SOUTH AFRICA CONNECT: CREATING OPPORTUNITIES, ENSURING INCLUSION

South Africa's Broadband Policy

20 NOVEMBER 2013

Executive Summary

National policy and constitutional context

South Africa Connect, the national broadband policy and the associated strategy and plan, gives expression to South Africa's vision in the National Development (NDP) of "a seamless information infrastructure by 2030 that will underpin a dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous". As envisaged in the NDP, at the core of this will be "a widespread communication system that will be universally accessible across the country at a cost and quality that meets the communication of citizens, business and the public sector and provides access to the creation and consumption of a wide range of converged applications and services required for effective economic and social participation".

"This ecosystem of digital networks, services, applications, content and devices, will be firmly integrated into the economic and social fabric of the country. Together, these broadband elements provide an enabling platform for economic enterprise, active citizenship and social engagement and innovation. It will connect public administration to the active citizen; promote economic growth, development and competitiveness; drive the creation of decent work; underpin nation-building and strengthen social cohesion; and support local, national and regional integration." (NDP 2012)

Further, it operationalises the NDP and the New Growth Path, which both identify the knowledge economy as one of the drivers of job creation. The Presidential Infrastructure Coordinating Commission (PICC) launched Strategic Integrated Project (SIP) 15: Expanding Access to Communication Technology in 2012. It aims "to ensure universal service and access to reliable, affordable and secure broadband services by all South Africans, prioritising rural and under-serviced areas and stimulating economic growth".

Additionally, this policy gives effect to the Constitution of South Africa by creating the conditions in a modern electronic world "to improve the quality of life of all citizens and free the potential of each person" and, in doing so, enables equality in the rights, privileges and benefits of citizenship, including the guarantees of freedom of expression and association in the Bill of Rights. This aligns with the declaration by the Human Rights Council of the United Nations General Assembly that access to the internet is a basic human right which enables individuals to "exercise their right to freedom of opinion and expression".

Challenges of broadband

In South Africa, the lack of always-available, high-speed and high quality bandwidth required by business, public institutions and citizens has impacted negatively on the country's development and

global competitiveness. Significant growth in the ICT sector over the last decade has not been accompanied by the realisation of the primary policy objective of affordable access for all to the full range of communications services that characterises modern economies. The slow deployment of fixed broadband services (ADSL), and its relatively high costs, meant that over the last five years mobile broadband rapidly became the primary form of broadband access; rather than providing a complementary service to fixed broadband as it has done in mature economies. Despite this take-off in mobile broadband, South Africa's broadband penetration remains poor compared to that of other lower-middle-income countries. South Africa has lost its status as 'continental leader' in broadband and internet, and the last two decades has seen South Africa's steady decline on global ICT indices.

The high cost of communication has constrained investment in South Africa as a regional business hub, in particular, investment in large-scale business process outsourcing and similar job-creating industries has suffered. Despite recent reductions to both fixed and mobile data prices, broadband pricing remains a barrier to exponential growth in broadband use.

There is increasing evidence of linkages between investment in electronic communications infrastructure and improvements in the economy. Though broadband impact studies vary on the exact contribution made to economic growth, there is enough evidence to support claims that increases in broadband penetration correlate with increases in GDP, new jobs, broadening of educational opportunities, enhanced public service delivery and rural development. Broadband is a key element of the national cyber infrastructure, and as such a critical enabler of new forms of scientific and industrial development including for large science projects such as the Square Kilometre Array (SKA). Broadband contributes to environmental sustainability and a greener economy through smart and green infrastructure in which the energy requirements and the carbon footprint are reduced. However, four key variables need to be addressed for the link between broadband and economic growth to have an effect:

- broadband must reach a critical mass of South Africans;
- access to broadband must be affordable;
- demand-side skills must be developed so broadband services can be used effectively; and
- supply-side skills must be developed so that the economic and innovative potential of broadband can be exploited.

A national broadband strategy is required to address these four factors.

South Africa Connect

In response to evolving global trends, and in order to meet the diverse needs of the people of South Africa, this broadband policy adopts an integrated and cross-cutting, but citizen-centric, approach to the formulation of this policy. The approach leverages the linkages in the ICT ecosystem to create a

more equitable knowledge economy and information society. Through this policy, the Government of South Africa envisages the launch of a national project, *South Africa Connect,* which will mobilise the capabilities, resources and energy of both the public and private sectors, together with civil society, in order to connect South Africans to each other as well as South Africa to the continent and the world. This collective energy will be channelled towards realising a bold vision of a connected society.

This policy creates the framework to realise South Africa's broadband ambitions, which will be operationalised in a detailed implementation plan ("the roadmap") that will be set in motion on approval of this policy. A Broadband Council, consisting of representatives of and experts from government, State-Owned Companies (SOCs), business and civil society will be appointed by the Minister of Communications to advise the Ministry on "the roadmap" and other policy issues emerging in this fast-changing field.

To meet the national objective of more affordable broadband access for all, *South Africa Connect* allows for both demand- and supply-side policy interventions. These are reflected in a four-pronged strategy that will close the gap between the currently poor status of broadband in the country, and the country's vision of a seamless network of networks that by 2030 will make broadband universally accessible at a cost and quality that meets the needs of citizens, formal and informal business and the public sector. The policy reflects the Government of South Africa's commitment to creating an enabling environment for the rollout of broadband infrastructure and the production of associated content, applications and services. It does this by indicating possible adjustments to the structure of the industry and the institutional framework necessary for effective regulation of an open and fair competitive environment. Furthermore, it encourages public and private investment in the broadband network extension required to meet the social and economic needs of the country.

Digital readiness: To lay the foundations for South Africa's future broadband success, policies that constrain the competitiveness of markets and the rolling out of broadband, will be removed. Sector markets and institutions will be restructured where necessary to create an environment conducive to public and private investment in broadband extension, and to improve levels of service-based competition. This will require an autonomous, accountable and well-resourced regulator, with the capacity and competencies to ensure that this broadband policy is implemented effectively and urgently. Policy certainty will be provided with sufficient regulatory flexibility for the regulator to respond to dynamic shifts in the sector. Through institutional restructuring, capacity building, directed funding and performance management, the regulator will be capable of fulfilling its central role in the implementation of this policy. This will include creating a fair and competitive environment, particularly enabling service-based competition through the enforcement of the wholesale access regulation to dominant market players' networks and mandatory open access to

infrastructure rolled out through public investment. The Independent Communications Authority of South Africa (ICASA) will regulate where necessary in support of coordinated civil works, a one-build policy and the encouragement of infrastructure sharing more generally.

The removal of administrative bottlenecks and the lowering of hurdles will greatly accelerate the rollout of wired and wireless broadband. National Government, through the Department of Communications ("DoC " or "the Department"), will co-ordinate and integrate broadband rollout across the different tiers of government, building on and learning from the significant advances already made at provincial and municipal levels. In support of this, the Presidential Infrastructure Coordinating Commission (PICC) through SIP 15, will assist the DoC and ICASA, to streamline the application for and granting of way-leaves and other approvals to promote broadband network builds; it will co-ordinate the building of civil works and ducting to avoid the duplication of such activities.

The DoC will also ensure that impediments to broadband rollout are removed, by issuing the necessary policy directives to the ICASA to expedite the assignment of broadband spectrum.

In preparation for assessing the contribution of existing networks to the creation of a seamless national broadband network of networks, and to determine the areas of need and investment, SOCs should be rationalised to more efficiently and effectively contribute to national objectives.

Digital development: An immediately executable programme of *South Africa Connect* is the pooling of public sector demand for broadband in order to facilitate the smart procurement of high-quality broadband connectivity and services to address public sector broadband needs. This will simultaneously serve the communication needs in critical domains (such as health, education, and safety and security) and enable network extension to areas that might not ordinarily be reached by operators by reducing the associated investment risk as well as by ensuring demand. This will also reduce Government's on-going operational expenditure on communications through upfront capital expenditure. Ultimately, this aggregated public demand could serve as an anchor tenant in the open access national broadband network, described in the section on Digital Future, to guarantee significant demand for investors and thereby enhancing the viability of the network.

As both a supply- and demand-side measure to improve access to the internet and further stimulate demand for broadband connectivity, the connection of schools and clinics will be prioritised together with the deployment of free public WiFi networks at these points of connection for citizens to access e-government and other services.

Digital future: The Minister of Communications will consider the viability and competitive impact of the introduction of open access wholesale fibre and wireless broadband networks. The DoC will prepare a detailed roadmap on how this will be achieved and how the rationalised SOC together

with existing private networks and new investors can be voluntarily incorporated into a multiplayer entity required to offer services on a fair cost and non-discriminatory basis in order to enable service-based competition. Consideration will also be given to ways in which the aggregated public sector demand and spending referred to previously could be used to stimulate investment in the network by becoming an 'anchor tenant' on the network once established. This will induce private investment in the network thereby guaranteeing investors' significant demand and enhancing the viability of the network.

This wholesale open access regime may also address the structural constraints in the market arising from the dominance of a number of vertically integrated operators. Open access wholesale access will enhance service-based competition that will better meet the pent-up demand for affordable broadband services in the country. This will be accompanied by a regulatory regime that ensures that principles of open access are applied to ensure that access is open to any operator or service provider on a cost-based, including fair rate of return, non-discriminatory basis. Regulation will further enable the commercial sharing of infrastructure and pooling of resources, including spectrum, to reduce wholesale costs and encourage services-based competition in the market.

Digital opportunity: In parallel with the other three pillars of the strategy, a multifaceted series of interventions will stimulate demand through the e-readiness programmes in schools and clinics, formal skills development in curricula and general awareness and e-literacy campaigns. The high-level skills required by the sector, and the user skills necessary for social and economic inclusion will be targeted in schools, universities and community access centres to secure and create work. There will be an alignment of broadband initiatives with other government department programmes in Research and Development (R&D), innovation and entrepreneurialism.

Realising these digital opportunities requires demand be stimulated and use and uptake be increased through the promotion of local and relevant content and applications. Multiple development and incentive programmes in all these areas will form a key part of the broadband implementation and funding plan; these programmes will include a local content and applications development fund and dedicated ICT entrepreneurship and R&D funds. Specifically, there will be incentives for and localisation of local content and applications development.

This is necessary both for the revitalisation of the economy and also for enhancing citizenship and democracy in the digital age, and creating opportunities for participation and consultation. Standards for open data will be set to create new norms around public information that make it widely available and technically accessible. These will not only enable the use and re-use of public information for public purposes but also stimulate the development of applications and content for private and commercial purposes that can enhance the flow of information and add value to public information.

Funding

The high levels of investment required to build broadband networks, together with the dynamic legal, institutional and human resource requirements to make them effective, have challenged the realisation of such rights across the globe. What is clear is that the problems are too immense for either state or private sector solutions on their own. Emerging success stories derive from a public-private interplay where the relative powers and resources of both public and private sectors are integrated to achieve wide-based access to broadband. Success depends strongly, however, on the capability of the state to manage and coordinate such processes. The approach to funding broadband rollout running throughout this policy is informed by the evidence that such shared allocation of risk can produce the most appropriate incentives for investment, with positive implications for the availability, cost and quality of services.

The first two pillars of the strategy, Digital readiness and Digital development, will be funded through re-prioritisation and rationalisation of existing budget allocations. In addition, the DoC will engage with other government departments to explore funding options, including through synergies with budgets for construction work such as public works and the Neighbourhood Development Partnership Grant, as well as investment by the Department of Rural Development and Land Reform. Coordination with sector specific agencies and funds such as the Media Development and Diversity Agency (MDDA), relevant Sector Education and Training Authorities (SETAs), the Universal Service and Access Fund (USAF) and the Skills Development Fund will also be explored.

The Digital future strategy to create an open access broadband network or networks will, however, require new significant funding. Government spending in this area will be channelled through public-private collaboration and the possible raising of capital from institutions, such as the Development Bank of South Africa (DBSA) and the Industrial Development Corporation (IDC), to finance network extension to less developed areas, following further consultation with National Treasury and other relevant departments.

Cross-sector state coordination will be required to support the integration and application of state resources, enhance state capacity and competencies as well as optimise public service delivery. To ensure that this is implemented, and to demonstrate the importance of this project on the national agenda, a Broadband Council will be appointed. The Council, made up of public, private sector and civil society representatives and experts, will advise the Minister of Communications on the design and implementation of broadband by Government. DoC and SIP 15 will be responsible for infrastructure coordination across the three tiers of government. Overall inter-departmental coordination, and the monitoring and evaluation of the broadband policy outcomes, should preferably be facilitated through the Presidency.

