Global Trends in Telecommunications and Internet Development in the Context of Connecting Businesses and Communities

NTIA's Office of International Affairs

For the Global Forum

November 2003

Overview of Int'l Development

- I. Intro to NTIA's Office of International Affairs
- II. Trends in Information & Communications Technology (ITC)
  - Metrics
  - Complex ICT Policy Issues
- III.Overview of ITU's Telecom & Internet Development Recommendations
- IV. Regional Approaches, New USG Efforts
  - APEC - 6 Digital Divide principles for the Pacific Rim
  - Digital Freedom Initiative (potential 20 countries, Senegal 1st)
  - CITEL - developing best practices advice for the Americas

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OIA… Objectives…

I. NTIA's OFFICE OF INTERNATIONAL AFFAIRS (OIA): TWO PRINCIPAL OBJECTIVES

- **Improve access for U.S. companies in the global market**
  - **Advocate U.S. commercial interests overseas**
  - **Provide policy analyses, technical guidance, and representation in international fora**
- **Promote fair and open access to telecom services for consumers, particularly in developing countries**
  - **Endorse the need for competition and liberalization of Information and Communications Technologies (ICTS) policies around the world**
  - **Promote new and alternative ICT deployment, to improve global communications and expand trade opportunities**

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OIA FORMULATES, ARTICULATES, AND IMPLEMENTS POLICIES

- **To Enhance Competition in the Global ICT Sectors and To Work Collaboratively to Address Market Entry & Operating Issues**
- **Designed in Consultation with U.S. Commercial Interests and Other Federal Agencies**

OIA ACTIVELY PARTICIPATES IN EFFORTS TO PRIVATIZE AND REFORM INTERNATIONAL ICT INSTITUTIONS

– **ICANN, Inmarsat, Intelsat, ITU, OECD**

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OIA ENGAGES IN MULTILATERAL, REGIONAL, AND BILATERAL INTERNATIONAL FORA & TARGETED ACTIVITIES

- **Inter-American Telecommunication Commission (CITEL)**
- **Asia Pacific Economic Cooperation Forum Telecommunications & Information Working Group (APEC TEL)**
- **Global Business Dialogue on Electronic Commerce (GBDe)**
- **International Telecommunication Union (ITU)**
  - **Especially ITU's Development Sector**
- **Trans-Atlantic Business Dialogue (TABD)**
- **Organization for Economic Cooperation & Development (OECD)**
- **China-U.S. Telecom Summits (CATS)**
- **Caribbean Policy Workshop**
- **Information Society Dialogues with the EU**

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II. Growth of the Digital Economy

- **ICTs are providing significant economic benefits**
  - **U.S. experience late 1990s:**
  - ICT contributed half or more of the acceleration of U.S. productivity growth
  - ICT industries accounted for approx. 1/3 of real U.S. economic growth 1995-1999
- **"Network effects"**
  - **the more the technology is deployed, the greater its value to society**
- **In the new global economies, ICT capabilities and skills—or their lack—helps determine:**
  - **a nation's ability to compete**
  - **its economic growth, and**
  - **Its standard of living**

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Online Access and Education-USA

- In 2000, 6 out of 10 new jobs required computer skills possessed by 22% of the labor force
- The Internet can help students become independent, critical thinkers; collect, organize, and evaluate information; and "effectively express their new knowledge and ideas in compelling ways" (CAST, 1996)
- Use of technology results in educational gain regardless of age, race, parental income, or other factors (SRI, 1995)

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Forces for Change

- **Technological Change** (e.g., Wireless Revolution)
- **Competition** (greater efficiency, innovative processes and offerings)
- **Demand** (e.g., new perceptions of needs, cultural factors)
- **Public Policy** (courts, legislatures, regulators)

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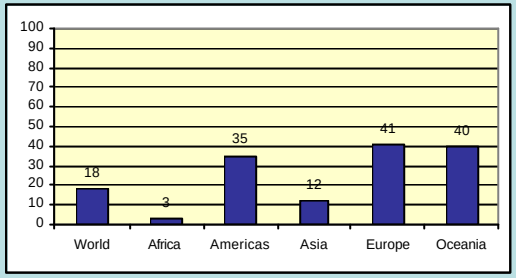
A Changing World…
Telephone Service

