

African Leadership in ICT

The Role of Government in Supporting Telecommunications

Unit 3 Module 4

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Module 4 – Telecommunications Infrastructure and Quality Internet provision

Unit 3 – The Role of Government in Supporting Telecommunications

Introduction

The 2007 Connect Africa meeting that we covered at the beginning of **Unit 2** also identified another two goals related to the role of government in stimulating broadband access and use:

- Goal 3: **Adopt key regulatory measures** that promote affordable, widespread access to a full range of broadband ICT services, including technology and service neutral licensing/authorisation practices, allocating spectrum for multiple, competitive broadband wireless service providers, creating national Internet Exchange Points (IXPs) and implementing competition in the provision of international Internet connectivity.
- Goal 4: **Support the development of a critical mass of ICT skills** required by the knowledge economy, notably through the establishment of a network of ICT Centres of Excellence in each sub region of Africa and ICT capacity building and training centres in each country, with the aim of achieving a broad network of inter-linked physical and virtual centres, while ensuring coordination between academia and industry by 2015.

Objectives

Upon completion of this unit participants will be able to:

1. Critically assess and discuss the various levels of potential government intervention in the development of broadband networks to support the knowledge society.
2. Critically analyse strategies to promote universal access and reduce the digital divide
3. Demonstrate proficiency with some of the emerging hot issues in the telecommunications industry.

1. Rationale for and Forms of Government Intervention

Over the last 10 years telecommunication markets have experienced their most extensive transformation since the early beginnings of telephony. Innovations in communication technology, like digital data transmission and the Internet, has given access to a new generation of information provision.

Alongside the technological progress, a change in political and institutional thinking has taken place. Former state-owned telecommunication companies were privatised, thus reducing the direct influence of governments. Generally, the private sector is now the predominant supplier of broadband networks and services around the world. But in any market structure, **there is a natural limit to the extent to which investment in communications infrastructure will be rewarded by increasing profitable revenue from customers.** Therefore the stage is set for government intervention. The main drivers for government intervention are discussed below.

In **Unit 2**, we saw that broadband has significant potential benefits in advancing countries socially and economically. The socio-economic benefits usually justify government interest in providing broadband to as many citizens as possible. At the same time, government should have an interest in stimulating supply and demand while eliminating barriers. Some of the supply drivers include perceived demand which favours urban areas and a major demand determinant is cost. **Leaving broadband infrastructure deployment entirely to the marketplace risks leaving out the poor, the marginalised, and generally those in the rural areas.** That is why the most successful countries have developed strategies that include complementary and mutually reinforcing roles for the private and public sectors.

According to a white paper by Cisco “**Broadband Across Africa: Accelerating Benefits**”, if there are limited broadband connections available in a country then they can’t be used for services that are designed to reach many people, for example, health, education, and government services. These services are by their very nature intended for everyone, and in most cases are the responsibility of government to provide. If broadband is too expensive for businesses and individuals to use, then there is no reason for businesses to develop and provide their services over the network, therefore further dampening demand. Without this demand, there is no incentive for broadband suppliers to invest in more networks, creating a **demand/supply dilemma.**

In summary, the main reasons for government intervention in the ICT and telecommunication market include:

1. Meeting national and public interest objectives and support development plans (like national vision policies).
2. Promoting commercial and economic sustainability of the sector and encouraging investment through competition.
3. Provide opportunities for new companies and investors to establish ICT related businesses.
4. Ensuring that consumer benefits are safeguarded.
5. Making sure the digital divide is reduced and not widened.

Forms of Government Intervention to Promote Broadband Deployment and Use

What are the possible Government measures to support broadband deployment and use that produce the desired effects on the Knowledge Society? If you remember the list of drivers and barriers for broadband that we discussed in the [previous unit](#), you will realise that they are connected. Governments must intervene both at the **supply side** (telecommunication companies and their market) and at the **demand side** (individuals, organisations, communities).

King et al. (1994) have used the demand-pull and supply-push theory in government interventions for technology diffusion. They argue that governments can either be influential or regulatory. When the two modes of intervention and the two types of driving forces are combined six main institutional actions are defined. These are: knowledge building, knowledge deployment, subsidy, mobilisation, innovation directive and standard setting and are presented in the figure below (**see next page**):

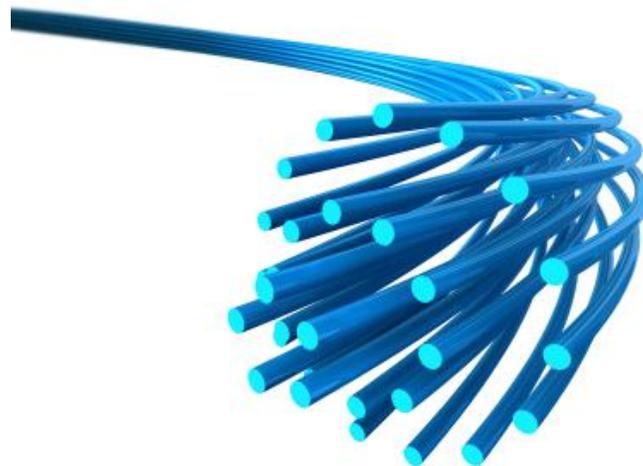
Actors	Modes	Telecommunication Market	Individuals, Businesses
Government		Supply Push	Demand Pull
	Influence	Knowledge Building Knowledge Deployment Subsidy Innovation Directive	Knowledge Deployment Subsidy Mobilization
	Regulation	Knowledge Deployment Subsidy Standard Setting Innovation Directive	Subsidy Standard Setting Innovation Directive

