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List of Acronyms

ACP	Africa, Caribbean, Pacific Group of Nations
AfDB	African Development Bank
AFRALTI	African Advanced-Level Telecommunications Institute Nairobi
Afritel	improvement of network facilities in Sub-Saharan Africa, and introduction of new technologies–ITU
AISI	African Information Society Initiative
BDT	Telecommunication Development Bureau–ITU
BMP International	United Kingdom-based telecommunications consulting firm
BOT	build-operate-transfer arrangements
CAPTAC	Conference of Postal and Telecommunications Administrations of Central Africa
COMESA	Common Market of East and Southern Africa
CSIR	Council for Scientific and Industrial Research
CT2	Computer Technologies 2
DECT	digital enhanced cordless communications
DISD	Development Information Services Division
DRC	Democratic Republic of Congo
DSL	digital subscriber loop
ECA	(U.N.) Economic Commission for Africa
ECOWAS	Economic Community of West African States
EDI	Economic Development Institution (World Bank)
ENDA	Environnement et Développement du Tiers-Monde
ESMT	Ecole Supérieure Multinationale des Télécommunications Dakar
EU	European Union
FAQs	Frequently asked questions
FCC	Federal Communications Commission
FCR	France Cable et Radio
FLAG	optical fiber submarine cable system between the United Kingdom and Japan, via the Middle East
FST	Faculty of Science and Technology (University of Nouakchott) (US)
GATT	General Agreement on Tariffs and Trade
GCA	Global Connectivity for Africa
GMPCS	Global Mobile Personal Communication Systems
GSM	Global System for Mobile Telecommunications
IBM	International Business Machines
ICO	ICO Global Communications, Inc.
ICT	information and communication technology
IDRC	International Development Research Center
IDSC	Information Decision Support Center, (Egyptian Cabinet), Egypt
IFC	International Finance Corporation
*info*Dev	World Bank Information for Development Programme

INTELCOM1	regional telecommunication infrastructure–initiative—international consultancy group specializing in telecommunication technologies
IPR	intellectual property rights
ISP	Internet service provider
IT	information technology
ITU	International Telecommunication Union
ITU–SG3	International Telecommunication Union–Study Group 3
LDCs	Least-developed countries
LEO	low-earth-orbit satellites
Lomé	set of trade agreements between the European Union and ACP nations
MCTC	Multi-Country Training Centre (Malawi)
MIGA	Multilateral Investment Guarantee Agency
NCC	Nigerian Communications Division
NGO	nongovernmental organization
NOMAD	Iridium's social responsibility program
OECD	Organization for Economic Cooperation and Development
PANAFTEL	African Telecommunication Network
PATU	Pan African Telecommunications Union
PC	personal computer
PICTA	Partnership for Information and Communication Technologies in Africa
POP	points of presence
PTO	public telephone operators
PTT	post, telephone, and telegraph
RASCOM	Regional African Satellite Communications Organisation
R&D	research & development
RITSEC	Regional Information Technology & Software Engineering Center
RNIS	Réseau Numérique à l'Intégration de Services
SADC	Southern Africa Development Community
SAFE	Fibre cable link between South Africa and Malaysia
SAT-3	West African Submarine Cable scheme (planned)
SATCC	Southern Africa Transport and Communication Commission–SADC
SEA-ME-WEA	submarine fiber cable link
SKA	sender keep all
SME	small and medium-scale enterprises
SNDP	Sustainable Development Network Programme, UNDP
SRDC	subregional development center
TCA	Technology Learning Centre for Africa, ECA
UDEAC	Union Douanière des États de l'Afrique Centrale
UNCC	United Nations Conference Centre, ECA
UNDP	United Nations Development Programme
VSAT	very small aperture terminals
WTO	World Trade Organization
Y2K	Year 2000 problem

Executive Summary

New information and communication technologies make it possible for developing countries not only to integrate into and compete in the global economy, but also to gain access, and add their contributions, to a growing body of global information and knowledge resources on development issues. Yet Africa risks losing out on the benefits and opportunities provided by the information revolution because of the poor state of its telecommunications infrastructure. Global connectivity—being wired to the world and each other—is therefore an increasingly vital development challenge for Africans.

To help our African clients and partners address this challenge, a high-level conference, "Global Connectivity for Africa," was held June 2-4, 1998, in Addis Ababa, Ethiopia. The conference was sponsored by the United Nations Economic Commission for Africa (ECA), the Economic Development Institute of the World Bank (EDI), the Information for Development program (*info*Dev), the International Telecommunications Union (ITU), the African Development Bank (AfDB), and the government of the Netherlands. Cosponsored by five major private telecom firms—Siemens, Teledesic, RASCOM, World Space, and Iridium—it brought together more than 300 high-level representatives and stakeholders from government, civil society, the private sector, and donor organizations to explore the new connectivity options available to Africa, and to discuss how these new connectivity choices can contribute not only to improved telecommunications in a cost-effective manner, but also to the wider process of economic and social development in Africa. This conference built upon the findings of the much larger Africa Telecom '98 conference in South Africa a month earlier.

Africa remains the least connected region in the world. To help address this situation, the conference highlighted the need for improved conditions for private sector investment, revised tariffs, and enhanced regional cooperation, while pushing for greatly expanded human resource development, capacity building, and technology transfer projects. It was emphasized that improvements in national infrastructure were urgently required in order to fully exploit the potential of new global connectivity opportunities and to justify the investment required in these large scale projects, especially since more than 70 percent of Africa's population lives in rural areas.

The conference underscored that technology issues and the availability of finance were not major constraints to achieving an "African information society." Encouraging the culture of information sharing and collaboration, and a greater commitment to change were seen as far more important challenges to meet.

General consensus existed that while the advent of new technologies and increased global connectivity might be seen by governments as a challenge to national operators and regulatory authorities, in many cases accommodating these technologies did not require far-reaching restructuring of the sector policies. Instead, the development and economic spin-offs into other areas created by low-cost universal access would more than justify any investment.

With regard to new cable and satellite projects being planned, no universal solutions or preferred systems emerged; in general, the different technologies complemented each other in providing services. Due to the sparse population in many parts of Africa, satellite systems appeared to offer the best solution for communications within the continent, while fiber cable networks offered the most cost-effective solution for intercontinental traffic.

The conference argued strongly for greatly increased regional cooperation. Exchanging experiences, sharing the cost of submarine cables and gateways to satellite systems, collaborating on international accounting settlements, and eliminating tariff barriers were seen as unequivocal ways to help ensure that these technologies could be more widely deployed, especially when so many countries in Africa are small and economic activity is low. Also, collaboration in standards setting and consolidated procurements offered rewards in reduced costs of implementation and maintenance.

Generating further recognition for "communications as a basic human right," the conference also emphasized the need for governments to ensure wide and unbridled access to information for citizens through universal service and the development of applications that would create the demand for increased connectivity.

On the question of liberalization, the conference called on governments to consider

- adjusting prices for domestic services to reflect costs of provision
- opening up the telecommunication sector to more service providers and adopting a more commercial approach to the financing of investment in networks
- improving the effectiveness of regulation

The conference identified over 30 Africa-wide, private-sector-planned cable and satellite projects. By taking advantage of the large number of projects planned, Africa would be in a better position to choose the means most suited to its socioeconomic environment to achieve global connectivity.

Many of the recommendations also reflected the great need for improved information exchange in many areas, indicating that special efforts should be made to support connectivity to the Internet for policymakers, decisionmakers and chief technicians. Equally important was the establishment of local information resources and the integration of the available international information.

The African Information Society Initiative (AISI) was seen as the framework within which to integrate the diverse range of projects being considered and to bring together the many stakeholders. The efforts of African communications ministers in defining a road map for establishing the underlying infrastructure needed for Africa's "information society" (as outlined in the "African Connection" document) were commended, and the suggested projects were widely supported. In this respect the participants responded positively to the plans by ECA to support a forum for African communications ministers, in order to maintain the momentum on the dialogue and to monitor progress in the development of an African information society.

Introduction

Approximately 320 persons met to address the issues, options, and benefits of the information revolution at the Global Connectivity for Africa Conference (GCA) at the United Nations Conference Center in Addis Ababa, Ethiopia, June 2-4, 1998. Sponsored by the United Nations Economic Commission for Africa, the Economic Development Institute of the World Bank, the Information for Development program (*info*Dev), the International Telecommunications Union, the African Development Bank, and the government of the Netherlands, and cosponsored by five major private telecom firms—Siemens, Teledesic, RASCOM, World Space, and Iridium, the conference's main objective was to help Africa improve its global connectivity—a factor now seen as vital in accelerating the low levels of socioeconomic development on the continent.

GCA's importance and rationale at this stage seem necessary and vital to the continent's development and to addressing the state of the communications infrastructure in Africa, currently marked by poor-quality service, limited access, and high costs at a time when global communications have become the sine qua non of economic and social growth.

The new technologies that are now available could substantially improve Africa's connectivity for telecommunications and information networks. Among these new solutions are the most advanced satellite, cellular, and fiber-optic cable technologies, which would offer the opportunity for vastly improved communications, increased volumes, higher speed and reliability, and a wider range of services—all at lower costs.

Although African governments and carriers have been approached in the past by the private promoters of these projects, they have found it very difficult to assess the merits of the various alternatives. A need clearly existed for an objective forum in which to analyze (1) the options and projects, (2) their implications for African countries, and (3) the policy, regulatory, economic, and institutional issues they raised. The conference thus was viewed as an objective forum in which members of the public and private sectors could come together to discuss these vital issues.

Strategically, the conference was a continuation of, and a follow-up to, two major initiatives: the Global Knowledge Conference and the African Information Society Initiative. GCA was intended specifically for Africa to address the issues and options of global connectivity that arose at the Global Knowledge Conference (GK '97), hosted by the World Bank and government of Canada in Toronto in June 1997, and attended by more than 1,700 persons. The conference was also part of an ongoing process to move the African information society agenda forward, building on the momentum created by the ECA Conference of Ministers' adoption in 1996 of the African Information Society Initiative as an action framework to built Africa's information and communication infrastructure.

GCA was prefaced by a ministerial meeting on June 1, 1998, convened by Mr. Abdulmejid Hussein, Ethiopia's minister of transport and telecommunications, and Mr. Jay Naidoo, South Africa's minister of posts, telecommunication, and broadcasting. The ministerial meeting (a follow-up to the recent Africa Telecom '98 conference in Johannesburg two weeks earlier) brought together communications ministers and gathered further high-level endorsement for the telecommunications development policies encapsulated in their jointly produced common-vision document, the African Connection (see annex III).

In addition, the event featured a Connectivity Fair that provided hands-on demonstrations of the uses of information and communication technologies (ICTs) in development, such as telecenters, distance education, and telemedicine, combining exhibits from the private sector, development agencies, universities, and donors.

