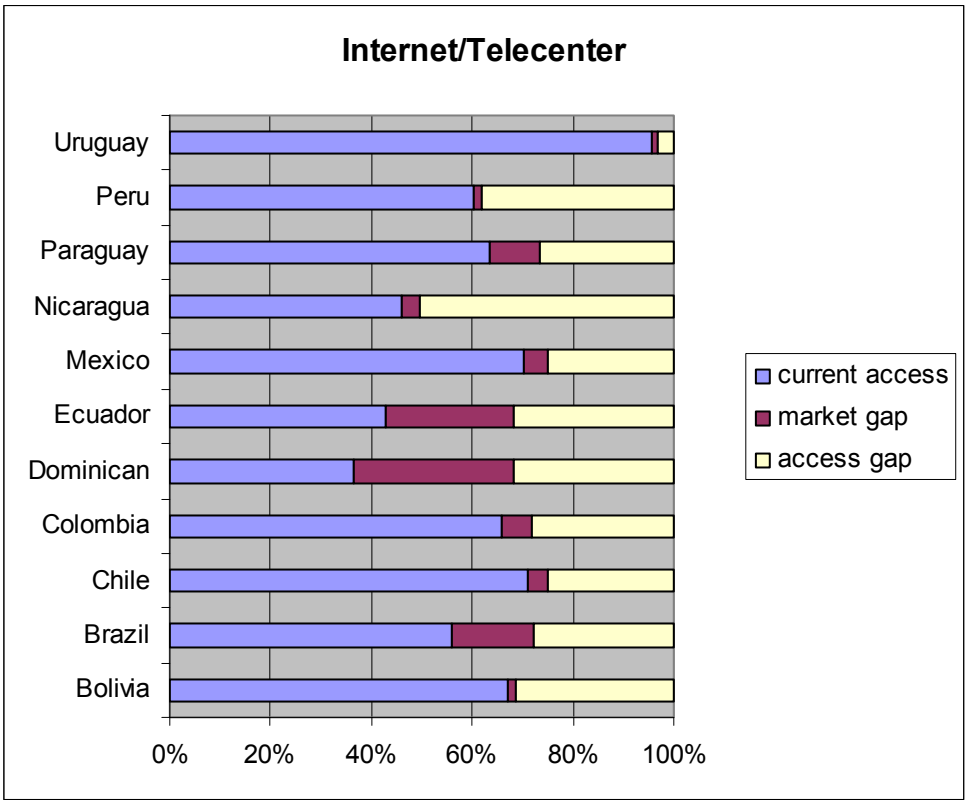

Figure 4
Regulatel Gaps Model results for Internet/telecenter access

The degrees of public access to Internet capabilities indicated by these measures vary quite widely among Regulatel member states, and within different regions of these countries. While some countries claim public Internet access is available in 60% to 70% of communities, in most countries there are many regions where Internet access is not at all available, or only sparsely. As expected the trend is that such access is greatest in larger cities, and in fact nearly all cities throughout the region with populations above 100,000 now offer Internet access, a situation which was not so widely the case even a few years ago. Among medium sized cities and towns of 20,000 to 100,000 inhabitants, Internet access is less common, averaging in the range of 25% to 100% across different Regulatel countries. A much smaller proportion of towns smaller than 20,000 in most countries currently include Internet connectivity or telecenters, although these numbers appear to be increasing across the region as well.

The model indicates significant disparities in the scope and potential of market efficiency coverage for public Internet access. In some countries, the results suggest that public Internet telecenters could be commercially viable in up to 75% of the market. In others,

the size of the true access gap for Internet access is as high as 40% to 50%, including most smaller and more isolated towns. These results for Internet and telecenter access are driven substantially by the underlying assumptions within the model concerning the availability and cost of technology to achieve local Internet access, specifically systems that are often based on VSAT downlinks connected to WiFi-based access transmission nodes, connected to small public telecenters.

Broadband

The third major market segment examined by the model is broadband network access. For the most part, broadband networks and services are quite new and not widespread in the region, especially beyond major urban centers, and in many cases reliable data on current levels of access are not readily available. This aspect of the modeling exercise also involved key assumptions about future broadband access technologies that could be deployed, especially broadband wireless access (BWA), which has the potential to shift the economics of this segment dramatically, thus influencing the size and scope of the market efficiency frontier and the access gap. The results were as shown in Fig. 5.

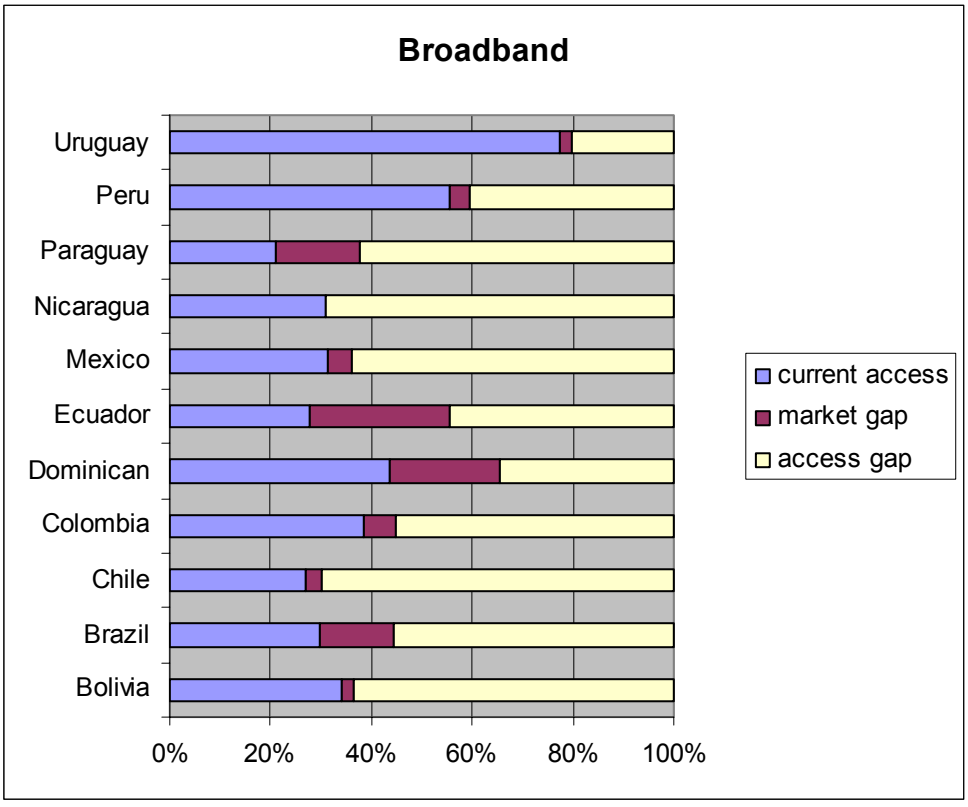

Figure 5

Regulatel Gaps Model Results for broadband access

The status of broadband markets is much more uncertain in Latin America, as one would expect given the relatively new technologies and market interest in this area. For most countries, the access gap is greater than 50% to reach all localities, although district-level access is more achievable for most. There do appear to be large potential opportunities in several countries for market-driven expansion; in all likelihood, this type of growth will begin to be seen as soon as viable pilot projects and public-private undertakings to deploy new broadband access technologies begin to show promise. If revenues from other sources become available to add to this base – for example, payments from government and institutional customers, or shifts in demand from voice applications toward broadband due to availability of Voice-over-IP service – then the market prospects for broadband services become commensurately more attractive.

"Micro" detail analysis of selected country results

The usefulness of the Regulatel gaps model extends beyond macro comparisons and analysis to allow much more detailed assessment of the conditions within individual countries and regions with respect to the location, size, cost, and characteristics of the market and access gaps for telecommunications services. This level of micro analysis depends upon a substantial level of detailed input data on each district or division within the country being studied, such as geographic, demographic, and network statistics that may be unique to each location. The study team sought such levels of detail from the member Regulators and received extensive inputs from five countries. The following example summarizes the results for Brazil. The full report provides similar disaggregated micro results for Bolivia, Colombia, Mexico, and Chile.

Brazil, the largest country in Latin America, consists of 26 states and the capital region, ranging in population from 500,000 to nearly 40 million. In this respect, many regions in Brazil are comparable in size and socio-demographic characteristics to several entire countries elsewhere in the region; hence, running the gaps model at the "micro" level for each of these regions is akin to running it at a "macro" level for other countries. Nevertheless, the analysis of market status and potential on a region-by-region basis

provides interesting insights into the diversity of the country, and the areas where market and access gaps are most pronounced.