Another approach is presented in the table below:

Intervention	Pros	Cons
Strategic	Alignment of players Consumer clarity	None
Regulation	Most practiced, defined and understood.	Complex power dynamics. Not introducing a new commercial factor.
Asset Shares	Reduces barrier to entry for operators	Involves ownership clarity and working with stakeholders
Government Buying	Effective market based intervention	Need to avoid dependence on public funds
Government Investment	Direct control of intervention	Possible crowding of private investment

- **Strategic:** meaning it sets out a clear roadmap for all market participants for investment planning. It creates important certainty and purpose for consumers.
- **Regulatory interventions,** from imposing price conditions on those with significant market power, to functional separation provisions. These are relatively well understood. However, they can be complex to adopt and involve complex power plays with incumbents. It is relatively limited in terms of introducing a new commercial factor in the overall equation: no major new revenues are created.

- **Asset shares**, for example of an electricity company sharing its poles and transmission infrastructure for fibre, can reduce the barrier to entry significantly. All other useful assets such as buildings, way-leaves, ducting, etc. can act in this manner. Governments should take steps to improve access to passive infrastructure (conduit, poles, and ducts) and co-ordinate civil works as an effective way to encourage investment. Access to rights of way should be fair and non-discriminatory. Governments should also encourage and promote the installation of open-access, passive infrastructure any time they undertake public works. This is positive in that it can create a stable platform for new competition, as well as updating the existing assets, generating public-private synergy. However, it does require hard work to engage with stakeholders across government to clarify and assign this ownership correctly.
- **Government** can affect the market through its **buying** power. This, when signalled correctly, can act as a primer to supply more advanced services and supply to other private customers also. This is effective and allows the structure of the market to grow. However, dependence on public expenditures where there is no substantial additive private customer base needs to be avoided.
- Finally, **governments** have the option to make strategic **investments** in infrastructure itself. There have been examples of this in Uganda, where a national fibre backbone has been built and will be made available to the market on open access terms. This is useful in that the government has full and direct control of the outcomes of this intervention, without reliance on other stakeholders. However, governments need to ensure that potential effective private investment that may otherwise have been made is not crowded out.



Summary of Potential Interventions and Their Effects

GOVERNMENT INTERVENTION	EFFECTS
<p>Coordination and support:</p> <ul style="list-style-type: none"> - Support development of high-bandwidth National and regional backbones. Invest in international links, like submarine cables or fibre networks. - Government to make strategic investment in infrastructure itself. There have been examples if this in Uganda, where a national fibre backbone has been built and will be made available to the market on open access terms. Also possible at municipal level. - Ensure low-cost international access infrastructure by preventing monopoly control over bottleneck facilities. - Invest in underlying infrastructure networks in unserved areas. - Support development of Local IXP (Internet exchange points at local level). Co-ordinate map-making of network routes as a way to encourage the rollout of smaller networks in need of interconnection. - Manage and coordinate IP numbers and Internet addresses (NICs). - Support the development of National Research and Educational Networks (NREN). 	<ul style="list-style-type: none"> - Development of a national infrastructure in a coordinated way - Compliance with international standards
<p>Supply side enablers:</p> <ul style="list-style-type: none"> - Competition: Provide a transparent market environment. Facilitate entry of new competitors, eliminate barriers and bottlenecks, reduce bureaucracy, cut fees. Prevent and punish anti-competitive behaviour. - Policies and regulations affecting network market structures: Encourage competition and technology diversity in access to and provision of telecommunications services. - Revise the licensing framework to accommodate rapid technological change and emerging competition; - Policies and regulations affecting content development and applications: Encourage multiple voice, data, and video content and service providers. Encourage open access to networks by content and service providers. - Spectrum management: in an effective way to facilitate new entrants and new technologies. Stimulating innovation in the use of wireless technologies by reforming radio spectrum allo- 	<p>Enable the development of a good telecommunications market, enforcing fair and equitable competitive market principles, restraining the power of dominant suppliers.</p>

GOVERNMENT INTERVENTION	EFFECTS
<p>cation mechanisms and management.</p> <ul style="list-style-type: none"> - Regulation of interconnection and facilities leasing. Promotion of mobile infrastructure sharing specially in rural areas. Local Loop Unbundling (LLU). - Reform the State-owned enterprises that hinder sector growth and development (especially telecommunication companies). 	
<p>Business related:</p> <ul style="list-style-type: none"> - Look for ways to encourage investment in infrastructure by improving access to passive infrastructure (conduit, poles, and ducts) and co-ordinate civil works as an effective way to encourage investment. Access to rights of way, ductwork, towers should be fair and non-discriminatory. Governments should also encourage and promote the installation of open-access, passive infrastructure any time they undertake public works. - Promote direct and indirect investment in infrastructure and access. Provide Funding mechanisms for broadband roll out. Offer tax incentives for companies willing to invest, especially in remote /poor areas. - Subsidise network providers to extend networks into unserved areas ahead of market demand, like provide time-limited subsidies to support network providers going into smaller communities or rural areas. - FTTB and FTTC (fibre to the building or the local distribution cabinet) are under development in several cities (industrial and economic zones, R&D poles, new residential areas, etc.). - Enforce consumer clarity and protect consumers rights when it comes to connectivity contracting. - Affect the market through its buying power. This, when signalled correctly, can act as a primer to supply of more advanced services, and supply to other private customers also. - Improvement in the overall investment climate in a country should also benefit providers wishing to roll out new networks. 	<ul style="list-style-type: none"> - Create a critical mass of broadband lines to encourage private sectors to invest in broadband infrastructure, and the development of applications and content - Enable the development of a local business market of related IT industries, like e-commerce, entertainment over the network, etc.
<p>Reducing the digital divide:</p> <ul style="list-style-type: none"> - Set up telecenters for public access. - Provide computers to schools, community centres, students, teachers. - Provide grants to communities for the development of plans and localised broadband content to support local priorities and 	<ul style="list-style-type: none"> - Ensuring affordable and equitable access and usage - Promoting broadband use - Encourage the use and development of new technologies in all segments of the local market