Targets

To guide the implementation of this policy the overall goal is to achieve a universal average download speed of 100 mbps by 2030. To reach this target in a progressive manner, reviewable targets have been set starting with an average user experience speed of 5 mbps to be reached by 2016 and available to 50% of the population and to 90% by 2020, with the quality of service monitored by ICASA. Targets are also set for schools and clinics and general public sector connectivity. The rapid evolution of broadband technology means that these targets will be monitored and evaluated on an on-going basis to determine if the targets need to be reviewed.

Table of Contents

Glossary

ADSL	Asymmetric Digital Subscriber Line
CoGTA	Cooperative Governance and Traditional Affairs
DEA	Department of Water and Environmental Affairs
DBSA	Development Bank of Southern Africa
DFA	Dark Fibre Africa
DHET	Department of Higher Education and Training
DoC	Department of Communications
DPE	Department of Public Enterprises
DRDLR	Department of Rural Development and Land Reform
DBE	Department of Education
DTI	Department of Trade and Industry
DST	Department of Science and Technology
ECA	Electronic Communications Act
ECTA	Electronic Communications and Transactions Act
FTTP	Fibre to the Premises
GDP	Gross Domestic Product
Gbps	Gigabits per second
HDI	Human Development Index
ICASA	Independent Communications Authority of South Africa
ICT	Information and Communications Technology
ICT RDI	ICT, Research, Development and Innovation
IDC	Industrial Development Corporation
IXP	Internet Exchange Point
ISP	Internet Service Providers
IT	Information Technology
ITU	International Telecommunication Union
LAN	Local Area Network
LTE	Long Term Evolution
Mbps	Megabits per second
MDDA	Media Development and Diversity Agency
MHz	Megahertz
MNO	Mobile Network Operators
MVNOs	Mobile Virtual Network Operators
NBN	National Broadband Network
NDP	National Development Plan
NGA	Next Generation Access
NGP	New Growth Path
NHI	National Health Insurance
NLDN	National Long Distance Network
NRI	Network Readiness Index
NT	National Treasury
PICC	Presidential Infrastructure Coordinating Commission

POPI	Protection of Private Information
POPs	Points of Presence
PPP	Public Private Partnership
R&D	Research and Development
RDI	Research, Development and Innovation
SADC	Southern African Development Community
SETA	Sector Education and Training Authority
SIP	Strategic Integrated Project
SKA	Square Kilometre Array – An international project to build a radio telescope which will have a total collecting area of approximately one square kilometre jointly hosted by South Africa and Australia.
SMEs	Small and Medium Enterprises
SAT 3	SAT-3 or South Atlantic 3 is a submarine communications cable linking Portugal and Spain to South Africa, with connections to several West African countries along the route
SOEs	State-Owned Enterprises
SOCs	State-Owned Companies
UN	United Nations
UNDP	United Nations Development Programme
USAF	Universal Service and Access Fund
USAASA	Universal Service and Access Agency of South Africa
USO	Universal Service and Access Obligation
WEF	World Economic Forum
WIFI	Wireless Fidelity - WiFi, is a technology that allows an electronic device to exchange data or connect to the Internet wirelessly using radio waves

1.   Vision

South Africa's National Development Plan (NDP) provides a vision of the ICT sector as one, which by 2030 will,

> "underpin the development of a dynamic and connected information society and a vibrant knowledge economy that is more inclusive and prosperous. A seamless information infrastructure will be universally available and accessible and will meet the needs of individuals, business and the public sector, providing access to the creation and consumption of a wide range of converged services required for effective economic and social participation – at a cost and quality at least equal to South Africa's main economic peers and competitors".

In line with the broader vision of the NDP, the 2020 Vision for broadband is that by 2020, 100% of South Africans will have access to broadband services at 2.5% or less of the population's average monthly income.

2.   Purpose

This national broadband policy and the associated strategy and plan is called *South Africa Connect*. The purpose of this policy is to provide a vision and long-term strategy that can begin to be implemented immediately, to catalyse broadband connectivity in South Africa. It also outlines a plan that can be implemented in the short term and identifies the national departments and agencies responsible for setting the plan in motion.

Specifically, the purpose of *South Africa Connect*, is to:

- provide a broadband vision and a roadmap to achieve this vision in ways that enable economic enterprise and innovation and ensure social and economic inclusion; and identify policy choices and strategies that will deliver a robust and cost-effective solution to universal, affordable broadband access;

- provide a model for the development of an open access national broadband network through the harnessing of public and private sector contributions;

- identify the market structure and associated regulatory regime required to induce sufficient public and private investment in extending broadband;

- create a framework for greater co-ordination at all tiers of government to manage the removal of impediments to broadband network extension;

- ensure consolidation of State-Owned Companies (SOCs) and better coordination with implementing agencies through the clear definition of roles, the integration of planning, monitoring and evaluation and the development of institutional capabilities;

- remove the policy constraints, regulatory bottlenecks and other hurdles that have constrained the diffusion of broadband;

- identify mechanisms to release high demand spectrum required for broadband extension; and

- identify areas and methods of demand stimulation, including through supporting the development of relevant content and applications, to ensure uptake and usage of broadband by all.

3. Objectives

The objectives of this policy are:

- affordable broadband available nationally, to meet the diverse needs of public and private users, both formal and informal, consumers and citizens;

- policy and regulatory conditions that enable public and private sector players to invest and also contribute in other ways to reaching South Africa's broadband ambitions;

- efficient public sector delivery, including e-government services, underpinned by the aggregation of broadband needs;

- that all public institutions at the national, provincial and municipal level should benefit from broadband connectivity and this should be extended to the communities they serve;

- to establish a framework such that public and private enterprises, formal and informal, are able to fully exploit the efficiencies offered by ubiquitous broadband and its potential for innovation;

- the development of a strong national skills base so that South Africa can perform as a proficient and globally competitive knowledge economy;

- a vibrant creative and software industry which produces content and applications which are relevant and meet the needs of the diverse users in the country; and

- a literate and skilled society that can effectively access services and content, including public information and public services.

4. Principles

Recognising that broadband is an evolving phenomenon with constantly changing and expanding demands and in order to create enabling conditions for an advanced, universally accessible information infrastructure that promotes social and economic inclusion, *South African Connect* is informed by the following guiding principles:

- **Openness**: at the infrastructure level, with open access for multiple services providers who are enabled to compete on shared platforms; at the level of government and its regulatory agencies, through commitment to an appropriate measure of open governance and open data; and openness in policy formulation through consultation and public participation.

- **Service and technological neutrality:** no preference should be given to any specific type of service or technology, while ensuring the use of common standards and protocols that enable interoperability;

- **Universality:** universal access to broadband services through more even provisioning of services, including a focus on services in underserved and underserviced areas and communities;

- **Equality:** address the digital divides between those with the resources and capabilities to access and optimally use the full range of broadband services and those who are marginalised from services;

- **Efficiency:** Within a competitive market, enabling the sharing of infrastructure to avoid unnecessary duplication;

- **Co-ordination:** by the State, across all tiers of government and across relevant sectors;

- **Transparency and accountability:** by sector institutions and operators, and policy and regulatory certainty to enable public and private investment;

- **Innovation:** creating conditions for innovation throughout the ICT ecosystem from policy and regulation to services and applications, and from networks to users and skills and capacity building;

- **Complementarity:** leveraging top-down coordination and bottom-up initiatives, public and private resources, fixed and wireless technologies, and different tiers of government; and

- **Future-proof:** ensuring that policy choices are flexible enough to accommodate technological progress, while neutral enough to withstand technology and market shifts and resilient to change.

5.   Problem statement

There is increasing evidence of linkages between investment in electronic communications infrastructure and improvements in the economy. Consumer access to high-quality broadband services is based on networks that are capable of supporting rapid growth in internet traffic, at competitive prices. Under these conditions, research suggests that a rise in broadband penetration is linked with economic growth and job creation. Though broadband impact studies vary in their estimation of the exact contribution of broadband to economic growth, there is enough evidence to support claims that increases in broadband penetration are correlated with increases in Gross Domestic Product (GDP), new jobs, broadening of educational opportunities, enhanced public service delivery and rural development.

If the necessary conditions are put in place and the broadband targets proposed in this policy are met, a high- level assessment of the impact of relatively conservative broadband investment figure

of R65 billion indicates that over 10 years more than 400 000 jobs could be created and over R130 billion contributed to GDP in South Africa. [1]

However, four key variables need to be addressed for the link between broadband and economic growth to take place:

- broadband must reach a critical mass of South Africans;

- access to broadband must be affordable;

- demand-side skills must be developed so broadband services can be optimised for personal and business use; and

- supply-side skills must be developed so that the economic and innovative potential of broadband can be exploited. A national broadband strategy is required to address these four variables.

In South Africa, the lack of always-on, high-speed and quality bandwidth required by public institutions, business and citizens has impacted negatively on the country's development and global competitiveness. Significant growth in the ICT sector over the last decade has not been accompanied by the realisation of affordable access for all to the full range of communication services that characterises modern economies. The slow deployment of fixed broadband services Asymmetric Digital Subscriber Line (ADSL) and the relatively high costs have meant that, over the last five years, mobile broadband has rapidly become the main form of broadband access, rather than providing a complementary service to fixed broadband, as is the case in mature economies. Despite this take-off in mobile broadband, South Africa's broadband penetration remains poor compared to that of other lower middle-income countries. South Africa has lost its status as continental leader in broadband and internet, and the last two decades have seen our steady decline on global ICT indices.

High communications cost have constrained investment in South Africa as a regional business hub, and particularly investment in large-scale business process outsourcing and similar job-creating industries. Despite recent reductions in both fixed and mobile data prices, broadband pricing remains a barrier to exponential growth in broadband use.

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[1] The impact of South Africa Connect on jobs and the economy, Dr. Raúl L. Katz, Adjunct Professor, Division of Finance and Economics, and Director, Business Strategy Research, Columbia Institute of Tele-information *Broadband Workshop (DoC) 11-12 November 2013, CSIR Conference Centre, Pretoria*

The increased availability and reduced cost of international bandwidth that resulted from the landing of multiple undersea cables since 2009, together with the take-off of mobile broadband, has massively increased demand for data services. With increased access to the internet, particularly through wireless broadband devices, the critical infrastructure constraint is no longer a lack or high cost of international bandwidth, but the development of national terrestrial networks. In particular, a high capacity access network is necessary.

With the increasing reliance on mobile or wireless communications, there is more demand than ever for radio spectrum - the invisible wavelengths or frequencies by which services such as broadcasting and mobile communications can be transmitted.

Policy and regulatory bottlenecks associated with spectrum assignment, together with delays in the migration of land analogue broadcasting to digital, have meant that service innovation, increased competition, potential job opportunities and tax revenues have not been realised. The efficient assignment and subsequent use of high demand spectrum to meet this demand is vital and the cost of not making this spectrum available is high.

Pressure on backhaul networks, which carry data from mobile sites to the backbone, and the high associated cost of leasing facilities from the incumbent operator, as well as delays in the licensing of the build-out of the state-owned broadband company, Broadband Infraco, have prompted other operators to build their own intercity high-speed networks. Numerous other companies are now also laying fibre networks and selling capacity, as are municipalities. While this has resulted in improved broadband capacity in metropolitan areas, and even in choice and reduction in prices at the wholesale level, large parts of the country remain unconnected.

If South Africa is to create the conditions for large-scale investment in networks capable of dealing with the demand for stable, high-speed broadband, significant policy challenges remain. Such investments will require more capital than either the State or private sector can, or is willing to, provide alone. Through this broadband policy, the Government wishes to address past inadequacies through credible commitments and the development of a predictable regulatory environment conducive to investment. However, raising capital is not the only problem.

The key to leveraging the benefits of broadband lies in the governance of the sector and in the ability of the State to coordinate activities across the ICT ecosystem. The challenge is the development of a strategy that enables the country to deal effectively with: the cross-cutting nature of ICTs; the coordination of activities across different sectors SOCs and tiers of government; the creation of institutional capacity to regulate the sector effectively; and the stimulation of demand

through the development of people's digital literacy, computer skills, and availability of devices, relevant content and applications (including e-government services and applications).

A clear strategy to address these key policy challenges will:

- enable efficient supply though encouraging investment;
- adopt open access systems;
- enable competitive infrastructure sharing;
- stimulate demand through skills development and e-literacy;
- incentivise low entry-level prices for devices and services;
- support local content development including e-government services; and
- enable research and development and innovation.