Conference Structure and Participants

Key characteristics of the conference included

- plenaries featuring prominent figures from the telecommunications industry and information networks
- in-depth working sessions built around case studies
- a number of open sessions for informal consultations and discussions
- ad hoc meeting groups
- a Connectivity Fair for informal learning about connectivity options and downstream applications

The conference structure included eight working sessions (four per time slot), as well as other activities appropriate to the overall goals of the conference. It was conducted in French and English, with simultaneous translation provided for all sessions.

1. **Plenaries** set the discussion framework and articulated main challenges.
2. **Working Sessions** including toolkit–case studies and working groups focused on a theme of concern for global connectivity. These sessions were facilitated by moderators, respondents, and presenters.
3. A two-day **Connectivity Fair** exhibited new technologies.
4. **Cybercafes** featured on-site computer networks.
5. **Open Spaces** allowed for spontaneous meetings and consultations.

Two special plenaries were “The Year 2000 Problem—Is Africa Ready?” and the concluding “Lessons Learned and Next Steps.” A follow-up workshop on the Year 2000 problem was held after the formal closing.

Serious efforts were made to structure the conference to promote exchange of ideas and interactivity at all sessions, and to avoid the standard format of plenaries and set speeches. According to most participants who evaluated the conference, GCA met this goal. (The full GCA program appears as annex I).

Participants

Participants were invited by the World Bank Group and ECA, and included the following:

- policymakers (mainly ministers and senior officials), regulators, and operators from African countries
- promoters and operators of the various connectivity projects relevant to Africa
- representatives of user groups in Africa (business people, rural consumers, promoters of information applications for economic and social development)
- senior figures in the telecommunications and information industries in Africa
- representatives of international organizations and donors

The full list of conference participants appears as annex V.

CHAPTER 1
The Impact of Global Connectivity on Africa's Development: Opportunities and Challenges

African competitiveness will increasingly hinge on the ability of African policymakers to kick-start a process of rapid development in their countries' communications sectors. The nascent global information society is bringing about a fundamental shift in the way business is done. Information and communications must now be added to land, capital, and industry as factors of production. Additionally, convergence and the sharp drop in costs of new technologies have created demand for new and sophisticated services.

At the same time, the emergence of the global information economy is bringing about a redefinition of wealth and a realignment of power from national to global power structures, and from the state to the individual. This is evidenced by the state's increasing difficulty in exercising a public monopoly in telecommunications. The new technologies facilitate an unstoppable flow of information and ideas that do not recognize national borders or cultures. In order to survive economically, politically, and socially, Africans will have to become active participants in the global information society. The urgency of this need was underscored by the widening gap between the information "haves" in the developed world, where virtually every household is expected to be connected to the Internet by the turn of the millennium, and the information "have-nots" in the underdeveloped countries, where most people have never even made a phone call.

While the conference focused on connectivity, its goal was to bring about better living conditions for Africans through access to communications, now being recognized as a basic human right. The African Information Society Initiative aims to provide the framework in which to achieve this. With technology and communication costs plummeting, and the low level of industrial and infrastructural development in Africa, the opportunity exists to jump-start the continent, both technologically and economically, into the information age.

But all this depends on addressing the abysmal state of Africa's underlying telecommunications infrastructure. Teledensity (telephone lines per 100 inhabitants) is 0.5 in Sub-Saharan African countries (excluding South Africa), compared with 4.5 in emerging economies and 52.6 in industrialized countries. Line growth remains is about 8 percent a year, half that of other developing regions. The number of Internet hosts per 100,000 inhabitants is 0.1 in Sub-Saharan countries, compared with 5 in emerging countries and 1,014 in industrialized countries. Africa is even less well represented in Internet content, which is almost entirely material produced in the North.

Currently the existing telecommunications operators are constrained in their ability to provide this infrastructure. A number of factors are involved—inefficient monopolistic models of service provision, lack of capital, unclear regulatory requirements, a shifting global economic environment, fast changing technologies, and limited human resources.

However, it was noted that sectoral reform is now taking place in about half the continent's countries. Also the common vision of the African ministers of communications, as outlined in the African Connection document that sets out a number of programs and priorities, was seen as an encouraging new development that could help to bring about a sound basis for accelerating telecommunications infrastructure development.

In parallel with more directly addressing the needs of the communication sector, a more integrated approach to developing the region's information infrastructure would also be needed; this activity requires more than simply a laissez-faire attitude. While the private sector will clearly have an important role to play in building the infrastructure, its utility and pervasiveness will directly depend on the efforts of governments to require universal service obligations in operator licenses, to ensure a conducive environment for the development of value-added information services, and to integrate connectivity into government service delivery.

Many precedents exist for governments to make large public investments in infrastructure in order to build the market for the private sector (as occurred with U.S. government funding for development of the Internet). If governments can establish attractive channels for investment at all levels in the infra- and infostructure development chain, the capital should be able to be found to make this happen.

Opportunities

The conference identified an increasing range of technologies now becoming available to provide communications services.

- Global Mobile Personal Communication Systems (GMPCS)
- new developments in fiber optics (Wave Division Multiplexing, etc)
- digital radio and television broadcasting
- very small aperture terminals (VSAT)
- smart cards
- network computers and thin client operating systems
- Java
- Internet telephony and videoconferencing
- telecenters
- wireless voice and data links—DECT, CT2, GSM, Spread Spectrum, packet radio
- digital subscriber loop (DSL)

The costs of many of these technologies are falling rapidly, with functionality and interoperability rapidly improving. A variety of priority sectoral applications was identified, which will substantially reduce the costs of delivering a wide range of services and create increased demand for connectivity:

- Electronic commerce—placing orders, making payments, payment smart cards, 24-hour electronic access to funds, and so on
- Governance—electronic service delivery, one-stop information services, licensing, taxation, record-keeping, and smart cards
- Tourism promotion—advertising and bookings made through the World Wide Web, local connectivity for visitors

- Transport—coordination of the movement of goods and people, including navigation systems, port tracking, and so forth
- Education—distance education, curriculum support for teachers, multimedia educational delivery, literacy skills, online libraries, qualification, record and identification smart cards
- Health—telemedicine and telediagnostics, expedition of medical supplies and emergency response systems, patient record and insurance computerization
- Social—greater participation in the global dialogue, ailment support groups, low-cost connectivity with the diaspora and others displaced from their families.
- Agriculture—market prices, weather reports, databanks, extension officer support.
- Environment and natural resource management—monitoring of environmental change, ecotourism promotion

In addition, the buildout of the global communication infrastructure already taking place through projects such as Iridium, FLAG, Oxygen, and WorldSpace is reducing the potential cost of entry for Africa. Other factors include

- the climate of democracy, change, and liberalization in many African countries, which are now seeing strong economic growth as a result of their policies
- the penetration of the Internet to most capital cities in Africa, which now provides a low-cost, high-speed information-sharing vehicle and a low entry cost to the global marketplace through Web-based “shop fronts”
- the interest of the private sector in servicing the largest untapped communications market
- the interest of the United Nations and the international community in assisting Africa to meet its development needs

Challenges

The following threats and challenges that African policy- and decisionmakers would need to address to ensure global connectivity for Africa were identified.

- developing new institutional models and changing existing institutions to take into account the new dynamics of an information society
- ensuring sufficient awareness of the necessity and requirements for GCA among policy- and decisionmakers
- ensuring political stability
- responding to shifts in revenue-generating opportunities caused by GMPCS, Internet telephony, call-back, and refile
- ensuring transparent policies and corruption-free licensing and procurement procedures
- responding to the global changes in accounting rate, GATT, and WTO agreements
- ensuring quick response to changes and shifts in the international arena
- ensuring a climate of information exchange and sharing
- ensuring retention of national sovereignty and continued cultural identity

- ensuring sufficient commitment to regional collaboration
- responding to the technological impacts on intellectual property rights
- finding sufficient human resources to design, install, maintain, and use new infrastructure and applications
- addressing the general lack of public funding for "nonessential" expenditures such as research and higher education, as well as the other severe financial constraints and very low salaries in the public sector and at the tertiary (as well as primary and secondary) education level in many countries
- addressing the severe deficiencies in the underlying telecommunications networks and high costs for its use
- reducing the high cost of equipment and services relative to income levels, exacerbated by import duties and lack of local manufacturing facilities
- finding innovative ways to meet the needs of the 70 percent or more African people who live in rural areas

Broad Needs and Goals

Eight areas were identified, some of which had particular importance, especially for national policymakers.

- the recognition by government of the increased role of ICTs in the development process, and in the integration of Africa into the global economy
- acceleration of and broader participation in national restructuring of the communications sector and related policies to improve the environment for accelerated development of the sector, in particular the creation of more attractive environments for increased local and foreign private investment—stability, transparent policies, and progressive strategies
- the creation of "smart" partnerships among governments, the private sector, intergovernmental organizations, and international development agencies
- the institution of national information infrastructure policy development mechanisms involving broad participation from all sectors
- a major expansion of human resource development and skills transfer programs
- improved regional, subregional, and bilateral cooperation between countries and economic blocs in Africa.
- greater emphasis on the provision rural connectivity
- the adoption of targets for telecom infrastructure roll-out on the continent—10 million lines a year was suggested as a minimum; since China was able to roll out 20 million lines in one year, this should be an achievable objective.

Other general priority areas identified were

- developing and communicating a clear vision of Africa's needs
- assessing and improving availability of information on the expanding range of technology options available

- ensuring that new technologies are complementary and not destructive to investments already made
- developing a comprehensive strategy for improving the availability of international bandwidth
- sharing information on best (and worst) practices
- establishing pilot projects to demonstrate innovative approaches
- ensuring that women, youth, and the disabled are given priority in obtaining the necessary skills
- promoting freer access to information, including liberalization of government control and censorship
- using innovative approaches to education and training at all levels

CHAPTER 2
Key Opportunities and Challenges: Conclusions and Recommendations of the Conference

Awareness

Participants felt that policymakers at the highest levels were not sufficiently aware of the importance of, and the need to develop national strategies for, connectivity issues. They felt that special efforts had to be made to sensitize heads of state and chief executives of the private and public sector to the broad policy goals and the importance of communications to other sectors. To reach these audiences, the right language would be essential: avoiding overuse of technical terms, and supplying convincing examples of how connectivity can make a difference in the lives of people and in meeting development challenges.

They also suggested the following strategies.

1. Organizing activities at the national level to assist policy makers in defining national strategies to improve connectivity. One strategy for this would be the establishment of National Information Infrastructure working groups with cross-sectoral representation.
2. Organizing activities to raise awareness among African public telecommunication operators to ensure their awareness of the tremendous changes taking place in the global telecommunications environment.
3. Publicizing programs and pilot projects for low-cost universal access through the development of public shared-access facilities (including smart pay phones, telecenters, and community information centers).
4. Devising ways to encourage the involvement in African connectivity efforts of Africans working and living abroad who are highly trained in new communication technologies.

Policy and Regulation

Rapid changes in the communications sector will need to be accommodated by national policymakers in the form of clear and well coordinated policies and guidelines. Because of the international and cross-cutting nature of global connectivity, national policies will need to be developed through broad national participation and international consultation, and within agreed regional and subregional frameworks.