Summary Results **BRAZIL**

Infrastructure shared % **0%**

Region	Cellular Telephone			Telecenter/Internet			Broadband		
	Current Access	Market Frontier	Access Gap Capital Cost	Current Access	Market Frontier	Access Gap Capital Cost	Current Access	Market Frontier	Access Gap Capital Cost
National	**63%**	**75%**	**$27,387,905,988**	**56%**	**72%**	**$10,065,531,371**	**30%**	**44%**	**$10,965,166,261**
ACRE	62%	75%	$87,533,950	51%	70.99%	$33,382,868	22%	44%	$35,841,291
ALAGOAS	60%	75%	$445,086,581	38%	68.71%	$169,742,900	26%	52%	$180,034,500
AMAZONAS	52%	74%	$441,583,193	46%	70.39%	$168,406,811	33%	53%	$178,586,672
AMAPA	61%	74%	$74,896,123	63%	73.27%	$28,563,173	26%	33%	$31,646,113
BAHIA	49%	74%	$2,057,172,189	22%	65.56%	$784,544,824	25%	53%	$831,178,639
CEARA	58%	75%	$1,166,645,978	40%	69.11%	$444,924,381	28%	51%	$472,961,922
Distrito Federal	100%	100%	$0	100%	100.00%	$0	75%	75%	$3,127,451
ESPIRITO SANTO	71%	75%	$509,677,107	60%	73.19%	$186,010,002	25%	43%	$200,631,918
GOIAS	67%	74%	$822,646,790	67%	73.70%	$300,230,340	27%	35%	$335,326,919
MARANHAO	41%	72%	$927,212,131	26%	66.26%	$338,392,147	22%	54%	$356,667,428
MINAS GERAIS	62%	74%	$2,935,377,931	55%	71.60%	$1,071,285,422	25%	48%	$1,143,772,499
MATO GROSSO DO SUL	69%	75%	$340,928,585	68%	74.45%	$124,424,122	28%	39%	$139,121,893
MATO GROSSO	65%	74%	$420,332,610	60%	72.47%	$153,403,142	23%	49%	$163,182,040
PARA	56%	74%	$1,015,944,293	39%	68.83%	$370,775,531	27%	55%	$391,092,440
PARAIBA	51%	72%	$565,013,528	40%	68.18%	$206,205,391	21%	49%	$218,978,542
PERNAMBUCO	58%	74%	$1,299,127,862	44%	69.83%	$474,125,231	28%	49%	$505,999,013
PIAUI	53%	72%	$466,526,912	37%	66.92%	$170,262,055	22%	49%	$180,394,141
PARANA	63%	74%	$1,569,035,692	68%	74.29%	$572,629,863	25%	36%	$638,372,874
RIO DE JANEIRO	72%	75%	$2,389,034,986	68%	74.64%	$871,893,982	42%	48%	$938,284,101
RIO GRANDE DO NORTE	55%	73%	$456,067,889	40%	68.18%	$166,444,966	24%	49%	$177,055,470
RONDONIA	60%	74%	$226,375,644	68%	74.49%	$82,617,275	20%	31%	$93,914,602
RORAIMA	55%	74%	$53,222,095	51%	71.34%	$19,423,752	23%	41%	$21,072,255
RIO GRANDE DO SUL	68%	74%	$1,681,315,974	68%	73.85%	$613,607,288	25%	29%	$703,717,772
SANTA CATARINA	66%	74%	$878,793,697	66%	73.57%	$320,721,521	21%	33%	$359,410,795
SERGIPE	62%	74%	$292,770,981	26%	66.08%	$106,848,689	20%	55%	$112,265,355
SAO PAULO	71%	75%	$6,075,742,971	71%	75.16%	$2,217,382,232	37%	38%	$2,475,960,058
TOCANTINS	53%	70%	$189,840,299	56%	69.43%	$69,283,462	14%	34%	$76,569,559

The data indicate that the cellular telephone market is reasonable well developed, covering 63% of town populations, but with a remaining market gap of another 12%. Most regions generally mirror these conditions, with cellular coverage in the 60% to 65% range. The areas that the model indicates should be within the market frontier but are not currently served tend to be towns/cities of greater than 20,000 population; according to the data there are some 192 such towns in Brazil currently without cellular network coverage. The cellular market results also show the net subsidy cost that would be required under prevailing conditions to eliminate the uneconomic access gap in each region. The overall total is about US$27-billion, with widely varying amounts needed for different regions. In Sao Paolo, for example, the subsidy cost to eliminate the access gap would be over US$6-billion, whereas in Amapa it would cost only US$75-million.

With respect to Internet access, the data provided indicate that pubic Internet access is already quite widespread throughout Brazil, within reach of 56% of the population through telecenters or the equivalent. The market efficiency gap is another 16%, meaning that local Internet access for some 72% of the country also appears to be within reasonable reach of the market (at the community or town level). As for broadband service, the data on current levels of access to broadband networks is highly estimated, but the model can still reasonably project the potential frontiers and gaps. On the basis of the model's assumptions regarding wireless broadband deployment, the market frontier for access is about 44% population coverage (note that this includes all urban areas as well as other regions). The subsidy cost to achieve universal broadband access would be about $11-billion.

Analysis of findings and implications for policymakers

The findings arising from this exercise provide important insights into the status and trends in Latin American telecommunications markets, and implications for Universal Access policies and programs in the region. As has been increasingly acknowledged in telecommunications development circles, cellular telephones have become the new Basic Service of choice, due to levels of availability, affordability, and convenience that have far exceeded in less than a decade the impacts that traditional fixed-line telephones were able to achieve in nearly a century. From this perspective, it seems that the main emphasis of universal access policies concerned with voice telephony – indeed even

those aiming to shift toward universal voice service – should emphasize these market realities, and avoid investing scarce resources in fixed network deployments, where mobile services can (and often already do) serve the market with little or no subsidy. Moreover, the work of the cellular market is not yet complete, as most countries have yet to see their mobile networks extend all the way to the market frontier. On the other hand, where true access gaps do exist, the policy question involves not only identifying and quantifying these gaps on a case-by-case basis, but determining what socio-economic criteria and priorities should drive allocation of public resources to fill those gaps.

With respect to Internet access, the most interesting finding from analysis of several countries' data in this area is that the market should again be able to do much of the work without significant subsidy incentives. Where this may already be occurring, these developments validate the finding for other countries that the market frontier for Internet access may be far beyond its present levels, even toward nearly universal access itself. And if such countries have not yet seen growth patterns in Internet services comparable to the cellular market, there is certainly evidence to suggest that they will, given appropriate incentives and opportunities for market forces to take hold.

Finally, the model's review of the broadband market, while it depends upon less reliable data and more forward-looking assumptions, nevertheless supports a conclusion that broadband connectivity is very much within the range of options for telecommunications development across much of Latin America. The model results quite probably establish a low-end, conservative boundary for what the broadband telecommunications markets in Latin America can continue to achieve through economic and regulatory incentives and new technological and service configurations. It suggests that there is considerable room for market-based growth, and even more with strategically targeted subsidies, and that perhaps the most promising medium to longer term approach will be the provision of integrated services over broadband access networks, at least in a large number of locations. These ideas are explored and elaborated further in subsequent chapters of the report.

INNOVATIVE STRATEGIES AND BEST PRACTICES FOR ACHIEVING UNIVERSAL ACCESS

The research for this study has highlighted many interesting and innovative technologies, financing, business, commercial and new partnership arrangements and regulatory strategies in Latin American universal access policies, programs and projects. It has brought out a sampling of general ideas and specific case examples from around the region and in some cases from beyond. Although many initiatives remain speculative, either as to their effectiveness, sustainability, cost-effectiveness, replicability, or scalability – and some experiments will undoubtedly prove impractical in the long run – the mix of new approaches and broadening involvement in the process offer valuable insights that can be shared among the Regulatel member countries and with others. Not all of these innovations and practices are entirely new or revolutionary, as many of these countries have been leaders for quite some time, but each offers elements of critical but creative thinking, implementation of new strategies that sometime departs from traditional approaches to delivering communications services to the public. These are facilitating the development and experimentation with promising new models and pilots.

Transmission technologies for local access and transport

Universal access programs in Latin America are providing an excellent opportunity to experiment with the evolving wireline and wireless technologies for providing access in rural, remote and unserved areas.

