Economy of Infrastructure: ICT
National Planning Commission
Johannesburg, 23 September 2010
Alison Gillwald
Outline

- Role of sector in growth
- Sector contribution to economy
- Global benchmarking
  - Benchmarking Africa - access, usage, prices
    - Fixed-lines
    - Mobile
    - Interconnection
    - Internet/Broadband
    - Leased lines
    - Regulation
- Analysis
  - Absence of policy/vision
  - Lack of co-ordination (cross cutting nature of ICTs)
  - Legal framework - Institutional arrangements
  - Market structure - concentration/ownership
  - Licensing - ahead and behind
  - Universal Access - over taken by events
  - Broadband Policy - absence of vision/strategy
- Vision for the sector in 15 years and how to get there
ICTs at centre of information economy

- Last 20 years communications sector shifted from sector specific public utility to cross-cutting service underpinning the transformation of economy and society

- Everything from billions of rands of stock exchange and financial transactions to national and municipal systems from airports to traffic lights are made possible by advanced communications networks

- Digital economy underpins wider economy and builds our national competitiveness

- Through mobile phones millions of individuals for the first time connected from their homes, able to communicate with public offices, respond to job enquiries and able to transfer funds with the click of a button

- These things do happen in South Africa as they do in other parts of the world but they generally happen highly unevenly across the citizenry and at much greater cost as a result of historical legacies and policy and institutional failures over the last decade and a half.
INFORMATION INFRASTRUCTURE

Source: Centre for Tele-information, Danish Technical University
Cross cutting e-economy/e-strategy

- Digital Britain - NGN network, content, skills development
- Australian - $42 billion investment will support up to 5,000 local jobs every year and 37,000 jobs at its peak over the eight-year life of the project.
- US - $227m - economic recovery strategy/job creation - demand side stimulation/skills
- Korea - e-economy as part of knowledge economy - Highest FTTH, e-education and skills, e-commerce,
ITU - ICT Development Index (IDI)

- 2002: rank 77th
- 2005: rank 91st
- 2007: rank 91st
- 2008: rank 92nd

IDI: Three stages in the evolution towards an information-society:

1. ICT Readiness (infrastructure, access)
2. ICT Use (intensity)
3. ICT Capability (Skills)
South Africa is ranked 62 among the 133 participating countries on the overall index.


It is only ranked 76 in terms of usage component.

Major barriers to market growth:
- Lack of competitive or affordable backbone infrastructure/bandwidth
- High costs of access to the Internet
Total Cost of Mobile Ownership (TCO) in USD. Source: Nokia 2009

Average 46.54 US dollars

Wallet share (TCO / GDP per capita)

TCO in USD. Source: Nokia 2009
“Internet: still a significant gap between the richest countries and all the rest, which have a mix of larger-country stars (VietNam, China) that punch above their category averages, and dogs (South Africa, India) that fall well below”.

University of Manchester.
Telecom investment & economic growth

- Correlations between telecom penetration and growth - fixed, mobile, broadband.
- Causality?
- Network effects
- World Bank 2010 10% increase in broadband penetration accelerates economic growth by 1.38% points.
- US $227 million broadband infrastructure investment as part of economic stimulation package.
- Australia between $40 and $60 billion public-private partners strategy to support economic recovery and growth.

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Telecommunications revenue as % of GDP
Source: World Bank, IC4D database 2010
Comparative investment in infrastructure

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Total annual CAPEX in telecommunications/population (in USD, including fixed, mobile and Internet services. It should include all operators)

*Source: ITU 2010, WB 2010.*

Gaps in South African data reflect its failure to submit data over several years to ITU for global indicator reports.
'Summary of SA telecom market

Source: ITU 2010

- Estimated Internet Users
- Mobile phone subscriptions (post-paid + prepaid)
- Fixed telephone lines

Friday 26 November 2010
SA has a very concentrated market
result: high prices

The state remains a significant player in the telecoms market although it has sold its stake in some companies

Mobile market: dominated by MTN and Vodacom, CellC captures a small market share

Fixed market: dominate by Telkom, Neotel is a new entrant

Herfindahl-Hirschman Index (using customer market share)
Source: Vodacom & MTN Annual Reports, CellC press releases, authors’ own calculations
Market structure
Ownership

1. **The State is a significant player in the sector**
   - Shareholdings in Telkom, Sentech and Infraco (through Eskom and Transtel)

2. **New structure in state ownership**
   - Sale of Telkom Media
   - Sale of IT company Aviria.com
   - Telkom sold a 15% stake in Vodacom to Vodafone; it distributed the remaining 35% to its shareholders

