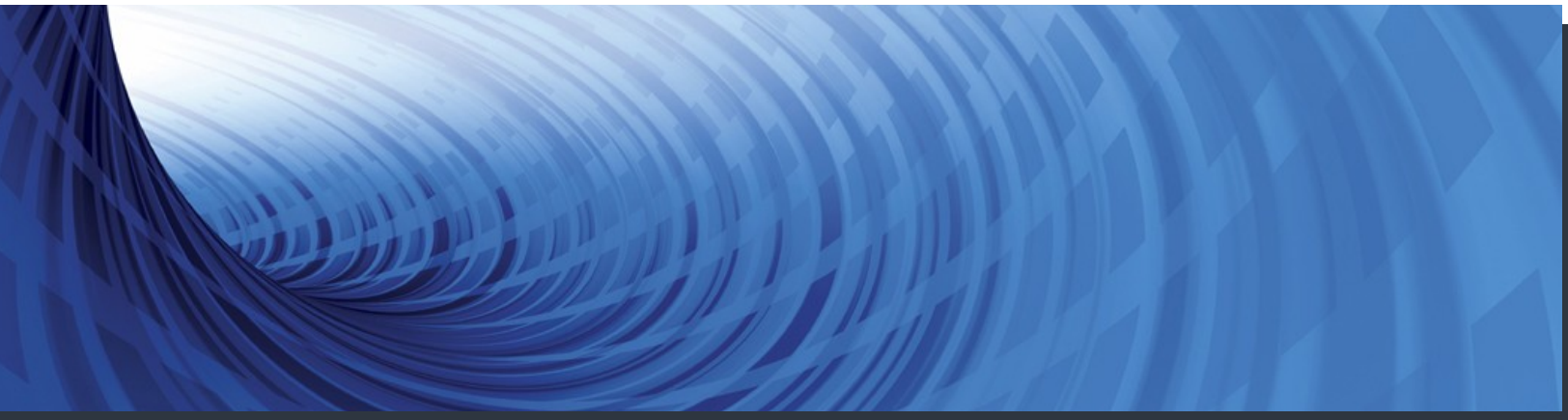

Universal Access and Service

Module 4

ICT Regulation Toolkit

EXECUTIVE SUMMARY

Universal Access & Service

Module 4 of
ICT Regulation Toolkit

www.ictregulationtoolkit.org

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The full module is available online at:
http://www.ictregulationtoolkit.org/en/Sections.aspx#3126.

For more information, please see
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Introduction

This Executive Summary of the Universal Access and Service (UAS) module (4) of the ICT Regulation Toolkit is available online at www.ictregulationtoolkit.org. Online, the UAS module covers the following topics in depth:

Chapter 1 - Introduction to UAS;

Chapter 2 - Overview of regulatory reform - the first vital step of increasing UAS using market mechanisms and good regulation;

Chapter 3 - Main approaches and specific UAS instruments, policies and interventions that policy-makers and regulators can use beyond sector reform;

Chapter 4 - UAS policy development, its framework and process;

Chapter 5 - Financing issues related to UAS and financial analyses;

Chapter 6 - UAS programme development and economic analysis, including for project prioritization;

Chapter 7 - Competition process of awarding subsidies for the provision of UAS by operators and service providers; and;

Chapter 8 - Overview of technology issues and trends that are relevant to UAS.

This Executive Summary highlights essential concepts, trends, approaches and best practice that provide a high-level overview and understanding of UAS. It does not follow the same structure as the online UAS module. Chapter 7, a very detailed step-by-step description of the bidding process for UAS projects and subsidies is not summarized for this higher-level Executive Summary. Also Chapter 8 on technology can be better studied in more detail in the Toolkit itself, while relevant references to technology issues can be found throughout the Executive Summary.

UAS has seen massive change prompted by privatization and liberalization of the telecommunications market in the developed world, and by innovative approaches employed by developing countries. The latter were faced with different sets of challenges to achieve UAS, and in response developed new UAS models. Market liberalization and sector reform did not only change the communications landscape dramatically, but also saw innovation and new ways to promote and achieve UAS proliferate throughout the world. With a new service revolution looming—the broadband revolution—UAS will likely see another major shift in UAS models and approaches.

Universal service and access today

The concepts of universal service (US) and universal access (UA) vis-à-vis telecommunications and ICT are distinct. US refers to service at the individual or household level, e.g., typically a telephone in each home. UA refers to a publicly shared level of service, e.g., through public payphones or Internet telecentres.

However, in more and more countries UA and US apply at the same time, and it therefore makes also sense to use the generic term universal access and service (UAS). For example, in the past, developing countries typically focussed primarily on UA as that was the appropriate and most feasible target. However, since the maturation of mobile communications, which extended services further and lowered access barriers to take up, many developing countries may now also realistically target US for telephony, at

least in many urban areas. At the same time their goal for the Internet is UA. Thus, their policy is no longer solely focussed on UA but on both UA and US.

In the more developed world, which previously had only US policy goals, the onset of broadband has led to a re-definition of the term UA, i.e., the goal is universal access to broadband availability and affordability. It is often recognized that universal availability of broadband services may not necessarily yield universal service-like household penetration, though the provision of affordable access is an important goal.

Scope of universal access and service

As can be seen from the above, UAS policies and strategies go beyond telephony, and include at least data and Internet communications. Now policies increasingly look towards broadband communication.

Traditionally, broadcasting has not been a part of UAS, but is now regarded as part of ICTs, in particular as the underlying technologies and delivery mechanism between telecommunications and broadcasting are converging. However, media laws and policies have fundamentally different requirements, which go beyond affordable access and service, such as diversity and quality of content, pluralism and independent news reporting, etc. As a consequence, developing UAS requirements for broadcasting will break new ground.

Increasingly, UAS policy needs to be as forward-looking as possible and include broadband developments, the move towards a next-generation network (NGN) environment, and should address issues of convergence. The future challenges for policymakers are how to address the increased requirements and complexities of UAS while at the same time having UAS policies and programmes that achieve their goals quickly and efficiently.

Concepts and definition of UAS

For ICTs, universal access (UA) and universal service (US) can largely be characterized by the availability, accessibility and affordability of telephony and the Internet, with increasing consideration of the inclusion of broadband and broadcasting.

The following definitions are used:

- **Universal access (UA):** ubiquitous access to the service e.g., at a public place, thus also called public, community or shared access.
- **Universal service (US):** every individual or household can have service, using it privately e.g., either at home or increasingly, carried with the individual through wireless devices such as mobile phones or PDAs.
- **Universal access and service (UAS):** the generic term when referring to both UA and US or the general concept.

The three hallmarks of UA and US are:

Availability: the service is available to inhabited parts of the country through public, community, shared or personal devices;

Accessibility: all citizens can use the service, regardless of location, gender, disabilities and other personal characteristics; and

Affordability: the service is affordable to all citizens.

The following concepts are the steps in the progression of UA to US:

Universal access: every person has affordable and reasonable public access to defined ICT services considered essential for social inclusion and economic development;

Universal geographic coverage: 100 per cent of the population can *obtain* a defined ICT service provided that the user has the ability to pay for the service; and

Universal service: 100 per cent of individuals or households can *afford* ICT services categorized as part of US, and a majority of the population subscribes to these services.

The concepts of UA and US are applicable to the following ICT services:

Telephony (voice calls and text messages);

Narrowband and broadband Internet;

Radio and television broadcasting.

While broadcasting has traditionally not been a part of UAS policies, it is increasingly being considered due to the convergence of technologies and triple-play offers by service providers (e.g., cable TV operators that also provide telephone and Internet services). UAS policies that include broadcasting are emerging. This is especially the case in countries that have adopted a multi-sector regulator overseeing both telecommunications and broadcasting.

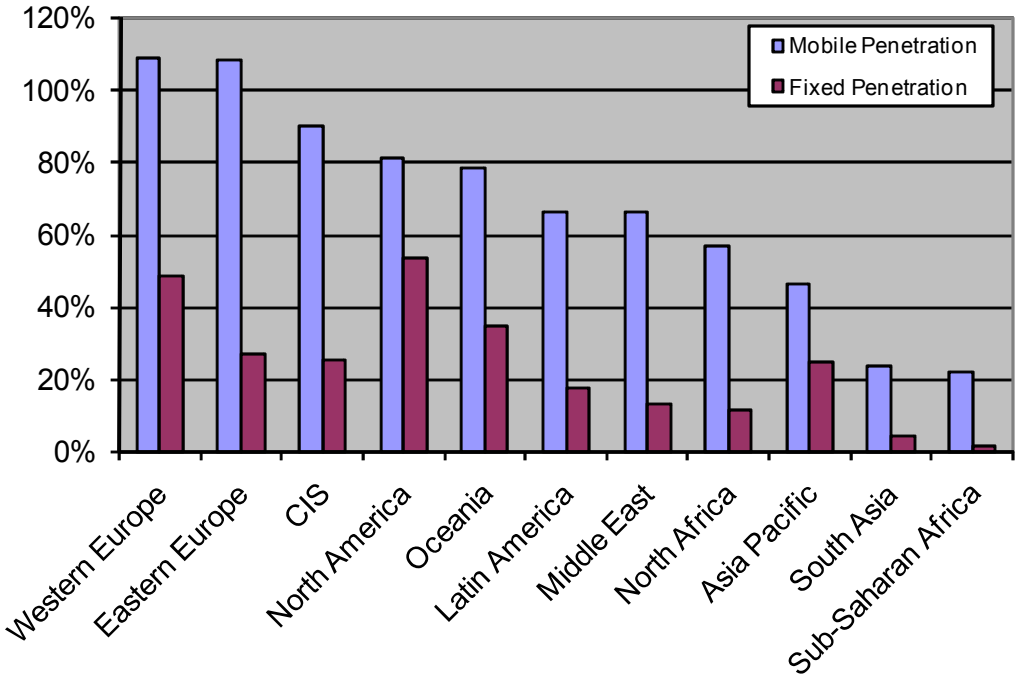
Major trends in UAS

The following are major trends that challenge and shape UAS policy development.

Much more ambitious goals

Technology change and market growth have lowered costs to the level where universal access (UA) to voice services has been achieved or is soon achievable for most developing countries, and a degree of use is affordable for almost all citizens. Many developing countries can now set their sights on universal service (US) goals for telephony, see the Figure below (subscription penetration translates into a higher household penetration). UA for Internet has already been part of many UAS policies, but now the new frontier is setting the goal of achieving access for all to broadband services. Access alone is not sufficient; the capacity and speed is important and will have to be continually improved. Telecommunications markets are dynamic; new technologies are constantly emerging, and new services rapidly become popular and then indispensable. Therefore, universal access and service (UAS) aspirations will continue to rise over time.

Figure: Fixed and Mobile Penetration 2007



Source: ITU World Telecommunication/ICT Indicators Database

A wider array of models and approaches for UAS

Since liberalization, many developing countries have introduced UAS policies and programmes and there is a wider array of models, experience and best practices to build upon. With the advent of broadband, new ideas and models are emerging and are piloted and implemented to achieve rural broadband access. Existing UAS models need to be reviewed regarding their applicability and, as required, adapted.

Most models recognize the importance of understanding and incorporating market forces into their approaches. Many UAS models are working with the commercial sector and use competitive approaches where appropriate.

Greater interest in reaching the poor by commercial companies

Probably brought on by declining growth opportunities in traditional markets as they mature and saturate, there is a general trend for many operators and service providers to focus their attention also on the still unreached markets. In addition, Corporate Social Responsibility (CSR) programmes, base of pyramid marketing and concepts of social investing, contribute to the interest in serving the poor.

e-Inclusion

Aspirations have become much broader and include large elements of human social development and constructive applications beyond the spread of technology and

infrastructure. The future of UAS will probably consist of "e-inclusion", which is the goal of the European Union (EU) declared in *EU Ministerial Declaration on e-inclusion, Riga*.

e-inclusion means both inclusive ICT and the use of ICT to achieve wider inclusion objectives. It focuses on participation of all individuals and communities in all aspects of the information society. E-inclusion policy, therefore, aims at reducing gaps in ICT usage and promoting the use of ICT to overcome exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion.

The Riga declaration recognizes the social consequences of lacking access to ICTs when ICTs have become engrained in all parts of the economy, public and personal life. It stresses actions in the following areas:

Improve digital literacy and competences;

Reduce geographical digital divides;

Use ICT to promote cultural diversity;

Promote inclusive e-government;

Use ICT to address the needs of older workers and elderly people; and

Enhance e-accessibility and ICT usability for people of all abilities, gender and social standing.

Developing countries have not yet reached the levels of dependence on ICTs that are current in the EU, but the concept of e-inclusion holds a broader relevance and illustrates the direction of change expected over the next decade.

More complex interactions with other policies

ICTs support many applications and services and influence the performance of many other sectors. Consequently UAS policies should ideally be designed in co-ordination with, or at least with consideration of, other government policies, including those for computer applications, health, education, government, and rural livelihoods (including electricity, infrastructure, etc.). Countries require overarching national ICT policies that address the sectors impacted by ICT and outline ICT development in all sectors of the economy and society. UAS policies are typically a sub-policy to the national ICT policy with the focus on areas and services that cannot be reached by the market alone. However, UAS policies aimed at increasing telecommunications infrastructure and access should not be impeded if other sectors are slower.

Current situation of UAS

For many developed and emerging market countries universal service (US) to telephony has already been achieved. For many developing countries, US for telephony is coming within reach, largely due to the mobile expansion and service revolution.

In almost every country of every region worldwide, mobile service has reached a greater level of penetration and, in most developing countries and emerging markets, a greater level of population coverage than fixed networks.