While almost 20 African countries have introduced some form of communications sector restructuring, it was often observed that regulators lacked (1) sufficient capacity to evaluate new technologies and projects, (2) the ability to ensure adherence to regulations, and (3) autonomy, being unduly influenced by the PTOs and sector ministries to which they were responsible. Also, in many cases, privatization had occurred before an effective regulatory environment was established. Regulators also have a particularly difficult job because competition is so fierce and operators are not transparent in sharing their economic information and plans. In particular, this made establishing the true costs of service provision almost impossible.

The following regulatory and policy objectives for national governments and in particular regulators were identified.

1. Ensuring the establishment of strong and well-resourced, independent national regulators to administer the communications sector. It was felt that this should be a precondition to any major restructuring of the sector.
2. Instituting regular review of sector policies and regulatory arrangements that are aimed at improving connectivity. This would include development of mechanisms to monitor the progress of infrastructural development; the World Telecommunications Development Conference in Malta included specific resolutions about Africa, to help establish a process of monitoring and follow-up to the Abidjan resolutions. A valuable adjunct to this would be case studies of countries (including some outside Africa) that have had sector reform for some time, to identify effective policy and legislative models.
3. Participation in efforts to establish regional and subregional information exchange and collaboration mechanisms (see Regional and International Cooperation, below).
4. Ensuring that consumers benefit from the reduced cost of international access and that tariffs are cost based.
5. Ensuring that exclusivity in licenses granted does not restrict the choice of new technologies and services available. This would include the adoption of licensing policies to facilitate the take up of the services that will be provided over new infrastructures.
6. Developing strategies for telecom operators to cope with the impacts of the changing accounting rate regime, Internet telephony, and by-pass—for example, increased buildout of the local network to meet the demand for more local bandwidth and changes in revenue-generation models from international calls to national usage of the infrastructure. Awareness-raising programs will need to be intensified and regional and subregional collaboration will need to be developed (see Regional, below). Aside from the impact on revenues, the effect of these developments on the profitability of new capital investment will also need to be examined. *Info*Dev and the World Bank have offered to support policymakers in capacity building, in order to deal with these issues.
7. Reducing government taxation of national telecom operators to ensure that they are able to reinvest more of their profits in network expansion.
8. Ensuring the interoperability with the existing networks of new infrastructures such as GSM cellular and other wireless systems. This would include ensuring that these networks have data communication facilities comparable to traditional networks. For example, in many cases GSM systems are not being implemented with data services, and rural wireless systems are being provided with limited data capabilities.
9. Ensuring that a free market provides Internet access and other value added services.
10. Developing community approaches to connectivity development by making provision for village level or other small-scale operators (NGOs, community groups, women's groups, and small businesses) wishing to invest in establishing services for their local needs. This could be carried out through local BOT agreements with the national

operator(s), or by allowing the establishment of local telecommunications cooperatives (see the U.S. and Asian examples at the National Telecommunications Cooperatives Association's Web site: http://www.ntca.org).

11. Investing in network infrastructure to link all public institutions—in particular, local government offices, schools, clinics, and libraries.
12. Reformulating universal service obligations in concrete terms in the light of options now available. This would involve more widespread institution of universal access requirements on operators and the establishment of "universal service funds" to channel investment into rural and other disadvantaged areas from a proportion of the revenues of operators and value-added networks, such as in policies recently adopted in South Africa and Uganda. Quality and type of service issues will also need to be addressed.
13. Ensuring that the provision of access to connectivity coincides with special programs to support indigenous content and applications development, and the establishment of procedures to identify priority sectors of the economy for special connectivity efforts. This would include prioritizing initiatives involving youth and women.
14. Establishing procedures to ensure that development projects in all sectors have an ICT component built in.
15. Eliminating import tariffs on ICT-related equipment and services.
16. Identifying mechanisms to encourage local manufacture of suitable ICT equipment.
17. Introducing fast-track policies to address the urgent Year 2000 (Y2K) problem.
18. Modifying existing laws and regulations to accommodate the use of electronic media and the admissibility of electronic documents in court, and so on.

Finance and Investment

Massive investment will be required to significantly improve Africa's connectivity. In telecommunications alone, it is estimated that investment totaling at least US$50 billion would be required to achieve a minimum teledensity of 5 percent or 5 lines per 100 inhabitants in Sub-Saharan Africa. Just to maintain the existing levels of teledensity costs US$6 billion a year. Currently, an average of about US$20 billion per year in financing is sought (about 65 percent from local sources, 20 percent from private credit, and 15 percent from multilateral and bilateral assistance). Total financing requirements are expected to rise to US$60 billion per year, with 45 percent coming from private sources, 40 percent from local sources, and 5 percent from official sources.

GCA participants heard that the World Bank is committed to supporting investments in Africa in order to achieve global connectivity. Normally, the financing would be obtained through its sister organizations, the IFC and MIGA; however, the Bank itself could become involved in financing if sufficiently broad development goals were created for the project.

The following priority goals were identified.

1. Institute the policy measures as described above to encourage international and local private sector investment.
2. In support of this, national regulatory bodies should be encouraged to work with na-

tional and international investment promotion agencies to establish "one-stop shops" with sound investment package incentives to attract foreign investors. These would include

- developing a clearinghouse mechanism for use by operators and entrepreneurs seeking investment to make the information needed to prospective investors widely available
- developing guidelines and identifying sources for the production of the information required by investors
- financial reporting of existing operations
- new project proposals
- market analysis
- general economic, investment, and risk analysis

3. Develop an information resource (Web site) for use by entrepreneurs to identify sources of investment and development funds.
4. Create special opportunities to allow local financial participation, including microcredit facilities, in rural areas (see 10 under Policy and Regulation).
5. Consider the establishment of an African Telecommunications Development Fund and /or subregional funds as a means for pooling investment and attracting the private sector, the international community, and other telecommunications development funds, such as WorldTel.
6. Encourage support from development agencies with a regional focus, such as the AfDB and the Lomé–EU, for regional connectivity projects to improve the continent's economic integration.
7. Improve information sharing on models for public–private partnerships, since experience in this area is limited.
8. Develop innovativSe methods for reducing equipment costs for new investments in infrastructure, primarily by using the technology with the best price–performance ratios, but also by pushing to relax the tied procurement procedures in bilateral loans and suppliers credit, and by using joint procurement strategies.
9. Reduce the perceived and actual investment risks by setting up a special insurance company for telecommunications development in Africa. The World Bank has clarified that guarantee systems exist for the International Bank for Reconstruction and Development but are still being discussed by the International Development Association (involving the World Bank, the government concerned, and the sponsor of the project concerned). These systems would include government action to bring down risk levels as outlined above and in the Policy and Regulation section.
10. Improve the consultation between potential service providers and end-users in order to develop business models that can provide more affordable services.

Human Resources and Capacity Building

Participants were universally concerned about Africa's acute shortage of trained human resources, including both technicians and decisionmakers, able to deal with connectivity challenges. They suggested both creating and strengthening specialized training institutes, as well as reexamining national educational strategies, to ensure the inclusion of communications awareness and training from an early age.

Within the specialized telecommunications area, the conference supported the creation and strengthening of regional, subregional, and national centers of excellence to train policymakers, network operators, and users. Ideally each country (or groups of nearby countries) should have a training center whose curriculum covers both telecommunications and information technology components. Access to databases of specialized human resources and training centers would facilitate national training efforts. In-country secondments and exchanges with other countries, both developed and developing, could help in areas such as regulation, telecommunications networks, wireless usage, and equipment maintenance, as well as in the training of telecenter operators. Regional employers would have to improve remuneration and in-service training opportunities to retain skilled staff.

To raise communications awareness, governments need to ensure that all students at tertiary institutions have full Internet access and that primary and secondary schools get connected to the Internet. Online programs could help a great deal in facilitating distance and continuing education. National programs are needed to encourage computer literacy at all levels, working towards developing skills in computer programming. This training could result in major benefits by increasing the information economy in Africa and capitalizing on global shortages of programmers.

Technology

GCA participants underlined the need for more objective information on connectivity technology choices, such as this conference provided. They said that too much of the information they received was commercial, and opportunities to share information and experiences with neighboring countries with similar conditions were rare. They were also concerned about relying on conventional wisdom in choosing between cable and satellite technologies, in the light of rapid technological change. Certainly, regional cooperation and universal service obligations would also have major impacts on the choices of cable and satellite technologies.

They identified the following as useful strategies in making improved technology choices.

- Improving the availability of unbiased information on alternative technology options. Increased regional and subregional information exchange among operators and carrying out case studies on different technology solutions would be helpful in this regard. The toolkit and case studies presented at the conference were seen as a valuable first step in this process that should be developed further.
- Exploring the potential of regional or subregional collaboration in the adoption of common technologies and standardization (a) to create a local manufacturing base, (b) to create economies of scale, and (c) to streamline licensing and type approval procedures. This could be followed by identifying areas amenable to the development of local manufacturing of equipment.

- Developing a frequency and spectrum management plan.
- Exploring the use of push technologies and asymmetric connections to the Internet to improve its utility and cost effectiveness.

Regional Cooperation and Partnerships

Participants believed that the regional cooperation's potential in this area had not yet been realized, due to a number of constraints. However, given low levels of economic development and the small population of many countries, regional cooperation could have a big impact on costs by consolidating traffic and procurement. In regional connectivity projects, it seems necessary to distinguish between needs for connectivity **between** African countries and connectivity **with** countries or regions outside of the continent.

Many of the issues discussed under this rubric were also addressed in "The African Connection" document prepared by the African ministers of communications and distributed at the Africa Telecom '98 forum in May 1998 (see annex III).

Technical, regulatory, and financial areas were identified where regional cooperation and partnership would be most useful. These included

- regional coordination of regulatory and tariff policies
- adoption of common standards for new technologies
- joint procurement
- creation of spectrum management and frequency plans for radio-based connectivity.
- adoption of mutually compatible standards for key regulatory documentation and systems to enable investors to expand more rapidly into the markets of neighboring countries
- adoption of common strategies on reducing tariffs and transit charges for telecommunication traffic and implementing roaming agreements on mobile networks (both GMPCS and terrestrial cellular)
- agreement on mechanisms for accounting settlements

In all these areas, the prerequisites for successful regional cooperation were an improved information base (including an inventory on ongoing projects and initiatives), improved information exchange between countries, and improved efficiency of subregional and regional organizations. Much discussion took place on the Pan African Telecommunications Union (PATU's) role, and ways in which to make it more effective. Participants also felt that efforts must be made to harmonize and reduce duplication among other subregional network infrastructure-building efforts, in particular those of COMESA, SADC, the East African Cooperation Digital Transmission project, RASCOM, and PANAFTEL.

Given improved mechanisms for subregional and regional cooperation and partnerships, participants felt that additional activities could be envisaged, including

- development of a regional or subregional telecommunications fund.
- support for regional projects outlined in the "African Connection."
- expansion and improvement of existing regional telecommunications infrastructures and initiatives: PANAFTEL, INTELCOM1, RASCOM, SAT-3, and so on.