The most commonly deployed wireline technologies for broadband local access networks are digital subscriber line (DSL) over a copper local loop and coaxial cables whereas power line communications (PLC), which uses the low and intermediate voltage lines of the electricity power distribution network to transmit high speed voice and data signals also presents an interesting possibility especially in countries such as Ecuador and El Salvador which have high electricity penetration rates. This technology is still being developed and has so far not been widely used outside of experimental and pilot projects, but wireline technologies are in most cases not very cost effective in most rural and remote applications. Following are promising wireless technologies which are proving to be very appropriate in these areas:

a. Second and third generation cellular mobile (radio-in-the-loop) systems

This is a mature technology for both voice and data and while the cost of a Greenfield installation can be relatively high, expansion of existing second and possibly third generation systems can be cost effective because the major component of capital cost is in the installation of new base stations. The cost of adding new subscribers and capacity is usually marginal as these functions are shared by all users. Some low cost operators are using such systems very effectively.

b. Broadband wireless access (BWA) systems

Because of their decreasing price and wide coverage areas BWA and pre-WiMAX systems are very promising solutions for providing affordable access to stand alone communities in universal access applications. Figure 6 shows a BWA access configuration with a satellite backhaul link. A single base station can cover an area with a radius of up to 30 km in a flat rural setting where it can be practical to receive a signal with a small outdoor antenna depending on the signal strength in any particular location in the covered area. Non line-of-sight (NLOS) coverage is available within a radius of 3 – 5 km. The subscriber simply installs the customer premises equipment (CPE) by simply plugging it into a power source and a terminal which can be a residential VoIP telephone, a computer or a public payphone. A system like the one illustrated in this figure today costs less than US$ 50,000 including a base station and remote network management and control function. The CPE costs in the order of US$ 200 – 250.

The OmniGlobe model (www.omniglobenet.com) like the recently completed QINIQ network (www.qiniq.com, Figure 7) use such a network configuration.

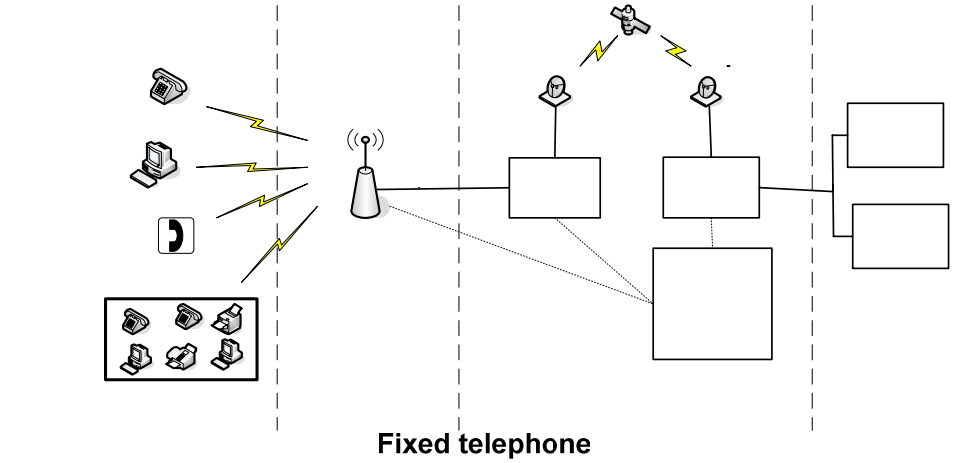

Figure 6
Broadband Wireless Access (BWA) with satellite transport (The OmniGlobe model described below uses a network configuration similar to this)

RF Base Station (with possibly a switch and server)

B. Access network

Figure 7
QINIQ Network: 4.5 m. VSAT, Base Station Antenna Tower and Shelter at Chesterfield, Nunavut, Canada

Another access solution is the deployment of a cluster of WiFi hotspots covering a whole area of a community. Each hotspot can provide coverage within a radius of a few hundred meters of a WiFi base station. In Minnesota, for example, Maple Leaf Networks (www.mleaf.net) has built a network in and around the town of Harmony, Minnesota covering an area of nearly 200 km^2 using 12 WiFi meshboxes supplied by LocustWorld (www.locustworld.com) situated on top of silos and water towers in this rural region. The capital cost of the whole network according to Maple Leaf was less than US$ 20,000. Maple Leaf offers a 1 Mbps down/256 Mbps up service for US 30/month. An "indoor" line-of-sight CPE costs US $ 125; an external unit costs US$ 175. A similar network in Sopachuy, Bolivia covers most of this rural village of 1,500 people with only 3 overlapping WiFi hotspots. (See Figure 8 and below). Each WiFi transceiver/router has an individual IP address by which it can be controlled and managed by a local operator or from anywhere in the world. The system supports data, soft (computer based) telephony and VoIP.

Source: LocustWorld

Figure 8
Installation of a meshbox at the telecentre in Sopachuy, Bolivia (The omni-directional antenna is located on top of the meshbox)

Also at Yachana in the Amazonian region of Ecuador, 2.5 hours by motorized canoe from the nearest small city, FUNEDESIN, the Foundation for Integrated Education and Development (www.funedesin.org) has deployed a wireless mesh network also

supplied by LocustWorld to connect a school (Yachana Technical High School) an ecotourism centre (Yachana Lodge Ecotourism Centre), a bio science centre (The Bio Science Centre and a medical clinic13. The different sites are between 1.5 km and 5 km. apart. The mesh is connected to the outside world via a VSAT link. All power for the meshboxes and laptops is provided using solar panels. VoIP is used to provide voice services within the network and to link users to the worldwide public telephone network through Skype which provides very good service even though some delays are perceivable as a result of the satellite link.

Used in a point-to-point mode WiFi can also be used as a backhaul transmission link with line-of-sight ranges that can easily reach up to 20 km. depending on antenna gain and the power which can be applied to the radio which can be higher in rural areas than that which might be permitted in urban areas for the 2.4 MHz unlicenced band[14]. An agricultural community information system located in the Chancay–Huaral valley north of Lima, Peru uses a network of 12 WiFi backbone links (the longest of which is 10 km) operating in the 2.4 MHz frequency band to cover the whole 22,000 hectare (220 km^2) valley. The installed cost for the tower, antenna, and radio equipment at each site was between US$ 1,200 and US$ 1,500.

c. Access using the 450 MHz frequency band

There has been growing interest in using the 450 MHz band and, more specifically, CDMA 450 technology for rural, sub-urban and sparsely populated areas for both mobile and fixed applications because (i) the relatively large cell sizes decrease costs because fewer base stations are required to cover a given area, (ii) the commonality of design and commercially available standard which ensures that both the terminal and network equipment are produced in large quantities resulting in decreasing prices, and (iii) it is a broadband system that can simultaneously transmit high speed data, voice and VoIP. In-building coverage is also good in this frequency band.

[13] FUNEDESIN owns 4,380 acres of rainforest (the purchase of which was made possible through donations from Rainforest Concern) that is protecting biodiversity and the culture of the indigenous peoples of the Amazon rainforest. The aim of FUNEDESIN is to be self-sustaining through eco-tourism and establishment of micro enterprises. FUNEDESIN has been recognized for its world-class pioneering work in these areas. Yachana Lodge was awarded the "Conde Naste Ecotourism Award" 2004 and was a finalist in the World Travel and Tourism Council award 2005.

[14] The world record for an terrestrial- based unamplified WiFi point-to-point connection, achieved by a couple of students in 2005, is 124.9 miles (= 201 km) See Wired News, 2 August 2005

The privately initiated and operated regional telecommunications company, Televias Huarochiri, which is being partially financed by FITEL, the Universal Access Fund in Peru, has deployed a CDMA 450 network to provide fixed access in an entire province in the Andes Mountains (5,700 sq km., 60,000 inhabitants and mountain peaks of up to 5000 m.) using only four base stations. The cost per base station is US$ 25,000. With this network the company plans to offer services to about 1000 fixed telephone and 200 Internet subscribers and about 150 public payphones. It has also deployed a CDMA 2000 1x network (operating in the 800 MHz band) with which it will serve up to 1000 mobile customers.

Financing Innovations

There are numerous opportunities for policymakers and universal access fund administrators and regulators to support the initiatives of entrepreneurs and potential investors and entrepreneurs who seek financial resources to support new investments in telecommunications projects. These can include cooperation with financial institutions dedicated to underwriting ICT projects, including microfinance of small scale projects, through co-financing, risk mitigation, loan guarantees, and other mechanisms.

Indeed micro credit has been an important tool in rural development in many countries of Latin America and elsewhere for years, especially in agribusiness, but increasingly in many other sectors including small telecommunications and ICT projects. Micro financing strategies target small, medium, and micro-enterprises (SMMEs), understanding that they have an important role to play in the reduction of poverty and the creation of sustainable employment and that in many cases they are in a much better position and prepared to provide the goods and services that the local population wants. Within traditional financial systems, commercial banks are often reluctant to assume the risk of lending to SMMEs, given low aggregate returns, and high risks and transaction costs. The flexibility and responsiveness of micro and small and medium enterprises in the face of rapidly changing demand and supply conditions can be an advantage in the telecommunications and ICT sector, especially in rural and underserved communities; however, potential entrepreneurs often face challenges in terms of up-front financing, even in the amount of a few thousand dollars or less.