GOVERNMENT INTERVENTION	EFFECTS
<p>needs; grants to community groups to develop plans for broadband usage and localised content.</p> <ul style="list-style-type: none"> - Universal Access and Service: Provide universal service and access strategy, policy and leadership; Efficiently and effectively manage the of the Universal Service and Access Fund to reduce the digital divide by ensuring the widespread (and affordable) diffusion of ICT. 	
<p>Demand side enablers and barriers:</p> <ul style="list-style-type: none"> - Support the deployment of electrical grid, this being one of the main barriers for technology use in Africa. - ICT literacy basic skills: Train new graduates, government employees and unemployed in basic ICT skills. Support integration of ICT in schools. Increase computer literacy of small-business owners, not-for-profits, teachers, and community groups. Increase number of university graduates in engineering and IT. Increase ICT technical training in colleges. - Improve Government operations and services that use Internet, including spending power. Use broadband to support effective and efficient delivery of programs and services, including quality healthcare and education. - Aggregate government requirements to create “demand pull” for broadband. - Setup public access telecenters, free or for a small fee, in the most disadvantaged communities. - Provide discounted or free connection of health, educational facilities and research centres. - Provide tax incentives, discounts and subsidies for the purchase of computers by students, teachers, government employees. - Support content and online service application developments by small businesses and communities. - Monitor, evaluate and communicate on the effective use and social appropriation of broadband applications - Support content and e-applications development. Promote R&D and innovation in ICT. Support NRENs. - Promote telework. 	<ul style="list-style-type: none"> - Generate adequate supply for broadband infrastructure - Stimulate demand for broadband adoption and use - Lower barriers for broadband penetration - Empower the population



Reflection: You can see that the areas of government intervention are really broad. Now that you have read about them, do other new categories occur to you? Have you identified some strategies that your government is applying? Can you think of factors (social, political, geographical) that might reduce the efficiency of government interventions in some of these strategies? Share your reflection in the **Unit 3 Discussion Topic!**

Government Financing and Public Private Partnerships

The private sector should take the lead in financing and developing well-functioning broadband markets, but there are clearly some circumstances in which government intervention is justified. We know that leaving broadband infrastructure deployment entirely to the marketplace won't work, will take too long, or will be prohibitively expensive, especially outside urban areas. That is why the most successful countries have developed strategies that include **complementary and mutually reinforcing roles for the private and public sectors.**

As a general rule:

1. Governments need to actively look for ways to encourage investment in infrastructure. Civil costs (e.g. building roads, obtaining rights of way) are among the largest entry and investment barriers facing telecommunication firms. Governments should take steps to improve access to passive infrastructure (conduit, poles, and ducts) and co-ordinate civil works as an effective way to encourage investment. Access to rights of way should be fair and non-discriminatory. Governments should also encourage and promote the installation of open-access, passive infrastructure any time they undertake public works.
2. Governments could also help co-ordinate map-making of network routes as a way to encourage the rollout of smaller networks in need of interconnection.
3. Improvement in the overall investment climate in a country should also benefit providers wishing to roll out new networks, and act as a trigger in the decision-making process of these providers.
4. Governments should not prohibit municipalities or utilities from entering telecommunication markets. However, if there are concerns about market distortion, policy makers could limit municipal participation to only basic elements (e.g. the provision of dark fibre networks under open access rules).
5. Any government intervention in markets that involves funding should follow a set of basic rules. Requests for proposals should be technologically neutral and simply specify the minimum criteria for the project execution and success.
6. Any new infrastructure built using government funds should also be open access – meaning that access to that network is provided on non-discriminatory terms.
7. Access to spectrum remains a significant market barrier to wireless broadband provision. Policy makers should adopt more market mechanisms to promote more efficient spectrum use.

In the next section we will discuss specific government intervention models to reduce the digital divide.

Regulation

Regulation describes how Government seeks to balance the incentives to invest by operators, and the levels of competition in the marketplace to optimise the overall economic and other benefits delivered to the population.

The two basic means by which public institutions nowadays directly influence the structure of the telecommunications industry are **general competition law** and **sector specific regulation**. The latter is a prescriptive approach in the sense that the regulator imposes certain behaviour and standards on the market. In general the telecommunications sector is regulated, among other things, to promote and encourage the objective of fair competition in all fields of telecommunications. In most African countries, regulation is still being developed (generally less than 10 years old) and primary legislation takes the form of ICT Policy, ICT Law and ICT regulations. In more mature regulatory environments self-regulation and co-regulation are practiced.