- expansion and improvement of telecommunications links between neighboring countries.
- establishment of direct connections between African countries where current routes travel via Europe or the United States.
- strengthening of existing regional maintenance and training centers, such as ESMT and AFRALTI.
- development of a regional telecommunications research network involving African universities.
- development of multicountry sectoral projects in the areas of content and applications. This could be particularly useful in stimulating African content and applications development in languages not well represented on the Web, including French, Arabic, and Portuguese.
- identification of subregional telecommunications hubs that could provide telecom services to other African countries at the lowest possible cost by sharing intercontinental links.

A large VSAT hub connected to the global fiber-optic network where it currently lands—in Djibouti, Egypt, Tunisia, Morocco, or South Africa—would have a major impact on the roll-out cost and speed of national Internet connectivity in areas outside the capital cities and secondary towns.

International Cooperation and Partnerships

Many of the goals identified above would benefit from support from the international development community in helping accelerate efforts toward the achievement of global connectivity.

Participants requested international agencies to consider the following.

- Support the national African Information Society Initiative activities to raise awareness among policymakers and to assist them to define local policies for improving connectivity.
- Participate in the Partnership for ICTs in Africa (PICTA), the coordinating mechanism for development agencies working in areas relating to the support for the use of ICTs in Africa (see http://www.bellanet.org/partners/picta).
- Support the capacity building goals described above in Human Resources.
- Support the development of electronic information-sharing and distance-training resources to fulfill the needs described in Finance and Investment and Policy and Regulation.
- Support the need to reduce the costs of international Internet connectivity by encouraging operators in the United States and Europe to pay for their share of the link costs. (Currently Africa pays all of the telecommunication and access costs to establish a link to the Internet backbone in the United States or Europe, effectively subsidizing the connectivity costs of users outside the continent.)
- Make efforts to reduce the difficulties of obtaining multilateral financing, which currently takes an average of three years to arrange and labors under complex disbursement procedures and stringent conditions.

- The International Telecommunication Union should develop an African Information Management System for telecommunications operators.
- AfDB, ECA, United Nations Development Programme (UNDP), and the World Bank should be facilitators for investment and resource mobilization for connectivity projects in the subregion. In particular, calls were made for AfDB and the World Bank to assist African countries to invest in the SAT-3 West African fiber-cable project.

Targets and Monitoring

The range of topics considered by GCA in as complex an area as communications left little time for the development of detailed targets and means to evaluate progress toward global connectivity. However, among the targets and goals articulated by conference participants were

- at least 50 million lines installed over the next 5 years, broken down into individual country targets
- the allocation of at least 10 percent of national budgets to development of national telecommunications projects
- significant growth of African private-sector investment in the telecommunications area
- affordable universal access

ANNEX I
Connectivity Building Initiatives in Africa

This section summarizes the experiences related at the conference on connectivity building and support activities. (Further references on the state of Internet connectivity in Africa appear in annex VII.) African Internet connectivity is accelerating: 47 countries now have Internet access in the capital cities, up from just 4 in 1995.

While the telecommunications sector is still dominated by state-run monopolies, an increasing number of countries are restructuring the sector and putting in place the requisite regulatory frameworks for telecommunications development. According to one ITU analysis, on average, the level of liberalization of the telecommunications sector in Africa is ahead of Asia and slightly behind Latin America. Ten countries have established independent regulators, 17 have introduced some degree of privatization, and 15 new private mobile cellular operators have been established since 1995. The World Bank is currently assisting 25 African countries with communications-sector reform programs.

Most PTOs have signed the Global Mobile Personal Communication Systems (GMPCS's) memorandum of understanding and many are considering participating in other such initiatives such as ICO, RASCOM, Africa One, and Oxygen. ECA's Development Information Services Division (DISD) has embarked on a number of activities to support the AISI. In particular, it is aiming to increase the level of policy awareness by holding national workshops, providing policy advice to member states, expanding awareness on connectivity options, and strengthening African university and research libraries through support for ICT applications. Internships to African students and IT professionals will also be offered at ECA and the Centers of Excellence in Dakar and Nairobi.

ECA plans to develop a training center for ICTs through the Technology Centre for Africa (TCA) in Addis Ababa at the United Nations Conference Centre, to serve as a leading permanent demonstration and training site for showcasing new technologies and innovative uses. ECA is encouraging active private sector and development agencies participation in building up the TCA.

ECA support for the establishment of some of the initiatives outlined by the African communications ministers in the African Connection is expected shortly. During the conference, for example, ECA voiced its commitment to support an ongoing forum of African ministers of communications to maintain the momentum.

The IFC is currently lending to 40 connectivity projects in 25 African countries. Most of those projects include some form of privatization of public companies in a wide range of telecom technologies, including fixed phone, pay phone, cellular, paging, and cable TV.

The ITU is supporting a variety of capacity-building projects in Africa to reinforce the two regional human-resource development centers for telecommunications—ESMT in Dakar and AFRALTI in Nairobi—as Centers of Excellence. It also has initiated projects to carry out multilateral training programs (for example, in Malawi with the Multi-Country Training Centre, or MCTC) and to develop online training facilities. ITU is also pushing for revitalization of PANAFTEL–Afritel and examining the potential for extending infrastructure from the power grid, such as in the Southern African Power Pool, which has a fiber-optic cable component.

IGAD is developing a transport strategy that encompasses telecommunications as part of a strategic framework for data communications infrastructure. This will involve improving the existing regional infrastructure networks, RASCOM, and PANAFTEL.

COMESA is working to promote the development of telecommunications in its member countries and to improve interconnectivity and harmonization of regulatory frameworks among countries. Various infrastructure development projects are currently being considered.

SADC's regional agenda for telecommunications is carried out by SATCC, which is working to improve interconnectivity between southern African countries. Recently it has developed model telecommunications legislation and regulatory mechanisms for use by members. Working papers and studies on radio spectrum management and planning have been produced.

Iridium, a Motorola subsidiary, is launching the first GMPCS. In September, Iridium's network of 66 low-earth-orbit (LEO) satellites will begin commercial operations with costs as low as US$1.60 a minute for national calls, using a handset almost indistinguishable from a cellular phone. The phones will cost around US$2,000, but top-end, dual-mode handsets costing about US$3,000 will be able to switch over to Iridium when the conventional terrestrial cellular network is unavailable.

Customers will be largely drawn from business travelers, wealthy tourists, and international relief agencies, but some use by lower income rural populations is expected. Governments may provide isolated villages and remote public works projects with phones for use in emergencies. Iridium also has a social responsibility program called NOMAD, which aims to provide free phones and call time to governments and agencies involved in relief work and crisis management.

Iridium is working intensively with the public telecommunications operators in Africa to finalize tariffs and interconnection agreements, and calls made to destinations within a country will be cheaper than international' calls. The issue is complex, because only 12 satellite earthstation gateways are required to link the satellites back to the terrestrial network, so each country will not have its own local link. As a result, someone in Mozambique making a call from an Iridium phone to the terrestrial network in the same country will also have to cover the costs of bringing the call from the gateway to Mozambique.

While many fiber cable building initiatives exist, none have had firm commitments since the agreement on SAFE to link South Africa to Malaysia via Mauritius. The next fiber cable most likely to proceed is the West African coastal fiber-optic cable, SAT-3, being spearheaded by Telkom S.A., which has gathered support from a number of other African PTOs.

WorldSpace is an ambitious satellite initiative founded by Noah Samara to provide digital broadcast radio services for each continent. The first satellite will be put up over Africa, and plans exist to ensure that it will contribute to public service broadcasting for people across the continent. To this end, WorldSpace Corporation has set up the WorldSpace Foundation, which has developed an agreement with the Radio Netherlands Training Section (http://members.forfree.at/~rbo/index6.html) for strategic assistance. WorldSpace will reach the whole continent by means of three separate beams to southern Africa, to east

Africa, and to west Africa, respectively, with all three overlapping in central Africa. Each beam has the capacity to carry five channels of 32K bps each. The satellite was launched in September 1998, with operations expected to begin in January 1999. The broadcasts will be picked up on small portable receivers costing about US$200. The price of the receivers is expected to fall as the sales volume increases.

West Africa

Nigeria

Within the policy and regulatory environment Nigeria has fully implemented the recommendations of the ITU in

- The separation of the postal and telecommunication functions
- The establishment of a regulatory authority, the Nigerian Communications Commission (NCC)
- The provision of financial and managerial autonomy for the telecommunications operators
- The opening up of the sector to regulated competition
- The availability of licenses for private-sector participation in basic, mobile, satellite, and value-added services, including the Internet, as well as international services.

The infrastructure provisioning is mature but inadequate.

- Nigeria has only 700,000 telephone lines but needs 3 million lines immediately.
- Nigeria has only 15,000 cellular lines but needs 200,000 lines immediately.
- There are 4 digital and 2 analogue satellite links, as well as 19 domestic satellite earth stations, for local TV transmission.
- There are over 600,000 personal computers, over 5 million TV sets, and over 20 million radio sets supported by over 36 public radio, 2 private radio stations, and 45 public TV and redistribution stations. Two private global TV stations have taken off as well.
- Five private VSAT operators are providing service, three of which are allowed to offer international services.
- Ten Internet services providers (ISPs) are active.
- Two private telephone companies already offering services; another four are expected to be operational soon.
- Three private companies are already offering public pay phone services.

There also are immediate plans to privatize the national operator and to appoint a second national carrier.

Senegal

Senegal has one of the more advanced telecommunications networks in Africa—Sonatel—which was recently partially privatized. Fiber-optic cable links all of the major towns in the country, and plans exist to join Gambia's fiber network to Senegal's.

There are approximately 9,000 private telephone shops in the country, many of which are now adding computers and Internet access to their services. This represents 6 percent of the lines, but 18 percent of the operators' revenue.

Telemedicine applications are being developed for use between St. Louis and Dakar.

Gambia

Fiber-optic cable connects all of the provincial towns except those north of the river Gambia, which are linked via 34 Mbps digital microwave.

The country is actively participating in GMPCS discussions and has recently become a participant in the UNDP Internet Initiative for Africa (IIA), which will support the PTO in developing a national Internet backbone.

Sao Tome

Internet access was installed in Sao Tome last year, and boasts approximately 50 users currently.

Guinea

Internet services have recently been introduced, and five ISPs have had their license applications accepted.

Liberia

Liberia has instituted an "open-door" policy toward private-sector investment in telecommunications infrastructure. A company in Liberia is in the process of establishing Internet services.

Central Africa

Gabon

Gabon operates a domestic satellite network, and the PTO established Internet services early last year. There are now four points of presence (POPs) located in the major towns. Unlimited access Internet accounts cost 6,000 CFA per month.

Cameroon

Cameroon is planning to partially privatize the PTO, and a bill is ready to go to Parliament on this.

Democratic Republic of Congo (DRC)

The DRC has recently given approval to private-sector telecommunications providers, and a 240,000 subscriber license has been issued.