6.   National policy context

At the highest level this policy gives effect to the Constitution of South Africa by creating the conditions in the digital age "to improve the quality of life of all citizens and free the potential of each person" and, in doing so, enable equality in the rights, privileges and benefits of citizenship, including guarantees of freedom of expression and association in the Bill of Rights. This aligns with the declaration by Human Rights Council of the United Nations General Assembly that access to the internet is a basic human right which enables individuals to "exercise their right to freedom of opinion and expression."

The NDP, together the New Growth Path (NGP), identify the knowledge economy as one of the major job creation drivers. A knowledge economy basically refers to an economy that is underpinned by universally available and accessible high speed broadband providing access to the creation and consumption of a wide range of converged services required for effective economic and social participation. In December 2012, the Presidential Infrastructure Coordinating Commission (PICC) launched Strategic Integrated Project (SIP) 15: Expanding Access to Communications Technology. SIP 15 aims "to ensure universal service and access to reliable, affordable and secure broadband services by all South Africans, prioritising rural and under-serviced areas and stimulating economic growth".

SIP 15 prioritises the migration of terrestrial broadcasting from analogue to digital transmission by June 2015; it also focuses on the expansion of access to ICT through broadband infrastructure roll-out. SIP 15 emphasises the critical need for "coordination and integration of communications infrastructure activities within state-owned enterprises, private entities, provinces and local

government" as being critical and seeks to co-ordinate the disparate broadband initiatives within the country.

The national broadband policy has been prepared against the backdrop of a separate DoC process to review ICT policy being undertaken by the ICT Policy Review Panel of Experts. They are about to finalise a National integrated ICT Policy Green Paper. This includes a comprehensive ICT policy review with the purpose of developing a comprehensive e-strategy as proposed in the NDP. This is being done in recognition of the fact that optimal ICT sector growth will only take place with policies, market structures, regulation, institutional arrangements, education and financing arrangements that are conducive to driving increased supply and demand.

7.   Definition

In line with the growing trends towards defining broadband rather in terms of functionality, in South Africa broadband should be understood as an ecosystem of high capacity, high speed and high quality electronic networks, services, applications and content that enhances the variety, uses and value of information and communications for different types of users.

8.   Targets

The targets indicated below have been derived from consideration of existing baselines and benchmarking against the kind of targets being set in other countries.

Table 1: National Broadband Policy Targets

Target	Penetration measure	Baseline (2013)	By 2016	By 2020	By 2030
Broadband access in Mbps user experience	% of population	33.7%[2] internet access	50% at 5 Mbps	90% at 5Mbps 50% at 100Mbps	100% at 10Mbps 80% at 100Mbps
Schools	% of schools	25%	50% at 10	100% at 10	100% at

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[2] Research ICT Africa, 2012 ICT Access and Use Survey. *

Note: Census 2012 surveys households not individuals and this figures of 32,9% is defined as households where at least one member had access to or used the Internet either at home, work, place of study or Internet café. RIA's household figure of nearly 19.7%% of households with access to refers to a dedicated household line (fixed or mobile). The International Telecommunication Union (ITU) is currently in the process of standardising mobile phone access as a demand-side, individual use indicator rather than a household measure.

		connected	Mbps	Mbps 80% at 100Mbps	1Gbps
Health facilities	% of health facilities	13% connected	50% at 10Mbps	100% at 10 Mbps 80% at 100Mbps	100% at 1Gbps
Government facilities	% of government offices		50% at 5Mbps	100% at 10Mbps	100% at 100Mbps

The minimum average targets listed in the above table will be reviewed annually. They will be supplemented by ICASA by quality of service standards, which may include download and upload speeds and latency, together with waiting time for installation and fault clearance.

The targets also serve as indicators for the four interventions identified below in order to achieve the identified objectives of affordable, ubiquitous broadband which is reflected in the staggered percentages toward universal access in 2030. It also sets ambitious but realisable medium and long term targets that reflect the need for improved quality of service to fully exploit the benefits of broadband that will require significant investments in ultra-high speed networks. There are also targets for public sector connectivity and specifically for schools and health facilities that have been prioritised as part of the associated human development thrust of this policy.

Issue	Action
Targets	
Currently low penetration, high prices, poor quality of service	• ICASA to monitor and evaluate the targets and compliance with quality of service standards on an ongoing basis, to report on them annually, and on this basis the Minster to review targets as necessary.

9. Gap analysis

This section identifies a number of key broadband policy areas to assess the shortfall between the current status of the broadband ecosystem in the country, as discussed in the problem statement above, and the broadband vision for South Africa stated above.

Market structure and **regulatory regime**: Despite the horizontal licensing regime introduced by the Electronic Communications Act of 2005, the market remains structured around vertically integrated incumbents, whichj have multiple licences, but continue to compete downstream with multiple service providers. This creates anti-competitive incentives in the market and requires a resource-intensive regulatory regime, where the regulator is constantly required to adjust the behaviour of

the incumbents. This wholesale open access regime will also address the structural constraints in the market arising from the dominance of a number of vertically integrated operators. Re-structuring the market to enable greater wholesale access to networks by service providers will go a long way to creating a more competitive services sector, which is likely to enhance quality and drive down prices. National policy is intended to create the conditions for the regulator to induce investment in the sector, enable competition, and create awareness of services to ensure positive consumer welfare outcomes. However, such outcomes have only occurred to a limited extent in part due to weaknesses in the regulatory design and institutional framework, including the capacity and effectiveness of sectoral agencies. The problems within the institutional arrangements include: institutional duplication and lack of coordination; appointment processes and governance of agencies; limitations on the autonomy and funding of institutions; and the mechanisms to enforce the transparency and accountability of institutional decision-making.

The primary gap in this regard is that the regulator in particular, which is key to successful implementation of this policy, has had neither the human and financial capacity nor sufficient autonomy to undertake the critical task of regulating the highly imperfect markets that have emerged. The arising regulatory bottlenecks are hampering expansion of the sector, the fairness of competition and, ultimately, the welfare of consumers.

Universal access: South Africa has experienced unintended outcomes of universal access and service (UAS) policies over the past two decades. Despite the dedicated agency and funds based on operator levies and obligations, pent-up demand for communication services over the past two decades has been primarily met through market reforms and the provision of commercial mobile communications services, first with voice and now with data, than through dedicated universal access and service policy interventions. The privatisation and extension of the fixed line monopoly aimed to double the network, but left the country with arguably fewer residential lines than before. The unplanned and largely unenforced community service obligations on mobile operators have done little to close the digital divide. The unintended outcomes of these interventions have been compounded by failure to enforce universal service obligations (USOs) and to utilise universal service funds in a timely manner for the purposes intended. Prior to proposing universal access strategies for broadband, a comprehensive overhaul of the existing policy, institutions and funding mechanisms is required. The ICT Policy Review Panel is undertaking such a review, the outputs of which will inform the plan – just as this policy will inform the workings of the Panel.

Infrastructure reach: Because South Africa is highly urbanised, large concentrations of the population are in reach of wireless broadband services, if not fixed. "Reach" does not refer to the

affordability of the services or whether people have the skills set to utilise services, aspects of which are discussed later in the document.

The gap in high-capacity backbone infrastructure is greatest in rural areas and in particular in former homelands. There are also some urban areas with high population densities that remain unserved. Nonetheless, other than in some parts of KwaZulu-Natal, North West and Eastern Cape, fibre backbone coverage reaches to within 10km of most communities.

However, the real gap is in the last-mile or local loop infrastructure. In high demand metropolitan areas there is considerable duplication of infrastructure, but outside these areas, ADSL is limited, The delay in releasing spectrum and the cost of building out high-speed next generation networks to low demand areas, mean that the substitution of mobile broadband for ADSL is not as prevalent as it is in metropolitan areas.

Infrastructure cost: The high prices charged for communications services are identified as one the primary factors hampering South Africa's competitiveness.[3]

While there is some vigorous competition among mobile operators in the sale of retail mobile data, and some resale by some of the larger internet Service Providers (ISPs), there is not significant scope for price competition without serious wholesale access regulation, and service providers tend to focus as a result on their value-added services to compete.

The lack of effective regulation of wholesale markets and the inability to provide incentives to operators to share infrastructure means that wholesale broadband has not been widely accessed thus affecting the development of service based competition.

Competition in international bandwidth has brought down the cost significantly, but this has not all been passed through to end users - terrestrial network charges and IP transit charges remain high and, as yet, are not regulated.

In the fixed market Telkom is the sole provider of ADSL lines, though again there is some resale by ISPs. Whilst prices have come down, they remain high by global standards. As a result South Africa only has 800 000 ADSL subscribers; a very low number for a lower middle-income country. Despite the fact that limited penetration of fixed-line copper networks constrains the availability of ADSL in all parts of the country, over 1,2 million ADSL lines lie fallow.

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[3] World Economic Forum Global Information Technology Report

Satellite is generally not cost effective, but is a viable solution to reach the most rural and remote areas.

Spectrum: With the increasing reliance on mobile or wireless communications, there is more demand than ever for radio spectrum - the invisible wavelengths or frequencies by which services such as broadcasting and mobile communications can be transmitted.

Policy and regulatory bottlenecks associated with spectrum assignment, together with delays in the migration of land analogue broadcasting to digital, have meant that service innovation, increased competition, potential job opportunities and tax revenues have not been realised. The efficient assignment and subsequent use of high demand spectrum to meet this demand is vital and the cost of not doing so is high.

Funding: There is a significant funding gap to get us from where the country is now now to where it aspires to be. Funding requirements for the effective roll-out of broadband are beyond the capacity of either the government or the private sector alone. The scale of funding traditionally derived from the Universal Service and Access Fund (USAF) and indirectly thorough Universal Service and Access Obligations (USOs) is inadequate for the scale of funding required for large-scale infrastructure expansion. What is required are new innovative ways that blend private and government funding sources to fund not only infrastructure roll-out, but also critical content development and the provision of public services online. Funding models that share investment risk between the public and private sector are emerging across the globe as the burden for funding cannot be carried by government or private sector alone.

In addition to relying on direct funding, indirect funding arrangements will be needed. One such indirect funding mechanism is the pooling of public sector demand for the purposes of co-ordinated and bulk procurement. This will encourage network investment guaranteeing returns and thereby reducing risk for operators.

Diffusion: Factors that currently inhibit the diffusion of broadband include the high cost of services, low levels computer and e-literacy, insufficient R&D and innovation and application and service development, coupled with the lack of government uptake of digital services. These factors also reduce the attractiveness of the market, and the realisation of entrepreneurial and innovation potential associated with the availability of high-speed broadband.

Content and apps development: Government can play a significant role in encouraging uptake and usage through ensuring the availability of relevant content to drive demand – this includes ensuring e-education and e-health content and applications to support the promotion of safety and security, social development schemes, and home affairs, amongst others. Civil society and community based

organisations, along with the private sector must seek ways to encourage the development of local content and applications to drive usage. It must be noted that current funds and agencies to address access and content are not technologically neutral and their mandates derive from a pre-convergence era.

The gap in content and applications development will be addressed through alignment of proposed mechanisms to incentivise local production with existing and proposed funds and agencies intended for this purpose.

Trust, security and privacy: As broadband services and applications extend into every aspect of our lives, greater numbers of individuals are shopping, using government services and interacting socially online.

While South Africa has long been aware of the need for cyber security, being amongst the early countries in the world to pass dedicated legislation in this area, the existing law, the Electronic Communications and Transactions Act, is over a decade old and needs to be aligned with this rapidly changing digital world in order to provide users with confidence to use services and products and thereby stimulate broadband use.

Such updated laws also need to be aligned with global developments and the efforts of agencies working in this area. A key aspect of this is the creation of a secure digital environment which safeguards the privacy of users and protects their data and its use in the increasingly vast databases which now underpin mainstream electronic services. Whilst current Protection of Private Information (POPI) legislation goes a long way to protect private information, a wider review is needed to determine the need for consolidation and to identify any gaps arising from particular local needs and global trends.

Indicators and Analysis: The poor quality of official information and data on which many international studies are based, and on which national government and the regulator are dependent, severely limits a commitment to evidence-based policy.

While South Africa's poor performance in global and continental indices are indicative of South Africa's declining global position, the underpinning data are incomplete and lacking. In order to set targets, make use of benchmarks, and monitor and evaluate policy outcomes, it is imperative that decision-makers have accurate and current data.