Additional readings for those interested in regulatory framework issues:

1. Infodev's **ICT Regulation Toolkit** (2004) is a must-have in regulation, with the objective *"to assist regulators with the design of effective and enabling regulatory frameworks to harness the latest technological and market advances"*. It includes content on Competition and Price Regulation, Universal Access and Service, Radio Spectrum Management, and New Technologies and Impacts on Regulation.
2. In 2004, **ITU launched a project**, financed by the European Commission, to help create a coordinated regulatory environment in West Africa. In 2005, regulators from 15 countries agreed on a common regulatory framework to govern their national ICT markets.
3. For several years ITU has been promoting a project **Harmonization of ICT policies in sub-Saharan Africa** (or HIPSSA) that aims at developing and promoting harmonized policies and guidelines for the ICT market.
4. Some **African organizations that coordinate regional regulation** are the **Association of Regulators of Information and Communications for Eastern and Southern Africa** (ARICEA), East African Communications Organisation (EACO), Regional Regulators' Associations (RRA)

Spectrum Management Issues in Africa

As we saw in **Unit 1**, the electromagnetic wave is a combination of electric and magnetic fields that propagates through space. The **Electromagnetic spectrum** is the set of all possible frequencies of the electromagnetic waves:

1. Radio frequencies are a natural resource that need to be managed (assigned properly), and that will be wasted if not used efficiently. All nations share the electromagnetic spectrum and reserve their right to its unlimited use.
2. **Spectrum management** is the way the radio spectrum is administered so as to ensure that it is available for users as much as possible without interfering with each other, and is available in the most effective way. The spectrum is managed by each country as each sees fit, but to facilitate international telecommunications cooperation that support trade, transportation, communications, and mutual protection against interference, all countries have agreed to an International Telecommunications Convention so a country's spectrum Administration is linked to decisions and or recommendations of the International Telecommunications Union (ITU) or to regional organisations like **Communication Regulators' Association of Southern Africa** (CRASA).
3. Each country has an entity responsible for spectrum management, the regulator, generally the Ministry or Department or Agency of telecommunications which reports either directly or indirectly to the government. In some countries, these organisations delegate certain tasks (e.g, assignments, authorizations) to other public or private entities.
4. The spectrum is divided into unlicensed spectrum (free to use) and licensed spectrum (a fee has to be paid):
 - **Unlicensed spectrum** refers to spectrum frequencies that do not require a license from the telecommunications regulator in order to operate devices in that spectrum. Unlicensed spectrum is regulated through the technical behaviour of the devices allowed to operate within those frequencies. Devices must conform to technical standards set down by the regulator for devices within each license-exempt spectrum band. In particular they must not exceed the rated power output for the given spectrum band. For example, devices certified as WiFi use the unlicensed ISM frequency band. This radio frequency band is internationally reserved for industrial, scientific and medial purposes and devices operating in these bands must tolerate interference generated by other equipment (being unlicensed also means sharing the spectrum with other devices).
 - **Licensed spectrum:** In order for some wireless technologies like Wi-MAX to be deployed there is a need for telecommunication companies to have licenses to use the required frequencies in a certain country/region. Therefore the electromagnetic spectrum is auctioned or hired for a fee, and can constitute a very high income source for some governments. Licensed spectrum policies vary country to country, and can be a driver or a barrier for wireless telecommunications.

Access to spectrum remains a significant market barrier to wireless broadband provision. Policy makers should adopt more market mechanisms to promote more efficient spectrum use.

For additional information you can read Infodev's ICT regulation Toolkit, [Module 5: Radio Spectrum Management](#).

Convergence and Government Intervention

Telecommunications convergence, network convergence or simply convergence are broad terms used to describe emerging telecommunications technologies, and network architecture used to migrate multiple communications services into a single network. Convergence at a technology and service level it is the coming together of:

- **Fixed-Mobile services:** are being combined, like some mobile phones that can connect using to the Internet when at home. Future distinctions will be between types of mobility in a single network, user terminal and services
- **Telecommunications in the traditional way and Internet:** related infrastructure, regulatory and business model convergence. VOIP (voice over IP) is an example, when combining Internet and traditional telephone networks to conduct a call.
- **Services and Applications:** telecom, computing, information, entertainment, TV broadcasting, VOIP, e-commerce, e-banking are becoming sources of income for telecommunication companies, and a way to cover the costs of deploying infrastructure.
- **Technology and infrastructure:** common switching and transmission infrastructure allow for shared costs and easy of management.

Converged licensing is a new model that allows telecommunication companies the provision of various communication services like text, data, image, voice and video over a single infrastructure, that is, the use of a single transmission technology to offer various services. This has been the consequence as well of the integration of access devices such as the telephone, television and personal computer into one device, tablets and Smartphones.

A new licensing model has to be designed to allow companies to provide various services under a single licence, also called a unified licence. This type of licence has been in existence in many African countries, and some examples include the national telecommunication companies' licences. In fact most national monopoly operators that existed prior to the wave of sector liberalisation across the world operated under authorisations that were in effect converged or unified licences.

Case studies: For an example of converged licensing please read [Tanzania's Experience in Licensing of Communications Operators under the Converged Licensing Framework](#) (2006).

Domain Names and Address Spaces

Internet Corporation for Assigned Names and Numbers (ICANN) is a non-profit organization which has responsibility, at a global level, for managing the Internet Protocol (IP) addressing system which enables access to the internet (i.e. the domain name system and the numbering system which underlies this). ICANN manages the Internet Assigned Numbers Authority (IANA), which oversees global IP address allocation, root zone management for the domain name system (DNS) and other aspects of IP management.

Regional Internet Registries (RIRs) are organisations which oversee the allocation of IP numbers (delegated to them by IANA) at a regional level. There are five RIRs, [AfrinIC](#) is responsible for the African continent. AfrinIC has designated certain address blocks for particular countries. This has given rise to the whole new industry geo-location services because now it is much easier to tell where your computer is when you Access the internet.