Eastern and Southern Africa

South Africa

The PTO, Telkom S.A., recently sold a 30 percent share to the private sector. The sale carried service obligations to roll out 3 million lines in the next five years, to establish a national fiber optic backbone and thousands of telecenters, and to connect every school, clinic, post office, and police station. This is expected to involve US$10 billion in private-sector investment. The government is requiring the international private sector to form partnerships with the local private sector.

Telkom S.A.'s SAT-3 and SAFE projects are ready to cooperate with Eastern Africa countries.

Ethiopia

Ethiopia is in an active phase of line roll-out, with 75,000 lines being added in one two-week period. . In the next two years, a further 650,000 lines are planned. A VSAT program is being established to link 400 towns (250 VSATs will be installed in the first phase). Cellular service is planned for the capital and six major towns by the end of 1998.

Mauritius

Mauritius will have a landing point in the SAFE marine fiber project linking South Africa to Malaysia. Internet services are provided only by the PTO. There are about 40,000 GSM cellular phone users.

Botswana

Botswana has an extensive fiber-optic network linking major centers. It recently established a cellular phone service with private-sector participation and is participating in GMPCS projects. Licensing of operators encourages the provision of rural access. Internet backbone services are provided by the PTO, with private-sector ISPs selling to end-users.

North Africa

General recommendations for the region

1. Establish a direct connection between the fiber backbones of Egypt and the Sudan (Aswan and Wadi Haifa or Attara).
2. Promote connections between North Africa and its southern neighbors.
3. Support the production of Arabic information content in the region.

Egypt

- RITSEC has been given responsibility by government to manage nationwide Internet services and the international gateway.
- Egypt has a recognized value-added service market with 40 ISPs throughout the country, including 20 in Cairo.

- There are about 100,000 Internet users.
- The government has established VSAT terminals in the rural areas.
- The majority of the 1,000 national Web sites were established by the private sector.

Mauritania

- The country has been connected to the Internet since October 1997.
- Five Internet service providers have been given the authorization to operate.
- The Faculty of Science and Technology (FST) of the University of Nouakchott has been leading Internet development in the country for some years. A group of FST lecturers keeps decisionmakers abreast of developments in this field.
- There are eight leased line users in Nouakchott using 64K bps dedicated links, including those of the university, state institutions, and an Internet service provider. These all connect to the PTO's hub, which links via FCR's hub in France.
- Mauritania uses the Intelsat, Arabsat, and Domsat satellites, and has 13,000 subscribers.
- The telecommunications sector will soon be liberalized.
- UNDP's IIA for Africa program will support the development of the Internet in Mauritania.

The Sudan

The 1994 privatization exercise was considered a success and Sudatel, which is 80 per cent privately owned and 20 per cent government owned, has implemented a 1,400 km digital backbone and connected 36 towns through a Domsat system. The fixed telephone and mobile cellular telephone networks are expanding by about 70,000 lines a year. Sudanet is the only Internet provider in the country. The University of Gezira operates a store-and-forward email service.

Morocco

The reform of the telecommunications sector in Morocco has already begun. The aim is to separate the postal, telecommunications, and regulatory functions. The National Telecommunication Regulatory Agency's role is to define the components of universal service, grant licenses, and formulate regulations. There is also a Ministry of Posts and New Information Technologies.

State divestiture has been going on for some time. The Posts and Telecommunications Corporation was established in 1984, sales of telecommunications equipment were liberalized in 1989, and 5,500 teleboutiques were set up in 1992. The country was connected to the Internet in 1995, and now has about 40 ISPs.

Following the restructuring of tariffs in 1992, prices fell by 32 per cent. The telecommunications infrastructure has been completely digitized, and new services such as X25, GSM, video conferencing, RNIS, and pagers have been introduced.

Tunisia

In the national plan for 1997-2001, Tunisia plans to invest US$1.5 billion in the communications sector, representing 4 percent of national investment, including a 17 percent annual growth in line build out. It is actively seeking international partnerships to complement the objectives in upgrading, restructuring, and training.

The country has 4,400 kms of fiber and coaxial cable and is connected to the SEA-ME-WEA submarine fiber cable. There are about 70,000 mobile network lines and a further 200,000 lines are planned.

Libya

Libya is the process of connecting to the Internet (http://www.nida.org.ly). It has recently completed a fiber-optic cable telecommunications link between Tripoli and Bengazi.

Lessons Learned and Next Steps

In an interactive plenary discussion on the final day, participants tried to synthesize the message of the conference and the important next steps that should be taken. These were the major points made, falling under the rubrics of policy and regulation, access, capacity building, financing, and partnerships.

Policy and Regulation

- There is a need to regularly review sector policies and regulatory arrangements to optimize the benefits available from the increased choice of technology.
- Licensing policies need to be adapted to facilitate the take up of the services that will be provided over new infrastructures.
- By-pass is inevitable; it can be accommodated without losses to national operators.
- Regulatory intervention is needed to ensure that consumers benefit from the reduced cost of international access.
- Rules are needed to ensure that any exclusivity granted should not restrict the choice available of new technologies and services.
- Awareness-raising programs on changes in the accounting rate regime should be intensified.
- Governments and regulators need to develop specific strategies to cope with the changing accounting rate regime.

Access

- The new technologies increase options to improve access to communications rapidly, especially in rural communities.
- Explicit strategies need to be developed to implement and sustain access
- Regulatory issues, user and community involvement, design of appropriate projects, funding must be considered.
- Affordability is one of the key barriers; organizing the sharing of facilities can overcome the high cost of access in rural areas—for example, pay phones, telecenters, community information centers.

- Universal service obligations need to be reformulated in concrete terms in the light of options now available, for example, for more specific requirements for rural service.

Capacity Building

- More and better information on the availability and impact of the new technologies in Africa is needed.
- Ensure that training institutions in the sector, including the Centers of Excellence, address connectivity issues.
- Sector regulatory bodies should share experiences and develop common approaches on connectivity issues.

Financing

- The financing of the connectivity projects should be undertaken primarily by the private sector.
- Opportunities should be created to allow local financial participation, including microcredit facilities in rural areas.

Partnerships

- Existing forms of partnership need to adapt, and new forms to emerge, to accelerate and optimize the development potential of these technologies.
- Greater participation by groups previously underrepresented, such as women, users, and communities, is needed.
- Forms of partnership should include regional and subregional cooperation, public–private partnerships, and support from development partners as well as foreign–local partnerships.

ANNEX II
Working Group Summaries

Working Group: Analyzing Connectivity Choices: The Toolkit and Case Studies

The two case studies used in the *info*Dev-financed "Toolkit for Evaluating Cable and Satellite Projects" involved a coastal African country with a large population and relatively well-developed telecommunications infrastructure, and a landlocked country with a relatively small dispersed population and not so well-developed telecommunication infrastructure. In the case studies, a cost–benefit analysis was made for each of the countries comparing the impact of their participation in cable or satellite projects. Major conclusions were

1. The toolkit's overall conclusion is that cable is more profitable than satellite for high volume operations.
2. However, profits diminish towards the year 2008 as satellite systems improve, even though the profits remain positive.
3. GMPCS can provide some "fixed" services to rural areas (such as found in Africa) at a much lower price than mobile GMPCS.

While the study was seen as a useful first step, the following issues appeared not to have been addressed or taken into account in the assumptions for the analyses.

Economic dimensions

The model is not expected to be affected by the increasing use of Internet telephony as both infrastructures can be used for this traffic.

The very low per-capita income in African countries raises the following concerns.

1. affordability of the service by the user and preferences and choices as parameters that influence traffic patterns
2. sustainability of the services–projects
3. out-of-pocket costs per user
4. need to include capital costs for land connection to the landing point
5. costs for cable possibly cheaper than presented in the toolkit
6. cable performance unequal to satellite performance when inter-African traffic is considered

Technical dimensions

The technical dimensions centered on the geographic and topographic variations from country to country; implications were identified for

1. the particular type of technology
2. the deployment complexity of the different technologies
3. the relative advantages and disadvantages: satellite vs. terrestrial, mobile vs. fixed services
4. knowledge of new technologies' future growth paths
5. training
6. internal country infrastructure

General policy dimensions

Priority general policy issues identified were

1. issues with respect to the building of new infrastructure as compared to extending existing infrastructure
2. interconnectivity–interoperability with existing infrastructure (for example, data not supported on many GSM networks)
3. availability of additional capacity and/or connectivity
4. ownership of the companies offering these choices (important consideration for African countries)
5. despite cable's lower cost, countries' reluctance to put all their eggs in one basket
6. need to consider a better definition of service providers, especially for GMPCS (difference between gateway and service providers as regards service to Africa unclear in study)

Government policy dimensions

Government policy with regard to new connectivity projects should take into consideration the following.

- regulatory regime
- liberalization agenda
- contribution to economic development
- level of indigenous participation and partnerships on offer
- nature of the partnership

Proposed action and strategies

A toolkit review focusing on the above topics as well as the relevant RASCOM study was encouraged.

Working Group: Attracting Private Sector Investment for Connectivity: Domestic, Regional and Global

Lending institutions such as the World Bank, the International Finance Corporation, MIGA, and public and private banks in both the developed and developing world seek basic reassurances that investments in the connectivity sector can pay off. Expertise and capital from outside investors, combined with strong local management, presents the most promising investment model. In addition, key characteristics of an investment climate that attract capital include

- the use of a proven technology
- assurances that transparent licenses are in place
- a long-term commitment
- minimization of downside risk
- access to foreign exchange.
- a regulatory framework
- interconnection agreements,
- lack of cross-subsidies
- a good mix of investor expertise, capital, and local management skills

  In the future, lending institutions will have to address
- issues of scale (how to help entrepreneurs requiring relatively small sums of capital)
- lending to entrepreneurs that do not benefit from local governmental guarantees
- innovative cofinancing approaches
- the need for human resources that support a transparent investment climate (for example, management of spectrum allocation)
- a concern for backing connectivity that supports national economic and social development priorities

Investments in the connectivity sector are not without risk, but such investments, if structured correctly, will produce both profits for the investors and benefits for the country.

The IFC is currently lending to 40 connectivity projects in 25 African countries. Most of those projects include some form of privatization. In the IFC's experience, the foremost factor in the success of connectivity investments was public–private partnership. Donors are trying to balance the interests of the government and the private sector. Countries should not look to the World Bank for direct investment in telecommunications and connectivity projects. Investment capital must come from private sources, and that will only happen when investment climates improve: the government creates an investor-friendly, enabling climate and the private sector carries out the project.

African countries' move toward establishing a favorable environment was in the right direction, but needed to be encouraged more strongly. The importance of putting into place separate regulatory authorities was stressed, as was the need for the investment climate to highlight opportunities for a broad range of operators, from large, state-owned entities in the process of privatization to small providers and users.

The group identified three fundamentals for attracting private sector.