Together with StatsSA, DoC and ICASA have developed a national ICT indicator portal over the past year. However, the quality of information received from operators has been mixed and as a result ICASA has again not been able to submit complete datasets to UN agencies, nor comprehensively

populate the official portal. ICASA is in future required to publish at a minimum the annual ICT indicators as required by the ITU and which form the basis of other UN and multilateral agency international indices.

Regional integration: This policy seeks to address some of the gaps between status of regional integration currently and the vision to achieve a 'Digital SADC' by 2027 which acknowledges that the key benefits from becoming a knowledge-based society are based on the provision of always-on affordable broadband connectivity delivering relevant content and useful applications by means of easy- to-use access devices.

Making sure this happens by 2027 will require rapid and concerted efforts by all. This policy supports the framework for this, which is based on the two platforms: **ICT Policy and Regulatory Harmonisation** and **Confidence and Security of Networks and Services Infrastructure**. Four pillars stand on these two platforms: Infrastructure; E-services and Applications; Research, Innovation and Industry Development; and Capacity Building and Content. South Africa through this policy is committed to the region being fully interconnected nationally, regionally, inter-regionally and globally, through reliable and affordable fibre optic links. An affordable satellite based connectivity solution is also available for remote areas outside the near-term reach of fibre infrastructure.

Skills development: There is now considerable evidence to demonstrate that inequality of access and use of ICTs and therefore the ability to deploy their full potential – is rooted in the unequal capabilities of individuals and groups, such as the poor, particularly poor women, those living in rural areas, persons with disabilities, and the elderly.

As ICTs become more complex, the ability to optimise their use correlates strongly with education and income. Those marginalised from education and therefore from employment and income are most likely to be marginalised from access to the type of communications services required to participate meaningfully in a modern economy and society. Therefore, strategies for inclusion in the information society and knowledge economy need to be central to national human development strategies. This needs to become a national priority and a core element of the national project of digital inclusion.

Perhaps the greatest gap for South Africa is overcoming human development and having the skills base necessary to operate a knowledge economy. This is demonstrated in South Africa's low ranking global indices such as the Human Development Index and the World Economic Forum's Global Information Technology Report.

This policy proposes ways to address this gap through prioritising the connection of schools and introducing ICT skills development in the school curriculum. This is the base required to address the next gap, namely R&D, innovation and entrepreneurship.

R&D, innovation and entrepreneurship: Whilst South Africa's overall R&D spend has moved towards 1% of GDP, this is still significantly below what is required for economic competitiveness. It also means that South Africa has insufficient knowledge-generating capability to fuel a continuous stream of technological innovation, as envisaged in industrial policy goals.

This coupled with inadequate levels of entrepreneurship, means that South Africa is losing out on the socio-economic benefits that should accrue from R&D, innovation and entrepreneurship.

Pervasive and affordable broadband is likely to stimulate innovation in broadband applications and services. This needs to be accompanied by investments in the development of critical mass, in ICT R&D capabilities, in innovation support measures and in advanced human capital development. South Africa's National ICT Research, Development and Innovation (RDI) Roadmap provides a plan and coordinating mechanism for public and private investment in ICT R&D and innovation.

Open Access: While operators increasingly share infrastructure on a commercial basis as the economy tightens and they seek efficiencies, the regulation of open access in order to improve competition in South Africa has been limited, beyond consideration of Local Loop Unbundling. Some of the access remedies that were available to regulators for traditional telecommunications networks may no longer be technically or economically viable on their own for broadband networks, as it is clear there will be insufficient infrastructure competition, especially outside very densely settled urban areas.

Open access arrangements have been used at the backhaul and backbone network levels, for example by municipal backhaul networks, undersea cables or wholesale backbone networks. These initiatives are mostly the result of public intervention and are usually triggered by a mismatch between public policy objectives and the current outcomes of market forces.

IXPs (Internet Exchange Points) were regarded as a sound example of open access arrangements, because an IXP typically allows its parties to exchange traffic, based on agreed terms and conditions, and usually has a clear and transparent policy to which members must adhere. They are usually run directly by industry participants, such as ISPs, who set their own policies and practices on a voluntary basis and under mutually beneficial terms and conditions that are open for others to join, upon adherence to these rules. However, the terms under which ISPs of different sizes can peer or transit has become increasingly discriminatory and there may be a regulatory gap and need to mandate open access at that level.

The scope for wholesale open access in fixed networks not only affects products and services such as access to the local loop or wholesale services at higher levels of the network (e.g. bitstream). Key access products, such as dark fibre services, access to ducts or, especially, access to in-building wiring, play a major role and are taken into account as they present a major barrier for the entry of alternative operators.

The intent of this policy is to provide a clear framework for the implementation of an open access regime for the wireless and fibre networks planned for the country. Bearing in mind that there is no single definition of "open access", for the purposes of this policy *open access* refers to mandatory wholesale access to network infrastructure or services that is provided on fair and reasonable terms, for which there is some degree of transparency and non-discrimination[4]. It is considered as applying to fixed and mobile access networks, backhaul and backbone networks, undersea cables and internet exchange points.

10. Current status of broadband infrastructure networks

Policy interventions for enhancing broadband access need to start by taking into account the reach, availability and affordability of the different elements that make up the national broadband landscape. Without such analysis, there is risk that simplistic solutions may be chosen that do not address the root cause for South Africa's lag in deploying broadband.

In the absence of a clear umbrella policy for broadband, various public and private broadband networks have evolved in South Africa over the last decade. The current status of the different network elements in South Africa differs dramatically and the dynamics that have led to the current state therefore require different remedies. The national broadband infrastructure value chain can be understood as consisting of the following elements, all of which require supply side strategies to ensure co-ordination and integration:

- international connectivity, provided via under-sea cables;
- domestic backbone, long distance fibre optic links, including regional (rural) district extensions;
- metropolitan networks;
- local access networks; and
- on-site (Local Area Network) connectivity and devices.

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[4] See OECD 2013, Stimulating Competition through Open Access Networks available at
http://oecdinsights.org/2013/03/05/stimulating-competition-through-open-access-networks/

International connectivity: Until 2009, South Africa was connected to the rest of the world via a single international submarine cable, SAT3. As of 2013, four submarine cables provide a combined capacity of 11,5 terabits per second of international connectivity, available on a wholesale basis from at least 5 providers. Additional cables that are under construction will bring the total capacity to 29,5 terabits per second. . These undersea cables connect South Africa with Europe and Asia, as well as with other African countries through the various landing points on the east and west coast of the continent. In addition, South Africa is connected to neighbouring countries through cross-border networks.

Since the introduction of undersea cable competition in 2009, prices have dropped dramatically, driving demand and resulting in better use of available capacity. Despite this, there is still considerable capacity available to meet immediate future needs.

Domestic backbone or National Long Distance Network: Long distance "inter-city" fibre-optic connectivity is provided by a number of private sector players and SOCs.

Of these, Telkom's network is the most extensive, connecting virtually every city and town. This is followed by the Broadband InfraCo, which operates a significant national network covering major national routes. These are complemented by additional networks on high-demand routes between Johannesburg, Cape Town and Durban (Dark Fibre Africa and FibreCo), and by fibre networks between Johannesburg and East London (FibreCo) and between Pretoria and Musina (Liquid Telecom).

An extensive long distance fibre network exists in South Africa, to the extent that approximately 86% of the South African population is within 10km of access to fibre. There are concerns that some long haul fibre may not be sufficient to cater for future demands.

Whereas competition on the major national routes has contributed to price reductions, limited competition exists on other routes and the cost to connect remote locations remains high.

Neither the Telkom nor the Broadband InfraCo networks are currently available on an open access basis. The current private sector National Long Distance (NLD) projects may have elements of wholesale and open access, but do not presently address demand beyond the main centres. A key part of this is the **regional (rural) district extensions:** Rural networks exist in large parts of South Africa, but as a consequence of the spatial legacy of Apartheid, limited infrastructure exists in the former homelands and other historically disadvantaged areas.

Metropolitan Area Networks: Most municipal areas have considerable core network infrastructure, dominated by Telkom's network infrastructure developed over many years. The relatively new

entrant, Dark Fibre Africa has built nearly 8000km of metro ducts and fibre in all major metros and a number of secondary cities providing open access dark fibre on a wholesale basis. In addition, many municipalities have built their own municipal fibre networks to serve the needs of local government.

As in the case of longer distance networks, this metropolitan area infrastructure reflects South Africa's unequal spatial development, with limited network infrastructure in townships. A lack of coordination between operators in metropolitan areas and agreed models for making municipal networks available for wider purposes limits the potential of some metropolitan infrastructure to contribute to South Africa's broadband ambitions.

The last 10 years have seen a proliferation of network initiatives led by various Provinces, Metros and other Municipalities. Local government has invested significantly in broadband infrastructure roll-out during this period and there are a number of successful projects and initiatives.   This drive by local and provincial government has resulted in two undesirable unintended consequences. The first is the proliferation of projects in an uncoordinated manner and the duplication of effort and networks and the possible wasting of resources. The second unintended consequence has been the conflict that has arisen between municipalities with vested interests in their own infrastructure projects and the shutting out or hampering by officials of normal private sector infrastructure deployment in those areas. The DoC, and where appropriate, PICC, through SIP 15 will seek to ensure greater coordination of provincial and local government broadband infrastructure initiatives and harmonisation with the national broadband network and the monitoring and evaluation of the broadband policy outcomes should preferably be facilitated through the Presidency.

However, local authorities play an important role in creating an enabling environment for broadband, through provision of wayleaves and other approvals. Currently municipalities' capabilities and practices in this regard are uneven, but there have been some notable successes, from which key lessons can be derived.

Access networks: In South Africa the biggest gap in the national broadband infrastructure is currently in the access network illustrated by the fact that 86% of the population is within 10km from a fibre access point. Broadband access is provided via mobile, fixed wireless, ADSL and, to a very limited scale, by fibre to the premises (FTTP).

Of the access mechanisms, mobile coverage is the most extensive, but mobile broadband access is limited to lucrative urban areas and data costs are relatively high. Extending broadband access is dependent on allocation of high demand spectrum. It is also dependant on higher tower density, which requires additional investments by mobile operators.

The fixed-line incumbent, Telkom is the sole providers of ADSL connectivity and has only 800,000 subscribers. Although a large number of internet service providers can legally provide internet services over ADSL, their ability to differentiate their offerings and service levels is limited by the cost and points of interconnection into the Telkom network. Fixed wireless is available in limited areas and fibre to the premises (FTTP) to a very limited extent at a high cost. Access networks are generally available as a retail service only.

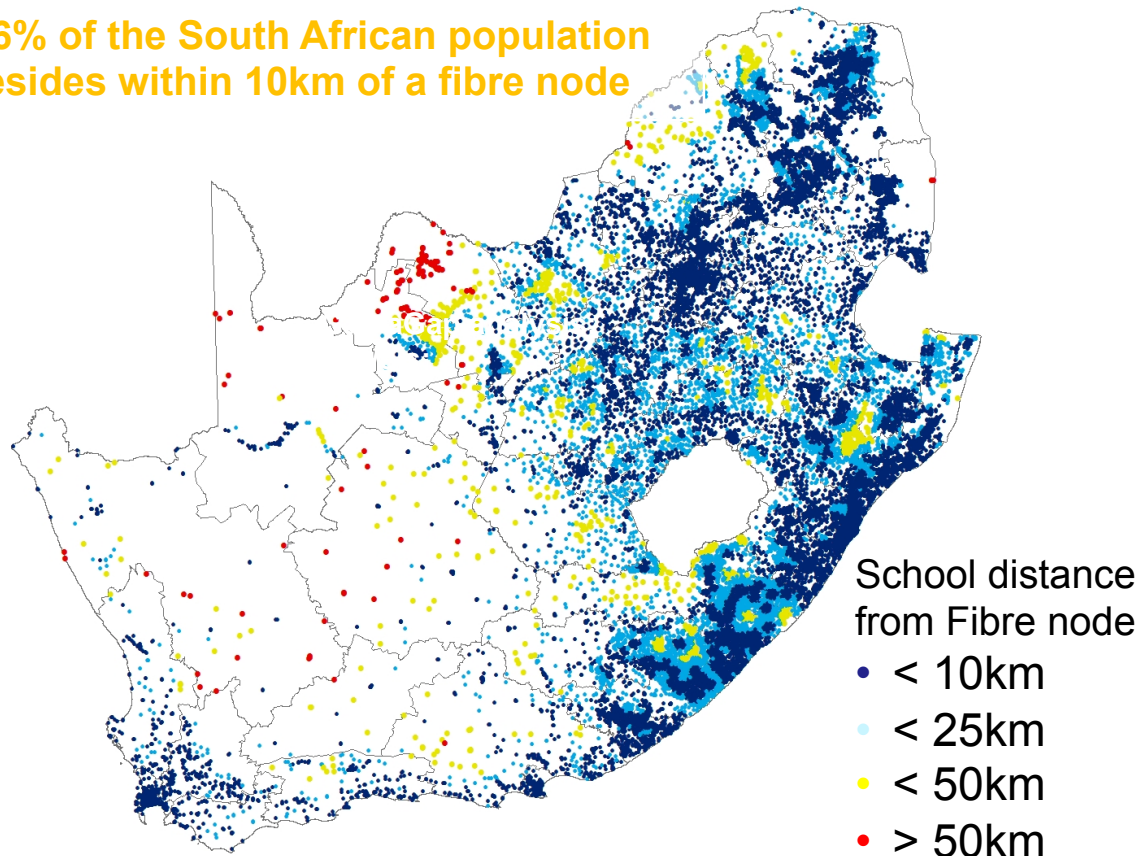**86% of the South African population resides within 10km of a fibre node**

School distance from Fibre node
- < 10km
- < 25km
- < 50km
- > 50km

Figure 1 – Fibre distribution

Compelling global trends show increasing pressure on operators to better share infrastructure. An open access wholesale wireless network presents a viable way of enabling this. This trend could be leveraged in support of the National Broadband Network and the Open Access Wireless Network.