The accessibility and affordability of telephone services have been improved by innovations in the mobile industry, such as prepayment and low-denomination refill or scratch cards, which allow poorer people to buy smaller amounts of telephone service. Interestingly, none of these innovations has to do with the actual price of a mobile call, which is still more expensive than fixed services in many countries, but rather with the affordable packaging of services. Various other ICT service providers follow this approach, e.g., by offering prepaid Internet access or fixed voice services.

The costs of handsets are dropping rapidly through special initiatives of service providers and equipment vendors; special low-cost mobile phones can cost as little as USD 16 without import duty, however, affordability analyses show that even with cheap phones and very low entry-price tariffs, a significant portion of households in rural areas may still need public access phones. These services may be formalized public phones or informal shared access and street-side or village reseller businesses. Public phones will continue to remain important for those without private service, or with economic, physical or other challenges, for some time to come.

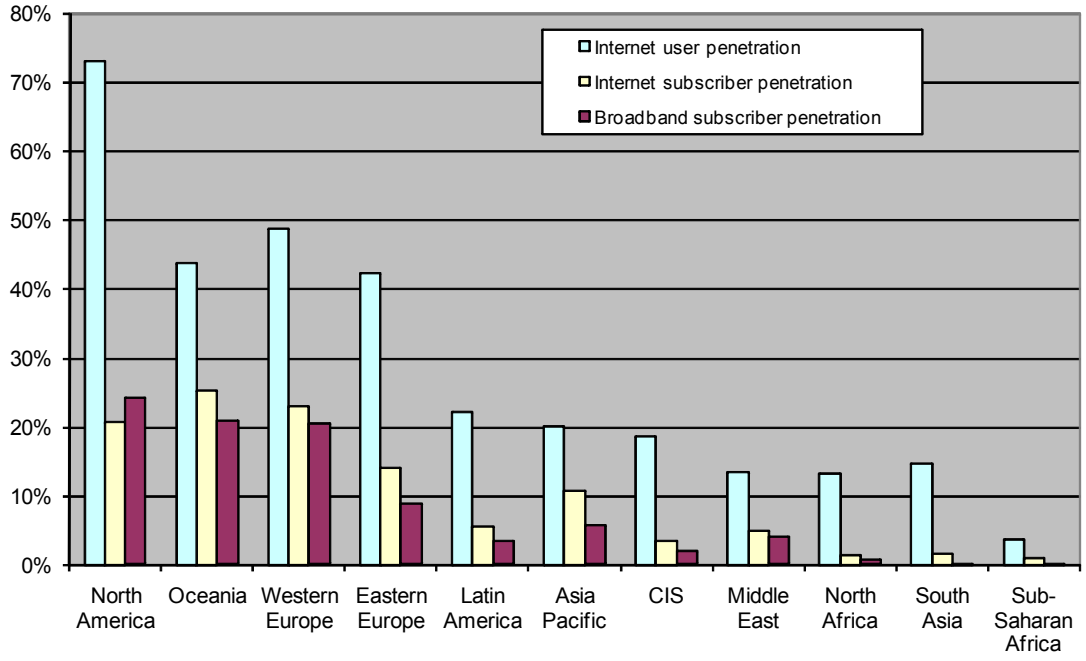
Internet and broadband

Currently, Internet use has higher requirements for its up-take such as literacy, computer skills, computer ownership or similar user terminals, wide-spread electrical power to run computers and useful Internet content, applications and services such as those provided by e-government initiatives. Universal Internet access therefore needs to address these requirements, as well as ensuring the development of infrastructure and public access Internet centres, such as telecentres.

In addition, broadband adds the dimension of capacity and speed of the Internet, which is continually growing. In 2008, broadband Internet is defined by the ITU and OECD as always on service with download speeds equal or faster than 256 Kbps. The Federal Communications Commission (FCC) of the United States defines broadband as 768 Kbps or faster. Broadband speeds develop rapidly: in 2004 the average advertised broadband speeds were typically 2 Mbps in OECD countries, while this increased to almost 9 Mbps in 2007.

The figure below summarizes the penetration of Internet subscribers, Internet users and broadband subscribers in 2007 and 2006 respectively.

Figure: Internet subscriber, user and broadband penetrations by region, 2007



Source: ITU World Telecommunication/ICT Indicators Database

Public access to the Internet

As in the case of telephony, multiple forms of public Internet access are essential at the community level for social and economic development.

All continents have multiple public points of Internet access, which have been developed through policy, private entrepreneurship and other public initiatives designed to overcome the barriers for Internet access. These access points range from purely commercial cyber-cafés, to non-profit or publicly funded telecentres and may consist of small public Internet access points with one to four computers (many hundreds of these access points have been established through Universal Access and Service Funds (UASFs) on semi-commercial or non-profit bases) to large multi-purpose community telecentres, most of which have been financed separately through aid agency activities and agreements.

International developments

The main international initiatives related to universal access and service (UAS) to ICTs are the World Summit on the Information Society (WSIS, Geneva 2003 – Tunis 2005) objectives, and the Millennium Development Goals (MDG).

The WSIS objectives raised the political profile of ICT development and recognized that access to ICT is necessary to boost socio-economic development. The WSIS objectives also recognize the need for special action (i.e., a UAS policy and its implementation) to

provide such access to all, especially disadvantaged groups. The objective of connecting communities globally by 2015 also prompted commitments to provide a large amount of funding for promoting UAS.

The Millennium Development Goals (MDGs) include a global partnership for development whose target is to provide citizens with all the benefits of new technologies, especially information and communications, in cooperation with the private sector. There is some debate around whether and how ICT deployment assists in reaching the MDGs, but the following points seem clear:

ICTs can help in implementing many initiatives that contribute directly to reaching development goals even when they do not necessarily contribute directly themselves (e.g., training material for health centre staff being disseminated rapidly via e-mail);

ICTs have impacts that depend on the technical, economic, administrative and social environment, so general assessments of their contributions without considering the local context are difficult; and

ICTs are increasingly understood to be complementary to other development imperatives and not to be traded off against them.

Development specialists stress that for ICT to make a positive contribution to poverty alleviation, the following are essential considerations:

- A well thought out development strategy should come first; this can include how ICT services could foster development (e.g., m-banking for people outside of the banking sector);
- Information and communications needs for implementing the strategy should clearly be identified; and
- ICT should be deployed appropriately to meet these needs.

UAS policy, financing and impact

Rationale for UAS policy

ICTs are present in all sectors of the economy and are recognized as a pillar of modern society. No sector seems to work efficiently without them. Diverse sectors such as governance, education, health, business, finance and tourism are critically dependent upon information and communications. All countries, irrespective of economic status, must recognize the trend towards ubiquitous use of ICTs. This is why the term enabler is often used to describe ICTs.

The main arguments for a universal access and service (UAS) policy are the following:

ICTs are social and economic enablers. ICTs are increasingly used in all sectors of economies. In many regions, economic activity is shifting away from agriculture and industry to services sectors and towards the new information economy and society. The ICT sector is considered to be a significant engine of growth for economies. Also, on the social side, ICTs facilitate many functions and improvements, including e-governance, distance education, e-health, database sharing across social service agencies, etc.

Supply and demand increases the importance of UAS policy. The increased supply of ICTs through rapid technological developments and base of pyramid marketing, actually fuels the requirement for universal access (UA). Mobile phones, not too long ago considered luxury items and out of reach for most, are now providing the main access to voice service for the majority of people in many countries, making it more urgent that the population without access be provided with access to phone service. Similarly, for large parts of populations, work and life without the Internet is unthinkable, and ever more megabyte-rich applications will require increased broadband development. The more ICTs are used, the more there is a dependence upon them, which in turn makes it more essential that all citizens have access to ICTs.

Market gaps can remain in place. While it has been demonstrated that market forces, after liberalization and sector reform, have had the greatest impact on improvement of UAS in many developing countries, for various reasons market gaps may remain in place. Some countries, for example, have exceptionally challenging geographic characteristics combined with extremely low population densities (e.g., Mongolia and Botswana) or isolation (e.g., many islands in the Pacific region) or extreme poverty, which make UAS more challenging. In other countries, the market might be able to achieve UAS, but the timeframe in which this could be obtained, might be considered too long. In some places, the latter could apply to broadband development.

Monitoring UAS and updating it. Constant change in technology, services, and pervasiveness of various ICT services, makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed. Also, there are countries where the market can achieve UAS, but there is a need for public oversight to confirm that it has been achieved, to improve regulation, and to continually review the concept of what is considered UAS.

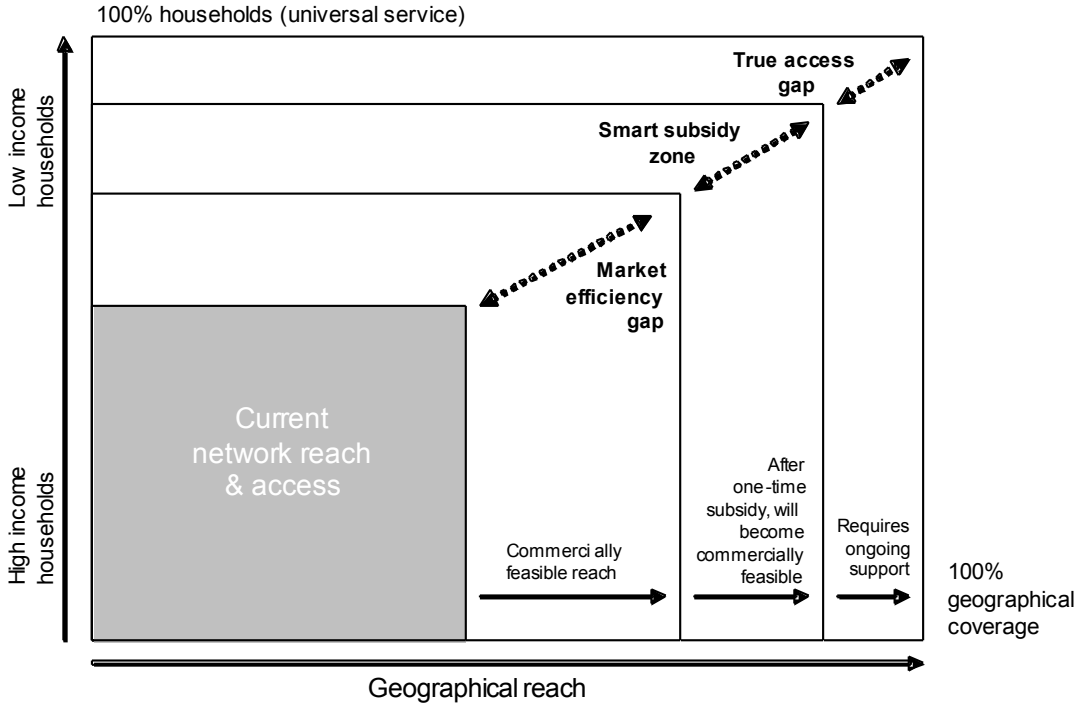
Access gaps and required intervention

Three separate zones exist within the known access gap, namely the market efficiency gap, the smart subsidy zone and the true access gap, as illustrated in the figure below. Each zone requires a distinct set of policies and strategies, which together yield an integrated universal access and service (UAS) programme.

There are also two dimensions to the challenge of achieving UAS: these are poverty and high-cost areas. Poverty exists in both urban and rural areas, however the cost of addressing both poverty and high-cost areas together, as exists in many rural settings, is much higher. Providing access to the urban poor is well within the reach of the market.

The market efficiency gap is the gap between the service reach, which can be achieved in a fully liberalized and efficient market, and what is actually achieved by markets under existing conditions. This gap can be bridged through private service provision so long as the regulator and policymakers provide enabling regulation, ensure

Figure: Distinctions within the access gap



Source: Initial concept in "Telecommunications & Information services for the Poor: Towards a Strategy for Universal Access" by J. Navas-Sabater, A. Dymond, N. Juntunen, 2002. Modified by Intelecon

a level playing field among all market participants, and create a positive fiscal, business and investment climate. This allows operators and service providers to serve a much broader area and close the market efficiency gap. This frontier can be reached within the context of telecommunications sector reform and does not require subsidies. Many countries are now doing very well in bridging this gap through effective competitive service provision. The only issues to be addressed relate to how far the market can

actually reach commercially, and how best to implement and sequence more pro-market conditions to reach the limits of the market.

The smart subsidy zone refers to rural or high cost areas, and low-income population groups that won't be reached by the market alone, even if it is an efficient market, or at least not for a long time to come. Targeted financial intervention beyond normal regulatory measures and incentives is required to provide services to these population groups and areas. A smart subsidy is the term used to describe a one-time subsidy that is designed to be results-oriented, does not distort the market, and encourages cost minimization and growth of the market. It helps to kick start a project or service, with the ultimate objective of the programme becoming commercially viable, whereas without the subsidy investors might otherwise have been reluctant to invest. Investors' reluctance could be due to perceived risk or general lack of capital for the kind of service opportunities that are considered by government to be essential for socio-economic development. The important element of the smart subsidy zone is that the one-time subsidy to private sector providers will make the project commercially viable on an ongoing basis by filling the financial gap. This increases the operator's rate of return and reduces his risk. No further subsidies are needed if the service targets are realistic, and have a medium-term commercial viability in view. Targeted interventions are usually implemented using a Universal Access and Service Fund (UASF). The extent of the smart subsidy zone is sometimes hard to predict and can be a moving target, as it is not uncommon that operators exceed expectations.

The true access gap comprises areas or communications targets that are beyond commercial viability, even in instances where initial smart subsidies are given. Commercial sector operators or service providers serving these areas or population groups would need ongoing financial support, possibly in the form of operating subsidies (or end-user subsidies in the case of universal service). It is a political decision if and to what extent to subsidize ongoing service provision to areas and population groups that are beyond the limits of the smart subsidy zone and whether or not to use UASFs to finance such operations. However, even the true access gap can sometimes be bridged with innovative commercially related approaches. In some cases, true access gap areas can be combined with more profitable areas without need for ongoing subsidy. Also, in most countries, the true access gap may apply only to a small percentage of the total population.