- Governments that hesitate to embrace the global communication revolution will erode national competitiveness and will miss development opportunities. As it is, Africa is already on the margin of the telecommunications revolution, even relative to other developing regions.
- Governments should realize that the private sector is a critical player in the global communications revolution. Massive investment will be required in telecommunications alone; for example, investment totaling at least US$50 billion would be required to achieve a minimum teledensity of 5 per cent or 5 lines per 100 inhabitants in Sub-Saharan Africa. This by far exceeds public-sector financing and managerial capacity, making large-scale private investment and operations a necessity. If governments continue to monopolize telecommunications and information technology, access to capital, markets, and technology, to the exploitation of new opportunities, and to the benefits of competition will be handicapped. An appropriate information technology development strategy for Africa could therefore be based on

1. a public-private partnership with greater outsourcing of public sector requirements for information technology services wherever possible to local private entrepreneurs
2. a foreign-local private sector partnership encouraging and facilitating collaboration and competition between foreign and local private suppliers of information technology services

- The realization by governments that mitigation of actual and perceived risks is critical to attracting private investment. If governments fail to manage effectively the factors that affect these risks, then private investment will be stifled. In Africa, private-sector confidence in procompetitive regulatory frameworks initially will require strong, high-level commitment to a simple set of rules ensuring a level playing field and counterbalancing the monopolists' mindset of incumbent state telecommunication firms, while technically capable regulatory institutions are built up in the medium term.

Key Conclusions from the Discussion

1. Governments must realize the importance of telecommunications for national development and the need to ensure universal service to rural areas where the majority of Africans live.
2. Private–public partnerships (for example, those in Mauritius and Gabon) and support from multilateral financial institutions are needed to strengthen the local private-sector.
3. Local private investors' fears of being pushed out of the market by large international investors, especially as part of globalization, must be addressed. Calls were made to AfDB and World Bank to continue to promote development.
4. A need exists for lending mechanisms scaled for entrepreneurs who do not need capital in excess of US$200,000 and for more innovative cofinancing mechanisms.
5. Rural investment opportunities can also be profitable, and should not be neglected.
6. Local, private sources of funds need to be more firmly committed to long-term projects.

7. Attractive opportunities for investments in telecenters are available.
8. Better information dissemination is required about the opportunities and the enabling environments in African countries in order to positively affect the perceived risk of investors and financiers.
9. Keeping corruption out of telecom institutional arrangements is critical.
10. Special attention should be devoted to promoting connectivity investments in niche subsectors such as teleworking.
11. Capable human resources are vital, particularly at the level of government and regulatory authorities, to creating a favorable investment climate.
12. Customer-oriented profiles should be used in developing connectivity projects.
13. Licensing and spectrum allocations can result in important revenue streams for governments that liberalize the sector.
14. The SAT-3 submarine cable project on the southern and western coasts of Africa, in which most African operators wish to participate but have problems meeting investment requirements, is critical. Calls were made to AfDB and World Bank to support the project.
15. Financial institutions were cautioned against reverting to traditional operations that have proven inefficient (monopoly) and ineffective (limited capacity to meet demand) in Africa. Calls were made for (a) use of local capital markets and (b) consideration of wider communications market (services such as Internet, supplies of equipment, public telephones, electronic commerce, and so on).
16. Universal service, especially to rural areas, calls for (a) clear national policy and (b) support for African enterprises (for example, RASCOM at the regional level and SMEs at the national level) that might be more willing than foreign investors to serve rural areas. Since financial institutions have insisted on the rule of market forces to allocate investments, even in rural areas, rural licenses could be auctioned to build new markets.
17. Mitigating risks must include (a) insuring against risks traditionally through MIGA or IFC "comfort" equity investment and (b) government action to bring down perceived and actual risk levels. Setting up a special insurance company for telecommunications development in Africa has been proposed. The World Bank has clarified that guarantee systems exist for the International Bank for Reconstruction and Development, but are still under discussion for International Development Association assistance (involving the World Bank, the government, and the project sponsor).

It was also noted that investment will need to cover the development of applications and content that make use of the connectivity. This reflects the shift from basic hardware and software to innovative use of connectivity to produce new solutions to pressing problems such as electronic commerce, governance, applications for education and learning, and preservation of cultural heritage.

Working Group: Implications of Future Developments in International Telecoms Revenue for Connectivity

Two of the challenges facing Africa are the implication of global connectivity for international telecom revenues and the future financing of telecommunications networks to improve teledensity so that Africa can enter the information age.

Funding is not expected to dwindle for the telecommunications sector, one of the most dynamic. During the 1980s, the annual investment level in Africa was US$20 billion, with 65 percent coming from telecommunications businesses and 15 percent from multilateral sources. In the 1990s, investment has been US$60 billion, with 55 percent coming from private sources and 5 percent from such multilateral sources as the World Bank and the African Development Bank. To maintain the present teledensity in Sub-Saharan Africa, US$6 billion per year is needed. And in order to leapfrog, much more is needed.

The private sector is the heaviest investor; its involvement will increase with ongoing structural reforms. In addition, the telecommunications industry has undergone spectacular changes during the past 10 years, opening up new opportunities for the private sector. It was almost a foregone conclusion that monopolies were a thing of the past. Increasingly, more operators have been emerging on the market, creating fierce competition.

The possibility of acquiring wholesale traffic rights has made the current system of charge distribution even more complex. Transferring traffic through cheaper routes by bypassing ITU routes (refiling) from point A to point B through point C, without B knowing the traffic sources, was becoming increasingly substantial and had become inevitable.

Some services, such as Internet connections, are growing rapidly because of their pricing structures: sender keep all (SKA) and flat rate. Flat rates—applying the same pricing structure to all—were difficult to apply to traditional telecommunications services. However, this new communication means is used increasingly because the sender keeps all of the revenue. In addition, the reality of Internet telephony must be taken into account.

Currently, more than 20 percent of the PTT revenues are related to accounting rates, but the current accounting rate formulae were not designed to accommodate the present situation. At present, accounting rate systems are undermined by

1. Technological pressure by way of call-back, refile, and Internet calls. Nontraditional traffic to the United States is growing at the rate of 35 percent per year, compared to the 10 percent rate of growth of traditional traffic, due to U.S. regulations on competition.
2. Liberalization of the rules of the game. The signing of the WTO agreement by 60 countries allowed for free marketing of services.
3. The political economy. Some countries apply pressures in order to influence accounting rate systems.
4. The FCC benchmark order measures. These consisted of setting a charge ceiling that was reversed to foreign callers.

- By January 1, 1999, no operator will have to pay more than US$0.35 per minute. In January 2000, the rate would be US$0.19 per minute.
- In 2002, there will be a US$0.23 per minute ceiling for developing countries; they should prepare themselves accordingly.

At the moment, two proposals are being considered: (a) an OECD termination rate and (b) an ITU–SG3 accounting rate based on cost base tariff.

The World Bank was providing support through the *info*Dev fund to educate countries, using conferences and briefing seminars on the substance of the World Trade Organization agreement. The *info*Dev program might also commission studies on the impact for telecommunications administrations of removing the distribution charge. *Info*Dev was also working with the International Telecommunication Union and providing support to regulators.

A strong move exists toward full transparency of accounting rates—a trend that *info*Dev would like to support. However, some questions linger about how best to support transparency in a competitive environment where discounts are kept secret. The importance of autonomous regulators was underscored. (The URL for the ITU Web page, with reports related to accounting rates, is http://www.itu.int/itu-d-finance/finance/addis.htm).

In developed European countries, the pattern has tended toward abolishing the distribution fee, except for transit traffic. European countries would certainly influence the developing countries to reduce distribution fees, starting in January 1999.

The loss of earnings arising from phasing out distribution fees should be compensated for by establishing new infrastructures to raise revenue. Partnerships with the private sector will enable developing countries to develop networks to increase traffic and, by extension, operating revenue.

Time is essential in coping with the rapid changes taking place. Raising awareness may be one of the biggest challenges in Africa. Countries should also maintain continuity of the officials who attend the various conferences and spread the information once back in their home countries.

Proposed Strategies

African countries should adopt strategies for speeding up network development by

- exploring smart partnerships to finance the development of networks
- enhancing awareness of agreements (for example, those of the WTO and GATT) and their implications for and impact on ITU development
- creating an attractive regulatory environment with competent, independent, and financially autonomous regulators
- pursuing operational restructuring and forging intelligent partnerships with the private sector to meet demand
- monitoring the coming changes in tariff structures so that the distribution fee does not unbalance their budget structure

Other Recommendations

1. Countries should set up mechanisms to spread information from international forums.
2. *Info*Dev should assist African countries to collect their payments from major carriers.
3. Collaboration between African countries should be supported (for example, to aggregate their tariffs).
4. The World Bank should encourage regional cooperation and mutual support among PTOs.

Working Group: Applications and Downstream Benefits from Increased Connectivity: Lessons from Africa and Elsewhere

It was observed that ICTs can be applied at all levels. The technologies complement and do not replace traditional methods of communication and information exchange. In education, for example, they serve as an addition to, rather than as a substitute for, normal education. For grassroots groups, adult education can be augmented by ICTs for family planning and natural-resource management. In addressing the crisis of unemployment, implementing new technologies provides new job opportunities and one solution for unemployment.

Studies by IDRC and others on the use of ICTs have shown that, using information and communication technologies, the following occurred.

1. Governments worked better and cost less (for example, the Intranet in Namibia).
2. Cultural opportunities were enhanced.
3. Improved access and communications were provided for individuals with disabilities.
4. Health care was improved, costs were reduced, and access to databanks could be provided to doctors and pharmacists.
5. Reinvigorating and improving education was possible.
6. People of all ages widened their circle of friends.
7. Parents were communicating more with children.
8. Users developed important job skills and assisted with career building.
9. Business opportunities became available.

But connectivity will not help unless there is a real culture of exchange of information, based on

1. liberalization to put in place genuine competition (not simply from one monopoly to another)
2. deregulation
3. adequate training—a national human capacity to train is required
4. accessibility
5. affordability (sustainable and low cost)
6. human resource development and technology transfer

Special concern was voiced about the isolation of African researchers, who suffer from insufficient financial resources, and inadequate data and documentation. Many researchers don't have the necessary bibliographic information to carry out their projects, nor do they have access to the most recent publications and information. They also remain unaware of the financing opportunities available for research.

For communities to really benefit, the technology must be integrated with the development process and cannot be realized without some imperatives—in particular, a culture of openness and transparency and an emphasis on the diffusion of connectivity. The importance of the telecenter (multipurpose, integrated information and communication centers providing telephone, fax, e-mail, word processing, radio, TV, library resources, documentation, and so on) was emphasized as a potential catalyst for local economic development.