Domain Names

Domain registration and management (what is called the "root" service of DNS or NIC) are managed by each country for all addresses that end with their country code, called TLDs or top-level domains like .tz (Tanzania) or .ke (Kenya). Whether domain management of their own country domains is considered a national asset or not depends on the country concerned. In some cases after recovering the management of national domains that were in the hands of private companies, many African governments have created specific legislation for the management of domain names and other critical Internet re-

The Fight for Dot-Africa Domain

A new ".africa" internet domain was proposed in 2011 to provide a stronger brand identity than current country domain names like .ke or .za, while preventing registration revenues flowing abroad. A major benefit of the ".africa" domain would be that proceeds from African domain registrations would remain on the continent, rather than flowing offshore.

ICANN will be accepting applications for this domain till April 2012. Under ICANN's proposed rules, any entity that wants to apply for a TLD to represent a large geographic region must secure the support of 60% of the nations in that region. Several organizations are currently competing to manage the .africa domain, among which are DotConnectAfrica - a non-profit organisation registered in Mauritius - and Uniforum, sponsored by the African Union with support from Africa Top-Level Domain Organisation (AfTLD).

However, not everyone is as optimistic about the potential impact of the new generic top-level domains like .africa. To be successful, the new gTLDs would require a change in consumer behaviour, plus a change in how search engines index the internet.

sources, as we will see in more detail in Module 5. For historical and political reasons for each country this task can be given to a public, private or non for profit organisation. This organisation can delegate administration of the domain or sub-domains to other organisations, called registrars that in most cases are private companies.

Domain registration is free or for an annual fee, and the main requisite is to be a resident of the country. Domain name management is a critical task for the correct functioning of Internet (governance) in a country, but also a nice source of income for many organisations and companies.

Some relevant domain root managers are:

- For Africa: **AFTLD** acts as a focal point for all the African domain name manager organisations
- Kenya: for .ke domains, **KeNIC**, a non-profit
- Mauritius: for .mu domains, **NIC**, a non-profit
- Tanzania: for .tz domains, **Tanzania Network Information Centre Limited**, a non for profit.
- South Africa: for .za domains **SADNA**
- Zambia: for .zm domains **ZAMNET Communication Systems Ltd.**
- For other domain information managers in Africa check **this website**.

Additional reading: As an example of a government policy you can access Uganda's **policy framework for management of .ug country code** (2011).

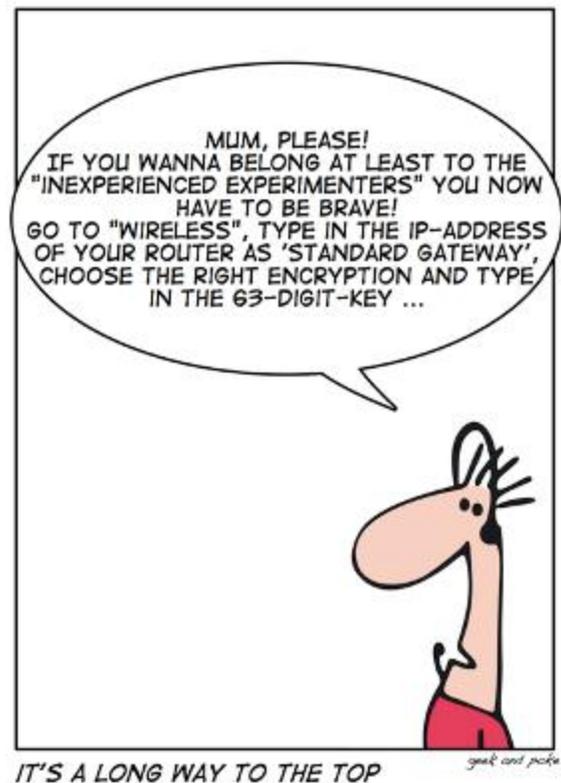
2. Promoting Access and Digital Divide Reduction Strategies

New forms of enterprise, new types of skills, new sources of wealth and new forms of social interaction - these are among the benefits of the "Information Society". Businesses and governments alike promote the new technologies for the benefits they will bring. But, if these developments are seen as being beneficial, then the lack of them is seen as a cause for concern.

Many people, mostly those already poor or socially disadvantaged in some other way, cannot or do not have access to the new technologies and the opportunities they bring. These people - "socially excluded", in the current jargon - stand on the wrong side of the "**digital divide**". This disparity in access to Information and Communication Technologies (ICTs) may result from differences in class, race, age, culture, geography or other factors and can deprive certain citizens of the opportunity to participate in the global economy.

Many African governments have prioritized ICTs in their national agendas, appreciating the great impetus and contribution that communications play in the development process. But governments face many urgent and immediate challenges for basic services and human needs, especially in the countries of sub-Saharan Africa. This makes it difficult for leaders to place a priority on broadband and to use limited resources on what may be seen by many citizens as "nice to have" compared to their more pressing needs for schools, healthcare, government services, and the essentials of daily life. Also, given that most citizens don't have easy access to computers and many don't have the basic literacy allowing them to benefit from access to the Internet over broadband networks, why should governments focus on this topic?

Please read APCs' [Manual of ICT Policy](#), Chapter 6 (pages 30-34) on **the digital divide**.



Strategies to Bridge Digital Divide and Increase Equitable Access

Given the costs involved it may not be possible for governments or the private sector to extend broadband networks to all communities at the same time and each country will have to develop its own Broadband deployment strategies.

For example, a country might decide to focus first on targeted development regions, likely in or near urban areas, where there is the potential to establish a “cluster” of broadband service providers, ICT-related businesses, businesses that are intensive users of ICT, and other users (e.g., technical colleges, universities, and researchers). The World Bank confirmed in a recent study that setting up geographical pockets of advanced broadband capabilities enhances export market share growth by promoting clustering and new businesses whereby networking and specialisation can improve these firms’ competitiveness.