In other areas, the governments' own activities as a user of telecommunications can lead to direct financing of major components of new networks and services which can help expand the market and reduce risk.

This study is recommending two innovative financing instruments or approaches which are especially well suited to the smaller, entrepreneur driven universal access projects in this sector.

(i) ENABLIS: Filling the gap between micro credit and venture capital

For most universal access projects and especially those which involve some network build out, microfinance funding levels are not enough. Their funding requirements are significantly above those of the capacities of a microfinance organization but, on the other hand, below those which will interest a venture capitalist. An innovative funding mechanism intended to fill the "financing gap" for entrepreneurs who are unable to find risk capital between the micro-credit and venture capital thresholds has recently been established in South Africa. Enablis Entrepreneurial Network (Enablis) (www.enablis.org) whose purpose is to support entrepreneurs (men and women) who adopt ICT as a significant enabler for economic and social development in the developing world is a not-for-profit, membership-based, cooperative organization which has the support of international and domestic private sector companies and funds and the Canadian Government's Fund for Africa. The underlying principle for Enablis project financing is that in successful community-based micro-finance institutions, where investment certainty is low, closeness to the borrower ensures loan repayment. The membership relationship that Enablis fosters together with the capacity building services it offers, results in reduced risks. The Enablis model is built on a concept of regional chapters that all have the same cooperative vision, governance approach and operating methods while at the same time adjusting to regional conditions.

What makes the organization unique is that in addition to financially supporting small entrepreneurially-focused ICT projects Enablis supports their promoters by providing them with the networking, learning, mentoring and coaching which they need and which will contribute to the success of their ventures. Enablis members have access to a number of on going support services including an e-coaching program, an e-

advantage seminar program, an e-circle peer-to-peer support program and an e-finance risk capital program.

The concept can easily be implemented in Latin America.

(iii) Venture oriented universal access fund mechanism

Under this approach universal access funds are structured so that a portion can be used for micro financing operations including the offering of loans, equity participation in projects and/or the implementing telecommunications company, grants or a combination of these. Application of funds out of the "micro financing" budget item would be subject to somewhat different criteria with respect to risk and would have to have provision for some failures and defaults. On the other hand, it would also be a potential additional source of income for the fund through interest on loans and potential returns on investments.

Evaluating and vetting of proposals for micro loans, equity positions and grants in small rural and peri-urban universal access projects initiated by small local entrepreneurs, local authorities and sometimes NGOs will require regulators and/or fund administrators to develop special due diligence skills, which many of them may not have today. They will have to be able to establish the financial, technical and commercial viability of such entrepreneur driven type ventures and be able to structure loans, equity positions and grants based on each particular project and circumstances. The project may also need to be approved partially on social and economic development grounds and not solely on its commercial merits. Fund administrators will have to have these skills at both the working and management levels. To evaluate project proposals they will require a core of engineering, financial and economic skills which may not be the same as for more conventional type of projects with which they have been dealing up to now. The administrators of the fund will also have to be able to make decisions rapidly based on the analysis and recommendations of the fund's staff.

As indicated above we are recommending this approach as one of several means to deal with the inability of universal access fund programs to disburse the large sums of money that they collect.

These innovative financing instruments do not, of course, eliminate the need for more complementary traditional financing and credit support methods including: foreign donors and lenders; loan guarantees, vendor financing; and a number of public-private partnership arrangements including project finance, build operate transfer, and export bank and credit agency financing.

Innovative business and commercial practices

Many universal access projects in Latin America provide good examples of business, commercial, service offering, marketing and partnership innovations. In commercial and non commercial telecentres, for example, the cost of operating is often offset by non core (telephone and Internet access) commercial activities including broadband Internet services; national and international long distance calls, voice mailboxes where people can come to check their messages for a small fee as well as non telecommunications services such as post office, photocopying, faxing, typing, the sale of local advertising and announcements on community radio stations[15] In others models the telecentre can serve as a full-service business communications resource where anyone else can obtain a wide range of support services to help establish, operate, or support their business ventures, including: technical and industry research materials and resources; temporary office and conference space; use of computer, telephone, fax, photocopy, and printing facilities; web site development; advertising services; translation services; job listings; technical consulting support; and clerical services[16]. Another interesting business model is that of the "chalequeros" in La Paz, Bolivia individuals who resell mobile telephone services from a single handset that they carry around with them. Micro credit is well suited to this type of undertaking.

Successful undertakings are invariably based on a set of specific service offerings which have been developed and implemented to suit the specific requirements of the community or target population to be served, established through extensive research and intimate knowledge of the community. Televias Huarochiri, mentioned above, decided on a comprehensive 5 services (fixed, mobile and public telephone, Internet access and cable TV) offering covering a whole province in Peru.

[15] As found, for example in the LINCOS telecentre projects in the Dominican Republic and Costa Rica.
[16] Hungarian Teleház model

Focused marketing is especially important for small, local commercial undertakings. Ruralfone, a fully commercial small town operator in Brazil, (www.ruralfone.com) has implemented simple but effective community oriented marketing techniques such as door-to-door sales, systematically following up with new and existing customers, establishing good relationships with local governments, and sponsoring and participating in local events.

A very important policy in both commercial and cooperative type community projects is the empowering of the young people in the community and giving them responsibilities for managing, administering, operating and maintaining the network on a day-to-day basis and teaching others (Figures 9 and 10). This has helped ensure the success of both not-for-profit community operators such as the Chancay-Huaral Agriculture Information System project and also commercial local and regional telecommunications companies such as Ruralfone and Televias Huarochiri.

Source: Peter A. Stern, 02/05

Figure 9
Administrators of the Telecentre at Chancay Bajo, Peru

Source: Ruralfone

Fig. 10
Ruralfone staff meeting, Quixada, State of Ceara, Brazil

The relationship between non governmental organizations (NGOs) and the ICT sector can be mutually beneficial. NGOs generally need affordable communications and see ICTs as an important instrument to accomplish their missions. Some have made ICT deployment their primary activity, recognizing the central value of information resources to other development objectives.

Innovative procurement practices have resulted in significant savings in capital investment requirements as well as during project design, implementation and operation phases of these small, local undertakings. Examples are:

i. the use off-the-shelf more traditional technology. Ruralfone in Brazil has used this method quite effectively buying just locally produced, proven GSM equipment;

ii. using outsourcing and demand aggregation for the planning, design, installation and operation of small community oriented enterprises such as OmniGlobe which offers small entrepreneurs wanting to establish local wireless networks everything from system design, build out, backbone connectivity to the Internet and ongoing operation and back office support;

iii. government procurement whereby demand for telecommunications and ICT services from different government departments and agencies, such as education, health, public services, and others, which allocate funds for telecommunications, data networks, e-government projects, and service is aggregated.

Regulatory policies and strategies for universal access

Regulators and Fund administrators have come to recognize the importance of adapting regulatory provisions to achieving universal access objectives in rural, remote and underserved areas of Latin America as well as affordable service access to urban populations including policies related to frequency use, Voice over Internet Protocol (VoIP), specifying quality of service requirements and standards, licencing, and facilities, tariffs and interconnection, and infrastructure sharing.

(i) Spectrum use policy

New wireless technologies and applications (some of which are discussed above) have increased the demand for spectrum dramatically over the past few years. The ITU reported that it has been advised of more frequency assignments in the last ten years than in the whole preceding period from the start of radio[17]. The scarcity of spectrum especially in the desirable range between 350 to 6,000 MHz is becoming more acute in spite of the fact that the usable spectrum is today 5,000 times wider than it was at the beginning of the radio era in the late 1920s[18]. The need for ever more spectrum and computerization are leading to the development of new ways to transmit and receive signals over the air and to manage the radio frequency spectrum. Policy makers are reflecting on new, more efficient ways of managing the radio frequency spectrum with the most immediate being the allocation of an increasing amount of spectrum to licence-exempt use to acknowledge the potential

[17] Lie, Eric, Background Paper: Radio Spectrum Management for a Converging World, Workshop on Radio Spectrum Management for a Converging World, International Telecommunication Union, Geneva, 16 - 18 February, 2004.
[18] Werbach, Kevin, Radio Revolution: The Becoming of the Age of Unlicenced Wireless, New America Foundation.

of these new wireless technologies and to promote innovation in all wireless applications especially for universal access.

Not all policymakers and regulators are keen to offer frequencies for unlicenced uses. Besides being concerned about potential abuse and uncontrolled use of the spectrum leading to congestion, they may also be reluctant to part with a good generator of revenue. Others, however, see the potential benefits for their communications industries and citizens through the mass market that can be created by the development and production of open standard, licence-exempt devices. Of the Regulatel member countries only El Salvador so far has a licence free spectrum policy. Others are reviewing these policies in light of technological developments.