3. **The Government continues to own 37.7% of Telkom and 14% direct shareholding in Vodacom**

Source: Research ICT Africa 2010 Sector Performance Review
## Performance

### Fixed-lines | Access

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Number of fixed lines as a percentage of the population (Source: ITU 2010)

- **Less than 20% households have a fixed-line telephone**
  - Large scale disconnection of subscribers unable to afford services
  - 60% of users are not interested in a fixed-line service even if prices were to come down

- **Negative consequences of privatisation:**
  - Sequencing - absence of competition
  - Maximisation of state asset came at some cost for development of a competitive sector.
  - Anti-competitive practises chilling effect on competitive sector.
  - Over the last 10 years, subscribers had been brought onto the fixed line market with the universal access targets set by Government as part of the privatisation. To-date they are unable to afford the service

- **Policy & Regulatory bottlenecks:**
  - Delayed market entry, licensing delays, absence of competition enabling provisions in policy like LLU, absence of short term asymmetrical rates
Performance
Fixed-lines | Price

- Fixed-lines prices of both voice and data are amongst the highest in the world.
- While not the most expensive by African standards based on OECD medium-user basket, SA has the highest priced basket.
- Next five countries historically middle income comparators for South Africa.
- Average monthly WTP for non-users that would be interested in getting a mobile phone - R 46.70 (USD 4.40)
### Performance Mobile | Access

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Mobile SIM cards as a percentage of the population (ITU 2010)

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SA market is saturating

Disparities of access in relation to (income)

Multiple SIMs (over count for 10% - 4.5 m)
Performance
Mobile | Access

- Mobile penetration rates continue to be impressive
- But in 2009 Tunisia and Botswana surpassed SA in terms of SIMs as a percentage of population
- Supply-side data: penetration rate of 100%
- Demand-side data: penetration rate of 62%
  - Significant number of multiple SIMs (1.13 active SIMs per user) GDP per capita levels
  - high prices and control costs by not making off-net calls
- Penetration levels for poorer people are still at only half the population
- Majority of mobile phones in urban areas

Mobile phone ownership by geographic area
**Usage prices remain high in South Africa compared to virtually every other comparable country in the world**

**High prices limit usage**

**High price of interconnection influences prices**

**High prices limit other innovations like airtime transfers and data use**

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**ARPU has declined**

- The decline up to 2007 is anticipated with the saturation of the higher end of the market
- Also the compulsory registration of SIMs from July 2009 might have contributed to the decline of new SIMS and ARPU

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Friday 26 November 2010
Wholesale - Interconnection
Termination rates comparison

- **SA mobile termination rates are among some of the highest in the world**
  - at least 2-3 times higher than a number of African countries

- **Interconnect rates have remained the same for the last seven years**

- **High interconnection rates justify high prices**
  - mobile operators currently pay each other R1.25 per peak time minute for terminating calls on their networks

<table>
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<tr>
<th>Country</th>
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<th>Off peak</th>
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**Comparison of mobile termination rates in ZAR**

*Friday 26 November 2010*
Telkom is dominant in this market and prices have not reached competitive levels.

Telkom’s high prices have been one of the factors in encouraging Neotel and the mobile operators to invest in leased line infrastructure.

- The investment saw prices drop from 2007 to 2008.
- However, prices between 2008 and 2009 have remained constant.
- Why? Because MTN and Vodaom’s investments are not for general resale but for the benefits of their own networks.

Leased line prices using OECD methodology (USD PPP)
SA continues to dominate internet access within sub-Saharan African but with lower penetrations rates and high prices by other lower middle income country standards

Households with computer

Households with working Internet connection


Source: ITU 2010

Proportion of households with Internet access at home

Source: ITU 2010

Friday 26 November 2010
Extraordinarily high prices and low penetration compared to other middle income countries

- 2.8 subscribers per 100 inhabitants

ICTs and broadband at centre of economic policies in leading countries and of African best performers - Algeria, Tunisia, Morocco, Mauritius, Kenya.
The lowest uncapped and unshaped bandwidth being offered in most countries exceeds the highest in South Africa.

Minimum Subscription Price, USD for OECD countries, October 2009, compared to SA

South Africa’s lowest (left of bar) & highest (right of bar) broadband prices compared to OECD
Undersea cable developments

Capacity of Undersea Cables

Source: Steve Song, Shuttleworth Foundation 2010
Overall sector growth but suboptimal - South Africa steadily slipping down international and African indices.

While phenomenal mobile growth fixed line growth for voice services, opportunity to extend customers up value chain inhibited by access and usage high costs, low PC ownership and IT literacy.