Main Telephone Lines per 100 Persons, 2002



Source: ITU

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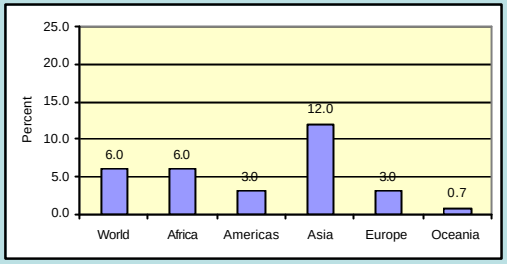
A Changing World…
Telephone Service

Compound Annual Growth Rate, 1995-2002



Source: ITU

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A Changing World…
Telephone Service

Mature landline technology…

- Developed in the 19th Century; thrived in the 20th Century – what's next?
- High subscribership that is leveling off in developed regions and countries, e.g., Europe
  (40.9% pen.; 3.0% CAGR, 1995-2002)
- Low but growing penetration in less developed regions and countries, e.g., Asia (12.1% pen.), Africa (2.7% pen.)

Source: ITU

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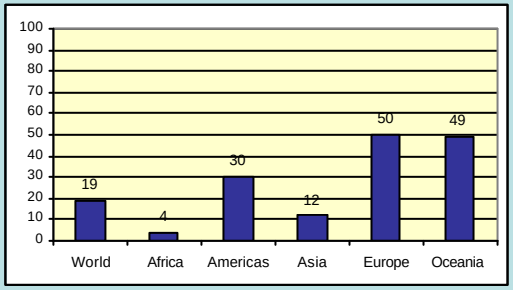
A Changing World…
Cellular Mobile

Cellular Subscribers Per 100 Persons, 2002



Source: ITU

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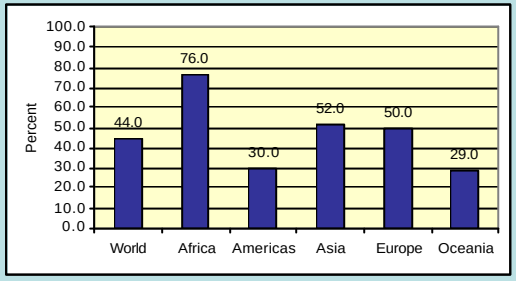
A Changing World…
Cellular Mobile

Compound Annual Growth Rate, 1995-2002



Source: ITU

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A Changing World…
Cellular Mobile

Rapid growth (1995-2002):

- Lowest CAGR: Oceania (28.7%)
- Highest CAGR: Africa (75.8%)

High % of total telephone subscribers (2002):

- Lowest %: Americas (45.8%)
- Highest: Africa (61.0%)

Source: ITU

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Cellular/Mobile Trends

- In 2002, almost 100 countries had more mobile than fixed telephone subscribers (ITU)
- Developing economies: leapfrogging to mobile infrastructure to meet basic telephony needs
- Developed countries using mobile infrastructure to meet the needs of those in high cost or hard-to-serve areas.
- ITU prediction: mobile communications the key to achieve our universal access goals

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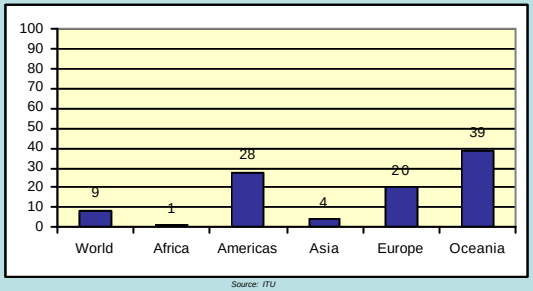
A Changing World…
Personal Computers

PCs per 100 Persons, 2002



Source: ITU

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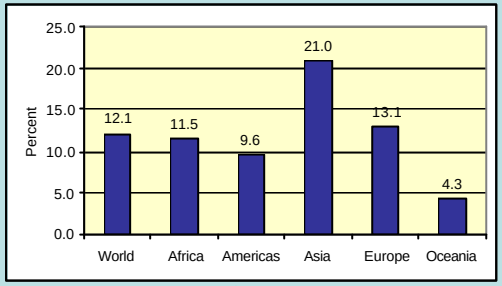
A Changing World…
Personal Computers

Compound Annual Growth Rate, 1996-2002



Source: ITU

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A Changing World…
Personal Computers

PC penetration generally lower than for phones (2002):