In cases where the market is in fact achieving most UAS objectives, a degree of public oversight remains important. It can make progress more visible, highlight any deficiencies and provide a safety net for people with challenges, or places not otherwise served. Constant change in technology, services, and pervasiveness of various ICT services makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed.

In all cases, it is important to work with the market as it develops. This involves, for example:

- Consulting industry and the wider public on the details of UAS policy and its implementation, and taking views expressed into account, especially those that rest on practical experience;
- Ensuring that all market participants have the opportunity to contribute to UAS goals, and receive appropriate recognition when they do so;

Reviewing policies and practices regularly to keep pace with market and technological developments; and

Wherever practicable, incorporating competitive mechanisms into the distribution of subsidies for UAS projects.

UAS policy framework

Universal access and service (UAS) policy is usually a sub-policy under the umbrella of or in context of a larger communications sector policy.

Most countries have a telecommunications, communications or electronic communications policy. Some countries are broadening the scope and calling it an Information and Communications Technology (ICT) policy to include broadcasting and IT. Some countries may also have a separate national ICT policy or strategy, or an information society policy. In addition, some countries have separate national broadband policies that stand alone, in addition to the telecommunications or ICT policy.

National ICT policies typically concern themselves with readying the country, its economy and society for participation in the information society. Developing countries often name the policy an ICT for Development policy. This cuts across various sectors, including education and health, finance, small and medium business and government (e.g., developing e-government capacity and services). In developing countries two other key elements of ICT strategy are often human resource development (including enhancement of education and training) and fiscal measures (e.g., reduced import duties on computers, network equipment and software).

Telecommunications and ICT policies often have a component that relates to universal access or service. Telecommunications policies typically set the objective of providing affordable communications to all citizens and to achieve regional equity, or balance, in the development of networks and services. There are often specific sections within policies addressing universal access or service (UAS). National ICT policies may also specifically address methods of promoting equal access, serving remote and rural areas and reaching disadvantaged population groups (e.g., women, the elderly, the physically challenged, certain indigenous people).

A UAS policy is part of the larger communications and national ICT policy. If it is a separate policy document, it is typically more detailed and includes specific strategies and implementation arrangements to achieve UAS. When most of the main principles of equal access and recognition of the importance of communications to socio-economic development have been addressed in the communications sector policy, the UAS policy tends to focus on mechanisms for funding UAS, and the main measures and instruments used to achieve the policy goals. This includes the vision, objectives, structure, and administrative or operational practices of a Universal Access and Service Fund (UASF) if that funding mechanism has been chosen.

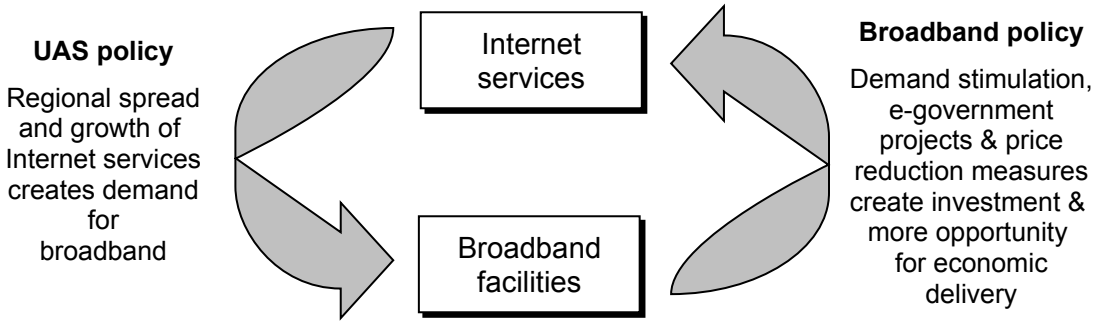
Relationship to broadband policy

In a country where national broadband development still needs to be promoted, UAS policy comprises a subset of the national broadband policy. This specifically concerns the part that addresses rural broadband, in addition to covering the general UAS policy

topics such as institutions, financing, monitoring and measures. In a country that has achieved UAS and urban broadband coverage and penetration, the only remaining tasks for a UAS policy is rural broadband, and UAS policy is near synonymous with rural broadband.

UAS policies and broadband policies influence each other. UAS policies promote the regional spread of Internet services and stimulate demand that in turn can increase the demand for broadband. On the other hand, broadband policies use a range of regulatory and fiscal options to reduce costs (e.g., international gateway liberalization) and facilitate broadband network investment, which in turn facilitate better access at lower prices. The figure below illustrates the interplay between UAS and broadband policy.

Figure: Relationship between UAS & broadband policy



Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Several countries have separate broadband policies. These include India, Jordan, Malaysia and Pakistan. The purpose of having a national broadband policy generally springs from the perception that broad national government measures, and enabling regulation, is required to ensure broadband development within the country and that broadband is essential for global competitiveness, economic growth and social cohesion.

A UAS policy can complement a national broadband policy. Broadband expansion to rural areas is only usefully included within a UAS policy if the fundamental barriers to its deployment (regulatory, commercial and demand-based) are addressed at the higher level of a national broadband policy that deals with creating an enabling environment.

In other countries, where broadband is generally well advanced, the boundaries between a UAS policy and broadband policy can be blurred and in some cases the two policies are merged. UAS is defined as rural broadband once telephony targets have been achieved. For instance, since 2007 Chile has a new Information Society Universal Access policy, which encompasses the broadband policy and the Universal Access and Service Fund (UASF).

Some other governments are also considering the use of UASF resources to increase the reach of broadband networks and services into regional and rural areas that are beyond market-reach. However, he regulatory environment required for broadband to

thrive commercially must be addressed first and issues of financial sustainability carefully considered.

The following statement from Pakistan's broadband policy highlights the regulatory, content and fiscal measures required to enable broadband take-up:

> ***Broadband lessons from the world markets***
>
> Countries with high penetration of broadband users such as the Republic of Korea, Japan and Canada have all implemented conscious policies for the growth of broadband in their countries. These policies have included growth enablers such as price reductions for the use of infrastructure, unified licensing for service providers, the government's setting of strict annual broadband penetration targets, content and e-commerce development incentives and lowering of the price and tax barriers on the broadband terminal equipment. The resultant growth and high penetration of broadband has contributed significantly to the social and economic standing of these countries. Realizing the social and economic benefits of broadband, other countries such as India and Egypt have also recently issued similar strategies for the growth of broadband in their countries.

Developing UAS policy

Developing a universal access and service (UAS) policy begins with these essential questions:

Who is the lead ministry or entity developing the UAS policy;

What is the main purpose for developing the UAS policy? (e.g., social harmony/ regional balance; economic growth; global competitiveness; reduction in rural to urban migration; poverty reduction); and

What are the aspirations of the UAS (e.g., there can be different emphases on telephony, Internet and broadband – depending on UAS goals already achieved).

Steps in developing UAS policy

After determining the scope and primary concepts of the UAS policy, there are several stages and procedural elements involved in developing the policy:

1. Sector review – Establishing the current status quo, barriers to growth, potential solutions and UAS strategic options;
2. Policy formulation – Setting specific objectives, time-bound targets and strategies to achieve those goals;
3. Regulatory measures – Their priority over other government interventions and their ability to reduce costs of implementing the UAS policy;
4. Financial analysis – Identifying the required financial resources to implement the policy;
5. Economic appraisal of UAS options - Using strategic socio-economic considerations for policy development, and micro-economic analysis to decide on priorities and sequence within a UAS programme; and
6. Consultation – Several stages of consultation with various stakeholder groups to solicit input, feedback and develop broad buy-in.

Policy development will probably require a few iterations. Input from consultations can result in adjustments or changes to the draft UAS policy before it is finalized.

Key decisions on objectives, targets and strategy

Decisions on the following key questions need to be made after the sector review process has provided a foundation of data, analysis and initial viewpoints from various stakeholders:

Which **services** (e.g., telephony, Internet, broadband but also directory assistance and access to emergency numbers) should be included into the universal access and service scope

Which specific **targets** for each of the services should be set;

What **main groups** should be targeted (e.g., rural population, urban poor, people living in socio-economic depressed areas)**;**

What other **special targets** are advisable e.g., schools, libraries, hospitals, etc.);

What **timeframe** should be set for certain targets to be achieved and what timeframe will the UAS policy cover;

What **approach** should be used and which **strategies** employed, covering

- Estimating cost of achieving set targets and whether public funding (subsidies) is required;
- Who will provide the funding and how is it collected;
- Who will deliver the services (e.g., operators and service providers, NGOs, entrepreneurs, etc.); and
- How will those entities be selected.

Future proofing: How will the policy be adjusted to reflect market changes over time? Targets need to be feasible, as well as forward-looking and future-proof, so that they remain valid and appropriate during the lifetime of the policy and are not superseded by market developments. Most policies are designed for a five to ten year horizon, while a UAS programme sets targets for one to three years. The policy itself should allow for a process of review and update so that it may adjust targets.

Who is going to take the lead in the implementation (including coordination and monitoring) of the UAS policy?

Who should develop and draft UAS policy?

Typically, a UAS policy is developed by the ministry responsible for communications (or in countries without a ministry by the entity responsible for communications), often with the regulator's significant input or maybe even with the regulator's drafting of the policy.

Ministries other than the one responsible for telecommunications and ICT (e.g., education, science and technology, economic planning, finance, municipal and local government) are also considered to be stakeholders. For example, one or more might have a seat on the Board of the Universal Access and Service Fund (UASF). However, their involvement in the UAS policy development and drafting is usually one of contribution to a consultation process rather than as an actual sponsor of the policy.

Consultation can be considered a mandatory part of UAS policy development and leads to better results. The telecommunications and ICT industry, as well as non-government organizations (NGOs), should also be part of the UAS consultation process.

Who implements UAS policy?

UAS policy may be implemented by: the country's National Regulatory Authority (NRA), the ministry responsible for telecommunications and ICT or an independent agency. Each is considered below.

Regulator

Many countries opt to have the independent NRA responsible. This is a sound approach because:

The regulator typically has the required industry sector expertise, and skilled technical, economic and financial staff;

The regulator has a degree of independence and is perceived to be one step removed from politics; and

The regulator has established relationship and credibility with industry, often the main partner in the implementation of UAS policy.

There is a trend towards multi-sector regulation, including broadcasting. Under this scenario, the same reasons apply for it being responsible for UAS implementation.

Ministry

In a number of countries, the ministry responsible for communications implements UAS policy (e.g., Colombia, Guatemala, Peru and India where the ministry manages the UASF). This has the apparent advantage that the agency responsible for policy is taking responsibility to carry it out. However, a possible disadvantage is that since the UAS policies sometimes include special financing instruments (e.g., a UASF) for which the main contributors are the industry (either through a levy or use of frequency receipts), government is not perceived as being far enough removed to be an independent administrator of the finances, especially if the government has any ownership interest in the industry.

Independent UAS Agency

A few countries have opted to establish a separate agency. South Africa, Pakistan, Ghana as well as the United States and Canada have established separate UAS agencies. Peru and Nigeria have independent banks or trusts as the financial managers for a UASF, even though the regulator in Nigeria has the planning and secretariat role while the Peruvian fund is under the Ministry for Transport and Communications.

While a completely separate agency elevates the status of UAS and creates at least the appearance of even greater independence, it may come at a higher cost as well as with increased complexities of co-ordination.

Policy documents

A UAS policy should adhere to policy formulation standards, processes and formats. Although these may be unique to each individual country, as a general guide the following elements are usefully addressed in the policy:

Introduction & background;
Status of the telecommunications and ICT sector;
Vision, policy direction and objectives;
Key challenges and barriers (e.g., regulatory issues);
Strategic mechanisms for the implementation and funding of UAS;
Implementation arrangements;
Principles of operation of the chosen instrument(s), for example

- Universal Access and Service Fund (UASF);
- Mandatory service obligations issued with new licences;
- Competing for subsidies;
- Regional operators;
- Infrastructure sharing;
- Etc.

Monitoring, evaluation and review.

Financial considerations and analysis

Policy development should consider the desired outcome and the available financial resources in order to arrive at a feasible strategy. Countries benefit from having realistic objectives and targets that can be financed without strain, and which they have the capacity to manage.

If policy makers set UAS goals and targets that are too ambitious to achieve, e.g., would cost perhaps 5 per cent or more of the sector's annual revenues to subsidize, it might be unrealistic to set these goals. But a programme that costs only 1 per cent of the sector's revenues is more realistic, as long as the programme administrator (e.g., the UASF) has the necessary management and staff to ably administer the projects.

The three main questions related to finance in UAS policy are:

What is a financially feasible UAS policy, i.e., what is the limit?

Where should the financial resources for a UAS programme come from; and

How much finance is required to implement the desired UAS policy and programme strategy?

Finance required to implement UAS programmes

Typically, the amount of finance a UAS programme requires is estimated in the context of appropriate operator levies. There are two ways to estimate the appropriate level of UASF contributions. These are as follows:

1. ***Policy-driven approach*** – Determine what scale of subsidy programme would be required to meet the country's policy objectives and time-bound universal access and service (US) targets. The total cost and subsidy estimates are compared to the total sector revenues. The percentage of total sector gross or net revenues calculated by this method becomes the high level estimate; or

2. ***Market-driven approach*** – Determine from a survey or assessment of operator and other stakeholder opinions, as well as from international benchmarks, what operators would accept or could afford as a reasonable contribution. Then develop the UASF programme to match this.