Sector supported by high end users able to pay high prices but quickly becomes saturated, not reaching critical mass for network effects of next generation ICTs.

High prices for all retail and wholesale services inhibit optimal usage.

Low penetration of fixed broadband and unlike mature economies, mobile broadband used as primary service rather than complementary services for many broadband users.

High input costs for business, inflate costs of service sector and inhibit investment, location of regional business headquarters and BPO opportunities with associated negative consequences on job creation.

Dearth of competencies and capacity in state institutions, private sector and users

Absence of official ICT statistics and indicators for evidence based policy or vision or co-ordination from Presidential National Commission on Information Society and Development.
Policy, law, regulation, market linkages
Telecommunications Regulatory Environment Survey 2009

Overall TRE 2006/2009 Score

South African TRE 2006/2009

- Market Entry
- Scarce Resources
- Interconnection & facilities
- Tariff Regulation
- Regulation of Anti-Competitive Practices
- Universal Service Obligation (USO)
- Regulation of QoS
- Average

TRE 2009 Score (-2 = very inefficient, +2 = very efficient)

Mozambique
Tanzania
Botswana
Ivory Coast
Tunisia
Ghana
Uganda
Cameroon
Senegal
Kenya
Namibia
Benin
South Africa
Ethiopia
Nigeria
Zambia
Rwanda

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Comparative FDI: SA vs Nigeria

Source: RIA Communications Sector Performance Review 2006
Contradictory Policy Framework/ Legal Framework

1. **DOC - No major policy review since mid-nineties**
   (White paper on telecommunications/1996: Telecommunications Act)
   - 1997: partial privatisation of incumbent (Telkom)
   - 2002: introduction of a third mobile operator

2. **2000: Independent Communications Authority of South Africa (ICASA) Act**
   - Merging of 2 authorities: Independent Broadcasting Authority and the South African Telecommunications Regulatory Authority
   - No prior policy or law on convergence. It resulted in a single institution informed by two different statutes on broadcasting and telecommunications

3. **Electronic Communications Transactions Act**
   - One of the earliest countries in the world to introduce e-commerce measures, emulates UNCITRAL but large portions not implemented and not implementable.

4. **2001: Telecommunications Amendment**
   - Fixed competition, further mobile competition 2004 - delivery of voice services using any protocol by VANS and self-provisioning (subsequently clawed back), network operators resell, public payphone deregulated, e-rate to public schools.

5. **DPE created uncertainty around SNO, investors compelled into licence with state set aside (Transnet and Eskom) and then withdrawn in final instance to establish Infraco and led to delays that undermined both Neotel and Infraco’s viability.**

6. **INFRACO ACT 2007**
   - No policy co-ordination, cut across ‘managed liberalisation’, ultimately turf war between DOC and DOE
   - Public utility approach failed to understand or acknowledge regulated competitive environment
   - Lack of evidence of ability of broadband champions (Infraco backbone and Sentech wireless access) to compete effectively
   - As a result licensing delays undermined any possibility of success as events overtook intended backbone roll-out.
   - No serious consideration of more viable options - structural separation of Telkom, into common carrier backbone
   - No public consultation
   - Primary client Neotel and MTN and Vodacom built out own competing network
Policy & Regulatory Framework/ Licensing

- 2005: Electronic Communications Act
- Introduction of horizontal licensing framework
  - ICASA is in the process of converting existing licences into the new framework (required to be finished by law by Oct. 2008 with a 6 months extension)
  - ICASA through regulations requires entities that want to provide licence-exempt services to nevertheless apply for permission -> practically, it created another licence category
- Outcome
  - Market remains structured around vertically integrated incumbent operators (effective duopolies in both fixed and mobile market)
  - Fixed-line market: incumbent retains dominance over the backbone/competes downstream with its competitors
  - Mobile market: effective duopoly resulted in price matching, poor service quality and uncompetitive behaviour

- Failure: regulator has not been able to regulate incumbent operators effectively and enable fair competition in the market
- Impasse in interpretations of policy and licensing transfer resolved by courts in Altech vs. Minister of Communications, ICASA and others.
Institutional arrangements
- Members of the Council are appointed directly by the Ministry
- The Minister issues policy direction to the board in carrying out its oversight functions (e-rate policy)

Universal Access Fund
- Minister required to make determinations on what constitutes universal service and access
  - USAASA is required to manage the Fund, in accordance with the instructions of the Minister
  - ICASA is responsible for prescribing the basis and manner of contributions (unable to without definitions from Minister)
  - The Minister is responsible for determining the percentage of turnover