Constraints

1. Lessons learned from the past not used. Much technology implementation effort has been unplanned and unevaluated.
2. Insufficient capital.
3. Insufficient strategic planning.
4. Lack of investment in rural areas.
5. Limited computer literacy at all levels.
6. Lack of a coherent and integrated strategy. Any ICT-supported education policy, for example, must fall within the context of reforming national education policy to prepare the next generation.
7. Insufficient investment in content development and an emphasis on the production of information.
8. Few clear examples of the benefits and comparative advantages.
9. Insufficient information on the large range of technology options, causing inability to make the correct choices.
10. Insufficient investment in youth
11. Insufficient investment in schools and higher education

Concerns

1. Inappropriate material accessible to minors.
2. Loss of sensitive proprietary data.
3. Health or technical information falling into the wrong hands.
4. Infringement of property rights.
5. Inappropriate use of scarce resources, especially in relation to the emphasis on connectivity in rural areas, where other basic priorities such as water and electricity have not been met.
6. Sufficient political will to ensure that connectivity that will truly embrace all. For example, in a project to use LEOs for health users, the biggest problem was politicians' suspicions about the use of new and unfamiliar technologies.
7. The tendency of technology to reinforce the existing power structures and create an information elite. For example, only the privileged hospitals can afford telemedicine equipment, and Internet use is much higher in the economically developed countries.
8. Insufficient investment in potentially more cost-effective, low-end technologies.
9. Insufficient investment in content; much less investment vis à vis the infrastructure. This creates new form of dependence—looking to the North for solutions (for example, in the health sector). Most African journals are not indexed in international databases and so are not seen by others.
10. Insufficient understanding of intellectual property rights (IPR) and lack of African participation in international IPR forums.

Other Observations

1. The Council for Scientific and Industrial Research (CSIR) has developed a software toolkit that enables local content creation (http://www.citizens.csir.co.za).
2. Indigenous knowledge could be captured in an international database.
3. African representatives were absent from the World Science Conference.
4. The potential of soliciting support from the African diaspora with the use of ICTs has not been fully exploited.
5. Villagers will not be able to use the Internet directly because of the high degree of sophistication required.
6. There is a need to integrate Internet technology with local languages.
7. Access to communications is becoming recognized as a basic human right.

Recommendations

1. Demonstrate how connectivity makes a difference in the lives of people and in meeting development challenges.
2. Provide examples of the impact of ICTs in different circumstances; encourage scientific research and education.
3. Support better information access for researchers.
4. Support projects that improve the visibility of information from the continent, especially bibliographic data.
5. Identify ways of removing obstacles to connectivity, especially in rural areas.
6. Focus on content development at the national level

Working Group: Strategies and Tools for Universal Access

There was consensus that universal access (UA) to information and communication technologies required access in rural areas, where the majority of the population lived. Such access must be provided on a shared basis to make it affordable.

While providing access to basic telecommunications services (phone and fax) would already be a major improvement for persons living in rural areas of Africa, many felt that access to advanced information and communication services had to be considered an essential part of UA, since it was potentially even more important for people in remote, rural areas than for those living close to urban centers.

IDRC's experiences

IDRC shared its experience in the use of new information technologies in developing countries. It reported that it was applying lessons from its experience in two programs (Acacia and GAIT) to promote universal access. Acacia, with its emphasis on pilot telecenter and schools networking projects, is intended to demonstrate that ICT's can help poor communities in Africa exercise more effective control over their own development. GAIT, an international initiative to set up a global network of excellence focusing exclusively on universal access, with nodes in all regions, is intended to extend the economic feasibility of access in marginal markets throughout the world.

IDRC outlined the following principles behind these programs.

- Projects must be driven by the communities in which they are located, through participatory approaches based on local knowledge and content.
- Projects benefit from an enabling environment created by government, which encourages local supply of content, services, and technologies, and which encompasses a transparent regulatory process.
- National action needs global support that values the needs and voices of developing countries.
- Partnerships are key not only between government and the private sector, but also among community-based groups, NGOs, and academia.
- An integrated approach to UA, taking into account policy, infrastructure, technology, and applications issues, is needed.
- Demonstration and learning are particularly important, since little hard evidence exists of community access's impact on IT.

Telecenters

Ranging from public call offices, providing only phone and fax services, to multipurpose community telecenters (MCTs), which provide value-added public and private information and communication services (including Internet, access to IT equipment, office rental, photocopying, and use training), MCTs are increasingly seen as a major means of providing communications access in both rural and disadvantaged urban areas. While most telecenters to date provide only basic telecommunications services, the cost of adding information technology to them is relatively low, compared to the potential impact. However, although telecenters have grown profitably in many developing countries, national telecom operators and private entrepreneurs still hesitate to implement telecenters in rural and remote areas, citing financial reasons.

ITU has promoted the concept of MCTs, found widely in developed countries, since the early 1990s. ITU is testing MCTs' viability with pilot projects in developing countries, including Brazil, Surinam, Bhutan, and India. In Africa, IDRC is supporting pilot telecenter projects in Mozambique, Senegal, South Africa, and Uganda, as well as in Benin, Mali, Uganda, and Tanzania, in partnership with ITU and UNESCO. The World Bank and USAID are also sponsoring telecenter pilot projects in Africa. South Africa has a national telecenter program established by its universal service agency. The Algerian and Egyptian governments are establishing telecenters. The need to gather comparative data on these experiences was cited, particularly with regard to their profitability, in order to stimulate private-sector interest. It was noted that wireless technologies, such as cellular phones used by the Grameen Bank, potentially offer low-cost access. Using GMPCS as a means to provide access in remote areas was also discussed, but rejected as too costly.

In addition, the working group observed that

- Shared facilities improve affordability.
- Multipurpose centers based on pay-for-use improve sustainability.
- Governments, however, could consider subsidies to maintain affordable tariffs.
- Value to the community as well as profitability had to be considered.

The working group also raised the following needs.

- for telecommunications investment, to target the 75 percent of Africa's population that lives in rural areas
- to recognize the difference between rural communities in Africa and those in other areas in planning universal access services
- to encourage youth to become familiar with information technology
- to study and disseminate information on multiple models of financing telecenters
- for local leadership, essential to the success of rural connectivity projects
- for the involvement of women and inclusion of their needs, essential to the success of rural connectivity projects
- for training and awareness-building, essential in promoting universal access
- for national communications policies to be in line with international policies (for example, the WTO agreements and African Green Paper)
- for local content development
- for human resource development to accompany all efforts

Working Group: Economics of the Internet

Issues, Challenges, and Lessons Learned

1. The major bottlenecks to Internet connectivity in Africa are

- inadequate and poor telecommunication and communication infrastructure
- cost of supporting and maintaining Internet nodes and systems
- shortage of technical expertise to design, install, and maintain Internet nodes and backbone networks
- prohibitive cost of connectivity to international Internet backbones

2. Content contribution to the Internet from Africa is very low.
3. The Internet is not a threat to PTO revenues in Africa, but this could increase in the future; those PTOs failing to adjust, adapt, and exploit opportunities stand to lose from competition.
4. Internet telephony in the future could erode the African PTOs' revenue bases if they don't exploit advances in the technology and emerging opportunities.
5. The Internet should be perceived as a different, all-embracing technology.
6. African universities' contribution to the development of the Internet, as research cen-

ters for Internet related research, as training centers to educate and train expertise to fuel, and as supports for Internet connectivity in Africa should be acknowledged, supported, and promoted.

7. The role of the private sector to drive and expand Internet connectivity in Africa should also be acknowledged.

Actions and Strategies

1. Unnecessary regulation of the telecommunication industry in Africa should be avoided.
2. Competition between ISPs and PTOs should be encouraged.
3. Regional cooperation is needed to share bandwidth and pipes to international Internet backbones to reduce connectivity costs.
4. Telecenters should be established, encouraged and promoted to facilitate and increase public access to the Internet.
5. Costs of computers and other equipment and regulations needed for Internet connectivity (such as be reducing import tariffs on ICTs) must come down, in order to boost public Internet access.
6. An Africa-wide initiative needs to be put in place to train Internet host–node and backbone network operators, who will be responsible for designing, installing, operating, troubleshooting, supporting, and maintaining Internet host and backbone networks, as well as providing end-user technical support.
7. Licensing systems need to be streamlined in African countries.
8. End-user awareness and training initiatives need to be established.
9. Initiatives and projects are needed to accelerate the Internet connectivity of African universities, colleges, and research institutes.

Working Group: Cable or Satellite: Advantages and Tradeoffs

The session's basic concern was that Africa has a major problem in deciding how to cope with multiplicity of alternatives (both cable and satellite, but particularly satellite) whose actual implementation remains highly uncertain. Many factors must be considered in choosing between cable and satellite communications systems, including

- geographic location (whether country is coastal or landlocked)
- population density (cable systems are most cost effective in densely populated areas)
- expected traffic levels—whether current traffic levels justify the costs of SMCs for which terrestrial networks must also be included
- need for systems to carry inter-African traffic, as well as connectivity with rest of world (global connectivity)
- coverage considerations—if universal access policies adopted, satellites may become the technology of choice

The need for consideration and integration of African initiatives such as RASCOM was underscored, as well as the need to consider the existing terrestrial network (PANAFTEL), which includes both SMC and satellite systems.

Discussion also centered on the role of governments—Should they decide on the technology or leave it to the private sector? The ITU representative pointed out that ITU supports all viable connectivity projects, not just Africa One (the first SMC proposing to cover all of Africa).

The working group concluded that

- The dichotomy of cable vs. satellite was a false one. The technologies were complementary and both needed to be considered.
- Existing systems should not be disregarded, but brought into complementarity with new ones.
- Choices needed to be linked to government development strategies, in particular to policies regarding universal access (and thus service to rural areas).
- Governments should leave the choice of technology to the private sector, as long as choices made support national development strategies and policies on access. Government's role will include ensuring universal access and fair competition.

Working Group: Connectivity Applications: The User's Perspective

Issues

Who are the users? They are technology's driving force of technology, and include

1. system operators
2. producers (for example, service providers)
3. end-users (academics, government, direct end-users, communities, beneficiaries, NGOs)
4. potential users (for example, information facilitators—a category of people who work with specific audiences

Connectivity faces three basic problems.

- access
- affordability
- exclusivity

One of the critical questions regarding universal access is how to first provide access to schools, universities, and hospitals, since health and education are key development issues.

Challenges and Lessons Learned

1. Professionals use a technical language that end-users often cannot understand.
2. Africa still has a long way to go in terms of connectivity.
3. End-users are forced to absorb a new culture when they use new technologies.
4. Can users put information on the Web themselves or should somebody else do it?

5. Users are diverse. They first need to exchange information in their own language and culture, especially in Africa, where the culture is essentially verbal.
6. End-users need a minimum of technical know-how to be able to determine the problems they face.
7. Professionals should create feedback loops in order to identify the different categories of users and their needs.
8. Production of content is not automatic. Users need to produce the information content that is relevant to them and based on their own strategies. For this, they need an enabling environment.
9. In rural areas, community telecenters for democratizing access are seen by many as the way forward. Important lessons are expected from the pilot projects now being established in this area.
10. Regarding information content, intermediaries should be a major focus. Information facilitators are therefore crucial. Women potentially have a big role in running telecenters.

Partnerships and Commitments

It was noted that few donors attended the conference. It was felt that some donors might be skeptical because of several factors: (a) without electricity, these technologies cannot be utilized, (b) there are insufficient technical skills in Africa, and (c) the need for basic education and literacy takes priority over getting high-tech equipment. The donor community worries about the need for training and maintenance and will continue to be skeptical if people cannot not resolve these critical issues.