- Highest: Oceania (38.9% vs. 40.4% phones), Americas (27.5% vs. 35.3% phones)
- Lowest: Africa (1.2% vs. 2.7% phones)

Source: ITU

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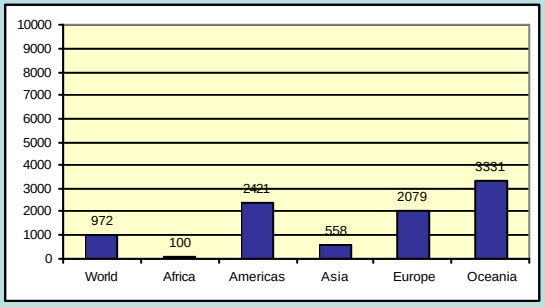
A Changing World…
Internet Use

Internet Users per 10,000 Persons, 2002



Source: ITU

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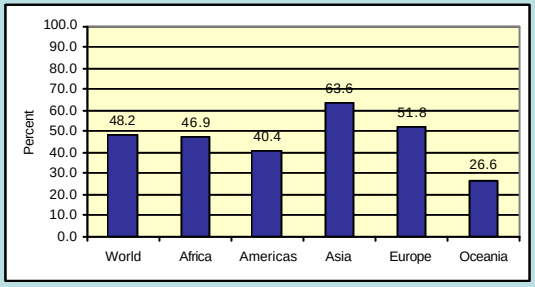
A Changing World…
Internet Use

Compound Annual Growth Rate, 1996-2002



Source: ITU

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A Changing World…
Internet Use

Robust growth (1996-2002)…

- Greatest penetration rise in Asia (19x), Europe (12x), and Africa (10x)
- Increases also registered in other regions: Americas (8x) and Oceania (4x). World average = 11x
- International Beauty Contests Not the Point. Access to Information by All Is.

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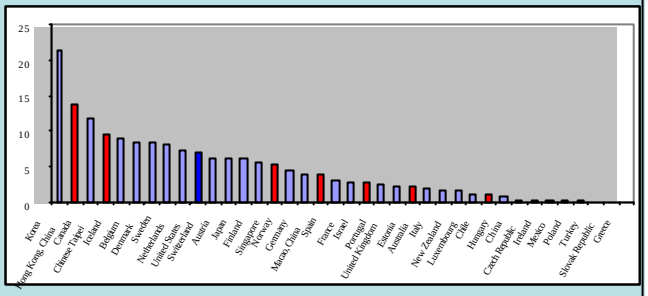
Source: ITU

A Changing World…
Broadband

Global penetration is very uneven (02)



Source: OECD

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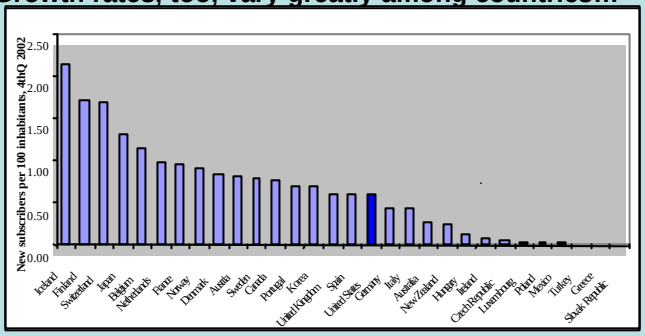
A Changing World…
Broadband

Growth rates, too, vary greatly among countries…



Source:OECD

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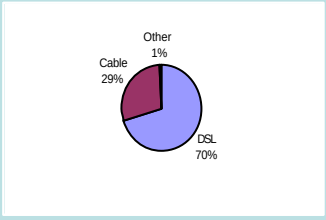
Broadband in Low/Middle Income Economies

Broadband by Technology Low/Middle Economies, 2002



Source: ITU World Telecommunication Indicators Database

Economy	Total Subscribers (thousands)	Subscribers per 100 inhabitants
Malta	17.7	4.46
Estonia	45.7	3.37
Chile	182.0	1.21
Hungary	63.2	0.62
Grenada	0.6	0.53
China	6600.0	0.51
Venezuela	114.3	0.45
Latvia	10.0	0.43
Brazil	731.0	0.42
Dominica	0.3	0.41
Argentina	115.0	0.31
Peru	34.3	0.13
Maldives	0.2	0.09
St. Vincent	0.1	0.07
Czech Republic	6.2	0.06
Mexico	50.0	0.05
Nicaragua	2.3	0.04
Uruguay	1.4	0.04
Turkey	21.2	0.03
Poland	12.0	0.03