The actual amounts required from the industry will vary depending on other existing financing sources available, such as government budget allocations, proceeds from licensing and spectrum auctions and development partners.

Economic appraisal of UAS options

Detailed economic analysis is typically undertaken during the development of UAS programmes, often to determine project priorities, and is less important at the UAS policy development stage. However, broad economic considerations are important in the policy formulation. Countries develop UAS policies based on the premise that access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale. This recognizes the importance of telephony and ICTs as enablers of growth and equality in the country, and competitiveness on the world stage. However, some projects may deliver different types and levels of benefit more than others, or deliver the benefit in different parts of the country, all of which are reasons why the selection of UAS programmes and projects need to be made carefully and priorities set for available options.

Agencies that implement UAS need to consider and analyze the economic impact and relative value of UAS strategic options, programmes or projects, make selections or set priorities in the context of national economic growth, developmental impact (including poverty alleviation), commercial viability, regional balance and related economic concerns.

Key factors to be considered in the implementation stage of UAS policy include:

The total population reached by each project or potential investment;

The expected impact and poverty reduction effects, as compared to the vision and objectives of the policy;

The regional benefits and equalization in socio-economic terms;

The commercial viability and sustainability of a programme;

Leveraging of private participation in the UAS programme;

The subsidy cost per beneficiary; and

The benefit to cost ratio or Social Net Present Value.

Legal modifications and regulations

Once a universal access and service (UAS) policy is developed, legal modifications and further regulations are often required in order to implement the policy. Typical issues that need to be addressed are:

- The legal basis for the chosen financing instrument: collecting a UAS levy from operators and service providers (licensees), using frequency and licence auctions proceeds to finance UAS, developing a new licensing regime with attached UAS requirements, or infrastructure sharing, or any other chosen instrument;

- The legal instruments to apply selected financing or implementation mechanisms (e.g., set up of a Universal Access and Service Fund [UASF], authorize its management and fund disbursement, new licensing regimes and draft licences);
- Detailed guidelines on UAS policy implementation, UASF objectives or objectives of any other chosen UAS strategy; and
- Detailed regulations, guidelines and principles of the UASF management and operation, if a UASF was chosen.

The precise amount of legal revision that is required, or additional regulation to be implemented, may vary significantly from country to country.

Services to include in UAS

The services to be included in the scope of universal access and service (UAS) will change as technology and society change. Because of this, in 2002, the European Union (EU) built into the EU Universal Service Directive, a requirement that the scope of universal service (US) obligations be reviewed every three years. To be included in the scope of a UAS policy, a service has to satisfy two tests:

> In the light of social, economic and technological developments, has the ability to use the service become essential for social inclusion; and
>
> Are normal commercial forces unable to make the service available for all to use?

The EU reviewed the scope in 2006, specifically whether mobile telephony and broadband Internet were to be added. However, neither mobile telephony or broadband Internet, was added for the following reasons:

> Mobile telephony passed the first requirement—ability to use a mobile phone is now seen as essential for social inclusion in Europe—however, normal commercial forces had led to widespread availability and use of mobile phones, so the balance of opinion was that there was no need for regulatory intervention to achieve universal mobile service;
>
> Broadband Internet, on the other hand, failed the first test—well under half of European households subscribe to broadband Internet and currently it isn't seen as essential for social inclusion. Therefore, the second test was not applied.

While advertised broadband speeds are high, the European Commission found that actual download speeds are between 144 and 512 Kbps in rural areas and 1 Mbps in urban areas in the years 2004 and 2005. Despite not including broadband into the official scope of universal service yet, the EU has a clear policy goal of e-inclusion and broadband development, and is active in promoting and expanding broadband take-up and in providing access to above minimum download speed broadband also in rural areas for quality of life, social inclusion and economic-strategic reasons. The European Commission believes all Europeans need broadband access.
For developing countries, modified forms of this general test regarding which services to include into the UAS scope might be employed. The main driver for UAS may be economic before social factors come to the fore, so policy makers in developing countries could ask the following questions:

In light of economic, social, and technological developments, has the ability to use the service become essential for uniform countrywide economic development or social inclusion; and

Are normal commercial forces unable to make the service available for all to use, within a timescale consistent with the contribution of the service that will meet the Millennium Development Goals?

UAS targets

Universal access and service (UAS) measures are usually targeted at rural areas that are unserved or underserved, and especially low-population density areas where provision of services is not viable. But UAS targets can also be focussed on very poor urban areas in large metropolitan cities, including slums.

In order to develop UAS targets tailored for a particular country, the following should be considered:

The current state of the sector and current levels of UAS in the country;

The resources available and required for achieving UAS targets;

Financial sustainability after implementation;

The feasible quality of service (for uniform quality countrywide); and

Planned periodic reviews in light of technological and market developments.

Developing countries typically set the following universal access (UA) targets:

A public phone for a specific size of community (e.g., for all communities larger than 2000 inhabitants);

A limited walking distance to a public phone (e.g., 5 km for communities too small to have their own public phone);

An Internet Point of Presence (POP) in districts centres, provincial capitals or towns above a certain size (e.g., above 20,000 inhabitants) that provides broadband capacity; and

A public access Internet centre accompanying the Internet POP.

Increasingly, universal service-like targets are included in developing countries policies, such as:

An overall telephony subscriber penetration of 20 per cent and a rural penetration target of 10 per cent within a specific time frame (e.g., by 2010); and

Asking operators to provide a tariff option that allows households in the lowest income decile (10 per cent) a minimum or modest use.

Providing special assistance to specific groups of individuals is typically related to universal service (US), not to universal access (UA). However, typically, special assistance is provided to certain institutions such as schools, colleges, libraries and hospitals and health centres.

Each country must decide which, if any, groups of individuals justify assistance and for which services. The decision needs to be guided by current service penetration, by financial resources necessary, and by financial sustainability. It is recommended that most countries should probably not provide assistance to particular people for a service until the service has achieved reasonable take-up (e.g., over 75 per cent) among the greater population.

To be useful, **targets need to have the following characteristics**:

Targets should focus on needs that have clear indicators and are of a high priority so that efforts are not spread too thinly among too many targets;

Targets should be designed to anticipate needs three to five years in the future;

Targets should be ambitious but realistic in the light of a country's actual situation;

Targets should be reviewed regularly (e.g., every two or three years); and

Targets should be objectively measurable, so that progress can be assessed.

Once achieved, new UAS targets can be set for the next phase of the UAS porgramme.

UAS and other national programmes or initiatives

Universal access and service (UAS) policies do not exist in isolation; they are relevant or inter-related to education, e-government, electricity, micro-finance and e-banking, among others. The above areas are all extremely important, having potentially large impacts on the social development and economic growth of a country.

ICTs are especially important for ***education***, but voice alone is a limited medium and telephony and radio broadcasting are not enough in the context of dynamic education. In consequence, universal access (UA) generally means increasingly "universal broadband Internet access". Many UAS policies include the provision of Internet access to schools, often partially paid for by Universal Access and Service Funds (UASFs). While UASFs can provide access and assistance, the ministry of education and others are required to enable schools to make effective use of the access. The task of training teachers and providing enough relevant, culturally appropriate, useful and appealing content is particularly significant.

E-government or e-governance is the use of ICTs to make government more responsive, efficient, effective, and transparent. In this context, government can mean any activity by officials at a national, regional, or local level, and can encompass whole development programmes, such as improving health or education, as well as day-to-day administrative activities.

The most popular use of the e-government in developing countries is the application of ICTs for administrative transactions, such as getting certificates or permits, or registering a birth or death. E-government may be more accessible to citizens and less prone to corruption: citizens make fewer journeys, complete fewer forms and meet fewer officials.

The conditions within a country, including communications infrastructure and public access, transparency of governance, and government capacity and general literacy, affect reasonable goals in e-government. E-government has many other requirements

besides the availability of infrastructure; they may jointly be called e-readiness. To ensure that e-government applications are matched to the readiness to accept and use them, they are often best introduced in stages.

Electricity is an important factor in the delivery of Internet and broadband development, as end-user terminals such as computers require significantly more power than mobile phones. While telephone networks and use has not been stopped by the lack of public power infrastructure (though the lack has increased cost and slowed speed of network development), further Internet and broadband development and geographical spread will depend on increasing national electrification as a pre-condition.

There are several important links between electricity supply and telecommunications:

Most obviously, the lack of electricity supply raises telecommunications network costs significantly, so funding universal access and service (UAS) in areas without electricity supply represents an additional burden on the budget;

There is often potential for shared backbone infrastructure. Power poles and ducts can carry optical fibre alongside the power cables at low marginal cost, indeed, recently installed power systems are very likely to include optical fibre for the use of the power company;

Sometimes there is the potential for shared access infrastructure. Local telecommunications distribution can occasionally use Power Line Communications (PLC), in which the power cables themselves carry telecommunications. However, the technology has to date been used too little to become sufficiently general and inexpensive; and

Community capacities developed by local participation in distributed electricity generation (such as solar or micro-hydro schemes) could also lead to community demand for and provision of communications facilities.

Financial services that deal with small sums of money (micro-finance) are widely believed to help people escape from poverty. e-banking and m-banking use ICTs to make micro-finance available to more people in new, less expensive ways. These initiatives create regulatory challenges of their own; customers must be protected against fraud, but regulation must not prevent the development of valuable and trustworthy services.

Ways in which telecommunications policymakers and regulators could integrate universal access and service (UAS) and micro-finance initiatives are as follows:

Stay informed about rural financial service expansion;

Keep abreast of emerging value-added services with a financial component offered by telecommunications operators or over telecommunications networks;

Ensure that the responsibilities for regulating value-added services with a financial component are clearly articulated and widely understood. Financial regulators, not telecommunications regulators, might have the main responsibilities, but users will not be interested in the demarcation: they will expect to be protected adequately and are likely to see problems as defects in telecommunications services;

Take part in any national working groups on expanding financial services or e-commerce for poor people. Cyber-security, and user identity management, are prerequisites for the development of e-commerce; and

When formulating UAS programmes, aim where possible to support target areas and activities for financial services expansion.

Finance trends

Over the last decade, the telecommunications sector has experienced a period of unprecedented growth at every level, from mobile telephony to broadband Internet, e-commerce, e-government, e-education and tele-medicine. At the same time, the style and sources of finance made available for ICT development have shifted radically.

Traditionally, ICT infrastructure financing came either from government budgets and revenues generated by the traditional fixed-line incumbent, or from donor and international financial institution (IFI) programmes supporting major capital infrastructure investments. Now, donor financing plays a relatively small role in infrastructure development, except in some categories such as Output-based Aid (OBA) finance. Donor strategies focus mainly on policy and regulatory support with almost total reliance on private capital for infrastructure and service development. Donor, non-government and institutional initiatives also focus on fuelling ICT service application and capacity development.

This trend and balance of activities is underlined by a 2005 report of the OECD's Development Assistance Committee (DAC) countries. The report shows that official government-to-government aid commitments amongst its 22 DAC members for ICT infrastructure declined strongly from USD 1.2 billion in 1990 to USD 194 million in 2002. The rationale for most donors to withdraw from providing ICT infrastructure finance was linked to the correct assumption that the private sector would play an increasingly strong role in the provision of services.

Declining donor assistance to ICT infrastructure is only part of the picture for the role of Official Development Assistance (ODA). Many donors, while still engaged in some bilateral ICT-specific programmes, are contributing to public private partnerships (PPPs) and international multi-donor initiatives for ICTs, while also integrating ICT components into their development programmes for other sectors.

Many of the main approaches for UAS already include a financing method. Some of the notable additional finance sources for UAS and ICT development are:

- ***Public-private partnerships*** - Governments in both advanced and developing countries are turning to the private sector for the delivery of public services. Public-private partnership is driven by the recognition that private sector organizations have good management skills, understand the market and marketing forces, are motivated and financially efficient. Government has the responsibility of meeting social and developmental needs and service objectives that are in the public interest. Government has financial resources it can invest in order to secure those objectives.

  There is a wide range of types of PPP. A PPP is a cooperative venture between the public and private sectors, built on the expertise of each partner, which best meets clearly defined public needs through the appropriate allocation of resources, risks

and rewards. The label of PPP could be applied to any project where both government and private organizations have a financial stake and the private sector is providing infrastructure or public services. PPPs are relevant to a range of ICT activities, from some forms of network development (e.g., broadband), e-government and e-commerce initiatives, to some forms of application development. This may be the case when government takes the lead in order to catalyze or enable a style of development that is not driven by commercial demand (e.g., health, education) and requires ongoing public funding.

- ***Municipal networks*** - The emergence of municipal broadband networks provides an additional source of financing ICT service development. There are both encouraging and discouraging examples. There are a number of small-scale network initiatives in Latin America. Among these, the Pirai municipal network in Brazil is a successful case that commenced from the demands of the municipal authority but spread to become the cornerstone of a broader and visionary plan to diversify the local economy and attract new investment through ICT and network development. The project included e-government, education and public access, with a range of application support and development activities. Many broadband access nodes have been established connecting all local government offices and most of the public schools, libraries, and general public access points. Broader commercialized services to households and businesses were also established though a public-private company. Less successfully, several municipal WiFi networks have been initiated in the USA. Most of these are proving themselves to be operational failures because the cost and technical complexity of building the networks for reliable operation is high, the revenue base had been largely unproven before the plans were laid, and there was strong competition from private operators.
- ***Village phone, operator outreach and partnership programmes*** have attracted a variety of funding sources such as from micro-finance organizations, corporate social responsibility (CSR) funds from operators or from commercial motives from operators, private development trusts and funds, as well as corporate programmes and foundations.
- ***Bi-lateral and collaborative initiatives financed by OECD governments and International Finance Institutions (IFIs)*** – Some examples of initiatives and players are the World Bank, International Finance Corporation (IFC), Public-Private Infrastructure Investment Facility (PPIAF), The Global Partnership for Output-Based Aid (GPOBA), infoDev, European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), Inter-American Development Bank (IADB), African Development Bank (AfDB) and the Asian Development Bank (ADB).
- ***NGO and philanthropic sources -*** Most of the focus of non-government assistance is on a specific sector of activity, e.g., e-health or e-education for rural and poor people. The role of most of these agencies in UAS development is one of applications development and user and institutional capacity building. When the additional role of NGO's and philanthropic agencies, corporate social responsibility (CSR) programmes, and community groups are considered, the spread of activities in the ICT realm is seen to be large.