Proposed Actions and Strategies

1. Professionals should develop an all-inclusive language to provide an opportunity for dialogue with end-users.
2. There should be a concerted effort on the part of all actors to train women in the use of ICTs.
3. Rural communities should have access to development information in technologies available to them.
4. ICT projects should be developed in full consultation with end-users (for example, local communities).
5. End-users should know how to use the tools in order to avoid being passive users. Once they have installed the applications for end-users, service providers do not always consider that the basic training that users need to use the tools efficiently.
6. Programs should be developed to identify strategic users for sustainable development , not just the privileged few who have already access, or can easily obtain it.

Plenary: The Year 2000 (Y2K) Problem: Is Africa Ready? Issues, Challenges, and Lessons Learned

Y2K is a global problem with serious implications for Africa. Any computer program or system with two-digit (that is, 99 going to 00) dating will be affected, which could stymie the finance, utilities, and government sectors, among others. Because of the ubiquitous presence of computers and coding with two-number year–date representation systems, the problem is universal and pervasive. While Africa has a lower concentration of information technology than developing countries, its older technologies are more likely to be affected.

Depending on the system's nature, program failures and data corruption can start before, and continue long after, 01-01-2000. The price of rare human resources to deal with the millennium bug is already rising. Overall, Y2K is likely to cost at least 30 percent of information system budgets for the next few years. The global cost of Y2K has been estimated at US$300 million to US$1.3 trillion, with serious implications for a wide range of industries; it might even create serious political problems.

Indeed, almost any international information transfer system is likely to be affected. Payments, pensions, and credit systems all risk failing if not made compliant, and even systems that are compliant can fail if connected to systems that are not. For example, South Africa Telkom, despite having worked on the Y2K problem for two years, is very worried about international data transfer. Ethiopia's coffee producers are worried that their produce will not be able to be sold on the computerized commodity trading systems in New York. South Africa's electricity company, Eskom, can almost guarantee that it will be able to generate and transmit electricity (at a Y2K-related cost already exceeding 200 million rand), but local authorities lack resources to ensure that this power can be distributed locally.

Legal issues produce further problems. Companies are afraid to give out information that might harm their profits, and thus are unwilling to release data that could lead to law suits or falling sales. For example, IBM talks of "awareness" rather than "compliance" with the Y2K standards. Who will be held responsible for damages caused by Y2K is unclear.

Despite the Y2K bug's seriousness, a very low awareness level and an even lower level of preparedness exists outside South Africa. Many countries in the region have taken no action to date, despite the rapid approach of January 1, 2000. The reaction to this problem around the world (including that from the World Bank) has been very late, largely because its urgency was only recently recognized. This lag creates its own problems, including procurement issues and the speed of government response.

Actions and Strategies

The first part of any strategy would be to ensure that awareness is as widespread as the problem itself. Identifying the problem's extent across sectors and regions is a vital early step. Following this must come a national strategy, then efforts aimed at remediation and testing. It is too late for a full solution, but countries should look at "triage" methods, inventorying systems likely to be affected and beginning to consider risk-minimizing methods. Telecommunications, power systems, financial systems, airlines, air traffic systems, and hospitals are all vulnerable, critical areas. Equipment suppliers should be surveyed and encouraged to make their products Y2K compliant.

South Africa's National Year 2000 Decision Support Center has divided the economy into six sectors, with sector committees meeting to design strategies particular to these areas. Information campaigns have involved radio, TV, and newspapers. The Y2K organization has also run models to estimate likely problems with critical systems. South Africa also considered criminalizing noncompliant goods, but lacks the time and resources to police this. Thus, the country is concentrating on government and small and medium-sized company awareness, and is considering free testing of systems in these companies. It is also considering the creation of a dedicated legal desk to deal with the problem of information scarcity created by companies' fears of lawsuits. The country maintains a Web site that publishes lists of equipment that are Y2K compliant, according to suppliers.

Implementation Processes

The private sector, and particularly large companies, should play a major role in protecting its own systems. Malawi's chamber of commerce now has its own information technology center, designed to sensitize members to millennium issues.

Having said that the private sector has a large role, the economics and time constraints of the Y2K issue suggest that government involvement is vital—without it there would be little awareness or response. Government's direct role is connected with health, central banking, airplane control, pensions, and other issues. In addition, they have a role in regulation and control to counter the negative externalities and information failures connected with Y2K. Given time constraints, the issue is for governments to devise fast-track procurement methods, legal structures to deal with liability issues (especially in dealing with dumping of noncompliant products in the private sector), accounting rules, and remediation, combined with contingency plans to repair or bypass the mission-critical systems in a country. Finding resources for dealing with this problem is another vital step.

Partnerships and Commitments

The World Bank plans to work with the United Nations, the OECD, and other groups on this problem, hoping to act as a focal point for information and help regarding the Y2K problem. World Bank loans and credits are being monitored to ensure that programs and projects are Y2K compliant. The IFC and World Bank are both distributing information and guidelines. In addition, the World Bank is considering grants and loans to deal with the issue on a case-by-case basis. *Info*Dev will put together a list of places and organizations compiling lists of Y2K compliant equipment, available from a dedicated help desk and the *info*Dev Web site. *Info*Dev is also putting together a toolkit for its Web site that will have a checklist of important questions to be asked and give examples of best practice and ideas for making equipment Y2K compliant in critical areas of the economy.

*Info*Dev organized two-day seminars—six for regions and countries in Sub-Saharan Africa and two in the Middle East and North Africa—between June and October to raise awareness, present the toolkit, and map out country strategies. A Y2K fair was held at the World Bank's annual meeting in October, which *info*Dev hoped would develop into a worldwide awareness-raising day for the Y2K problem.

*Info*Dev also will offer grants to governments for planning (up to US$100,000) and implementation of national strategies (up to US$500,000) linked to Y2K. Money can be used for awareness campaigns, testing, and investment in technology, for example. For IDA countries, conditions include that matching expenditure ratio is two to one, although this will be examined on a case-by-case basis and might include in-kind commitments. *Info*Dev will offer support to countries only if it is assured that national efforts are being made. In addition, it will support dissemination of best practices and grants for training as part of the implementation grants, and help governments with applications in order to expedite the grantmaking process.

Countries must apply for these grants as soon as possible. *Info*Dev will meet monthly to distribute grants, and hopes exist that additional resources will be made available from within and without the World Bank. US$14 million in grants has already been set aside (US$10 million of which comes from the United Kingdom). Seven percent of this will be reserved for low-income countries.

Evaluating the Achievement of Objectives

Although it is too late to prevent disruption due to the Y2K problem, objectives will have been achieved if mission-critical systems continue to operate or are successfully bypassed, and the disruption to economies and polities is minimized.

ANNEX III
The African Connection
Report of the African Ministers of Communications
May 1998

Summary

This document originated at an African Ministers Workshop in Preparation for Africa Telecom '98, held in Cape Town, South Africa, during February 1998; it was finalized during the May Africa Telecom '98 meeting (a conference sponsored by the International Telecommunications Union). According to South Africa's Minister of Post, Telecommunications and Broadcasting Jay Naidoo, "The document can serve as a 'Road Map' for enabling Africa's launch into the 'Information Age.' " It addresses programs for rural telecommunications development, policy, and regulatory framework development and human resource development. It also addresses Africa's role in the information society, by establishing a project for developing a broad information society policy framework. In addition, a number of projects have been identified as priorities for coordination and implementation in Africa. This has the advantage of ensuring regional funds and the building and sharing of expertise across the region.

The document's table of contents is reproduced in this annex. The full text can be found of the Internet at http://www.telecom98.co.za/africonnect.html.

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ANNEX IV
African Information Society Initiative (AISI)

The process that led to the adoption of the African Information Society Initiative (AISI) began in April 1995 with the African Regional Symposium on Telematics for Development, organized by ECA, the International Telecommunication Union, the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the International Development Research Centre, and Bellanet International. That symposium brought together nearly 400 information technology experts, senior government officials, and private-sector leaders from over 50 countries. It issued a communiqué requesting African ministers and heads of state to recognize the importance of information exchange, connectivity, and communication as vital factors in development.

Heeding the message of the symposium, in the following month (May 1995), the twenty-first meeting of the ECA Conference of Ministers (53 African ministers of social and economic development and planning) adopted Resolution 795 (XXX), entitled "Building Africa's Information Highway," that called upon ECA to form a High-Level Working Group on Information and Communications Technologies in Africa to draft an action framework to utilize information and communications technologies to accelerate African socioeconomic development.

The High-Level Working Group, 11 experts on information and communication technologies in Africa, worked from 1995–1996 to draft their action framework, which was submitted to the twenty-second meeting of the ECA Conference of Ministers and adopted in May 1996 as the "African Information Society Initiative: an action framework to build Africa's information and communication infrastructure." The document was almost immediately endorsed at several other forums, including the African Regional Telecommunications Development Conference (ITU) held in Abidjan in May 1996 and the Information Society and Development Conference, Midrand, also in May 1996. Two months later, the Organisation of African Unity summit in Yaoundé endorsed it, as did the June 1997 Denver G-7 (plus one) summit. In 1998, it became the basis of the "African Connection" of the Ministers of Communication at African Telecom '98, a conference sponsored by the International Telecommunications Union (see annex III).

The African Information Society Initiative includes a vision of an information societies in Africa and outlines its strategic objectives and related goals. It proceeds to define the challenges and opportunities of African Information Society as well as its institutional framework, human, information and technologies resources.

The Economic Commission for Africa is the secretariat for the implementation of AISI. The full text of the African Information Society Initiative, as well as related information on its implementation, can be found on the Internet at http://www.bellanet.org/partners/aisi. ECA implements AISI with a number of partners, whose objectives and activities are defined through the Partnership for Information and Communication Technologies in Africa (PICTA). Further information on PICTA can be found on its Web site: http://www.bellanet.org/partners/picta.

ANNEX V
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ANNEX VI
List of Documents–Liste des Documents

- Sponsor list–Institution parrainant
- List of participants–Liste des participants
- General trends in telecommunication restructuring–1998
- Briefing report on cable and satellite projects–Rapport de synthèse sur des projets à câble et à satellite
- Key issues for decisionmakers–Principaux problèmes à resoudre par les décideurs
- Toolkit for evaluating cable and satellite projects–case studies–Système des méthodes et outils pour l'évaluation de projets de câbles et de satellites–études de cas

ANNEX VII
Selected Connectivity Sites

African Connectivity Information on the Web

AISI Connect Database: http://www2.sn.apc.org/africa
Network Startup Resource Centre (NSRC) African Info:
http://www.nsrc.org/Africa/africa.html

World Bank Africa Connectivity Information

http://www.worldbank.org/aftdr/connect/connect.htm
African Internet Topology: http://comet.ctr.columbia.edu/
Carte de la connectivite en Afrique en 1997:
http://www.regards.cnrs.fr/africanti/carte01.htm