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African Nations At a Glance

- **Vast majority of populations do not have access to basic communications services.**
  - 1 in 4 have a radio (25%)
  - 1 in 13 have a TV (7.7%)
  - 1 in 35 have a mobile phone (2.9%)
  - 1 in 40 have a fixed line (2.5%)
  - 1 in 130 have a PC (0.8%)
  - 1 in 160 use the Internet (0.6%)
- **Significant gap between rural and urban access.**
  - Small percentage of connectivity in urban areas generally plummets in poorer rural areas.

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SOME COMPLEX POLICY ISSUES TO PONDER…

- **Efficiency vs. Equity**
  - Can competition and universal service co-exist?
  - Can a sustainable system of universal service support be achieved with more than one telecom service provider?
  - Should providers of new technologies (e.g., IP telephony; broadband) be exempted from universal service obligations?

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Complex Issues Continued

- **Entry**
  - Should entry be promoted? Regulated?
  - If so, should the same form and degree of regulation apply to all providers?
  - Should regulation vary by degree of market power?
  - Should regulation vary by technology or type of platform (e.g., wired vs. wireless; cable company vs. telephone company vs. satellite carrier vs. powerline company)?

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Complex Issues III

- **Universal Service vs. Universal Access**
  - What telecom or information services should be made available to everyone?
  - Should these services also receive subsidies, i.e., be both accessible and affordable?
  - Who should pay these subsidies?
  - Who should receive the benefits?

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Complex Issues IV

- **Price Regulation**
  - Should prices of telecom services be regulated?
  - If so, which providers should be regulated?
  - What criteria or "trigger" should be used to remove price regulation?

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Complex Issues V

- **Service Quality**
  - Should service quality be regulated or just monitored?
  - If so, should oversight apply to all carriers?
  - What standards should be developed to identify "good" service quality?

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Some Ways to Meet the Challenge: Ubiquitous Access Goals

- APEC:
  - Triple current Internet access in member countries, 2000-2005
  - Ensure that all groups within an economy have access to the Internet by 2010
    - At YE 2002 – 365 million APEC Internet users (up from 258 million at YE 2000)
- Canada: Commitment by the government to ensure broadband Internet access to all Canadian communities by 2005 (originally 2004).
- EU: E-Europe Directive sets 2005 as the target date for widely-available broadband deployment.

III. ITU Development Sector

- ITU-D: activities to:
  - facilitate connectivity and access
  - foster policy, regulatory and network readiness
  - expand human capacity through training programs
  - formulate financing strategies and e-enable enterprises in developing countries
    - www.itu.int/ITU-D/
- NTIA's Role:
  - Participate in World Telecommunications Development Conferences (WTDCs) every 4 years
  - Rapporteur: Study Question 13/1(complete)
  - Project Team Chair: ITU Council Initiative/ITU-D & T joint project team: handbook on national IP policies (commencing now)

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ITU-D Study Question 13/1:

Promotion of Infrastructure and Use of the Internet In Developing Countries

Purpose of Question 13/1

- **Make recommendations to develop telecom policies**
- **Promote Internet access in developing countries**

- **Non-exhaustive list for Internet infrastructure development:**
  - **Countries are making progress without meeting all guidelines.**
  - **Implementation likely to facilitate/speed Internet development.**

- **Background:**
  - **Question 13/1 evolved since origin at the 1998 ITU World Telecommunication Development Conference in Malta.**
  - **NTIA as rapporteur for study; joint public-private sector effort.**

- ITU Development Sector, Document 1/185(Rev.1)-E, 24 October 2001 (www.itu.int)

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Rapporteur's Group Had Three Tasks for Question 13/1

- **TASK 1: Develop a set of guidelines for government officials to use in creating a policy environment that fosters development of Internet infrastructure**
- **TASK 2: Identify the technological options available to achieve Internet build out, and prepare a technology neutral guide to options for Internet build out**
- **TASK 3: Determine how to best build human capacity for technical expertise in the private sector and among developing country officials**

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Task 1 – Promote Policy Environment For Internet Infrastructure Development