Economic impact of UAS projects

Countries develop universal access and service (UAS) policies based on the premise that providing access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale. There are general studies and analyses, that

address broader questions of economic impact of communications, ICT and broadband Internet. The understanding and latest knowledge of ICT economic impact is an important background for UAS policymakers and UAS programme planners, as these studies provide the general rationale and justification.

Telecommunications

In the case of telecommunications projects, significant benefits have been documented to various degrees in a wide range of studies since the early 1980's, and it can be demonstrated that there is a 'consumer surplus', over and above the price paid for the service. These include items such as:

Businesses (small or large) often report that the money they save due to greater efficiency and saved personal travel time amount to several times the cost of the telephone rental and calls they make.

Farmers and micro-businesses often report that the phone enables them to gain timely and geographically-specific information on urban market prices that increase their bargaining power with 'middlemen' and enable them to earn more for their product or secure a better price for their inputs.

A third of personal calls typically represent personal or family emergencies that require travel or other costs if the call was not made. Sometimes people report the benefit in terms of lower health risk, a life saved, better family relationships, more opportunities.

Institutions and government agencies (schools, clinics, local administrations), NGOs and other development agencies similarly report increased efficiencies and the ability to deliver services in a more timely, effective and less wasteful manner through use of the telephone.

In 2005, *The Impact of Telecoms on Economic Growth in Developing Countries*, has added to this long history of previous research, conducted over many years, to demonstrate that telecommunications has a significant impact on economic growth. This research has highlighted the particular impact of mobile communications penetration on economic growth.

Economic impacts of broadband Internet & ICT service deployment

The benefits of broadband Internet and ICT are generally less direct and more difficult to quantify though there is general consensus that critical macro-economic value is gained from the provision of broadband access to ICT services. Research and analysis on measuring broadband impact are only beginning.

What is clear is that the impact of broadband is highly dependent on framework conditions within the country and also within the sector that is to benefit from broadband access. An example of this is the following: a health project plans broadband connections to be provided to rural district hospitals to facilitate remote diagnosis, consultation, transmission of imagery and data, and video-conferencing between the rural hospital staff and specialist doctors in the urban hospitals. In order for the health sector to reap the benefits, certain conditions need to be in place, such as:

Trained staff at the rural hospital to operate and maintain necessary ICT facilities and equipment;

Increased staff at the urban consultation hospitals to be able to accommodate increased demands through rural hospitals;

Privacy regulation on patients records which are electronically submitted; and

Cost accounting and financial incentives for urban hospitals to provide remote consultation to rural hospitals.

Assessing the economic benefits and impact of broadband Internet is fundamentally different to assessing the impact of telephone communications, for the following two reasons:

1. A broadband Internet connection does not in itself provide any value or service in contrast with a traditional telephone connection that provides an instant use and benefit through immediate and direct verbal communication (saving travel costs and time of alternative means to communicate). Only the use of Internet services and applications made possible through a broadband connection can create benefits for the user, such as remote network access, VoIP services, video-conferencing, online-banking etc.; and
2. The realization of benefits from broadband for a country is strongly dependent on overall conditions such as the: regulatory framework (e.g., security for e-commerce transactions, laws for on-line banking, etc.); business environment (e.g., computer penetration, ability to develop skills, capacity for organizational change); supporting infrastructure (e.g., reliable electricity); and ICT literacy among the population.

Measuring economic benefits of broadband

The situation for measuring the impact of broadband can be summarized as follows:

It is still in an early stage – the first attempts at gathering empirical evidence were made in 2003 in Ontario, Canada, and in 2005 with national scale data from the United States;

It is often restricted to the developed and most advanced nations; and

There is little quantifiable proof and internationally comparable data of value for the time being, however multiple efforts are underway.

A method to measure the benefits from services used via a broadband connection in the developed world is to make the simple assumption that the direct benefit must be higher than the cost of the broadband connection to the subscriber, otherwise they would not subscribe. The assumption is that the subscriber has conducted a personal (or household) cost/benefit analysis and has determined that the net benefit outweighs the cost. This is a reasonable assumption since the market is the final arbiter of value, and demand is the indicator of benefit.

In general, a useful approach to assessing the impacts of ICT is to view it as a system that tracks inputs, outputs, outcomes and efficiencies, as follows:

The inputs are mainly the costs of providing broadband to a market including any required complementary investments;

The outputs are direct results of the inputs, e.g., a certain number of broadband connections within that market, number of schools or hospitals connected, number of ICT services used, number of on-line training courses provided, etc.;

The outcomes are measured through the impacts of the outputs such as number of school-children now ICT literate, number of hospital staff trained via on-line courses etc.; and

The efficiencies of the investment which concerns the cost to produce each unit of output, e.g., USD 5,000 per school to provide broadband connection, USD 500 per on-line course per person, etc.

Findings of studies so far

Studies that have attempted to analyze and measure the economic impacts and benefits of broadband Internet have found evidence supporting the following impacts:

ICT sector growth;

Productivity gains;

Transformation of how individuals, business, government and other parts of the society work, communicate and interact, transforming economic relationships and processes in the private and public sector; and

Reduction in pollution (due to reduced travel).

In particular, 'A cost benefit analysis for broadband connectivity in Europe' from 2004 analyzed direct benefits to subscribers, the benefits to providers of services, and indirect benefits arising to others as a result of broadband across Europe, and concluded that the potential economic impact of broadband is very significant but that it varies between countries. The variation is mainly dependent on three factors – the size of country (the greater the number of subscribers, the greater the benefit), the cost of transportation (the higher the cost of transportation, the higher the benefits of reducing travel through ICT) and the value of time (the more time is valued, the higher the benefits as ICT saves time).

Another study 'Measuring Broadband's Economic Impact' from 2006, analyzing data from the United States, stated that the analysis supports the conclusion that broadband positively affects economic activity, and in particular more rapid growth in employment, the overall number of businesses, and business in IT-intensive sectors.

Implications for developing countries

While specific academic studies that detail and measure quantifiable data on the impact of broadband Internet is still being gathered, it is nevertheless evident that broadband development does have significant macro-economic impact. Still, it is not clear to what extent ICTs have helped to directly reduce major development concerns and particular those of the Millennium Development Goals (MDG), such as poverty, hunger or sickness. The existing studies have shown that the economic impacts and benefits are variable between countries and dependent on framework conditions. Therefore experiences and models, especially from the most advanced world, are unlikely to be directly transferable to the developing country context.

But with the huge potential of broadband Internet for economic growth and development, developing countries can hardly afford to wait until there are more studies showing clear evidence, as they are already lagging behind the advanced nations in regards to ICT. Most developing countries recognize this reality and are keen to promote broadband

Internet development, and many are developing national broadband strategies or policies.

Some guidance can be given in regards to how each country can tailor the broadband and ICT strategy to their objectives and situation, as follows:

Piloting of broadband ICT projects

Piloting projects is a good approach that allows for the testing of working hypotheses of required input, output, outcome, efficiencies and required additional components.

Consider complementary activities

Any UAS broadband strategy should coordinate with other government ministries and non-government activities and programmes, which can bring a range of complementary activities. These include:

Public awareness, training and skills development;

ICT deployment in education and health sector;

e-government;

Environment and emissions reduction;

Regulatory improvements;

Development and expansion of ICT business opportunities; and

Expanded ICT and electricity infrastructure.

Pre-conditions for benefits from ICT development

A certain level of complementary activity and investment should be considered as essential pre-conditions to the effectiveness of ICT and broadband development. For example:

Reliable 24 hour commercial power supply is generally required for the use of computers and Internet access to be prevalent and beneficial;

School Internet access projects generally need the pre-condition of the national or provincial education authorities to develop a school computerization and networking programme, a computer lab, teacher training, and the specific institution of an IT curriculum, and relevant national content;

Promotion of computerization and Internet skills within all government levels, especially local government and local public health and education institutions;

Promotion of tele-working, e-government, e-banking, and conducting other activities on-line to offset emissions generated through travel.

Timing, market aspects and regulatory reform

Timing of a UAS policy and programme

The timing of a universal access and service (UAS) policy and programme must be carefully considered and be linked to the liberalization process for the following reasons:

- If a best practice UAS programme is implemented before major reform measures have been taken, it has a high risk of failure or of being ineffectual. It will also be more costly, as the market does not operate efficiently;
- If a UAS programme is implemented before the market has had an opportunity to work efficiently or while it is still in a period of major expansion, then the UAS programme can quickly become outdated; and
- If a UAS programme is implemented before existing pre-liberalization obligations are addressed, it can face major disruptions and pushback from the incumbent.

When is the right time to implement a UAS programme? Regulatory reform can go on for many years and with ongoing developments in the sector like convergence or broadband development, improving and adapting regulatory efficiency is a never-ending endeavour.

The following recommendations are made in regard to prerequisites for implementing effective best practice UAS programmes that rely largely on competitive allocation methods for funding and on working with the industry to achieve UAS. These recommendations should be regarded as minimum regulatory reform requirements:

- The majority of the main operators should be privatized. That does not mean that operators cannot still be government-owned. Possible scenarios are that the government owns less than 50 per cent, i.e. has no controlling interest;
- If the regulator has only recently been established, a sufficient amount of time must pass to establish a minimum amount of capacity, trust and credibility within the industry. Further, it must have a demonstrated ability and commitment to make regulations free of vested interests, and these must have been developed in consultation with stakeholders;
- A minimum of competition is essential in the sector and its sub-sectors (including, public telephony, long-distance transmission, mobile, Internet, etc.). This means having at least two competing service providers and the prospect of further opening of the market (commitments to issue more licences, or authorizations, or set full liberalization dates); and
- Policymakers and regulators should have a clear view of which areas or population groups are clearly underserved by certain services despite already considerable regulatory reform. Through consultation with the industry, it should be clearly established that these areas and groups would indeed not be served in an acceptable amount of time. This is when special measures are taken and a UAS programme is implemented.

Even if some of these prerequisites are not yet achieved, it is possible to start developing a UAS policy, as the development of a UAS policy can take up to a year since it requires inter-governmental co-ordination and agreement, public and industry

consultations, and an assessment of the sector status quo. Also, subsequent changes to laws and regulation and the development of additional regulatory instruments take significant amounts of time.

UAS as a market opportunity

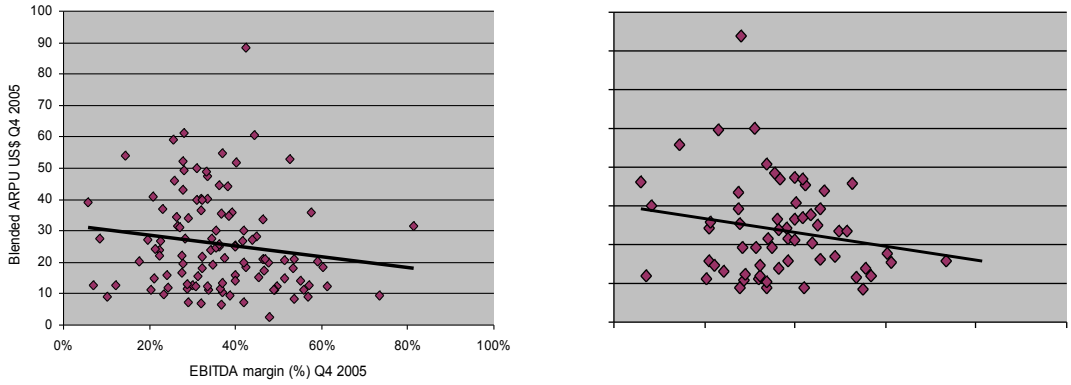
In the past, many countries believed that competition and private-sector market participation were at odds with serving the needs of the urban poor and rural areas. The underlying perception was that the urban poor and rural areas could not be profitably served and would therefore be neglected by private operators. Increasingly, policy-makers and industry experts are altering their views of un-served and under-served areas, regarding them less as intractable problems and more as potential markets for investment. This has been prompted by the success of mobile operators and their expansion into un-served and under-served markets. Also, there are models demonstrating how to serve the poor profitably that are discussed in 'The Fortune at the Bottom of the Pyramid' by C.K. Prahalad.

Potential revenue of the universal access and service (UAS) market is not limited to the expendable income of the rural poor. There are at least six sources of revenue from rural expansion including the following:

- Rural inhabitants who will spend a percentage (typically at least in the range of 3-5 per cent) of their household incomes on telecommunication services;
- Rural institutions – local government, schools and clinics– these are essentially government expenditures, and also national or international NGOs – all with increasing broadband needs;
- Local businesses who will use various services in their day-to-day work;
- Urban inhabitants travelling into rural areas for business or personal reasons;
- Calls originated by urban relatives and correspondents, either in response to "call-me" SMS messages, "beeping" or other means of reverse charging used by low income people; and
- Calls originating in the rural areas after the receipt of electronic airtime top-ups for pre-paid phones transmitted from urban to rural relatives, where such services are offered.