Another option is to deliver broadband capability to regional centres and establish community access points (telecenters) at these locations. Mediated access through one central point in a community simultaneously addresses the lack of broadband in every community as well as the lack of computers and general lack of readiness of many individuals and businesses—especially those in smaller centres—to become active users of electronic services.

In all these government interventions, **private and public sector roles are complementary and mutually reinforcing**. For example, see how the government and private partner’s roles are complementary in [NEPAD e-schools Initiative](#), in the section on partnership describing each partner’s roles.

Governments have successfully implemented several strategies to reduce the digital divide. In this section we will briefly discuss some strategies often employed to increase access. Such strategies center around ensuring universal access, developing telecenters, e-rates, aggregated demand and NRENs.

Universal Service and Access

The objective of providing universal service or access is to make sure that, after telecommunication markets are open to competition, a **minimum telecommunication service is available to all citizens**, including those in low income, rural, insular, and high cost areas, at rates that in light of specific national conditions can be considered affordable. Though originally designed for voice telephony, in many cases it was later updated to include a minimum speed connection to the Internet.

- “Universal service” refers to the availability of affordable communications services for all citizens on a personal basis (within the home or through personal ownership).
- “Universal access” refers to the availability of affordable communications services for all citizens within the community in which they live but not necessarily on an individual basis (ie: telecentres or public access points).

In most countries an institution (separate legal entity or otherwise) is created by legislation, regulation or executive order for the purpose of managing, promoting and encouraging the provision of Universal Service and Access to information and communications technologies.

Most countries have constituted a Universal Service Fund (USF), where usually a percentage of the amount taxed to telecommunication companies, coupled with a complex system of fees, surcharges and subsidies, is applied to programmes to:

- **Develop infrastructure:** pay for the deployment or subsidise backbones, deploy connectivity for rural areas or poor communities, Internet Exchange Points, among others.
- **Reduce average costs:** to ensure that consumers in all regions have access to and pay rates for telecommunications services that are reasonably comparable to those in urban areas. As telecommunication companies will probably charge higher for service provided in rural or remote areas, this can be done by subsidising all or part of the setup or monthly costs for some regions, ethnic groups, social groups, disadvantaged population, youth, etc.
- **Provide access for those with a low income:** support programmes to provide discounts that make basic internet access affordable for low-income consumers, communities or groups. It can be used to cover installation and set up costs, subsidise the monthly costs (all or in part). They can be setup by region, by ethnic groups, by income level, etc.
- **Rural health care:** provide subsidies for “tele-health and tele-medicine,” typically a combination of video-conferencing infrastructure and high speed Internet access, to enable doctors and patients in rural hospitals to access specialists in distant cities at affordable rates.
- **Schools & libraries:** subsidies for Internet access, telecommunications services, internal infrastructure and basic maintenance of internal connections to schools and libraries. The subsidies usually pay a percentage of costs based on need, with rural and low-income schools receiving the greatest subsidy.
- **Telecenters:** for community access to Internet using shared computers. For example in Tanzania Telecom Operators set aside 0.3 per cent of their annual turnover for the universal access fund administered by the Tanzania Communication Regulatory Authority (TCRA) and Development Partners.

However, in most countries the access to these funds and what they are used for is always a source of intense debate, and in many cases, it takes years to be able to use them efficiently for the purpose they have been created for. Some of the criticism and debate strives on the lack of vision and capacity to operationalise the universal funds by the public agency who owns the fund. Smaller service providers claim that universal service funds are mostly re-invested in large operators and civil society organizations often argue that programmes are not transparently run.

Case studies: The **Universal Service and Access Agency of South Africa (USAA-SA)** is a state owned entity established to ensure that *"every man, woman and child whether living in the remote areas of the Kalahari or in urban areas of Gauteng can be able to connect, speak, explore and study using ICT's"*.

Telecenters

A telecentre is a **public place where people can access computers**, the Internet, and other digital technologies that enable them to gather information, create, learn, and communicate with others while they develop essential digital skills.

These access centres, which may be provided by the private sector, the government, a public-private partnership, or in a not-for-profit or NGO model, create a “demand pull” for broadband by aggregating services as well as users to regional centres. While each telecentre is different, their common focus is on the use of digital technologies to support community, economic, educational, and social development—reducing isolation, bridging the digital divide, promoting health issues, creating economic opportunities, and reaching out to youth for example.



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Telecentres exist in almost every country, although they sometimes go by different names: public internet access centre (PIAP), village knowledge centre, infocenter, community technology center (CTC), community multimedia center (CMC), multipurpose community telecentre (MCT), Common/Citizen Service Centre (CSC), school-based telecentre, etc. (**Source: Wikipedia**).

Telecentres are being established through private and public programmes across Africa, through special projects, or by adding PCs to telephone shops, schools, libraries, community centres, police stations and clinics. In many cases telecenters are deployed or maintained using Universal Access Funds.

Use of telecenter services can be free or for a small fee. It can be free at certain hours, or to a certain group (i.e. youth), or for some services and not others. With low or no income groups, the sustainability of telecenters is a big issue. Costs can be usually kept low by taking advantage of the fact that communication and computing technologies allow voice, fax and Internet data to travel over the same telecommunication link. Sharing the expense of equipment, skills and access amongst an ever-increasing number of users also helps to cut costs and make these services viable in remote areas. If the usage and responsibility are shared, the potential for long-term sustainability will be increased, and it will contribute to realising Universal Service Objectives in rural and remote locations where the majority of people in developing countries live.