- **Basic telecom capabilities are the infrastructure necessary to provide Internet applications**
- **Telecom regulatory policies can have a direct impact on the Internet**
- **Competition and privatization in Internet service will:**
  - **Spur development of affordable basic telecom infrastructure**
  - **Stimulate innovation**
  - **Promote customer choice**
  - **Encourage market-based pricing**

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To Achieve Higher Levels of Internet Infrastructure Build Out:

- **Developed and developing countries have replaced monopoly telecom regimes with competitive telecom models that:**
  - **Eliminate barriers to entry**
  - **Foster a market driven environment**
- **Effective collaboration between the telecom industry and the Internet community of service providers and users plays an essential role in the development of:**
  - **Connecting user networks and infrastructures**
  - **Internet applications, technologies and standards**

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Guidelines

- **1. Infrastructure for Internet Access**
- **2. Independent Regulatory Decision Making**
- **3. Competitive Environment for Telecom Services**
- **4. Telecom Licensing System**
- **5. Interconnection for Telecom Services**
- **6. Universal Access for Telecom Services**
- **7. Access to Internet Services**

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4. Telecom Licensing System:

- Licensing conditions should be published
- Licensing procedures should be transparent
- Procedures adopted should be minimal and expedient
- Fees should be proportionate and based on market principles

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1. Policies to Promote Internet Access:

- Make leased lines available at reasonable cost and access charges for dial-up affordable
- Enable submarine cable operators to obtain backhaul at competitive rates
- Promote satellite interconnection between ISPs
- Allow network providers to sell capacity directly to ISPs
- Lower custom tariffs and taxes on telecommunications equipment
- Promote private investment in telecommunications and Internet infrastructure

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2. The Regulatory Authority Should:

- Be separate from, and not accountable to, any supplier of basic telecom services
- Use procedures and make decisions that are impartial with respect to all market participants
- Have powers that are explicit and clear in the area of rulemaking, adjudication and enforcement
- Be provided with sufficient personnel and budgetary resources
- Have sole regulatory jurisdiction consistent with the breadth and scope of its role

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3. Competitive Environment

- Governments should promote policies that facilitate competition
- Adopt regulations, including enforcement powers, to effectively curb telecom providers from engaging in anti-competitive conduct when there is evidence of abuse of power
- Adopt Interconnection policies for telecommunications to ensure that competitive providers can connect to the PSTN in a fair and timely manner
- Governments should allow investment in multiple carriers and ISPs to stimulate further build out and lower prices for business and consumer access

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5. Interconnection for Telecom Services:

- The regulators' role can include development of:
  - A set of transparent, non-discriminatory principles and rules for timely interconnection of telecommunications network operators
  - Interconnection terms between operators that are cost-oriented, transparent, reasonable, and sufficiently unbundled --so the supplier need not pay for unnecessary network components or facilities
  - Interconnection terms that are symmetrical and non-discriminatory between the telecommunications incumbent and new entrants

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6. Universal Access for Telecom Services:

- Develop basic infrastructure in rural, remote, and low-income regions
- Operate the program in a transparent, competitively neutral and non-discriminatory manner
- Requirements should be explicit
- Any cross-subsidy should be clearly and transparently identified
- It should be clear as to whether the funds come from taxes or revenues
- Universal access policies should ensure that telecom access and associated user equipment is available at affordable costs

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7. Access to Internet Services

- Factors limiting Internet access and use, particularly in developing countries, are:
  - Restriction of ISPs and public Internet access points
  - Restricted access to international gateways
  - Insufficiency of Internet points of presence in rural and disadvantaged communities
  - Inadequacy in advanced networking techniques
  - Budgetary and administrative constraints
  - Regulatory policies that favor telephone monopolies

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Recommendations For Policy-Makers:

- Promote widespread and affordable access to the Internet
- Ensure that the regulatory regime does not hinder development
- Urge ISPs to develop concessionary rates for Internet access in public service and development-oriented institutions
- Establish a consortium of public service institutions to contribute to Internet access, use and development
- Encourage the development of information strategies and models that facilitate community access
- Develop national programs to promote capacity building in Internet development and use, and the creation and dissemination of multicultural and multilingual Internet content

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Issues To Consider Before Investing In Internet Build Out

- **1. Interoperability**
  - Maximize current telecom network assets and resources
    - Consider interoperability requirements when evaluating candidate systems.
- **2. Scalability**
  - Where resources are constrained, scalability is a tool to increase Internet access through a phased approach.
- **3. Operations, Maintenance, and Administration**
  - When considering the various technological solutions available, policy-makers should carefully consider the investments in personnel and equipment,
    - both monetary and otherwise.