Low Average Revenue Per User (ARPU) does not imply a lower profitability for operators. Companies operating in a low ARPU environment are often as profitable as companies in high ARPU situations. For example, Philippine operators have some of the lowest ARPUs and highest reported Earnings Before Interest, Tax, Depreciation and Amortizations (EBITDAs) in the world, and Indian operators' EBITDAs have increased significantly over the last two years as ARPUs have fallen. An analysis of 61 operators confirms this as shown below.

Figure: EBITDA margin compared with ARPU



Source: Universal Access – How mobile can bring communications to all, GSMA 2006

For more revenue sources for rural broadband, beyond business and institutions, more experience needs to be gained through piloting of innovative products and services.

Regulatory reform to achieve UAS

Regulatory reform is integral to universal access and service (UAS) policy. It is important to emphasize that regulatory reform is part of UAS policy and not separate. There is a misconception that privatization and liberalization do not promote UAS and benefits only investors, industry players and urban and business customers. It is more accurate to consider regulatory reform as the first step in achieving UAS, and that a UAS policy is an additional measure to complete and supervise what a well-regulated and efficient market begins.

The most important step of sector reform is introducing competition, which coupled with fair and independent regulation, creates a level-playing field between operators. This is especially important if the incumbent operator is not yet privatized. The positive impact of effective competition has been demonstrated in most countries' mobile services expansion.

A thorough liberalization process, whereby the communications sector is effectively regulated and open to fair competition from private investors, is vital to the success of a universal access and service (UAS) programme for the following reasons:

Without an effective regulator operating within a modern telecommunication law, there are significant challenges for the implementation of a UAS programme;

Where a government continues to be a market player, usually by owning all or a part of the incumbent operator, it is likely that the government cannot be impartial when making sector policy and UAS policy, as it will have a vested interest in one of the market participants. Also, there is a risk that governments will continue to direct the incumbent operator to serve certain areas for political reasons, regardless of viability; and;

Only a reformed or renewed institutional framework is conducive to network and service expansion on an equitable basis. Therefore, competition, interconnection, licensing/authorization policies, tax policies and any economic disincentives must be properly addressed.

Governments are well advised to implement essential regulatory reform before creating specific UAS mechanism such as Universal Access and Service Funds (UASFs) or other specialized subsidy tools. Some key regulatory issues for UAS are the following:

- The development of a ***modern regulatory framework***, including addressing the impact of ***convergence***, and the establishment of a separate and ***effective regulator***. The national regulatory authority (NRA) should have the qualities of an accountable entity with decision-making powers isolated from vested interests. Consideration needs to be given to the scope of the regulatory authority's role and responsibility, introduction of a statutory framework that enables effective operation within government hierarchy, and ability to set and enforce measures that are publicly acceptable. For a discussion of this, see Module 1: Regulating the Telecommunications Sector: Overview, and Module 6: Legal and Institutional Framework;
- Implementing ***effective regulation of competition*** – A competitive marketplace is essential for the delivery of communications services to those who had no such service before. For example, fixed telephone penetration in India reached only 2 per cent of the population in the 50 years following independence, 1947-1997. However, industry reforms, including competition and other regulatory measures, launched in 1998 had, by 2008, propelled penetration (including mobile) to almost 20 per cent. Research finds that competition drives the greatest improvements in the sector. For example, markets operating with a duopoly are less able to realize the benefits of free competition, as there is not enough incentive to capture market share by expanding service, or by lowering prices. Collusion between the two operators on keeping retail prices high is also a potential concern.

  Competition promotes UAS in the following ways:

  - Competition drives expansion (i.e., coverage and availability);
  - Competition lowers prices (i.e., affordability), spurs new pricing models, and promotes better quality of services;
  - Competition encourages market segmentation and stimulates the introduction of innovative services (i.e., more choices and new services); it also promotes the servicing of the less affluent, through removal of non-price barriers and subscriber growth; and;
  - Competition makes Universal Access and Service Fund (UASF) tenders for subsidies to provide UAS successful; it often needs more than two major operators in the market for a UASF tender to work;
- ***Interconnection and pricing*** - Interconnection agreements are a crucial regulatory factor for the commercial viability of rural telecommunications because rural operations typically have more incoming calls. Interconnection agreements are particularly necessary vis-à-vis the payment for terminating traffic. For competition, interconnection and tariffs see also the ICT Regulation Toolkit Module 2: Competition and Price Regulation;

- ***Radio spectrum regulation -*** The effective management of radio spectrum, maximizes the use of this scarce resource and allowes for innovative and emerging technologies, including Broadband Wireless Access (BWA), especially for rural areas. Key guidelines are the following:
    - Facilitate deployment of innovative broadband technologies - including the principle of minimum regulation and allocation of frequencies in such a way that facilitates new entry into the market;
    - Promote transparency - including consultation and publishing of market forecasts, plans and registers of industry interest;
    - Adopt flexible use measures - including minimizing barriers to entry and adopting lighter regulatory approaches in rural and less densely populated area;
    - Ensure affordability - reasonable spectrum fees that encourage innovation;
    - Optimize spectrum availability on a timely basis;
    - Ensure a level playing field - especially to prevent spectrum hoarding by incumbent operators;
    - Harmonize international and regional practices and standards; and
    - Adopt a broad approach to promote broadband access - including special measures for UAS. See also Module 5: Radio Spectrum Management.
- ***Technology neutral licensing, unified licensing or general authorizations*** – In order for all operators to participate in UAS provision and competitions, they need to be free to choose which technology is best suited to serve rural areas. Introducing technology and service neutral licenses is helpful for UAS. Creating a level playing field now sometimes means ensuring that incumbents can compete by introducing technology neutral or unified licences, especially when they have been incorporated as commercial companies or privatized, and no longer receive favouritism and financing from the government. These steps ensure that the main operators who are asked to contribute to a UASF will compete on a level-playing field for future UAS subsidies and projects, and share the burden and opportunity of UAS more equally. See also Module 3: Authorization of Telecommunications Services;
- ***Open access and regulating dominant markets -*** Access to competitively priced national and international long-distance transmission is crucial for the success of a universal access and service (UAS) programme, both for the telephony part as well as the Internet or broadband part. Any dominance over transmission or international gateways usually keeps bandwidth and leased line prices higher than in a competitive environment and affects affordability for the end-user. It also limits the investment capacity of the other operators and service providers, which pay high prices for transmission or bandwidth rather then investing in network expansion.
- ***Taxes, import duties and fees -*** Countries need to carefully review their ICT-related tax and fee regimes. In general, high taxes, including corporate tax, import duties, tax on services, and value added tax on end-user equipment, result in fewer people gaining access to ICT services and slower network roll-out. Some countries with higher taxations of mobile services and handsets have experienced low subscriber penetration. Lower taxes, especially import duties, do lower the cost of network build-out, and lower taxes on end-users equipment, including computers, make them more affordable to customers while lower service taxes impact demand elasticity and can increase usage.

- ***Removal of pre-liberalization US obligations*** – These must be dismantled for market fairness. The incumbent, ex-monopoly operator, has often been shouldered with the burden of serving rural areas (even if inadequately) at the behest of political interests. The incumbent should be given the option to retreat from those areas where it does not wish to continue to provide service, including areas where it believes existing service provision is economically unviable. New technology / other players– whether mobile, an IP network or broadband wireless – tends to reduce costs, can offer more services and therefore has the ability to turn economic loss into gain.

These regulatory reform measures, if put into practice, create more sustainable and widespread communications access as well as service growth.

Licensing and UAS

Regulators have a major opportunity to incorporate universal access and service (UAS) objectives through their need to respond to convergence, and their move towards simpler class or general authorizations, by issuing technology neutral or even unified licences. UAS requirements added to these new licences are generally accepted in the context of an overall review of the licensing regime and in return for the greater flexibility offered by the new regime.

There are three types of licensing opportunities that allow UAS requirements to be added:

Competitive bidding for new licences – For any new competitively offered licences to industry, it is fair to add UAS requirements as long as they are publicized with other licensing conditions, as the cost of these requirements can be reflected by the bidder in its bid price. An example of this is South Africa's ICASA, the industry regulator, which granted Neotel, a new entrant operator, licences for providing Public Switched Telecommunications Services (PSTS) and Value Added Network Services (VANS), including a 3G licence. As part of its Community Service Obligations (CSO), Neotel has to provide high speed Internet connectivity to 5,000 public schools, Further Education Training Institutions (FETs) and rural medical clinics in South Africa.

Competition for additional frequency spectrum – Valuable spectrum auctions can also be used to add UAS requirements if bidders know in advance the specific requirements and their cost, which can then be reflected in the bid price. For example in Brazil, the regulator Anatel is pursuing broadband UAS targets, planning to connect all of its 5,600 municipalities with minimum broadband capacity, as well as creating and connecting 8,500 telecentres and 50,000 urban schools. Anatel used their 3G tender to achieve coverage throughout the country, by matching profitable areas with less attractive ones: Sao Paulo was paired with the poor North-East region, and Anatel was willing to accept a lower tender amount in exchange for mobile coverage in all regions. While only 1,836 municipalities currently have mobile services, all municipalities will soon have mobile and 3G services as a result of the 3G tenders.

Transition of existing licences to new licensing regime – This would likely affect all existing licence holders in a country and would probably not include a competitive element. UAS requirements added to these new licences need to be carefully balanced between benefit and costs, should not overburden operators, and are ideally developed in consultation with the industry to make sure UAS requirements are feasible. They also need to be applied with fairness to all existing licence holders. This might imply that

operators are treated differently according to their market share or subscriber size considering that the cost of the UAS requirements constitute a larger burden on small operators than on the dominant operator.

Enabling and stimulating broadband development

With the increasing importance of broadband development, policymakers and regulators are required to put a special emphasis on broadband and to ensure that broadband services are widely accessible to people, public organizations and businesses wherever they are located. This is a major challenge worldwide. The relatively high cost of establishing broadband networks has created new inequalities between suitably connected urban and developed countries and, rural areas and lesser-developed countries.

General good regulatory practice such as creating favourable frameworks that are incentive-based and investment friendly, liberalization, technology neutrality and unified licensing, and providing fair treatment, also apply to broadband regulation, and can help facilitate the deployment of and access to broadband services by a variety of operators and technology innovations.

However, in addition, the following issues are of particular relevance to broadband development and regulation:

Competition and access to international connectivity and capacity - Competition in international connectivity (i.e., sub-marine cables) and access to facilities such as international gateways (for Internet or voice traffic), is key to lowering the cost of bandwidth and broadband prices for consumers. Effective interconnection, gateway liberalization, and regulatory frameworks that introduce new models of sharing and collocation and national peering, and which reduce barriers to existing private, government and international networks, are important in encouraging existing and new market entrants to expand into broadband services.

Market liberalization and incentives for network deployment - In countries with less developed networks, the strategy for infrastructure network development including in rural areas is typically market liberalization, lifting foreign ownership restrictions, simpler licensing and promoting alternative wireless broadband provision. More incentives to ensure evolution to broadband services can include the following:

Consideration of tax incentives for fibre installation over cheaper methods e.g., microwave for network deployment;

Determination of whether market conditions are conducive to establishing duplicate backbone networks or single networks in which competing operators utilize shared bandwidth; if the latter, create open access policies for backbone networks;

Establish licensing that allows for infrastructure sharing and open access to broadband networks; and

Promote site collocation (site sharing) of network infrastructure projects (fibre backbone) where they can be accessed by a variety of potential operators and promote open access policies.

Planning for converged services

Regulatory approaches in support of broadband network development should take into consideration the convergence of multiple services (e.g., telephony, data and broadband) over IP networks. Approaches for co-existence of pre-existing services such as telephony and newer competing services such as VoIP or BWA services need to be considered and integrated in regulatory strategies, as well as the evolution from non-IP networks to Next-Generation Networks (NGN). Drivers of the increasing demand for broadband include: high demand for new services such as VoIP; cost effectiveness of utilizing multiple network topologies, and spectrum bands in service delivery of existing services (e.g., international calls). Effective regulatory mechanisms need to be put in place to manage issues such as interconnection, use of spectrum, and co-existence of traditional and new services.

Increasing public awareness and stimulating demand

Given the high costs of deployment of rural and remote broadband networks, the government needs to assist development by increasing public awareness and stimulating demand, for example by buying connectivity services in bulk, such as in the case of Malaysia (see box below). For example, regulatory agencies could work in partnership with other ministries in promoting the development and extension of e-government services, which in turn stimulate demand for broadband services.

Malaysia's National Broadband Plan (NBP)

The NBP has an interesting approach to encouraging demand, as opposed to costly government intervention in building and managing a national broadband network. NBP's strategy is for government to create a 'tipping point' in broadband demand by purchasing broadband services for key regional organizations. This stimulates a critical level of broadband use and encourages private industry to deploy needed networks.

Examples of targets for government-supported institutional broadband services include:

Approximately 900 federal, state and local government departments;

10 000 primary schools through the Schoolnet programme;

74 000 connections for public universities and research institutions;

4 000 hospitals and clinics networked and connected to Internet resources; and

1 700 libraries and a multitude of community centres with a focus on educational, entertainment and e-commerce applications.

Other approaches to promote broadband development include:

Supporting local, relevant Internet content in local languages;

Lowering the cost of end-user terminals through reductions of import duty and other taxes, national PC programmes helping lower income households to purchase PCs at discounts or with loans, and possibly subsidizing broadband equipment in schools;

Educating citizens about the benefits of broadband while further developing Internet skills;

Providing a legal framework for e-commerce and other applications; and

Ensuring that consumers have enough information on providers and pricing options as well as on available technologies.

Main approaches to UAS

Traditional approaches to UAS

Traditionally, before market opening, the incumbent operator, often government owned, had the obligations to provide universal service (USO). In a liberalizing market, imposing USOs on the incumbent operator alone is contrary to the objective of creating a level-playing field. However, shortly after market opening, developed countries often introduced administrative, non-competitive procedures for designating a company to fulfil a USO. These procedures are used where there is only one candidate capable of fulfilling the USO because new entrants are still far from national service provision. Typically, only an incumbent was considered capable as it often was already providing near-total fixed-line coverage.