Besides Internet access, Telecenters can be used for basic ICT training, local content development, to support e-commerce at a local level, to allow citizens to access e-government services, etc. Operators of the centres also can provide mediated access for individuals and small businesses and help them to find and access information, programmes, and services that they need, regardless of who provides these services (for example, government, the private sector, or the not-for-profit sector).

Case studies:

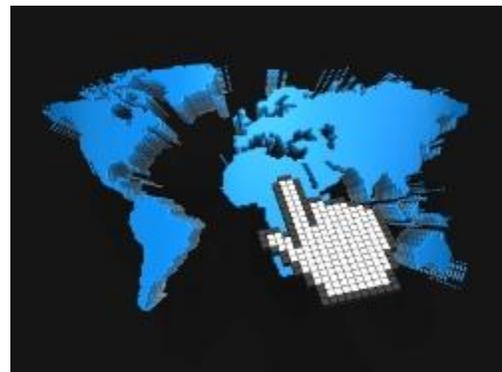
1. Kenya Digital Village centers. This initiative aims at providing internet access and various online services at the grassroots.
2. Tanzania telecentre network (TTN): that will soon have 3000 more telecenters according to [this article](#).
3. South Africa has a telecenter programme supported by the Universal Service Agency.

E-Rates

E-Rates (Education Rates, also called preferential rates) consist of providing specially discounted rates for Internet access for educational, health, science institutions, non for profit and community based organisations. With e-rates governments implement a way for institutions to obtain a discount from commercial ISPs (generally 50%) off the standard market rates. This model must involve other stakeholders like the Ministry of Telecommunications and the Telecoms regulator. The ISPs can voluntarily agree to grant e-rates or be compelled by legislation to provide e-rates

There are several options to fund the discount, like Universals Access Funds, regional funds, partnerships, etc. Organisations typically still have to pay for the remaining part of the fee. E-rates programmes usually require the application of a different discount rate to different regions e.g. rural vs. urban, and by type of institution, which can make this model quite complicated.

Two issues are vital for implementing an e-rate scheme in Africa: providing quality bandwidth and a fixed and predictable monthly cost. Without quality bandwidth, the experience of using the internet is likely to put off rather than encourage potential users. And a fixed monthly ("always-on") cost for an agreed level of bandwidth will make budgeting much easier.



Government funding for these kinds of schemes is achieved by taxing the sector or "social agreements": for example, where a mobile company gets a profitable licence and in exchange forgoes a certain level of income to underwrite one of the Government's social objectives. E-rates work best where they are tied into a Universal Access Fund (UAF) or scheme as this ensures that there are funds available to fund the discount (and even pay for the schools portion for poor schools) and also extend coverage of infrastructure to benefit rural schools. The private sector will only part with its money if it can be convinced that the scheme is well run, the schools can pay and it genuinely begins to expand the market.

Case studies:

1. South Africa: access **the regulations on e-rates** (2009) "*to stimulate and facilitate Internet usage by public schools. The e-rate will allow public schools a 50% discount on calls to access the internet as well as internet access charges.*"
2. Senegal: Sonatel offers discounted access for schools and other institutions up to 75%, on installation and access.

Aggregated Demands

One option to support the business development of some regions or towns is to create a guaranteed market for investors. The connectivity needs of schools, government institutions, hospitals, telecenters can be aggregated to create “demand pull” for broadband. In this way the network is being "pushed" out to the communities. The "pull" factor comes from the state encouraging, and financially supporting, local authorities, governments, health and education providers and the not-for-profit sector to aggregate demand. In this way the business case is made for continued roll-out of the service.

Through the creation of purchasing consortium (aggregation of bandwidth purchases or collective purchasing) groups of institutions, usually aggregated by region, district, province or other geographical administrative units form a consortium to collectively buy bandwidth from commercial providers, obtaining some collective discount or a needed investment in long distance broadband setups. The consortium creator usually helps by providing guidance and technical assistance, leading negotiations with ISPs, providing initial administrative and financial support.

Other models are the so called “intelligent cities” or “wired communities”, new towns or districts that are being built from scratch including broadband infrastructure and e-government services, that serve as pilots for nationwide deployments of technologies. National or regional governments might invest or subsidize infrastructure deployments, as well as use universal access funds to set up public access centres or telecenters.

Case studies: E-schools network South Africa, a non-profit that negotiates connectivity and communication solutions for 1700 schools.

NRENs

A National Research and Education Network (NREN) is a specialised organisation or network dedicated to supporting the internet communication and collaboration needs of the research and education communities within a country.

NRENs consist of a high-speed backbone network, often offering dedicated channels for individual research projects. NRENs aim at interconnecting universities, tertiary education and research institutions by setting up a cost effective and sustainable private network with high speed access that connects African NRENs to each other, to other NRENs world-wide and to the Internet generally. Some NRENs are opening up to provide service to local and community based organisations as well.

Governments should be interested in supporting NRENs for a number of reasons. The education and research community has specialised high-speed needs that may not be adequately provided by the private sector on public broadband networks cost-effectively. The research community at universities and government research institutions is responsible for innovation, which can be translated into commercial and social products. In advanced countries, NRENs are usually the places where new Internet protocols and architectures are introduced before deployment within the Public Internet.