Output
- No co-ordination between three entities responsible for different dimensions of implementation
- Imperceptible impact, with double negative impact, first on investment and then on failure to use funds effectively
- Market realities have overtaken universal service policy and strategies
2009: DoC issued a draft broadband policy

- failure to address institutional arrangements and market structure
  - no reference to the regulatory framework or agency
  - no reference to InfraCo
  - no reference to the necessary coordination of the DoC (responsible for the liberalisation of the market) and DPE (shareholder of Infraco - state broadband operator)
- failure to address regulatory and policy requirements
  - rights of way, spectrum management
  - no discussion of services and infrastructure
  - no reference to open access regime
- failure to address issues related to infrastructure sharing
  - no discussions on functional and structural separation
  - no opportunity for leveraging PPP funding in infrastructure
  - absence of demand side stimulation or of role in economic recovery
Vision for ICT sector in 5 years (Africa)/15 years (globally)

For the South African to have the leading ICT sector on the African continent, with the highest penetration levels and lowest prices on the full range of services required for effective participation in the knowledge economy and society.

Targets:

To have broadband in all public institutions (clinics, schools, libraries by 2012.

To Internet usage up to 40% of the population by 2014.

To have broadband penetration rates (to the home) of 25% by 2015.

SEOUL DECLARATION (2009)

WE DECLARE that, to contribute to the development of the Internet Economy, we will:

a) Facilitate the convergence of digital networks, devices, applications and services, through policies that:
   - Establish a regulatory environment that assures a level playing field for competition.
   - Uphold the open, decentralised and dynamic nature of the Internet and the development of technical standards that enable its ongoing expansion and contribute to innovation, interoperability, participation and ease of access.
   - Stimulate investment and competition in the development of high capacity information and communication infrastructures and the delivery of Internet-enabled services within and across borders.
   - Ensure that broadband networks and services are developed to attain the greatest practical national coverage and use.
   - Encourage a more efficient use of the radio frequency spectrum to facilitate access to the Internet and the introduction of new and innovative services, while taking into account public interest objectives.
   - Encourage the adoption of the new version of the Internet protocol (IPv6), in particular through its timely adoption by governments as well as large private sector users of IPv4 addresses, in view of the ongoing IPv4 depletion.
   - Ensure that convergence benefits consumers and businesses, providing them choices with respect to connectivity, access and use of Internet applications, terminal devices and content, as well as clear and accurate information about the quality and costs of services.
Recommendations to achieve this

1. Develop a vision for the sector through the development of a integrated policy framework to:
   - Remove protectionist strategies, open markets to competition to meet pent up demand, while developing strategies for backbone investment
   - Co-ordination of state enterprises
   - Targeted universal services strategy to deal not only with the gaps in the market, but focus on demand-side stimulation of the market

2. Clarify institutional arrangements and design for sector through role and rationale clarification:
   - Professionalise regulator, reduce decision-making council and increase staff
   - Ensure adequate resources and capacity to enable effective regulation of sector

3. Review policy, law and regulation to:
   - Correct legal contradictions and regulatory bottlenecks
   - Open access regime for optimal use of networks and facilities and spectrum to enable entrepreneurship and innovation
   - Create enabling regulatory environments through removal of barriers to entry, service neutral licensing
   - Competitively value spectrum for optimal access and use

4. Complete competitive entry regulation such as:
   - Carrier pre-select
   - Essential facilities regulations
   - Local Loop Unbundling
   - Determine rights of way for new entrants

5. Introduce wholesale and retail price regulation, including:
   - Determining glide path toward cost-based termination rates
   - Implement mechanism to value spectrum for competitive access and efficient use

6. Ensure access to essential facilities (cost with favourable terms for access and co-location)

7. Demand side stimulation for PCs, Internet broadband

8. Cross cutting: capacity building at institutional and individual level to exploit ICT enabled efficiencies and productivity gains.

Create conditions conducive to investment through accountable capacitated institutions, certain regulatory environments and flexible policy frameworks
NPC - getting ICT back on national agenda

- With a clear vision of e-Africa promote the development of an integrated and co-ordinated e-strategy for the country including:
  - Seamless, ubiquitous and affordable infostructure as necessary base of enhanced services underpinning modern economy
  - Robust, transparent and progressive political, legal and institutional framework for sector development as key contributor to economic growth and development, including job creation
  - Demand side stimulation for more equitable participation in economy and society and to create necessary critical mass for realisation of knowledge economy and society
  - The systematic and standardised collection of data and analysis for evidence based policy, monitoring and evaluation against targets
For further information see www.researchICTafrica.net
Contact Alison Gillwald at agillwald@researchICTafrica.net
+27 214476332