Recognising this likelihood, the EU requires USO designation procedures to be "efficient, objective, transparent and non-discriminatory…" but not necessarily competitive. Where an open tender is not used, the EU prefers the designation to be:

- Open, in the sense that both the specification of the obligation to be fulfilled and the proposal of the designated provider are publicly available;
- Subject to public consultation;
- Broken down into components (geographic or functional), so that more than one company can be designated; and
- Of moderate duration.

Some EU countries have opted to make the significant market power (SMP) operator in the retail access market the universal service (US) provider.

The challenge of costing universal service provision and reasons for current low use of administrative USO funding

If a single operator bears the burden of USO in a liberalized market, the question arises what compensation the operator receives for providing USO. In these circumstances, administrative procedures for allocating universal funding have been developed. Administrative procedures exist, for example, in the USA, Canada, Australia, and France. All procedures for administrative payment of compensation to operators are based on calculations of the costs that the company incurs in fulfilling USOs. Usually, these are net avoidable costs. "Net" means that the benefits that the company receives from fulfilling the obligation are subtracted from the costs. Benefits are, for example, revenues directly attributed to USO customers, inbound calls to USO customers, and intangible or intrinsic benefits such as ubiquitous presence, brand enhancement and corporate reputation. "Avoidable" means that costs will only be taken into account if they would not be incurred without the obligation.

Calculating relevant costs and benefits for USO funding purposes is a major undertaking. Cost calculations in telecommunications are never clear-cut, and include elements of judgement and attributions that are to some extent arbitrary and estimated. Because large inter-industry transfers may be involved, it is important to make these calculations as accurate as possible. The choice of the costing methodology to be used is important and ultimately must be practical and acceptable to all parties.

The countries mentioned in this section have elaborate cost models for USO costing, and they require specialised expertise to run them. These models also rely on the industry to provide well-founded data input. In turn, these data often require highly developed accounting systems that the companies would not put in place for purely commercial reasons. The difficulty of estimating costs acceptably is one reason why few regulators in Europe have implemented administrative funding of USO even though the Universal Service Directive allows them to do so if they judge that the cost has become an unfair burden on the designated provider. Similarly, Australia carried out a review in 2004 that led to a decision to base future US funding on estimates rather than on detailed modelling.

Some regulators have estimated that the intangible benefits of USO provision (such as brand recognition, positive publicity and marketing) are great enough to outweigh the tangible net costs. Typically, USO providers are incumbents with high market shares of the fixed line market (often well above 80 per cent). Since contributions to shared US funding are proportional to market share, the additional financial support that the US provider would receive is likely a small proportion of the calculated net loss. This may well be less than the overhead cost of running a shared fund, leaving aside the cost of calculating the amount of compensation that is due.

Recently, where mobile operators have secured a much larger share of the total market and reached almost total ubiquity, the question of US is now subject to redefinition. Internet and broadband development also requires the redefinition of US and how to achieve it, requiring likely a competitive allocation. For this and other reasons, the old method of estimating the cost and allocating responsibility for USOs to operators remains an uninteresting proposition in most European countries and other advanced nations.

Consequently, with more mature liberalized markets, the EU is moving toward more competitive designation procedures led by new member states. For example, Estonia broke new ground in 2006 by being the first member state to designate through an open tender procedure an alternative operator as its US provider. This is the Finnish company Elisa, rather than the incumbent. The United States is currently reviewing its US funding system for high-cost areas. From 1998 to 2007, total high-cost funding has tripled to USD 4 billion per year, and an emergency cap is now likely to be applied to limit further growth. As part of the review, the Federal-State Joint Board is considering introducing competitive subsidy auctions based on the experience of developing countries but modified to suit the United States' conditions.

Competing for subsidies and UAS funds

The first generation of emerging market Universal Access and Service Funds (UASFs) to distribute subsidies based on the principle of competitive tendering, were established in Latin America in the 1990's. These competitive tenders are also called reverse auction or minimum-subsidy auction because the qualified bidder with the lowest request for a subsidy wins the tender. The first such competitions were held in 1995, soon after the establishment (in 1994) of Chile's Fondo de Desarrollo de las Telecomunicaciones.

The Chilean case, and ones that followed soon afterwards, were unique in the sense that they were also used as a one-stop mechanism to enable potential new entrants to

compete with the incumbent operator for universal access (UA) licenses in areas that were poorly serviced but for which a subsidy was offered. The services provided were primarily fixed network payphones, using wireless access or satellite (VSAT) technologies, and were located in places that were at the time, far from areas expected to be serviced by mobile operators.

Following the Latin American experience, a second wave of UASFs occurred in Asia and Africa. Nepal (1998) and Uganda (2000) pioneered the concept in their region, and several others, including Mongolia, Pakistan, Botswana, Burkina Faso, Malawi, Nigeria and Mozambique, are following in their footsteps. This is often with technical assistance from the World Bank or other international donors. The UASF concept has spread to approximately 46 countries by end of 2007.

Many UASF initiatives are following Uganda's lead by holding technology neutral competitions that are increasingly being won by mobile operators with existing licenses. These UASFs, as well as the early Latin American funds, are also applying their resources to the financing of Internet Points of Presence (POPs) in rural districts, telecentres and cyber cafés, school connectivity, and other ICT initiatives.

Almost all such funds have been created in emerging markets and developing countries in the context of liberalized markets to provide financial assistance for the following:

Meeting regional and rural service targets for telephony and Internet services;

Supporting key users, such as rural schools and health clinics, to access the Internet;

Supporting ICT projects by commercial and development organizations that provide national and local content, services and applications that stimulate Internet take-up and usage; and

Supporting various activities related to regionally balanced network and service development, such as the creation of Internet Exchange Points (IXPs) and regional Internet points of presence (POPs).

UASFs are primarily:

A means of financing – in the majority of cases financing comes from a percentage levy of operators revenue;

An administrative, planning and management entity for UAS programmes– UASFs and their programmes are often managed by a specially created UASF unit within the regulator or even a separate entity outside of the regulator – this often includes certain management principles such as accountability, transparency and efficiency; and

A competitive mechanism to award a service contract to the commercial sector to provide UAS services in exchange for subsidies from the UASFs.

Sources of financing

Most UASFs are financed mainly through annual operator levies although there are other sources, as follows:

1. Government general budget (in a small minority of cases, including one of the first funds, Chile's Fondo de Desarrollo de las Telecomunicaciones);
2. Industry levy, as a percentage of annual revenue, on certain classes of licensed operators;

3. Various other regulatory sources such as the proceeds of license competitions, frequency spectrum auctions and fees; and
4. Once-only contributions financed by loans or grants from international donors such as the World Bank that contribute seed finance to assist UASF start-up in the early years.

UASFs financed mainly by operator levies are independent of available government funding and are particularly attractive for low-income countries with limited resources and more pressing government budget priorities. However, countries with more resources could consider contributing some amount from the government budget to the UASF. After all, the UASF implements government policy. It is important though that the UASF remains independent from day to day politics to fulfil its long-term UAS objectives, and that it continues to focus on sustainable solutions with effective and cost-efficient private sector participation.

A strong argument can also be made that at least part of the proceeds of radio frequency auctions and licence competitions should be used to source a UASF. Guatemala's FONDETEL used this financing approach. Auction proceeds are paid by various industry players for a national resource, the proceeds are often simply transferred to the government budget, but instead it might be more appropriate to use this money particularly for ICT development, such as to fund UAS or special measures for broadband development (e.g., increasing PC ownership or equipping schools with computer labs and broadband access).

A stronger case could be made that the funding should, if possible, be more balanced between the first three financing sources. Important though in all cases is the predictability, timing and the frequency of the funding to allow proper planning and constancy for the UAS implementation.

Planning and management entity for UAS programmes

Regardless of the financing sources, an instrument like the UASF is also an institutional vehicle to plan, administer, manage and implement UAS programmes. Often the national regulatory authority has a specific department that manages the UASF on a day-to-day basis. The two main reasons for this are as follows:

1. The regulator will have a degree of independence from government and industry; and
2. The regulator will have technical and regulatory expertise.

A UASF programme will have a greater chance of success if the regulator has a strong reputation for independence and industry trust. This is even more important if the government still has an ownership stake in any of the operators.

Regardless of which entity is chosen as the UAS unit, key management principles that are required to ensure success and the financial integrity of UASFs include:

- Accountability;
- Transparency;
- Independent auditing, publication and annual reporting;
- Keeping administrative costs to a minimum; and

- Efficient use of funds.

Another important element of UASF is effective oversight. It is best practice that the regulator provides the Secretariat expertise and everyday management under a special Management or Advisory Board which provides high-level strategic direction, approves major projects and fund disbursements, and monitors proper execution and financial integrity. Most UASF's have a Board functioning above the level of the senior executive, however the Board's role differs from country to country, depending on specific local factors. Options for UASF Boards are as follows:

- Direction or management – making executive decisions on a wide range of issues from hiring of senior managers to budgetary approval, approval of UAS programme and projects, and the final award of subsidy contracts;
- Monitoring and oversight – ensuring that the decisions of the executive (whether named director, manager or administrator) and his/her management team are scrutinized on behalf of stakeholder interests; or
- Consultative or advisory – requested to review proposed UAS programmes and projects, executive decisions, provide expertise and advice which is published and requires a formal response by the UASF management unit.

Competitive subsidy allocation mechanism and smart subsidy

A smart subsidy is a one-time and partial subsidy that can leverage additional commercial investment, and is minimized though a competitive procedure. The objective of a smart subsidy is to enable operators to bring a potentially loss-making or marginal project into a normal commercial rate of return. The mechanism of a smart subsidy competition is geared to the achievement of realistic universal access and service (UAS) objectives. UAS targets are realistic and feasible for the market if commercial operators, with some smart subsidy support, will be able to and will want to achieve them. The subsidy thus represents an amount that bridges the operator's financing gap. It could be viewed as support to offset capital investments, capitalized operating losses for the first few years, or a combination of both. The important concept here, is that the subsidy is a once-only allocation which may be disbursed in tranches over a stipulated period of time (e.g., one to three years) corresponding to various output milestones, but is not open for re-negotiation or longer term continuation.

Key advantages of UASFs include:

Transparency and fairness

A UASF that adheres to best practice provides a transparent means of allocating subsidies for the achievement of service targets in commercially unviable areas. All operators and service providers pay into the fund in equal proportion to their revenues, making the cost of UAS shared equitably among operators. Technology neutral competitions allow all operators and service providers a fair chance to win a UAS subsidy competition. The alternative of mandating targets runs the risk that it would be difficult to allocate fair targets for different operators in a competitive market. It would require that the costs of the targets are established and then distributed proportionally among the industry.
The valuation of the contribution of each operator towards UAS would require the regulator to seek confidential financial information (revenue, capital and operating

expenditure) from each operator. This would be akin to the administratively heavy approach taken in traditional price regulation, or by some very high-cost and patently inefficient previous administrative approaches.

Emphasis on innovation and least-cost solution

One of the key challenges is to properly establish the cost of UAS provision. This requires complicated cost models, well developed internal accounting systems within operators, and may result in disputes. Another challenge is to use a system that encourages cost-minimization and innovation. UASFs using competitive subsidy bidding mechanism avoid detailed cost modelling but instead use more simple cost models that help establish a maximum subsidy ceiling. And by using a competitive process, there is an inbuilt incentive for least cost innovative solutions, as the bidder requiring the least amount of subsidy wins. However, it is important to note that the bidding process is not geared towards the cheapest solution but rather, as a first step, a bidder has to comply with specific corporate, financial and operational experience requirements and demonstrate that it can meet the service and quality specifications for the UAS provision.

UASFs provide "pay or play" in practice

With a UASF least subsidy tender, no operator is forced to participate in the competition. Thus operators who are not interested in serving rural areas or providing public access are free to opt out, though they do have to contribute to the fund. The UASF can be a way of requiring that the industry at large contributes to financing the achievement of UAS, while only operators interested in expanding to rural areas will tender for the subsidies. The successful operators will, in fact, have a portion of the funds they contributed and maybe more, returned to them.

UASFs can bring finance into the sector & reduce the cost to operators

UASFs present a mechanism for government, or donors such as the World Bank, to contribute financially to UAS in a liberalized market, without getting directly involved in less-efficient forms of project ownership or management, as in the monopoly era. This has resulted in a considerable amount of seed finance being contributed before the build-up of equity through operator contributions in some smaller markets.

The public interest is explicitly served

The process of good governance typically requires an explicit determination of objectives and targets, a process of consultation, buy-in by all stakeholders, and satisfaction by consumer representatives that various interests are balanced for the public good. This has been achieved reasonably well in the case of the best-practice UASFs currently in operation that held public tenders. It would be difficult to achieve the same level of confidence through a trade-off negotiation with operators, unless the UASF administration could clearly demonstrate the basis of the balance of interests and fairness achieved, with a high degree of transparency. This would, as previously stated, run the risk of incurring a heavier and more intrusive administrative bureaucracy.

Challenges of UASFs

The increased use of UASFs and their experiences has also brought to the forefront some challenges of the UASF approach which can be summarized as follows:

- Some UASF funds have not been allocated in a technology neutral manner;
- Some UASFs have accumulated too much money and allocated too little; and
- UAS programme planning and implementation has sometimes been overtaken by market developments.

A couple of funds set-up before the mobile service explosion, were limiting fund distribution to fixed-line operators while asking mobile and wireless operators to also contribute to the fund which primarily benefited the government-owned incumbent operator. This was against the principle of technology-neutrality, equity between contributors and eligible recipients of funds, and did not encourage cost minimization. Experiences highlight the importance of adhering to those key principles when operating a UASF programme.