On-site (LAN) connectivity and devices – Previously the cost of personal computers represented a significant barrier to access by individual users. The advent of low cost mass produced smart phones and tablets has however to a significant extent overcome this. Gaps that remain relate to:

- affordability of devices amongst a significant portion of the population;

- institutional absorption of such devices, for instance in schools; and

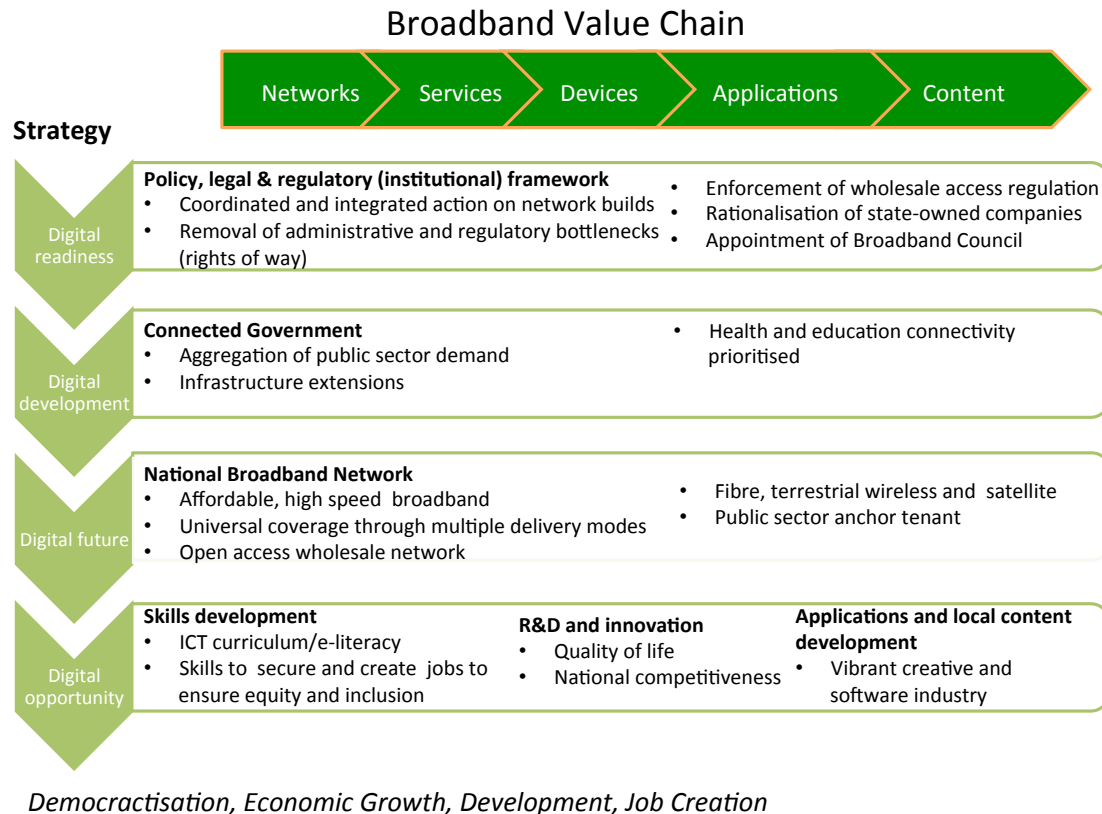- inability of these devices to address all user requirements.

11. South Africa's Broadband Strategy – Closing the Gap

A four-pronged strategy, with both supply- and demand- side interventions will close the identified gaps between the current status of broadband in the country and the vision of a seamless information infrastructure by 2030. It will also address the intermediate targets set to achieve this. Ensuring that broadband is universally accessible across the country at a cost and quality that meets the needs of citizens, business and the public sector and which enables the optimal use of its potential, requires a sophisticated response, and coordinated action by a range of role-players.

The four interventions through which *South Africa Connect* will be implemented are summarised below:

- **Digital readiness** – The creation of an enabling regulatory and institutional environment that facilitates broadband rollout whilst preserving the broader public interest; the establishment and rationalisation of existing institutions and state owned companies to harness the potential of broadband; the removal of any administrative and regulatory bottlenecks constraining network build out and co-ordinating further builds to avoid unnecessary duplication, particularly of civil works.

- **Digital development** – The pooling of public sector demand and procuring of high-capacity and future-proof network capacity at more affordable rates to address public sector broadband requirements; and, in this process, stimulating network builds by operators by reducing the associated investment risk, by ensuring demand. This strategy will also reduce Government's on-going operational expenditure on cost to communicate through upfront capital expenditure.

- **Digital future** – Enable sharing and cooperation on open access wholesale network builds and operation through ensuring economies of scale, reducing risk and guaranteeing returns.

- **Digital opportunity** – Ensuring that people are able to realise the benefits of broadband by having the necessary awareness, skills and relevant content and applications, which together will stimulate demand and uptake. Further that R&D, higher levels skills and research is supported and entrepreneurship and innovation are stimulated.

In the figure below the four prongs of the strategy are mapped against the broadband value chain to illustrate how they impact on different aspects of this value chain.

Broadband Value Chain

| Networks | Services | Devices | Applications | Content |

Strategy

Digital readiness

Policy, legal & regulatory (institutional) framework
- Coordinated and integrated action on network builds
- Removal of administrative and regulatory bottlenecks (rights of way)

- Enforcement of wholesale access regulation
- Rationalisation of state-owned companies
- Appointment of Broadband Council

Digital development

Connected Government
- Aggregation of public sector demand
- Infrastructure extensions

- Health and education connectivity prioritised

Digital future

National Broadband Network
- Affordable, high speed broadband
- Universal coverage through multiple delivery modes
- Open access wholesale network

- Fibre, terrestrial wireless and satellite
- Public sector anchor tenant

Digital opportunity

Skills development
- ICT curriculum/e-literacy
- Skills to secure and create jobs to ensure equity and inclusion

R&D and innovation
- Quality of life
- National competitiveness

Applications and local content development
- Vibrant creative and software industry

Democractisation, Economic Growth, Development, Job Creation

12. Digital readiness - laying the foundations for South Africa's broadband future

The creation of an enabling policy and regulatory environment is fundamental to the successful outcome of this national project. The current market structure and institutional arrangements that constrain the competitiveness of markets or their effective regulation will be identified and fast-tracked in the current ICT Policy Review process. During this process appropriate transitional measures will be implemented to ensure the optimal utilisation of critical network assets and capabilities in the SOCs.

Market structure and arising regulatory regime: The sector is liberalised but still has high degrees of vertical integration, and limited infrastructure competition outside of the metropolitan areas. To address market dominance and enable service-based competition, it is vital that there is effective open access wholesale regulation.

In order to enable broadband development, the regulatory framework must attend to demand-side issues, in addition to dealing with traditional supply-side issues of interconnectivity, facilities leasing, scarce resource allocation of numbers and spectrum, tariff regulation and quality of control.   As we

increasingly move online, a key role for regulators is to protect consumers' rights and privacy, and to ensure user trust and confidence. Quality of service regulation is going to become an increasingly important aspect of regulation, without which user experience of the internet and Internet Protocol (IP) based services will be suboptimal and stifle demand.

With this enhanced mandate, it is vital that the institutional constraints on effective regulation are addressed as a matter of urgency. This includes consideration of its independence, its accountability, competency and funding in order to ensure that it can perform its critical role in the development of the sector and economy.

This also includes consideration of ways to strengthen ICASA's capacity to act on already legislated parts of its mandate which, if implemented, would facilitate broadband infrastructure sharing. This includes the requirement in South Africa, for network licensees to interconnect their networks and make available their facilities at cost-based rates, including a reasonable rate of return, and for the regulator to identify essential facilities and ensure the access of competitors to them. Less has been done to incentivise infrastructure-sharing and enabling the sharing of at least passive infrastructure, such as masts and ducts. Enabling broadband networks extension through co-ordination and regulation of 'one-build' civil works, or mast erection, with competition in the active infrastructure running on top of this passive infrastructure, will be a priority going forward.

Institutional capacity: Requisite institutional capacity needs to be built, strengthened and, where necessary, streamlined in the DoC, its portfolio organisations, the responsible national departments, and in complementary agencies outside of the ICT sector, if this cross-cutting policy is to be successfully implemented.

Rationalisation of State-Owned Companies: In preparation for assessing the contribution of existing networks to creating a seamless national broadband network and to assess the remaining areas of need and investment, SOCs should be rationalised to contribute to national objectives more efficiently and effectively. To this end, a transition plan enabling the ongoing operations and support of relevant SOCs should be aligned with rationalisation objectives. An effective approach to the positioning and strengthening of the relevant SOCs to optimally support and contribute towards the delivery of a robust and cost-effective open access broadband network or regime, will be developed by the departments in the infrastructure cluster (led by DoC, NT and DPE) and feed into the broadband roadmap and implementation plan. This approach will take into account the role of both the public and private sectors.

Enabling investment in infrastructure: Deployment of high-speed broadband networks requires an enabling environment that facilitates the coordinated building and sharing of infrastructure. The high cost (up to 80%) in deploying new networks relates to civil engineering works. Inefficiencies and bottlenecks preventing rollout therefore need to be addressed. Co-building of infrastructure will be enabled to avoid unnecessary duplication and investments directed instead to areas that are currently underserved. Exploiting the extensive networks that exist will result in better utilisation, greater cost savings and fair competition.

Specific measures envisaged to promote investment in infrastructure building are:

- **Efficient permit granting:** Responsible authorities will provide network operators with a clear, simple, transparent and efficient mechanism for granting permits for civil works.

- **Access to and use of existing physical networking infrastructure:** ICASA will enforce regulations requiring network operators' obligations to meet all reasonable requests for access to infrastructure on a non-discriminatory basis to their physical infrastructure (such as ducts, conduits, manholes, cabinets, poles, masts, antennae, towers and other supporting constructions).

- **Coordination and exploiting synergies with other civil works:** Transparency of information on and mechanisms for accessing on a reasonable basis existing and planned public infrastructure suitable for hosting high-speed internet such as electricity, water and sewage, transport infrastructures and high sites. Such sharing across different civil domains will also facilitate future smart cities and regions.

- **Transparency** will assist in preventing accidental damage to water pipes or electricity and cables during construction of broadband infrastructure.

- **Coordination of civil works:** Frameworks will be put in place facilitating coordination and cooperation of civil works amongst network operators.

- **In-building equipment:**
  o All newly-constructed buildings and buildings undergoing major renovation will be equipped with facilities, such as ducting for fibre optic cabling, for high-speed-ready in-building physical infrastructure, up to the network termination points from 2015.

  o Every internet provider will have the right to terminate its network at a concentration point located inside or outside a building and will have the right to access any existing high-speed-ready in-building physical infrastructure on reasonable terms.

Spectrum: Spectrum is a scarce but non-depleting resource that has to be managed efficiently in order to optimise its potential to provide broadband access. This is especially pertinent given the dominance of mobile access in South Africa. Fixed wireless access also requires spectrum and represents an alternative to fixed line networks to provide high capacity broadband especially in rural areas.