Latin American policymakers, regulators and Fund administrators must recognize the potential of this technology to provide cheaper and more accessible broadband local access. Policies and regulations for the use of licence-exempt spectrum in Latin America should therefore build on developments in the USA, Canada and Europe while at the same time ensuring that entry of such radio equipment is not hindered so long as it has been type approved in North America and/or Europe.

Also, as mentioned earlier, there is growing interest in using the 450 MHz band and, in particular, CDMA 450 technology for rural, sub-urban and sparsely populated areas for both mobile and fixed applications; however, so far there appears to have been limited or no development of 450 MHz spectrum policies for rural applications in Regulatel member countries.

(ii) Voice-over-Internet Protocol (VoIP)

Advances in packet switching technologies are making it possible to provide good quality voice services over the Internet using Voice over the Internet Protocol or VoIP. This presents a particularly attractive alternative to long distance and international calling especially where prices on the traditional public switched telephone network (PSTN) continue to be high and where access to high speed Internet at reasonable prices is becoming more readily available. It also presents opportunities for new and old service providers to offer voice services at prices

which are much cheaper than over the traditional circuit switched networks. Consumers benefit from lower prices.

This has become a serious challenge for incumbent telephone operators and regulatory authorities across the region. There is no question that VoIP alternatives directly cut into lucrative long distance and international traffic revenues (even while they also stimulate demand for such calls), including both outgoing call charges and incoming net settlement payments or termination charges. For this reason, many established operators have vigorously opposed authorization of both public and private VoIP applications in all its forms and some regulators and policymakers have joined them. In Panama, VoIP calls must pay a 12% surtax, and Internet cafés are subject to heavy fines if they allow customers to use VoIP applications. Both Mexico and Colombia have issued strict prohibitions in the past against VoIP services.[19] In Colombia only operators that have paid US$ 150 million can offer long distance services.

In all Regulatel member countries except Chile, where it is currently under study, VoIP is considered to be a technology for providing voice services and not a service in itself. Therefore, given that regulations are generally technology neutral it is treated no differently than public telephony and does not take into account the different forms (computer-to-computer, computer-to-telephone, and telephone-to-telephone). In Brazil, for example, computer-to-computer VoIP is not regulated but other forms require the operator to obtain a licence. Cuba is considering permitting VoIP in private networks and closed user groups. Other countries have specific authorization requirements for cybercafés and other types of uses.

The rationale for these types of restrictions sometimes includes arguments that VoIP services do not contribute equitably to national development and universal access obligations, and some of the revenues that they divert could be used to fund expanded access; however, the technical and economic advantages of VoIP can also offer intriguing opportunities to support those very universal access goals directly. For example, public telecenters and Internet cafés that allow low priced use of VoIP services over their systems can provide an essential option for public users who could not otherwise afford to place international calls. The same ideas can be

[19] Charny, Ben, "VOIP smuggled into Latin America," CNET News, 3 August 2004.

employed by small, rural telephone companies as well. If VoIP services are integrated with rural network development initiatives such as BWA or satellite broadband, the breakeven point for including Internet access, and even broadband connectivity, becomes much more achievable. In effect, voice telephone service whether for local or long distance calling can be provided on a packet switched network at a very low additional cost. Revenues from call charges that are lost to VoIP can actually translate directly into cost savings for both users and local service providers, removing many layers of cross-subsidy and bureaucracy from the universal access process.

In Peru one of the factors which has contributed to the success of the 30,000 or so cabinas publicas (commercial telecentres) has been the VoIP that they are able to offer to users. It is estimated that 1/3 of all the people who use these cabinas use their VoIP services. Among the lowest socioeconomic strata where telephone penetration is very low it is estimated that of all people that go to a cabina publica go to make VoIP telephone calls[20].

From this point of view, there seems to be little justification for maintaining any significant restrictions on VoIP services, especially in the context of rural access development. VoIP could open many remote markets to both voice and data access on a cost-effective basis.

(iii) Licencing

Burdensome licencing requirements like high taxation rates are important barriers to investment especially for the small investors that policy makers, regulators and Fund administrators would like to entice to build networks in rural and unserved areas of Latin America. In Brazil, Ruralfone, a North American investor with no particular ties to Brazil was attracted to invest in the State of Ceara in Northern Brazil in part at least because of the ease of getting a licence. There was relatively little paperwork involved and the fixed telephone licence for the whole State of Ceara (7.4 million people) cost only US$ 4,100. Also because of a favorable regulatory environment

[20] Francisco Proenza, “Ecuador: Hacia una estrategia de uso y aplicación de Tecnologías de Información y Comunicaciones (TICs) al servicio del desarrollo loca”, 4º Informe de la Serie Apoyo a la inversión en el desarrollo de tecnologías de información y comunicación para combatir la pobreza rural en América Latina y el Caribe Centro de Inversiones de FAO Roma 8 de febrero 2006

Ruralfone was able to sign interconnection agreements with about 20 operators including the incumbent, Telemar, within a period of 6 months.

There are other Regulatel member countries have liberal licencing regimes. In Argentina the Secretary of Communications (not the regulator) issues a telecommunications licence to virtually anyone requesting one. It allows the licence holder to provide any and all telecommunications services, fixed or mobile, national or international with or without the licencee's own infrastructure; however, the licencee must advise the Secretary which services it intends to provide. Licences, which have to be awarded within 60 days of a request having been received, are good for the whole territory and are technology neutral. They are awarded for an unlimited period of time and come with a number of rights and obligations all of which are clearly described in the regulations[21]. Argentina has the fourth highest fixed and second highest mobile penetration rates of the 19 countries and amongst the lowest broadband Internet access rates.

In Guatemala there is no licencing requirement. Anyone who wants to operate or provide a service, basic or non basic) in urban or rural areas only has to register and thereby obtain a certificate from the regulator. The process is very simple and there is no limitation on numbers. It is also quite easy to get a licence in El Salvador.

These are good examples which show the benefits of having liberal and licencing regimes. They merit further attention by policy makers and regulators who are contemplating making adjustments to their regulatory frameworks to promote universal access.

(iv) Quality of service and standards policies

Regulations designed for areas with high penetration levels or with industrial imperatives in mind may require that certain levels of quality of service and standards be respected. For example, in Peru current regulations do not permit the installation or use of refurbished equipment even if its performance can be guaranteed as being just as good as new. Similarly, regulations and conditions of operation may not recognize that it may not always be possible to guarantee the

[21] Anexo 1, Marco Regulatorio de las Telecomunicaciones en la Argentina, Decreto 764/2000

same quality of service in rural as in urban areas even with new equipment. It may take days for a technician to travel to a very remote area of the country to repair a faulty payphone where the cause of the failure may be none other than a lack of sun to recharge the solar powered batteries. Also, the risk of interference from radio transmitting devices in certain bands may not be the same in rural as in more densely populated urban areas.

There are many quality of service and other standards which are important to respect if network integrity is to be maintained; however, if stricter standards are an impediment to investment and development of rural networks and services, policy makers and regulators need to determine where greater flexibility might be introduced with respect to these standards where this will either not cause any harm to the network or where the impacts are minimal.

(v) Tariff and interconnection regulations

OSIPTEL, the Peruvian regulator, in 1999 adopted special tariff regulations adapted for rural services under which rural operators are free to set outgoing and incoming tariffs so long as they do not exceed a maximum in either direction of calls between subscribers of the fixed service (PSTN) and a rural public payphone.

With respect to interconnection charges rural communications expert, Andrew Dymond, makes a strong and convincing argument for having asymmetric interconnection charges for rural areas as part of countries' universal access policies. Higher termination rates for calls originating in urban areas and terminating on rural networks are, he suggests, justified because it costs more to construct, operate and maintain networks in rural areas[22]. These higher termination rates should be accompanied by higher tariffs on such calls. Because of the inadequacy of costing information Dymond suggests as a first step using approximations which can subsequently be refined as regulators gain experience with asymmetric rates for rural terminations and tariffs. At least two Regulatel member countries (Chile and

[22] Dymond quotes ITU and other studies that suggest that a fixed rural network costs 6 to 10 times more than a fixed urban network per subscriber. See Andrew Dymond, Telecommunications Challenges in Developing Countries, Asymmetric Interconnection Charges for Rural Areas, World Bank Working Paper No. 27, 2004

Colombia) already have asymmetrical interconnection rates for calls to rural networks.[23]

Asymmetric interconnection charges make a lot of sense and can, as Dymond points out, have a significant impact in reducing the access gap and consequently the subsidy requirements from Universal Access Funds. This would seem to be an appropriate area for Regulatel with its members to develop policies, guidelines, costing methodologies (that can include benchmarks) along with model regulations and interconnection agreements for use in rural applications.