Also, some UASFs had only allocated a small portion of the funds for the implementation of UAS provision from what they had collected. Underneath this lie two problems:

- The percentage levy to be collected from operators was set too high, collecting more funds from the sector than the UASF was able to use and allocate, thus depriving the sector of important funds for commercial investments and expansion. This was sometimes caused by an under-estimation of market growth; and
- The pace at which UAS programmes were planned, projects designed and bidding processes implemented was sometimes too slow.

The latter point ties into the third challenge of UASFs, that UAS programme planning has in some instances been overtaken by market developments, especially the rapid spread of mobile coverage in many developing countries.

Way forward for rural broadband development

Looking at the three components of UASFs – means of finance, institutional entity to plan and implement UAS programmes, and the competitive smart subsidy mechanism – and taking into consideration the negative and positive experience of funds, for one of the main tasks ahead for UAS, rural broadband development, the following seems clear:

- It is necessary to limit the amount levied directly on operators as a percentage of revenues and at the same time to widen the pool of other financing sources. International experience indicates that no developing countries appear to have been able to disburse more than a maximum of 2 per cent of sector revenues in their UASF programme. International experience also indicates that this figure should not be static but should be slightly flexible to reduce contributions over time as the market grows and UAS targets are progressively achieved. At the same time, considering the potential finance required for rural broadband development, it seems also crucial to widen the sources for financing the UASFs and include licensing and frequency auction proceeds (e.g., a certain percentage of the proceeds) and government sources to the pool for the UASF.

- Delays in allocating funds as well as delays in implementing programmes both point to the requirement to increase capacity and efficiency of the organizations or departments charged with planning and implementing UAS programmes.
- The competitive smart subsidy mechanism and co-operation with industry has proven very successful and should be maintained and could be incorporated into other approaches as well, such as selecting a private partner for public-private partnerships.

Non-government and local community initiatives

Non-government organizations and local communities can play an important developmental role in universal access and service (UAS). They represent bottom-up rather than top-down policy driven initiatives and in many cases they have become significant contributors to the objective of reaching underserved populations and of bringing communications and improved livelihoods to the poorer segments of society. The focus on community involvement is typically more prominent with ICT and broadband initiatives.

Of particular note are the following models and experiences:

- ***Micro-finance*** and entrepreneurial ***village phone initiatives*** – these are now well-known, not least because of the high profile Grameen Village Phone initiative in Bangladesh launched in 1997. The Grameen Bank provides impoverished village women with financial support to develop sustainable income generating activities. Women clients of the Grameen Bank who show the initiative to become local Village Phone Operators (VPOs), receive training and are loaned funds to purchase a mobile phone set-up (phone with special in-built pricing software) suitable for rural areas, as well as airtime credits. Through the network of VPOs, vending affordable airtime denominations and facilitating individual calls, residents have access to communications. In 2006, Muhammad Yunus, the founder of the bank, and the Grameen Bank itself, were jointly awarded the Nobel Peace Prize "for their efforts to create economic and social development from below." Similar initiatives have been replicated in many other countries. However, in Bangladesh itself, the increased mobile penetration and the large number of village phones itself is eroding the profitability of the model. It is likely that value-added services need to be added to the village phone concept to remain relevant and sustainable.
- ***Community networks*** are a recent trend, however there are a few established examples which demonstrate some success factors. Often, these examples are small-scale initiatives. Pre-conditions for success include the following:
  - **A minimum critical size** – for example, a typical community network based on WiFi technology requires a population of around 15,000 with annual income per person of USD 500 to support itself. As technology costs reduce further, the size of population critical for success, will also shrink. Still, many communities will be too small to support successful community networks;
  - **Communal consciousness** or some level of organization enabling the population to function as a community, express its shared needs, and act in its own interests is necessary for community networks to succeed;

- **Local leadership** and, preferably, a core of committed people with a certain level of education and technical skills;
- **Access to external technical and managerial support**, especially if these skills are lacking locally; and
- **A supportive political and regulatory environment** that promotes community networks.

- ***Internet public access, telecentres, and cyber cafés*** – there is a very wide range of sponsors of telecentres, of funding sources and organizational and management models; also, many telecentres have been established through UASF competitive tenders. It appears the models are more successful:
  - If there is a network of telecentres which works together;
  - If there is a financing model in place that secures ongoing sustainability (often the cost of maintaining, upgrading and replacing equipment is underestimated, while service revenues are over-estimated);
  - If services are tailored to local demand; and
  - If telecentres are operated either commercially by local entrepreneurs or at least adhere to a certain degree to commercial management practices.

  Gaining sufficient broadband quality is crucial so that Internet users have an Internet experience that is relevant, worthwhile and which will engender ongoing interest in ICT. This challenge led the planners of Uganda's rural communications development programme to focus on providing broadband Internet Points of Presence in district centres, where demand is most likely to exist and key users might emerge, ahead of focusing on telecentres. In several places, commercial cyber cafés emerged once broadband Internet access was made available. These businesses could provide the experience as well as technical resources to support community initiatives or assist vanguard institutions such as schools, hospitals, community broadcasters and government offices. The practice of focusing first on Internet POPs has now become standard practice in many of the new generation of Universal Access and Service Funds (UASF);
- ***Community radio or local radio -*** While there are no fixed definitions of what UAS means in the broadcasting field, there is a certain consensus on what its key dimensions are. These include local media, plurality and diversity. It is essential to ensure that all citizens have access to a local radio station as a forum for local debates, relevant information, and cultural expression. It is important that local media provide a diversity of content and plurality of information and opinions. Further, radio is a mass and an oral medium that promotes community interaction and social communication processes. Rural radio is not only important for UAS to broadcasting services, but it can also play an important role in spreading the benefits of Internet access. In many cases, successful use of the Internet for development requires community intermediaries that can overcome issues of pre-literacy, lack of ICT training and language barriers of the Internet. Local rural radio, which has Internet access, is emerging as one such successful intermediary because it is accessible, affordable and cheap to produce.
- ***Co-operatives -*** While only existing in a handful of countries, co-operatives are providing communications services in some rural and remote areas. Analyses of experiences to date show that co-operatives only thrive when certain conditions are in place and that the model is not applicable to every country or situation. However,

there are considerations in the development community, whether co-operatives might be the model to deliver broadband to rural and poor areas. More piloting and experience with this approach needs to be gained to see if that is the case.

- ***Regional or rural operators*** - Reviewing the limited experience with regional or rural operators as a tool for UAS provision, also in light of possibly adopting a rural or regional licensing strategy for broadband development, the key findings are:
  - There is an inherent market tendency for rural or regional operators to become national operators, either by being bought by a national operator, or through their own drive to grow and become a national operator. It's possible that regional or rural operators might be a temporary phenomenon; and
  - Introducing regional operators can be an effective tool for introducing new entrants and more competition. If a regional licence is focussed on areas that are less well served and coupled with the incentive of being converted into a national licence within a reasonable amount of time, it can have the triple results of

    a) Increased service in previously un-served areas;

    b) Increased competition; and

    c) A period of time to prepare and adapt to increased competition for the existing player(s).

Reasons for community involvement in UAS projects

Communities have a role to play in UAS for the following reasons:

- Some available low-cost communications technologies can work on a neighbourhood scale and are not too technically demanding, e.g., WiFi and VoIP, with free and open source software (FOSS);
- There is a recognition of the critical role local leaders have in tailoring ICT facilities and services to local needs as well as the importance of community ownership of ICT programmes, which is vital in working towards sustainability;
- Communities have a growing awareness that poverty is a complex phenomenon, stemming from a lack of political power as much as from a lack of money, and that grass-roots initiatives, which build local competence and confidence, contribute significantly to poverty relief; and
- There is a rising popularity of multi-stakeholder partnerships, in which the public sector, the private sector and other interested parties work together, each contributing finance, skills or other resources. For best results, end-user communities should usually be development partners.

Backbone development and open access

Backbone development is of particular importance for universal access and service (UAS) for the following reasons:

The extent of the existing backbone in a country may limit the feasibility to provide ICT access to the entire country (e.g., a certain part of the country has no backbone);

The access to an existing national backbone by other operators and service providers– if there is no access to the national backbone at reasonable cost-based prices, UAS

competitions cannot be successful as there is no level-playing field among operators; and

The increased demand for capacity to support broadband, both national and international, and the increased investment costs to develop Next Generation Networks (NGN), can create bottlenecks for UAS if the market is not developing and deploying these networks under its own capacity within a reasonable time.

Consequently there is increased attention on the main infrastructure and backbone of countries by development organizations, policymakers and regulators. Some UAS policies and programmes already include backbone elements (e.g., Chile's Universal Access and Service Funds [UASF] backbone build-out) and others are contemplating it. Several models, options and approaches are considered and implemented to address any bottlenecks in backbone and infrastructure development, as follows:

Opening networks of monopoly or dominant operators ***to competition and wholesale service provision***. Non-discriminatory access to incumbent networks in developing countries is vital. The enforcement of open access is a prerequisite to further progress in network development and UAS. The least invasive measure to accomplish open access to dominant backbone networks is price regulation based on cost-models or international benchmarks. International benchmarks are faster to implement and provide an incentive to the operator to provide appropriate and sufficient cost data in case there is a disagreement with the benchmark set price regulation. The other end of the spectrum of policy measures is functional or operational separation or structural separation. Policymakers are wise to study existing cases to see whether the effort and cost to implement such measures are warranted.

Backbone extensions - Access network extensions, under a UASF subsidy tender typically have some limited backbone extension associated with them. It is normal for UAS tenders to include open access requirements on access backbone links so that service providers, other than the initial subsidy recipient, have use of the facilities. This has been for example the case in Nigeria, Uganda and Mongolia.

Emerging alternative network options – Policymakers and regulators are able to licence competitive backbone operators and allow existing operators to sell their excess capacity, if the market is not already liberalized. Encouraging and allowing companies to make their networks available for wholesale and public retail business is an important step in enhancing backbone networks because it increases competition and stimulates investment. Also, electricity, gas and railway companies increasingly have optical fibre links for their own purposes (or rights of way that permit them to provide optical fibre links), with large excess capacity. These links could be made available for public traffic if regulation permits.

Building new wholesale backbone-only networks – Special backbone network initiatives – as opposed to the creation of open access to existing networks – have become a focus for possible universal access and service (UAS) programming over the last few years. These networks are either run and managed by an independent specially constituted network operator or by existing network operators in a consortium. Proponents of such initiatives believe that the main operators will not have enough backbone to match the country's needs and demand for ICT bandwidth. Considering the challenges and complexities involved, special backbone network initiatives require careful evaluation as to whether or not this is a worthwhile option for an individual country.

Having a specially constituted network operator is most appropriate when the network is being constructed using funds independent of any existing network

operator. Several countries in the EU and the province of Alberta, in Canada, have used specially constituted operators to develop broadband networks in rural and remote areas, using public funds. Typically, broadband networks developed with public funds, operate independent of existing operators and are not involved in retail business, and offer open access, e.g., anybody may use the broadband links. In contrast, in consortiums the network is owned by existing operators that might still compete with one another, but they will work together in a consortium to share a specific backbone. The consortium has limited functions—typically to serve the aggregated demand of the network operators—so it does not inhibit competition. An Internet eXchange Point (IXP) is an example of several investments already managed by a consortium. Also, several under-sea-cable initiatives connecting continents with better international capacity, such as the Eassy initiative in East Africa, are opting for a consortium approach to share investment costs. The risk with consortiums is that a monopoly can be created, disallowing access to operators and service providers that are not consortium members.

Infrastructure sharing aims to extend networks to areas where service provision is commercially viable if several operators share the costs of infrastructure. A prominent example is shared mobile towers (passive infrastructure) in India, where towers had already often been shared by mobile operators in urban areas. The regulator, TRAI, determined that in order to cover the remaining rural areas in India, operators would need to share towers to reduce costs. India's Universal Service Obligation Fund (USOF) offered to subsidize the building of towers in rural areas plus subsidize up to three operators to provide service using the towers. The competitive tender was very successful with over 7,000 towers tendered and operators very keen to be able to provide services using those towers. The total subsidy was one tenth of what had been estimated. Other examples of infrastructure sharing initiatives and measures are:

- In many countries that have mobile operators as the dominant service providers, at least one mobile operator may have a near-ubiquitous national transmission network that has potential usefulness beyond the narrow needs of mobile service provision. This network could be used for the provision of widely dispersed POPs for ISPs. Even if the existing capacity is limited for broadband, an upgrade to provide broadband may be significantly more economic than a completely new network.
- In mobile networks, sharing infrastructure might include physical resources such as towers and buildings, whole transmission links i.e., network sharing, or sharing coverage areas so that different network operators provide equipment in different areas with the understanding that retail customers of the other network operators would be allowed to roam there i.e., national roaming. Because of the cost savings, sharing infrastructure may be a prerequisite for receiving Universal Access and Service Fund (UASF) support into new areas. This is seen in several recent UASF subsidy competitions where bidders were required to provide sufficient bandwidth capacity and access to radio towers on any new backbone link financed by the subsidy. Bidders also had to guarantee non-discriminatory open access (on commercial terms) to their facilities.
- In some countries obtaining construction permits for masts, ducts and buildings, or rights of way can be difficult for a variety of reasons, from the purely bureaucratic to the perspective and context of environmental policy. Certainly, sharing towers and buildings is often considered desirable for environmental or aesthetic reasons. There might be advantages for regulators requiring that network operators have sharing agreements in place so that these forms of infrastructure can always be open to other network operators, thereby making second and third applications for permits unnecessary.