The immediate priorities with respect to spectrum are:

- the identification of unused spectrum and its reassignment;

- the removal of all bottlenecks preventing migration of terrestrial broadcasters from analogue to digital in order to realise the digital dividend;

- the re-allocation and assignment of broadband spectrum taking into consideration job creation, small business development, national empowerment and the promotion of NDP goals;

- approval of spectrum sharing between spectrum licensees and across services by ICASA in support of efficient use of spectrum and where it does not impact negatively on competition;

- the enabling of dynamic spectrum allocation :and

- ensuring sufficient spectrum for extensive WiFi and other public access technologies and services.

It is Government's objective to ensure that access to broadband for all is attained. Therefore, licensing of broadband spectrum should contribute to the realisation of the following public interest policy objectives:

- the achievement of universal access to broadband;

- effective and efficient use of high demand spectrum;

- adoption of open access principles;

- safeguard the spectrum commons and spectrum required for public access technologies and services; and

- The promotion of broader national development goals of job creation, the development of small and medium sized businesses and South African-owned and controlled companies, and the broad based economic empowerment of historically disadvantaged persons.

The Minister will issue a policy directive to ensure that high demand broadband spectrum is assigned on a fair value, competitive basis and within a specified time period and on the basis of the principles stated above.

If required as part of the strategy to meet national broadband requirements, sufficient spectrum will be set aside for the creation of a national Open Access Wireless Network.

Legal and regulatory framework: The DoC will undertake a review of all relevant policies and legislation whereas ICASA will review regulation required to enable achievement of South Africa's broadband ambitions. Areas that require specific attention to create and stimulate demand and use of broadband services include:

- **Cyber-security framework:** An effective and secure online experience is an important contributor to increased broadband uptake and usage by the general public. Security covers a span of issues from confidence in payment and authentication systems, confidence in the security of personal information; and the protection online of children, or less literate members of society.

- **Legal frameworks (cyberlaw):** enables the development and use of services and applications, creating trust and confidence in online communication, business, trade and protection of individual rights, privacy specifically through legislation such as the ECA, ECTA, and the recently passed Protection of Private Information (POPI) Act.

- **Other law (ICT sector law):** Cross-cutting legislation and processes need to be considered through the ICT policy review which will examine ICT sector institutional arrangements, the sector regulator, universal access and service delivery mechanisms and institutions

Analysis, Information and indicators – The following measures will be taken to address the shortcomings in analysis, information and indicators:

- ICASA needs to streamline information reporting, regulate required reporting formats and ensure compliance to avoid delays and remove regulatory bottlenecks, and to update public information and indicators on the national portal regularly. They need to comply with international data requests comprehensively and timeously so that South Africa complies with UN and other international treaty organisation information requirements. This will help to avoid information delays that cause regulatory bottlenecks and will enable the DoC to formulate evidence-based policy.

- The DoC will, together with ICASA, identify and budget for the regular collection of the necessary supply and demand-side data required for effective policy formulation and

regulation and will co-ordinate with StatsSA on the regular production of the national ICT satellite account. DoC will ensure that collaborating agencies display all public information on the national indicator portal.

With this common basis and a commitment to rectifying the information asymmetries between the operators and the regulator and Department, and in order to address the general information deficit in the sector, two issues arise. One relates to broader national and sectoral issues that require better state co-ordination to introduce efficiencies in the sector and the other relates more to competitive issues, which will be dealt with first.

Broadband Council: To guide the implementation of this policy and to demonstrate the importance of this project on the national agenda, a Broadband Council, will be appointed by the Minster of Communications. The Council comprising representatives of and experts from government, SOCs, business and civil society will advise the Minister of Communications on the policy and implementation of the policy.

Table 1**: Digital Readiness - Policy decisions**

Issue	Action
Market Structure	
Vertically integrated incumbents hindering fair competition	• The Minister of Communications to consider the viability of an impact on competition of establishing open access national wholesale fibre and wireless broadband networks through the establishment of a multiplayer entity.

Institutional arrangements
Appointment process, funding arrangements, institutional design, capabilities and competencies produced negative outcomes
	• Review of the regulator and universal service agency governance structure, leadership appointment process and funding arrangement to ensure requisite capability to regulate:
	  • open access
	  • spectrum
	  • competition

Enabling infrastructure build	
Hurdles and bottlenecks hampering broadband rollout	• Authority for enforcement of Rapid Deployment Guidelines to be fast tracked and progressed at SIP 15 in consultation with ICASA. DoC to engage with DEA on the development of a Strategic Environmental Impact Assessment for broadband infrastructure
Spectrum	

Delay in allocating broadband spectrum	• Ministry will expedite policy directive to release broadband spectrum in ways that ensure efficient use and encourage competition.
Legal and regulatory framework	
Potential shortcomings in legislative support for Broadband policy	• The Department will undertake a review of all relevant policies and legislation. ICASA will review regulations required to enable implementation of this policy
Analysis, Information and indicators	
Absence of indicators to inform national decision making and inadequate reporting to UN and other multilateral agencies	• ICASA to prepare information reporting regulations to ensure collection of ITU universal indicators; • DoC to work with Stats SA on regular production of ICT satellite account from the national accounts to assess contribution of sector to national economy; and • DoC to budget for and manage demand survey to comply with UN commitments to Measuring the Information Society.
Rationalisation of state owned companies	• SOCs rationalised to contribute more efficiently and effectively to national objectives. To this end, a transition plan enabling the ongoing operations and support of relevant SoCs should be aligned with rationalisation objectives. The plan, positioning and strengthening of the relevant SOCs for participation in an open access broadband network would be developed by the relevant departments who will obtain the necessary Cabinet approval for implementation of a preferred option. • Implementation of preferred options as per implementation plan. • Develop the road map that guides the actions of public and private sector players over the next 10-20 years.
Appointment of Broadband Council	• Minister of Communications appoints Broadband Council to advise on implementation of policy and emerging policy issues.

13. Digital development - addressing needs and ensuring sustainable rollout

Government will invest in broadband infrastructure through aggregation of public sector demand and smart procurement of high capacity networks. The capacity procured will enable government administration and electronic service delivery (e-government), to digitally enable key social functions such as education and health, as well as to support emerging smart city requirements. Through this aggregated government demand, sustainable business cases will be enabled for network operators. This pooled public demand could be transferred to the open access network if it is established, as an anchor tenant, described in the section on Digital Future, to guarantee significant demand for investors and thereby enhance the viability of the network.

Realising the benefit of aggregated demand requires the coordination of network procurement across government; and close coordination with the responsible departments and authorities to ensure that the specific requirements for different sectors are met. Equitable access enabled in this manner will be ensured through appropriate phasing of network procurement.

The network requirements that will be served as part of the digital development strategy of this policy are:

- an expanded public sector network that will provide high speed broadband connectivity to administrative sites and other facilities;

- dedicated connectivity for all schools to be used by teachers, learners, school administrators and other support staff for administrative and teaching and learning purposes, is aimed at harnessing the vast potential that broadband has to:

  o extend access to educational opportunities regardless of gender, geographic location, socio-economic or ethnic background, illness or disability, or any other circumstance that would normally hinder access;

  o enable flexible, open learning environments which enable contextual, real-time, interactive and personalised learning;

  o extend learning beyond the formal school environment enabling learning beyond traditional classrooms; and

  o make education systems more efficient by helping teachers and administrators streamline routine tasks and improve assessment and data collection;

- dedicated connectivity for all public health care facilities is not only a requirement for implementation of the National Health Insurance but will generate efficiencies such as faster patient diagnoses, reduced medical errors, etc.

  Greater digitisation of the health care system enabled by broadband will improve the resilience of the health care system through its virtualisation ability. In particular, virtualisation will reduce the pressure on physical health facilities and personnel by keeping people out of hospital and by reducing the time they are there when that is required. Broadband will also enable equity in health care provision by enabling access to scarce expertise in rural areas.

- enable communities to solve their own connectivity problems through the development of regulation supporting cooperatives, the promotion of import tax breaks for non-profit organisations and open access to the national backbone; and

- free Public WiFi will be made available at all public points reached by the public sector networks. This will stimulate demand by allowing people to access the internet, including government services. Mechanisms will be explored to support and encourage municipalities to establish municipal-wide free WIFI networks aimed at enabling access, and innovation.

In rolling out these networks, due cognisance will be given to the mandate and authority of different spheres of government as well as the initiative that some provinces and municipalities have taken in establishing provincial and municipal networks. These national initiatives will therefore be coordinated with the initiatives at provincial and local level. The roll out of infrastructure by local and provincial government will be supported as a means of stimulating "bottom-up" infrastructure development, including community built networks, subject to coordination with the rollout of government networks as described above and integration into the future NBN. It is envisaged that some of the networking requirements will be met through a national satellite programme for areas where terrestrial network are not suitable. End-user costs on the national satellite programme shall be comparable to the end-user costs on terrestrial networks in other parts of the country.

Investment by government in network services is motivated by the administrative efficiencies and enhanced service delivery that can be achieved when government facilities are connected via broadband. As a result of government serving as an anchor tenant on the networks that will make up the government network, South Africa's broadband infrastructure will be expanded based on actual needs. It is worthwhile to consider that school density and location is entirely correlated with population density and therefore represents a major opportunity to support broadband rollout, in accordance with population density.

Critical success factors for the digital development strategy are:

- facilitation of planning and implementation across all relevant role players thereby avoiding duplication and leveraging synergies and resources optimally;

- smart buying of network components according to the policy principles and with the goals of this strategy in mind. This includes buying high capacity networks that meet future needs, investing in network assets that lower on-going operational cost and giving preference to offers that meet and support the broader goals of extending network infrastructure reach and access, through measures such as open access;

- implementation of measures that will enable uptake and usage. Examples include the availability of electronic educational content, the use of tablets and mobile devices in schools, implementation of transactional e-government services and government cloud solutions to consolidate investments in government IT systems; and

- integration of broadband network deployment into all spatial development planning including other infrastructure rollout, to reduce costs, increase developmental outcomes and promote industrialisation and developmental goals.

Table 2 - Digital development Policy Decisions

Requirement	Action
Network planning and coordination	
Coordination amongst all relevant role players to ensure optimal implementation and leverage of resources	• The DoC supported by a SIP 15 appointed coordinating agency will coordinate implementation of the digital development projects to address broadband needs and to ensure sustainable rollout.
Public Sector network	
Enabling infrastructure for e-government and government administration in phases.	• Requirements analysis, planning, design and implementation of a national network by an appointed agency to facilitate connecting all government offices and public institutions such as schools, health centres, police stations, courts, public access points.
Schools network	
To enable teaching and learning as well as school administration through national broadband.	• Requirements analysis, planning, design and implementation of a national schools network by an appointed agency; • Establish institutional capacity in the Department of Basic Education to enable uptake and use of broadband in the basic education environment
Heath Network	
Enable eHealth and National Health Insurance (NHI) for improved health outcomes	• Requirements analysis, planning, design and implementation of a national health network by an appointed agency; • Establish institutional capacity in the Department of Health to enable uptake and use of broadband in the health environment
Community networks	
Rural and poor populations and underserved areas in general not well served by network infrastructure and services	• Collaborative initiative involving DoC, DRDLR, CoGTA and provinces to identify areas that require community network interventions and conceptualising and implementing such networks.
Free public WiFi	
Free public WiFi at selected points reached by the public sector networks to stimulate demand by allowing people to access the internet, including government services.	• Integration of WiFi into the networks identified above ; • Fast-track implementation of WiFi at public facilities by agencies responsible for these facilities and networks where the capacity already exists.

14 Building the digital future - roadmap for public and private investment in the next generation broadband network

The above two prongs of the strategy, *Ensuring Digital Readiness* and *Digital Development*, coupled with the fourth prong to enable uptake and use and stimulate demand, *Realising Digital Opportunity*, will go a long way towards improving broadband access and quality in South Africa. However, for South Africa to create a broadband infrastructure that will make it competitive in the long term, additional investment is required in extending high capacity national broadband connectivity to all parts of the country. Such a national broadband network should build on and extend existing infrastructure and should enable and coordinate public and private sector investments in new infrastructure (green field) and upgrades to existing infrastructure (brown field) creating a seamless network of networks.