(vi) Facilities and infrastructure sharing

Sharing of facilities such as towers, ducts and gateways and other equipment and resources makes economic sense especially for small rural operators because it reduces their costs. It also makes sense from an aesthetic/environmental protection point of view and should be encouraged and receive the support of regulators/Fund administrators.

Models and Project Pilots

Research for this study has brought to light several very interesting, well adapted and very promising models and pilots in several Regulatel member countries (and elsewhere) that are applying the innovative technology, financing, service delivery, and business, commercial and partnership arrangements presented above. Table 2 shows in a matrix forms how the various innovative (and also more traditional) strategies and best practices presented above have been applied to these different models and pilots. This table can be used for devising new models and adapting other approaches for universal access. Also, there is an important role for Regulatel as suggested in the recommendations. The models and pilots, which are described in greater detail in the main report, are

1. A community telecommunications cooperative (Agrarian Information System (SIA) Project in the Chancay–Huaral Valley, Peru, www.huaral.org), a community initiated and operated network connecting 14 telecentres in this fertile 22,000

[23] See Bjorn Wellenius, Closing the Gap in Access to Rural Communications, Chile 1995 – 2002, World Bank Discussion Paper No. 430, 2002 and CRT Resolución 463 del 2001 por medio de la cual se modifica el Titulo IV y Titulo V de la Resolución 087 de 1997 y se dicta otras disposiciones.

hectare valley north of Lima serving the 6,000 farmers who initiated and partially financed the project. A technology innovation used in this project is point-to-point WiFi with links up to 20 km. There are also convincing youth empowerment programs as a result of which young people in the valley run and maintain the system and teach the older and younger members of the community in computer and Internet skills.

2. A community telecommunications operator: (Sistema de Información Campesina–Indígena Project, Sopachuy, Department of Chuquisaca, Bolivia) whose main objective is to facilitate access to information of importance to farmers and their associations in improving agricultural production through the use of the Internet (prices, clients for their products, commercial policies and consumer preferences and trends). The network is based on a technologically innovative WiFi mesh network topology supplied by LocustWorld (www.locustworld.com) and consisting of only 3 base stations each of which can serve 100 users in a range of 2 – 3 km and cost US$ 500 each. (www.iicd.org/espanol/boliviayecuador)

3. A privately initiated, entrepreneurial driven regional telecommunications company (Televias Huarochiri Pilot Project in Huarochiri Province, Peru) designed to expand the public telecommunications network in areas with very low income in the small mountainous province of Huarochiri, Peru. Televias Huarochiri will provide a complete offering of telecommunications services including fixed and mobile, in the home and in public places, Internet access and cable television throughout the province. The network which uses CDMA technology operating in the 450 MHz band (fixed) and 800 MHz band (mobile) cost less than US$ 1.5 million to cover this entire province of 60,000 km^2, 60,000 people, 4 river valleys and with mountain peaks as high as 5,000 m

4. The Televias Puyhuan project in Jauju (Department of Junin, Peru) which has a simple local access network built using Motorola's Canopy Broadband Wireless Access (BWA) system covering an area of 160 km^2 around the locality and providing access to a potential 16,000 people in this region whose economy is based mainly on agriculture and breeding. The project is partially funded by USAid and when completed will cost US$ 260,000 and will serve up to 600 customers

with telephone and Internet connections. It should become cash flow positive when it has signed up 280 subscribers.

5. A commercially run regional network connecting 29,000 people in 25 northern communities in an area of 5,180,000 km^2 in Nunavut Territory in the Canadian Arctic. (www.qiniq.com). Local access is provided by pre-WiMAX broadband wireless systems configured to provide non-line-of-sight (NLOS) coverage within 5 km of the base station. The communities are connected to the Internet and among themselves by a full mesh satellite network, enabling any site to talk to any other site on a single satellite hop. Bandwidth is dynamically allocated on a second by second basis allowing it to be effectively shared among all communities, based on demand to ensure that communities who need the bandwidth, get it when they need it. The business model is very dependent on locally based community service providers; the purely pre-paid billing concept; a bandwidth efficiency pricing plan

6. A privately initiated and operated local telecommunications company (Ruralfone in the State of Ceara, Brasil) whose cost effective business model is based on a set of very simple and easy to implement management, administrative, technological and commercial principles. (www.ruralfone.com). The whole town of 10,000 people is covered with a single GSM 1800 base station. The company supplies only a SIM card and lets people acquire their own handsets. There is only one simple rate plan.

7. A broadband access systems integrator model in which the integrator, OmniGlobe Networks (www.omniglobenet.com) offers complete system design, network build out, connectivity to the Internet and on going operations, maintenance, and back office support to small and medium sized local operators and service providers anywhere in the world. A network able to serve an initial 1,200 subscribers in West Africa was set up in less than 10 weeks after contract signature at a total cost of less than US$ 50,000. (See Fig. 6)

8. Two initiatives of an incumbent operator (Telefonica) which are facilitating access to basic telephone and Internet to low income users in underserved areas of Peru and Brazil.

9. A number of commercial and non-commercial telecentre models.

Source: Ruddy Valdivia

Figure 11
Rural telecommunications entrepreneur Ruddy Valdivia (center) and creator and operator of Televias Huarochiri (Peru) with his future customers

Table 2: Overview of innovative (and more traditional) strategies and best practices which have been applied in each model and pilot

Model	Example (locations)	a. Technology innovations	b. Financing innovations	c. Business, commercial, service delivery and partnership arrangement innovations	d. Regulatory provisions and strategies
1. Community telecommunications cooperative	• Agrarian Information System (SIA) Project (Chancay–Huaral Valley, Peru) (www.huaral.org)	• Deployment of WiFi in point-to-point mode	• Partially financed by users	• Run entirely by locals; intensive effort to train and empower young people to operate and administer the network • Deployment of VoIP	• Licence free spectrum if such policy is adopted by the regulator for WiFi.
2. Community telecommunications operator	• Sistema de Información Campesina–Indígena Project (Sopachuy, Department of Chuquisaca Bolivia) (www.iicd.org/espanol/boliviayecuador)	• WiFi mesh local access network (www.locustworld.com)	• Cost sharing among several local community organizations; some support from local and foreign NGOs • Network available for private customers.	• Shared satellite connectivity (demand aggregation) model • Only broadband	• Licence free spectrum if such policy is adopted by the regulator for WiFi.
3. Privately initiated and operated regional telecommunications company:	• Valtron Rural Telecommunications Pilot Project (Huarochori Province, Peru)	• CDMA 450 for fixed • CDMA 2000 1x (2.5G) for mobile	• Vendor financing • Project finance • Partial support from Universal Access Fund	• Training and empowering of locals who run the company; • Facilities sharing with electricity company • Possibility of sharing of office space and billing with electricity company • Full service offering (fixed, mobile, public telephone, Internet access and kiosks, cable TV) • Service offering developed after extensive market survey; adapted to local requirements	• Special tariffs for calls between rural payphones and fixed • Facilities sharing with local electricity company
4. Micro operator	• Televias Puyhuan (Jauju, Peru) • Oportunet (Técapan, Guatemala)	• Pre-WiMAx local access	• Foreign donor organizations • Project finance • Local entrepreneur	• Local entrepreneurs • Franchising through a local not-for-profit organization and with the support of a small nationwide local telecom operator (in Guatemala) • All broadband	• No licences (only registration) required in Guatemala
5. Small commercially operated regional network operator	• QINIQ Network, Nunavut Territory, Canada (www.qiniq.com)	• Pre-WiMAx local access		• Local contractor chosen to build and operate the network • Run on a purely commercial basis • Important role of the locally based community service providers • Purely pre-paid billing concept • Bandwidth use efficiency pricing plan	

Table 2: Overview of innovative (and more traditional) strategies and best practices which have been applied in each model and pilot