Case studies:

1. The recognition that the role of NRENs are growing in Africa. A number of countries including Kenya, South Africa and Malawi have fully functioning networks. Other countries such as Uganda, Tanzania, Namibia, Zambia and Rwanda have NRENs under development. There are even two regional RENs – [UbuntuNet Alliance for Research and Education Networking](#) – the Alliance of NRENs of East and Southern Africa and WACREN, the REN for West Africa.
2. South Africa NREN recently funded by the government – see <http://www.sanren.ac.za/>. This is an important case study because it's the first time government in SSA has invested in NRENs significantly.

3. Unit Activities

Reflection on the Leadership Journal

Please **download the reflection sheet (LINK)** and complete your module reflection (one page). After reading about telecommunications infrastructure technologies, broadband barriers and enablers, and the role of government, what is your reflection? What do you conclude about your country situation, compared with the rest of the world? Is your country a “leader” or is it lagging behind, and why? Is your organization a leader at national level? Are you a leader?

Submit the leadership journal by May 28th. You can access the submission by clicking this link (LINK).

Group Assignment – (Part III) – Writing Your Own Scenarios

In the last 2 units you have collected 18 signals looking at the state of ICT infrastructure in your nation or neighboring countries from within your individual subgroups.

We are now going to take those signals and use them as evidence for national scenarios of ICT futures. This assignment should seem familiar to you as it was presented to you earlier in **Module 3**. This time however, we have taken the opportunity break the exercise out in a more logical process, whereby we signaled and took the pulse of our horizon and are now going to demonstrate the long-term potential of these signals as alternative futures.

In this final part of **Module 4** group assignment, you will be working on your assigned scenario(s) with you your country sub-groups. If you don't know which sub-group and scenario(s) you belong to, please [click here](#) to see the country groups and assigned scenarios. If you have any other questions about completing the final part of Module 4 assignment, please contact your **module tutors**.

From the next page you will find the seven steps of writing your scenario(s). Before moving into the assignment, please have a look at [the scenario example](#) and take a quick recap on [the different alternative futures](#).

The deadline for submission is Monday, May 28th! You can access the submission box by clicking [this link](#).

Writing Your Own Scenario

1. Review the signals collected in module 1 and 2 and have think about how each of them will play out in the next 10 years. Will they continue on a positive or negative trajectory? Will there by success of failure? What bigger trend do these signals point towards and what new potentials and threats will exist in your country in 2022? **Note**, you do not need to answer these questions directly, they are prompts to help you think more systematically about the signals. However, please feel free to answer one or two, or even all of them if you have time.

2. Alternative Futures: Within every nation we have different futures unfolding at the same time, this mean you will all face growth, constraint, collapse, and transformation in different ways and places in the next 10 years. Based on the alternative future(s) your group has been assigned, look through your signals again and try to pull out that particular future. What signals point towards growth or discipline, for example? Who or what is growing, who or what is being disciplined? Why?

Tip: In steps 1 and 2 you should be building a mental model of your future world. The signals are current bits of evidence for how the future may unfold.

3. Choose your protagonist: think about the protagonist you want to create your scenario with. Is this protagonist young, old, male, female, urban, rural, well off, or struggling?

4. Choose your setting: set the scene, is your protagonist at work, or school, in the farm? What time of day is it? What are their major tasks?

5. Build your interactions: What are the tools or objects your protagonist is going to use in order to go through their day. What are the other people they will have to interact with? Frame these interactions by way of using them to highlight how this future world is different from the present that you know, how this is a world of transformation, growth, constraint, or discipline.

6. Write your story: Now walk us through a day or part of a day of your protagonist.

7. Tie in the evidence. From the signals you analyzed earlier in this process, list the ones that most clearly point towards the future you have illustrated. List as many or few that you think are relevant. These signals stand as evidence for the unpredictable future you are exploring.

Readings and References

Mandatory Reading

1. APCs' **Manual of ICT Policy**, Chapter 6 (pages 30-34) on **the digital divide**.
2. Infodev's **Government Role in broadband**

Extended Reading

1. Infodev's **ICT Regulation Toolkit** (2004) is a must-have in regulation, with the objective "*to assist regulators with the design of effective and enabling regulatory frameworks to harness the latest technological and market advances*". It includes content on Competition and Price Regulation, Universal Access and Service, Radio Spectrum Management, and New Technologies and Impacts on Regulation.
2. In 2004, ITU launched a project, financed by the European Commission, to help create a coordinated regulatory environment in West Africa. In 2005, regulators from 15 countries agreed on a common regulatory framework to govern their national ICT markets. <http://www.itu.int/ITU-D/treg/projects/itu-ec/Ghana/modules/Licensing.pdf>
3. For several years ITU has been promoting a project **Harmonization of ICT policies in sub-Saharan Africa** (or HIPSSA) that aims at developing and promoting harmonized policies and guidelines for the ICT market.
4. Some **African organizations that coordinate regional regulation are the Association of Regulators of Information and Communications for Eastern and Southern Africa** (ARICEA), East African Communications Organisation (EACO), Regional Regulators' Associations (RRA)

Universal Access:

1. **African Universal Service and Access Fund Association (AUSAFA)** aims to help African Universal Service and Access Funds (USAFs) fulfil their collective mission to improve rural ICT access. The association is a platform for members to collaborate, share knowledge and pool resources.
2. **Guidelines for universal access and universal service in Western Africa**
3. Universal access in Africa: **Africa's Infrastructure - A Time for Transformation** (World Bank 2010)

Telecenters:

1. The **community telecentre cookbook for Africa – recipes for self-sustainability – How to Establish a Multi-purpose Community Telecentre in Africa** by Unesco (2001)
2. **Telecentres, Access and Development - Experience and Lessons from Uganda and South Africa** (2005)