Based on analysis of global practice and taking account of the local context as described above, South Africa's broadband extension has to be a collaborative initiative – one that establishes a high capacity, high quality network that builds on existing infrastructure and involves both public and private sector players and is accessible to all on a non-discriminatory basis through open access regulation. In order to contribute to universal broadband access objectives, existing SOCs should be rationalised or contribute cooperatively to any open access wholesale consortium or vehicle created to enable broadband access in future.

The creation of the NBN will stimulate the building of broadband network infrastructure by reducing investment risk for network operators and optimising returns through enabling economies of scale by avoiding duplication, especially in areas where only one physical network would be viable. Public sector investment will prioritise areas and aspects of rollout where a smart kick-start approach is necessary (e.g. funding the construction of open access base stations) followed by those areas where on-going financial and other support is necessary.

The huge cost of having a national broadband network underlines the requirement to enable both public and private investment in the network. As such, the manner in which broadband extension will occur, the co-ordination and design of existing and new entities required to ensure universal broadband access by 2020, will be developed through a collaborative road-mapping process that takes account of the interests of the different actors in terms of their expected social and financial returns.

In alignment with the policy principles as set-out, the criteria for participation in any vehicles or entity established to fulfill national broadband objectives will include:

- that it is structured as an open access wholesale provider;

- Integration of existing network assets by network operators who are interested in participating in the NBN;

- complementary roles for government, state owned enterprises and the private sector;

- provide a neutral, non-discriminatory platform on which effective competition can take place between multiple services providers; and

- future network build outs be based on a consortium model, or similar multiplayer model.

As indicated in the gap analysis, 86% of the population reside within 10kms of a fibre access node. The initial and immediate challenge is therefore to close this gap in the access network on a cost-effective basis, in conjunction with ensuring open access on a wholesale basis to the fibre backbone network.

The ultimate goals of this policy will only be realised through the deployment of fibre access networks building out from a national fibre backbone. However, the high cost and time required to build fibre access networks demands that wireless access solutions need to be implemented in parallel with the planning and implementation of fibre access networks.

The future of fibre-based access networks and the wireless access network both require access at affordable and non-discriminatory rates to fixed fibre backbone facilities in order to be able to offer attractive end-to-end wholesale services to retail services providers at a quality that can be managed and controlled.

Wireless broadband access network - The speed of deployment of a wireless network is a fundamental consideration to meet the immediate challenge of meeting the targets of this policy. The Ministerial policy directive will consider as a priority how best to ensure that the release of high demand spectrum fulfils these policy objectives and specifically how best the application of open access principles to the assignment of broadband spectrum will be achieved.

The outcome should:

- maximize the efficiency with which spectrum is used and minimize the costs of deployment of wireless broadband capacity with national coverage;

- provide a neutral, non-discriminatory platform or effectively regulated competing platforms providing wholesale access on which competition can take place between multiple services providers at the retail level; and

- pool and share existing network assets;

Enabling conditions for a national wireless network in the high demand bands are:

- access to a portfolio of spectrum that includes adequate and sufficient capacity to be able to provide both capacity and coverage efficiently and economically from dense urban to rural areas;

- use of existing facilities wherever possible (e.g. base station locations, fibre links for backhaul and long distance connectivity) to minimize its costs through infrastructure sharing;

- cost-based, non-discriminatory access regime for service providers, allowing them to compete fairly in the market and recoup their investments; and

- spectrum allocation that is apportioned to ensure the viability of possible new entrants in a fair competitive environment, whilst encouraging competition and taking account of the broader interests of existing licence holders.

Key success factors:

- In an environment in which the level of the Government's direct financial contribution is constrained, attracting enough investment to deploy the network/s and the use or sharing of existing facilities to minimize the deployment costs;

- Realistic coverage targets so the costs do not balloon out of control relative to any conceivable revenue stream;

- Pricing incentives to attract users;

- Support from the highest levels of Government;

- Long term financial horizon for return on investment; and

- Assignment of adequate spectrum to ensure the viability of new entrants while advancing industry competitiveness in infrastructure provision.

Fibre and wireless open access network NBN

The Minister of Communications will be required to consider the need, structure and most viable business model for an open access wholesale national broadband network. Proposed as a voluntary public-private venture it will enable operators and investors who choose to participate in the NBN to contribute their network assets and new investments. This joint venture would be free to contract

the supply and installation of additional fibre optic links and capacity to third parties through competitive bidding. This wholesale-only joint venture would offer services to all operators and service providers within an open access and non-discriminatory framework regulated by ICASA.

The nature of broadband extension, the architecture, business model, investment plan and detailed design of solutions, will be refined through a collaborative road-mapping process. The roadmap development will involve extensive consultation with all relevant role players.

The infrastructure roadmap will need to be flexible and dynamic with a first high level version completed by July 2014. Elements of the broadband and building blocks include planning inputs, activities and outcomes, and some of these are in progress through studies commissioned by National Treasury, Department of Communications and SIP 15 (See Addendum 2 for outline of the roadmap). The detail planning for implementation of any investment vehicle or network is likely to take at least another year to finalise commercially.

Table 3 Building the Digital Future Policy Decisions

Requirement	Action
Open Access Wireless Network	
Creation of an open access wireless network	• The Minister of Communications will consider the feasibility and operationalization of the network • ICASA to assign broadband spectrum in support of the policy
Open Access National Broadband Network Models, design and roadmap towards a fibre rich Open Access National Broadband Network (NBN).	• The consideration and conceptualisation of an open access NBN will be undertaken by the DoC.

14. Realising Digital Opportunity

National capability: There is now considerable evidence to demonstrate the inequality of access and use of ICTs and the ability to deploy them to their full potential lies in the unequal capabilities of individuals and groups such as those living in rural areas, women, the elderly and persons with disabilities.

As ICTs becomes more complex, the ability to optimise their use correlates strongly with education and income. Those marginalised from education and therefore employment and income are most

likely to be marginalised from the type of communications services required to participate meaningfully in a modern economy and society.

The NDP draws attention to the fact that the broadband vision for the country cannot be achieved without rectifying the human capital deficits in the country. "The human development on which all this is premised will have created an e-literate (online) public able to take advantage of these technological advances and drive demand for services. ICT will continue to reduce spatial exclusion, enabling seamless participation by the majority in the global information system, not simply as users but as content developers and application innovators." (NDP 2012)

The key success factor in ensuring social and economic inclusion in the information society and knowledge economy is human development. The DoC will need to work closely with the Departments of Basic and Higher Education. This should be be made a national priority and a key element of the national project of digital inclusion that must be taken into account:

- **Supply side skills**: Address high level skills shortage in sector (public and private) to meet the specialised needs of knowledge production necessary for innovation through the co-ordination between the Department of Higher Education and Training /Department of Science and Technology /DoC including:

    o engineering and technical skills to design, build and operate networks, services and content;

    o software developers, designers, writers, programmers and editors to produce and supply digital content; and

    o   dedicated sectoral training for job creation – call centre operations and management through a targeted youth development programme.

- **Demand side skills**: enable national access and use of ICT through:

    o instilling digital skills through the school curriculum programme – co-ordination between Department of Basic Education/ DoC; and

    o developing a national digital literacy project aimed at those marginalised from ICT services. This will be addressed through national youth employment programmes and a programme such as "each-one-teach-one".

- **Institutional capability:** specialised policy and regulatory training and skills upgrade for staff in sector institutions. This is a particular challenge for individuals in institutions in this

sector due to the dynamic nature of the sector and the requirement for high levels of technical expertise.

R&D and innovation and entrepreneurship: To a significant extent, the socio-economic benefits of broadband are reliant on national R&D capability and on a healthy innovation and entrepreneurship ecosystem. R&D not only creates the basis for technological innovation and entrepreneurship but enhances a country's ability to effectively absorb new technology – this is known as a country's "absorptive capacity". The NDP proposes to invigorate and expand economic opportunity through investment in infrastructure, more innovation, private investment and entrepreneurialism.

The NDP also recognises the role that R&D has played in helping middle-income countries advance to higher income status. This is reinforced in South Africa's Information and Communication Technology R&D and Innovation Roadmap (ICT RDI Roadmap) which represents a plan for coordination and investment in ICT R&D, innovation activities and advanced skills. Broadband is one of the six clusters of market opportunities of the ICT RDI Roadmap and the other five rely on or build on broadband. The ICT RDI Roadmap will be adopted as the guiding document for investment in ICT RDI and the DoC will work closely with the Department of Science and Technology and other role players in implementation of this plan.

In addition the scale and scope of the SKA project will also allow South Africa to develop new expertise in networking and data analytics which will have applications in other fields and in advancing the technology that enables broadband networking and services.

The Department of Science and Technology has established a number of initiatives to mobilise technological innovation for economic growth and the quality of life of all South Africans including:

- the Technology Innovation Agency (TIA) with the objective of stimulating and intensifying technological innovation;

- the "Innovation Towards A Knowledge-Based Economy, Ten-Year Plan for South Africa";

- the National Advisory Council on Innovation (NACI) to advise the Minister of Science and Technology on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives; and

- the **Intellectual Property** Rights from the **Publicly Financed** Research and Development Act 51 of 2008.

Content and Applications: Given the potential impact of broadband on the South African economy, digital content – and the applications that allow that content to be accessed – increasingly becomes an important part of the broadband value chain and thus the broadband policy framework.

Digital inclusion extends beyond the rollout of networks, and is in many ways dependent on the availability of relevant content for local users. The content carried across broadband networks is the crux of the knowledge economy and the information society - without relevant content related strategies in e-government, including e-health, and e-education amongst others, we are unlikely to succeed. In addition, targets related to economic growth and employment will not be reached.

This policy seeks to encourage content development across the digital content in the broadband value chain and by supporting through competitive allocated funds or incentives:

- Traditional content/entertainment industries whose primary activity is the production and sale of content;

- Industries that are not content industries per se, but which in light of convergence and the prevalence of new media, increasingly produce digital content;

- Government content arising from activities in areas such as research, education, health, culture, e-government and smart city strategies; and

- User generated content, such as that created on social media networks, information/newsfeeds (such as Twitter), and platforms such as YouTube.

This policy encourages the development or generation of content through:

- encouraging the production, supply and use of public sector information and content; this includes promoting the digitisation and distribution of public sector information and improving access to public sector content (archives, museums);

- promoting demand for local digital content through increasing public sector efficiency and facilitating public demand aggregation, particularly in rural and remote areas, for example through the development of e-health and online education content and applications;

- Enhancing access to local content, diversity of content supply and use;

- Encouraging the development of e-skills in primary, secondary and tertiary education; and

- Promoting R&D in ICT applications, content and services locally.

The mechanisms to achieve and fund these outcomes will form part of the wider national creative industries strategy to be developed by the Departments of Trade and Industry, Arts and Culture and the DoC. Integration of these initiatives and identification of mechanisms to ensure the filling of current gaps will form part of the roadmap. The wider strategy will include the digitisation of existing local content, for example content in local museums and archives; the promotion of the creation of new local and high quality and locally relevant content and applications – in particular by government and small, medium and micro enterprises, and critically, the promotion of awareness of the availability of local content and applications.

A final mechanism is the promotion of 'open data' by government. Government recognises that it is a key collector and producer of large amounts of data that, when released publicly for reuse, can be used in new and innovative ways. A key roadmap project for the Broadband Council in support of ensuring digital opportunities are met, will be to advise the Minster of Communication on the requirements of an open data policy. Implementation of such a policy would promote free access to different spheres of government data, such as bus timetables, electoral registers, clinic schedules, so that it may bolster economic activity and efficiency, and in particular spur the development of locally relevant content and applications. The Council will need to advise on the necessary privacy policy to protect the rights of citizens, but this is likely to be compensated for by increasing transparency through access to open data.

Affordability and Accessibility of devices: Devices – smartphones, laptops, computers, modems, amongst others - can be a significant barrier to broadband adoption, uptake and usage. This is a particular challenge for low income consumers and for persons with disabilities. The development of low-cost devices by the private sector is encouraged as indicated above. Further, consideration should be given to using the USAF to subsidise broadband devices for "needy persons" as defined in the ECA.

The Department of Trade and Industry has a number of programmes to support entrepreneurialism; small, medium and micro enterprises (SMME) development; industrial development; and trade export investment and localisation. While the development of content and applications at the top end of the value chain represent high-value, relatively low investment and rapid returns, they present immediate opportunities and points of intervention for entrepreneurial support and demand stimulation. The policy does create a context for the development of globally competitive niche ICT related manufacturing industries drawing upon the vast wealth of innovative design, technology development and manufacturing skills available in the country. Local assembly of ICT products will be supported in addition where this makes economic sense. The design and manufacture of products for use within the African continent and which would have export

opportunities to other developing economies will be stimulated and supported. Development and financial support measures will be crafted to grow the local ICT manufacturing industry, creating jobs and reducing the country's dependence on imported equipment. This will be done on a niche basis in the face of the emergence of globally competitive manufacturing giants where local manufacture does not make economic sense. These initiatives will be harnessed to support innovation and entrepreneurship in broadband.