Model	Example (locations)	a. Technology innovations	b. Financing innovations	c. Business, commercial, service delivery and partnership arrangement innovations	d. Regulatory provisions and strategies
6. Privately initiated and operated local telecommunications company:	• Ruralfone (State of Ceara, Brasil) (www.ruralfone.com).	• Use of off-the-shelf locally produced GSM 1800 network equipment • In-country procurement of most goods and services		• Simple tariff plan • Only local staff • No expatriate wages • Only SIM cards (no handsets) reduces costs	• Licences easy to get and not expensive • No difficulties in negotiating some 20 interconnection agreements
7. Broadband access systems integration and outsourcing	• OmniGlobe Networks (Global) (www.omniglobenet.com)	• Pre-WiMAX local access • VSAT backbone with aggregation of satellite capacity • Very rapid deployment of network (8-10 weeks)	• Revenue sharing between local entrepreneur and systems integrator/outsourcing company	• Outsourcing of design, engineering, installation, initial training, back up support and acquisition of bandwidth along with internet connectivity • All broadband offering	• Licence free spectrum if such policy is adopted by the regulator for WiMAX
8. Initiatives of incumbents and large operators	• Telefonica (Peru and Brazil)				
9. Commercial telecentre models	• Cabinas publicas (Peru)	• Usually just a fixed line connection (ADSL or dedicated line)	• Self financed by entrepreneur	• Operates in a very competitive environment • Serves the large majority of people that have no computer at home	• No telecommunications licence required; • Not regulated.
10. Non-commercial telecentre models	• LINCOS (Dominican Republic and Costa Rica); Joven Club de Computacion (Cuba); Infoplazas (Panama); Compartel (Colombia); Puntos de Acceso and CBIT (Venezuela); GESAC (Brazil); Sao Paulo Acessa (Brazil); Pirai digital project (Brazil); Gemas da Terra Rural telecentres (Brazil); CAATEC (Costa Rica); CASIL and CASI (Uruguay); etc.	• In rural areas usually VSAT and sometimes connected to a cellular network if within coverage area.	• Usually subsidized by USF or other government agencies but also partially self financing • In Venezuela telecentres get to keep all charges made for telephone and Internet use as operator providing connectivity has to provide this for free under Universal Access Fund arrangements • In Panama incumbent offers connectivity at half normal price.	• Offer a number of telecommunications (telephone, fax and Internet), commercial (business support services incl. photocopying, web hosting, advertising, translation, temporary office space, clerical and technical consulting) and social (computer and Internet training, job listings, local radio broadcasting, etc.) services	

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THE NEW VISION FOR UNIVERSAL ACCESS PROGRAMS AND FUNDS AND RECOMMENDED ACTION

The role that Universal Access Fund programs and their equivalent have played in the growth of telecommunications in Latin America over the past decade has been important, although not nearly as significant as the market forces highlighted above. The Funds have helped to close some of the gaps not addressed by the market, especially in the most remote areas, to provide public access to basic telephone services, and sometimes more. Certainly many thousands of citizens and communities have benefited as a result in those countries where these Funds have been successfully implemented, and the lessons learned are valuable for countries that are still struggling to establish similar programs in many regions.

A central theme of this study, however, is that the telecommunications sector in Latin America is changing very rapidly, and the previous mandate of these public financing mechanisms is becoming outdated as a result. Not only has access to cellular mobile networks spread to 75% or more of many countries' populations on a purely commercial basis (with room for the market to cover yet further segments), but demand for services beyond basic voice telephony has begun to take off, just as new technologies are arriving to allow innovative and cost-effective means to deliver these new services. In addition, as the objective of universal (community-based) access has begun to become reality, a new goal of concentrating on universal (i.e. individual) service presents itself. Where network access is available, therefore, regulators and Fund administrators must begin to ask about the affordability of services for those on the lowest end of the income spectrum and to consider mechanisms for supporting these users' needs for communication as well.

Thus, while this study makes many specific recommendations for further improving, streamlining, or realigning the activities of public Universal Access/Service Fund programs and policies (see below), it is useful to define a new mandate altogether for the role of these Funds in the growth of the Latin American telecommunications sector in the years ahead. The key dimensions of the next generation "Universal Communication Fund" (UCF) should in our opinion include the following:

- Support for ubiquitous deployment of advanced technologies and services: As the communications technology revolution continues, the new UCF should become a

leader, not a delayed follower, in ensuring that all populations have access to the most modern and effective networks, services, and applications available on the market. The present view of this horizon would thus include broadband, wireless, multi-service platforms permitting full access to all functions and features of voice telephony, Internet access, data transmission, e-commerce and e-government, multimedia entertainment, and interactive communications on a global scale, with minimal barriers or restrictions. As new capabilities come on-line, the vision should shift to encompass these as well, and the system should be flexible and open enough to ensure such constant adaptation, just as businesses and consumers must do the same. The overriding purpose of the UCF, therefore, should be to maintain a front-line position along the market frontier, continually assisting the expanding ICT industry to close whatever access (and service) gaps may arise, while reinforcing the sector's ability to reach toward and push back that frontier.

- Emphasis on market orientation, sustainability, entrepreneurship: The role of the new UCF must be seen clearly as augmenting and encouraging the market, as a partner with commercial ventures of all sizes, which plans and functions with the same business-minded perspective, even while emphasizing non-market benefits and objectives that the private sector may not address. The Fund's purpose is not to supplant the market, but to encourage and assist it where necessary, from the expansion of large telecommunications operations to the establishment of new, small enterprises, which will be able to grow, innovate, and take the industry in new directions beyond what the Fund's initial financial infusions could ever contemplate. By acting more as a kind of public-private financing institution, offering a range of venture capital instruments, loans, guarantees, grants, and micro-credit services, often in partnership or coordination with other public interest and private mechanisms, the UCF can transform its role from one of primarily government subsidy to a strategic player in the evolving marketplace.

- This role depends heavily upon adequate technical capacity and acumen within the UCF administration, and in this respect the Fund should not seek to over-reach its capabilities, or its position in the industry. Where private or more well-established financial mechanisms exist, the Fund should not compete with these nor otherwise distort the market. Where partnership with other financing agencies would further both groups' objectives, the Fund may be able to play a more

passive but promotional role, by contributing to a larger process. But where key gaps exist in access to start-up capital, commercial loans, consumer credit, risk mitigation, or other vital impediments to telecommunications sector expansion, the Fund should be prepared to step in and help build commercial bridges between small entrepreneurs and sources of financing to long-term sustainable financing.

- Decentralized, bottom-up planning and project definition: The success of community-focused projects depends critically upon the active involvement of stakeholders at the local level, from the planning to the implementation stages. Each Fund-financed project should ensure that key local representatives and organizations are engaged and committed to following through with management or operation of new local and regional networks, school programs, and/or entrepreneurial ventures of all kinds. In many cases, the goal should be to promote the economic and social development of the locality and the region, to foster small business opportunities, and to provide jobs, training, and income for women and men in the targeted communities. This objective also implies that necessary capacity building measures should be incorporated in projects' scope, to help expand the options for local participation and long-term success (see below).

- To the extent possible the UCF should emphasize bottom-up definition of objectives, needs, and opportunities from around the country, and makes financing available according to general (and flexible) criteria, in much the same manner that commercial banks respond to market trends rather than try to create them. The Fund must still maintain ultimate control of its allocation decisions, based upon transparent and non-discriminatory principles and high-level development targets, but it should promote innovative, entrepreneurial thinking among those most likely to be directly affected by its decisions at the local level. It is also very important that national, regional and local universal access programs be coordinated with community organizations and non governmental organizations who are striving to achieve similar goals.

- Target universal service goals, and open access principles: The time may have come, and it is certainly nearing, when the UCF's policy goals in Latin America should move beyond public, community-based access to communications facilities, toward our vision of true universal service, on the individual and/or

household level, as well as for institutions and businesses throughout all regions of a country, from urban to remote. This means that the Funds must begin to focus not only on infrastructure deployment and service availability, but upon innovative measures to ensure that communications services are actually utilized by people, businesses and public institutions at all levels of society. In some cases, this may require developing demand-side subsidy programs, along the lines of the USF models in North America and the European Union among others, in which low-income households as well as key public institutions qualify for reduced-price or even free service, with various means-tests to ensure fairness and appropriate allocation of resources.

- On the other hand, one of the most promising features of the newer technology platforms that are emerging in this sector, particularly broadband wireless access systems, is that they offer the promise of much lower costs and prices for all manner of high-quality services, from international voice telephone to high capacity Internet based communications. A further important principle to ensure that the economic benefits of these developments flow through to all users is the concept of “open access” to networks and services that may be made available on a public basis. Open access to WiFi and WiMAX signals within a community implies that all users may connect to these networks for minimal charges, or even for free if the local government underwrites the connections. With such systems and principles, actual use of services can be dramatically less expensive for most common applications, and the UCF can focus its efforts on helping to expand demand and supply of related equipment (computers, smart phones, new integrated wireless devices) needed to take full advantage of the technologies, as well as appropriate applications, content, and capacity building (see below).

- Incorporate support for ICT applications, content, capacity building: There is a growing recognition that the success of advanced telecommunications/ICT development programs will depend as much upon the quality of the information content and applications available via new networks, and upon the level of training and awareness of users, operators, service providers, policy makers and regulators, as upon the availability and affordability of infrastructure and technical facilities. While other programs besides Universal Communication Funds may often take the initiative to support some of these needs - and these must be

coordinated with infrastructure and service financing projects - there is also a strong case to be made to incorporate such “soft” components into the mandate of the UCF.