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TASK 2: SAMPLING OF TECHNOLOGICAL OPTIONS AVAILABLE TO ACHIEVE INTERNET BUILD OUT

- **Traditionally, Internet transmission technology consists of wire (often copper), cable and fiber**
  - **expensive for rural, remote and/or poor communities**
  - **Yet number of solutions for these communities increases as technology develops at an accelerated pace**

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Sample Technological Options:

- **1. VHF and UHF radio systems using narrow packet radio technology**
- **2. Cable Modem**
- **3. Global System for Mobiles (GSM400) Using Packet Switching Technology**
- **4. x Digital Subscriber Line (DSL)**
- **5. Time Division Multiple Access (TDMA) Based on Point-To-Point (PTP) or Point-to- Multipoint (PMP) Radio Systems**
- **6. Fiber**

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Additional Technologies

- **7. Code Division Multiple Access (CDMA) 450 MHZ**
- **8. Multipoint Multichannel Distribution System (MMDS)**
- **9. Local Multipoint Distribution System (LMDS)**
- **10. Very Small Aperture Terminals (VSAT)**
- **11. Satellite Based Internet Access**
- **12. IP Based Networks**

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TASK 3: SUGGESTIONS ON HOW TO BEST BUILD HUMAN CAPACITY FOR TECHNICAL EXPERTISE IN THE PRIVATE SECTOR & AMONG DEVELOPING COUNTRY OFFICIALS

- **Seek to develop education and training programs**
- **Sponsor and promote programs aimed at assisting entrepreneurs with loans and/or matching grants**
- **Promote collaborative efforts to attract private companies to establish training**
- **Develop national and international networks of institutions, teachers and learners**
- **Enlist volunteers from the relevant community to manage and maintain a continual flux of volunteers**

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Human Capacity Building Needs Continued

- **Prepare appropriate formal agreements with participating parties, including students, teachers, technical assistants and sponsors**
- **Make training facilities easily accessible and safe**
- **Centralize training support where appropriate to reduce costs and increase quality and efficiency**
- **Anticipate the need to provide training in basic computer skills as an initial function**
- **Configure computers and provide technical support to ensure adequate security for equipment, software and data**
- **Develop minimum technological standards for informatics facilities needed for training purposes**

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Human Capacity-Building III

- **Consider all education and training programs as part of a process of lifelong learning**
- **Ensure that provisions for supervision, monitoring, evaluation and learner feedback are embedded very early in the planning process**
- **Clearly define the responsibilities of staff for training and technical support**
- **Provide education and training projects with ample time and resources to implement their approach and achieve their desired outcomes**
- **Develop marketing strategies to inform people about the training program, including generation of attention in local media**

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Asia Pacific Economic Cooperation Forum (APEC): Digital Divide

(21 Economies)

- **Level of Internet Access:**
  - varies among populations at the international, regional, economy and local levels
  - Income, education, age, gender, disability and rural/urban location are among the factors that determine level of access
    - By economies, and by the people within an economy
  - Lower prices for access has increased Internet uptake by consumers.
    - Competition and liberalization are essential policies to:
      - lower the price of access, and
      - stimulate supply of products and services to fit the variety of needs of users
- **APEC "Triple" Goals:**
  - To triple Internet access between 2000 and 2005
  - To ensure all groups within an economy have Internet access by 2010

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APEC: Underserved, Unserved Needs

- Underserved areas are being served through a combination of:
  - technology deployment
  - supportive policy environments, and
  - programs directed at the needs of underserved population
- Meeting such needs crucial for macro-economic growth and improved quality of life.
- To increase access for underserved groups:
  - maintain a commercial focus
  - undertake actions that will lower prices and create/expand demand for services among the target group
  - Important Demand Creation role for Governments: help by bringing government programs and services on line

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APEC Digital Divide Issues

- **Infrastructure Expansion/Buildout Essentials:**
  - An overall positive economic environment necessary
  - Public Policy Imperative to ensure Internet access: based on the increasing use of the Internet for economic and social purposes
- **Human Capacity Development:**
  - Availability of skilled workers is a major concern for economies
    - Difficult to predict future needs
  - Portability of skills means retention problems, upward pressure on salaries, and global movement of workers
  - Education and training are major preoccupations of governments and companies
    - A life-long requirement for workers
  - No single solution. Any solution will require industry to be a partner

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APEC's Six Digital Divide Principles

Characteristics of Successful Policies to Bridge the Divide

- **Leadership** – often at economy level but also including local and regional initiatives to create a vision and institutions/structures to address the issues
- **Partnerships** – including business, education and social institutions, and governments
- **Policy Coherence** – to ensure that all policies are working together to create the desired economic and social environment
- **Market Focus** – among others, to develop demand that can justify investment requirements
- **Sustainability** – to ensure continuation of the services beyond the seed money stage
- **Scalability** – to ensure that a program or an initiative can be replicated throughout under-served areas

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APEC Digital Divide Next Steps

- Monitor the access to/use of the Internet across the region
- Liaise with other international and regional forums
- Explore additional work, such as:
  - Policy environments needed to support emerging technologies to meet under-served areas (urban and rural);
  - Consumer confidence and ways to engender trust to improve levels of Internet uptake
  - Greater development of applications, through improving security of information systems,
    - e.g., authentication, PKI, privacy protections, security standards, and education
- Maintain a gender perspective in our work

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Digital Freedom Initiative (DFI)

- Launched March 2003, by U.S. Commerce Dept, USAID, USA Freedom Corps, and the Peace Corps
- **Goal**: promote economic growth by transferring ICT benefits to entrepreneurs and small businesses in the developing world
- **Key Elements**:
  - Place volunteers in small businesses to share business knowledge and technology expertise
  - Promote pro-growth regulatory and legal structures to enhance business competitiveness, and
  - Leverage existing technology and communications infrastructure in new ways to help entrepreneurs and small businesses to better compete
- Pilot project: in Senegal over a 3-year period in a public-private partnership: place 100 ICT volunteers; promote 10,000 telecenters
  - Could expand to 20 countries in next 5 years.

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Sources for Further Information

- Connecting the Globe: A Regulator's Guide to Building a Global Information Community. U.S. Federal Communications Commission: http://www.fcc.gov/connectglobe/
- New Technologies for Rural Applications, Final Report of the ITU-D Focus Group 7. ITU: http://www.itu.int/itudoc/itu-d/publicat/foc_gr7.html
- The Right to Communicate: At What Price? Economic Constraints to the Effective Use of Telecommunications in Education, Science, Culture and in the Circulation of Information. ITU and UNESCO: http://unesdoc.unesco.org/images/0010/001008/100803e.pdf
- The Networking Revolution: Opportunities and Challenges for Developing Countries: Are Poor Countries Losing the Information Revolution? World Bank: http://www.infodev.org/library/working.htm
- World Development Report 1998/1999: Knowledge for Development. World Bank: http://www.worldbank.org/wdr/wdr98/contents.htm
- World Telecom Development Report 1998. ITU: http://www.itu.int/ti/publications/WTDR_98/index.htm
- World Trade Organization Reference Paper on Basic Telecommunications. World Trade Organization (WTO): http://www.wto.org
- ITU-D Question 16/2 - Handbook on New Technologies and New Services : http://www.itu.int/publibase/catalog/index.asp (See Section 2.5 Work of the ITU-D Study Groups 1 and 2)

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Websites

- APEC Telecom & Information Working Group: http://www.apectel.org
- APEC Telecommunications & Information Working Group's Development And Financial Resources Information website: http://www.apectelwg.org
- Global Connectivity for Africa: http://www.worldbank.org/html/fpd/telecoms/gca.htm
- Global Internet Policy Initiative (GIPI): http://www.gipiproject.org
- ITU Development Sector (ITU-D): http://www.itu.int/ITU-D/index.html
- ITU Internet Case Studies: http://www.itu.int/ti/casestudies/index.htm
- ITU World Telecommunication Policy Forum: IP Telephony: http://www.itu.int/osg/spu/wtpf
- The Internet Society: http://www.isoc.org
- The Internet Corporation for Assigned Names and Numbers (ICANN): http://www.icann.org
- The National Telecommunications Cooperative Association, International Department http://www.ntca.org/intlconf/report_main.html
- World Bank's Information for Development Program: http://www.infodev.org
- World Bank's Investment Promotion Network: http://www.ipanet.net

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