- Particularly where the Fund is promoting an increasingly commercial orientation, and the activities of small ventures engaging in a variety of creative business plans, it makes sense to expand the view of program financing to help launch, and sustain, enterprises that highlight innovative uses of technology, business and commercial practices, the Internet, and multimedia applications, which can generate increased demand and economic benefits for local communities Service innovations might include, for example: human interest video and audio programming (news, entertainment, public affairs) transmitted via the Web over broadband links, and simultaneously on broadcast and cable TV facilities; instructional and informational interactive software applications for small businesses, farmers, mothers, students, the disabled, and other interest groups; on-line discussion, research, and self-expression programs to encourage promotion and exchange of indigenous cultural legacies and local political initiatives. All of these and countless other ideas are likely to have both commercial appeal and social value worthy of some degree of financial backing by the Fund.

- With respect to training and capacity building, as discussed above, human resource capacity is the lynchpin needed for all other objectives to succeed. The pressing need to reinforce personnel skills within the public and private sectors, as well as to educate consumers and user groups at all levels as well as entrepreneurs and small operators, dictates that Universal Communication Funds should strongly consider requiring that training programs be an integral component of their financing strategies. Such programs may include underwriting existing or new technical or management training initiatives by established educational institutions, or industry-based training to be introduced by service providers as an element of their business plans. The “market value” of such capacity building may be longer-term in nature, and hence difficult for entrepreneurs and small businesses to justify within their tight budgets, and thus especially appropriate for public, shared industry funding through the UCF mechanism.

The specific recommendations, which support the new vision for Universal Access Programs and Funds and which are found mainly in Chapters V, VI and VII of the main report, are addressed to the two main stakeholders in this study, namely, (a) the policy makers, regulators and Fund administrators and (b) Regulatel.

It is recommended that:

A. Policy makers, regulators and Fund administrators

With respect to Universal Access Programs and Funds:

- ensure that there is active participation of all stakeholders (the Fund administrator, operators, manufacturers, the regulator, the policy makers, and state and local governments) in the development and operation of universal access programs;

- encourage universal access projects which are initiated at the local community level by private citizens, community groups, local governments, small and local entrepreneurs and NGOs for the local population should be encouraged;

- give greater autonomy to independent boards and commissions of Universal Access Funds to disburse funds without having to seek further ex ante project approvals from other government authorities;

- set aside a certain portion of the overall amount in Universal Access Funds for micro financing or venture oriented operations including the offering of loans, equity participation in projects and/or the implementing telecommunications company, grants or a combination of these.

- for rural connectivity projects governments and regulators be prepared to assist in ensuring that the terms and conditions of contracts between satellite and other backbone operators, on the one hand, and operators of universal access projects, on the other, are clear, unambiguous and fully understood and respected by all parties;

- build close relationships with community organizations and NGOs to coordinate universal access projects and ensure that any potential overlap is avoided and that these community initiated projects can be rolled out quickly and without bureaucratic hindrances. The valuable lessons learned from the experience of these NGO should be taken into account in designing and implementing universal access projects;

- support small community based projects by giving them independent technical and management advice and legal support for during project design, construction and especially during contract negotiations with service suppliers;

- contemplate subsidizing the high cost of good quality satellite backbone capacity for such small community based projects if no other terrestrial alternatives are available or possible;

- encourage support and facilitate international cooperative and private satellite bandwidth aggregation and integration initiatives;

- take into account the attributes of successful programs indicated in Box 4; universal access projects, the attributes of successful projects indicated in Box 5; and, performance indicators used in output based aid (OBA) schemes indicated in Box 6.

With respect to innovative financing, business practices, commercial, service delivery and partnership strategies and practices for universal access projects:

- support the deployment of and experimentation with local access networks using new wireless and wireline broadband technologies (WiFi, WiMAX, SCPC DAMA and PLC) and the use of second and third generation mobile technologies (including those operating in the 450 MHz band);

- develop and incorporate a venture oriented financing mechanism into their universal access funds under which a portion can be used for making loans, taking equity participation in projects and/or implementing telecommunications companies, offering grants or a combination of these. They should also help small entrepreneurs access these and other sources of finance and, where possible, support rural operators to obtain bank guarantees and financing for their projects;

- encourage and, if necessary, help local entrepreneurs adopt innovative business, administrative, marketing, service delivery, and procurement practices for their universal access projects.

- make government procurement agencies aware of the impacts that their purchase decisions can have upon the emergence and expansion of market competition in markets as diverse as telephone services and equipment, computer hardware and software, and technical support services.

With respect to regulatory policies and strategies for universal access:

- review **spectrum use policies** related to licence free spectrum especially for rural applications to facilitate the deployment of technologies that use these frequencies for universal access projects;

- remove burdensome restrictions or prohibitions on **VoIP-based networks and applications** and instead encourage their deployment and use as a cost-effective means to expand affordable access especially for rural and unserved area applications.

- adapt **asymmetrical rules and regulations** pertaining to telecommunications services provided in rural and underserved areas;

- implement a **simple, pro competitive licencing regime** which encourages and facilitates the establishment of smaller, independent telephone operations in rural communities and underserved areas, especially where incumbent operators may have chosen not to build networks and provide services;

- implement and enforce regulations with respect to maximum permissible delays in signing of **interconnection agreements**;

- introduce greater flexibility in **quality of service and other standards** pertaining to networks and services in rural and underserved areas where this will either not cause any harm to the network or where the impacts are minimal if stricter standards are an impediment to investment and development of rural networks and services.

- Introduce regulations and promote and facilitate **infrastructure and facilities sharing** including the use of rights-of-way not only among telecommunications operators but also with other public service (electricity transmission and distribution, pipeline companies, public works ministries, railways, etc.) companies and operators;

➢ Ensure that there is an open and continued dialogue with operators, service providers and manufacturers on plans and strategies for Universal Access Programs and Funds. It is important that this dialogue not exclude the small rural operators and local manufacturers of equipment for rural applications. Regulatel can play an important role in this especially through its cooperation and annual summits organized with AHCIET.

B. Regulatel

➢ Gather, analyze and disseminate best practices with respect to:

- Policies, objectives and strategies pertaining to universal access programs and projects;

- The application of Universal Access Funds to venture oriented entrepreneur driven projects;

- The application of bottom-up approaches for developing and initially vetting universal projects using the Ecuadorian FERUM and Salvadorian FINET models as a starting point for such evaluation;

- Disbursement of universal access funds, supervision and project follow-up in Regulatel member organizations;

- The most appropriate technology for universal access in Latin America including results of in situ trials and pilot projects

- The promotion and facilitation of demand-driven and small entrepreneur initiated universal access projects

- Special regulations and licencing conditions which should apply to rural operators including tariff regulations designed for the rural environment;

- Programs to assist small rural operators in the management, administration, financing and commercialization of their projects;

- New universal access models based on service, technology, financing, commercial and administrative innovations;

- Information on multilateral funding of universal access projects in the 19 member countries.

➢ With respect to financing innovations:

- develop a model for Regulatel members to determine the feasibility of creating public access facilities which piggy back on private commercial networks such as those of banks or transport companies.

- Establish contact with the Enablis Entrepreneurial Network to explore ways with them of establishing this financing initiative in Latin America and support it in this undertaking.

- Create a repository of such innovative business, administrative, marketing, service delivery, and procurement practices for universal access projects. [The examples in this study can serve as a starting point for this]

- Act as the clearing house for information on multilateral funding of universal access projects in the 19 member countries;

➢ With respect to regulatory policy for universal access:

- With the support of its members determine the impact of asymmetric interconnection rates and tariffs for rural operators with the aim of developing policies, costing methodologies (that can include benchmarks), guidelines for termination charges and tariffs, along with model regulations and interconnection agreements for use in rural applications.

- develop a data base of information (rates, costs, regulations, interconnection agreements, etc for rural areas.) of its members.

- gather, analyze where appropriate and maintain up to date a data base of its members' universal access regulations and policies including spectrum use policies (use of licence exempt frequencies; use of the 450 MHz band, etc.). VoIP, licencing, quality of service and other standards for rural operators, and facilities and infrastructure sharing.

➢ Create and maintain a set of indicators of international best practices in universal access fund programs which can help the 19 members measure the results obtained by their programs and to define objectives to be attained. [The various indicators used in this study can serve as a starting point.]

➢ Implement training, exchange and cooperation activities to actively promote and extend the concept of universal service funds being applied in part at least to funding venture oriented entrepreneur driven projects.

➢ Develop a platform under its leadership and coordination to facilitate the dissemination of information on various new models for universal access projects and especially those which result from demand driven initiatives and involving small entrepreneurs, suppliers and operators. This platform would also facilitate contact

being established among these various stakeholders and links to technical, financial and other support mechanisms highlighted in this study.

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