To ensure that we leverage on public and private sector investment and procurement, opportunities to support industrialisation and localisation should be created in support of transformation, employment creation and for the manufacturing sector.

The DoC will work closely with other departments to ensure alignment of the strategies.

Content and Applications	

Requirement	Action
Research	The DoC will ensure that research is done to determine the demand gap, i.e. barriers to broadband adoption to inform additional actions and demand-side targets
National capability	
Requisite e-literacy and skills to use broadband	The DoC will engage with: • Department of Basic Education on integration of ICT into school curriculum. • Department of Higher Education on integration of ICT into post-matric curricula. • DPSA to integrate ICT skills development as an administrative and delivery tool in all government departments. • Department of Labour and SETAs to focus on adult e-literacy, youth development and sectoral programmes.
R&D and innovation and entrepreneurship	
Development of high level skills and critical mass R&D capability to drive innovation	• Enable public and private investment in ICT R&D through implementation of the ICT RDI Roadmap. • Development of professionals and postgraduates in multi-disciplinary programmes to meet the diverse skills requirements within the ICT ecosystem. • Support entrepreneurship and innovation through a coordinated incubator and mobile applications laboratory programme.

Table 4 Digital Opportunity Policy Decisions

Absence of local content, local production and innovation in content and applications.	• Establish a local content/public service content and apps production and innovation fund to incentivise public and private content development that is relevant, in local languages. • Digitise existing government content. • Government departments, private sector and NGOs to promote the awareness of locally developed applications and local content. • DoC in consultation with relevant departments to develop Open Data policy to contribute to broader e-government strategy.
Devices	• DoC will identify mechanisms and ensure implementation of device subsidies for identifiedsegments of the populations.

15. Funding

The scale and scope of the interventions to be undertaken for South Africa to meet its broadband targets requires investment by both the public and private sectors. The high investments required to establish next generation networks have generated different forms of public and private delivery across the globe. Emerging success stories derive from a public-private interplay where the relative powers and resources of both sectors are leveraged to achieve wide-based access to broadband. Such shared allocation of risk can produce the most appropriate incentives for investment, with significant implications for the availability, cost and quality of services.

An environment conducive to private sector investment will be created through enabling policy and regulation and through the certainty and clarity this policy provides.

More specifically, the strategies in this policy will be funded as follows:

- *Digital readiness* will be funded by government through reprioritisation and rationalisation of existing budget allocations;

- *Digital development* will be funded by government through reprioritisation of existing national and provincial budget allocations supplemented by new allocations;

- *Digital future* will be funded through public and private funding sources based on the business plan developed during the road-mapping process; and

- *Digital opportunity* will be funded by government through reprioritisation and rationalisation of existing budget allocations supplemented by new allocations where appropriate.

In addition, the DoC will engage with other government departments to explore funding of aspects of the policy including:

- through synergies with budgets for construction works such as public works and the Neighbourhood Development Partnership Grant as well as investment by the Department of Rural Development and Land Reform; and

- coordination with sector specific agencies and funds such as the Media Development and Diversity Agency (MDDA), relevant Sector Education and Training Authorities (SETAs), the Universal Service and Access Fund (USAF), and the Skills Development Fund.

Furthermore, following further discussions with the National Treasury and other relevant departments the development finance institutions such as the Development Bank of Southern Africa (DBSA) and the Industrial Development Corporation (IDC) will be considered to finance broadband deployment prioritizing rural and underserved areas.

16. APPENDIX 1: South Africa Connect Strategy Summary

The key issues that each prong of the strategy addresses, the intended outcome of each prong of the strategy and indicators of progress are indicated in the table below.

Strategy Intervention	Aspects addressed by the strategy	Intended Outcomes	Indicators
1. Digital readiness	• Institutional capacity • Regulation and administrative bottlenecks • Efficiency and effectiveness • Data and analysis for monitoring and evaluation and policy reformulation • Establishment of the National Broadband Council • Rationalisation of SOCs	• An enabling regulatory and administrative environment that facilitates broadband rollout • Broader public interest preserved • Level playing field with fair market conditions • Dedicated council to advise Minister on policy, planning and implementation	• Autonomy, accountability and efficiency of regulator • Access, price and quality of broadband • Time and cost of network build approval • Degree of disruption due to network build • Environmental impact of network builds • Targets met • Coverage, price
2. Digital development	• Pooling of public sector demand • Public sector networks • Open access to network regulation	• High capacity future-proof network capacity procured for key public sector broadband needs at more affordable rates • Government's on-going operational communications expenditure reduced through upfront capital expenditure • Risk of investment in network extensions for operators reduced through anchor tenancy	• Speed, quality and cost of network capacity at government facilities • Speed of rollout and quality of service • Network reach and price of access • Increased investment by network operators • Take up of services in public sector, schools and clinics.
3. Building the digital future	• Mechanisms for sharing of infrastructure • Coordination of infrastructure rollout • Enhanced use and licensing of spectrum	• Where competition is viable this will produce best outcomes but infrastructure sharing and cooperation to be enabled on network builds to reduced cost • Economies of scale enabled in medium density areas that cannot afford duplication through infrastructure sharing / pooling / swapping • Risk and time to return reduced in low density and low income areas through government investments and guarantees in network extensions	• Network reach • Cost to communicate • Speed, quality and cost of network capacity • Speed of rollout • Increased investment by network operators • Improved penetration
4. Realising Digital opportunity	• Capability and capacity • R&D, innovation and entrepreneurship • Industry development	• Uptake and use enabled through institutional capacity and individual capability and institutional	Demand stimulation through: • Fund local content • support apps to market

Strategy Intervention	Aspects addressed by the strategy	Intended Outcomes	Indicators
	• Local content and applications.	absorption • More equitable access to higher quality government services • Reduce pressure on scarce public sector facilities by moving services online • The benefits of broadband i.t.o. economic growth and enhanced quality of life is realised through relevant content and applications • Promote growth through enabling economic infrastructure and associated industrial development	• e- government services • ICT startups • Registration of ICT related patents • Increase demand side skills: ICT specialists, engineers, lawyers, economists • Number of PhDs in area of ICT • % of GDP spent on R&D • Increase demand-side skills: e-literacy campaign, ICT in school curriculum.

17. APPENDIX 2 - SUMMARY OF POLICY DECISION

Issue	Action
Targets	
Currently low penetration, high prices, poor quality of service	• ICASA to monitor and evaluate performance against the targets and compliance with quality of service standards on an ongoing basis, which are to be reported annually, and on which basis five year targets will be reviewed.

Digital Readiness - Policy decisions

Issue	Action
Market Structure	
Vertically integrated incumbents hindering fair competition	• Minister of Communications to consider the viability and impact on competition of establishing open access national wholesale fibre and wireless broadband networks through the establishment of a multi-player entity.
Institutional arrangements Appointment process, funding arrangements, institutional design, capabilities and competencies produced negative outcomes	• Review of the regulator and universal service agency governance structure, leadership appointment process and funding arrangements to ensure requisite capability to regulate: • open access • spectrum • competition
Enabling infrastructure build	
Hurdles and bottlenecks hampering broadband rollout	• Authority for enforcement of Rapid Deployment Guidelines to be fast tracked and progressed through DoC and SIP 15 in consultation with ICASA. DoC to engage with DEA on the development of a Strategic Environmental Impact Assessment for broadband infrastructure • DoC to engage with DEA on the development of a Strategic Environmental Impact Assessment for broadband infrastructure
Spectrum	
Delay in allocating high demand spectrum	• Ministry to expedite policy directive to release high demand spectrum in ways that ensure efficient use, wholesale access and fair competition. ICASA to assign high demand spectrum
Legal and regulatory framework	
Potential shortcomings in legislative support for Broadband policy	• The Department will undertake a review of all relevant legislation and regulation required to enable implementation of this policy
Analysis, Information and indicators	

Absence of indicators to inform national decision-making and inadequate reporting to UN and other multilateral agencies	• ICASA to prepare information reporting regulations to ensure collection of ITU universal indicators • DoC to work with Stats SA on regular production of ICT satellite account from the national accounts to assess contribution of sector to national economy • DoC to budget for and manage demand survey to comply with UN commitments to Measuring the Information Society
Rationalisation of State-Owned Companies	• SOCs rationalised to contribute more efficiently and effectively to national objective. • The DoC, DPE, Treasury and the PICC to agree on appropriate transitional measures during the process to arrive at the rationalised entities.
Appointment of Broadband Council	• Broadband Council, made up of public and private sector representatives and experts appointed by Minister

Digital Development Policy Decisions

Requirement	Action
Network planning and coordination	
Coordination amongst all relevant role players to ensure optimal implementation and leverage of resources	• DoC will coordinate implementation of the digital development projects to address broadband needs and to ensure sustainable rollout.
Public Sector network Enabling infrastructure for e-government and government administration.	• Requirements analysis, planning, design and mechanism to pool government demand for smart procurement of connectivity required across government and other public sector entities
Schools network	
Urgently enable teaching and learning as well as school administration through broadband.	• Requirements analysis, planning, design and implementation of a national schools network by an appointed agency • Establish institutional capacity in the Department of Basic Education or a relevant agency to enable uptake and use of broadband in the basic education environment
Health Network	
Enable eHealth and National Health Insurance (NHI) for improved health outcomes	• Requirements analysis, planning, design and implementation of a national health network by an appointed agency; • Establish institutional capacity in the Department of Health or a relevant agency to enable uptake and use of broadband in the health environment
Community networks	
Rural and poor populations and underserved areas in general not well served by network infrastructure and services	• Collaborative initiative involving DoC, DRDLR, CoGTA and provinces to identify areas that require community network interventions and implementing such networks.

Free public WiFi at points reached by the public sector networks to stimulate demand by allowing people to access the internet, including government services and to support municipal-wide public wifi networks.	• Integration of public WiFi into the networks identified above • Fast-track implementation of WiFi at public facilities by agencies responsible for these facilities and networks where the capacity already exists

Building the Digital Future Policy Decisions

Requirement	Action
Open Access Wireless Network	
Creation of an open access wireless network	• The Minister of Communications will consider the feasibility and operationalisation of the network • ICASA to assign spectrum in support of the policy
Open Access National Broadband Network Models, design and roadmap towards a fibre rich Open Access National Broadband Network (NBN).	• DoC facilitates process to conceptualise and develop the open access NBN

Digital Opportunity Policy Decisions

Requirement	Action
Research	The DoC will ensure that research is done to determine the demand gap, i.e. barriers to broadband adoption to inform additional actions and demand-side targets
National capability	
Requisite e-literacy and skills to use broadband	The DoC will engage with • Department of Basic Education on integration of ICT into school curriculum. • Department of Higher Education on integration of ICT into post matric curricula. • DPSA to integrate ICT skills development as an administrative and delivery tool in all government

Requirement	Action
	departments
	• Department of Labour and SETAs to focus on adult e-literacy, youth development and sectoral programmes.
R&D and innovation and entrepreneurship	
Development of high level skills and critical mass R&D capability to drive innovation	• DoC will engage with relevant stakeholders to enable public and private investment in ICT R&D through implementation of the ICT RDI Roadmap • DoC will engage with relevant stakeholders for the development of professionals and postgraduates in multi-disciplinary programmes to meet the diverse skills requirements within the strengthen the ICT ecosystem • DoC will engage with relevant stakeholders to support entrepreneurship and innovation through a coordinated incubator and mobile applications laboratory programme
Content and Applications	
Absence of local content, local production and innovation in content and applications.	• Establish a local content/public service content and apps production and innovation fund to incentivise public and private content development that is relevant, in local languages • Digitise existing government content • Government departments, private sector and NGOs to promote the awareness of locally developed applications and local content • DoC in consultation with relevant departments to develop Open Data policy to contribute to broader e-government strategy

Requirement	Action
	60
Devices	• DoC will identify mechanisms and ensure implementation of device subsidies for identified segments of the populations

18. APPENDIX 3 - National Broadband Network Roadmap

Planning of the NBN will be based on a logical planning from work as outlined below:

- Planning inputs
- o Study of global best practice and trends
- o Broadband demand model
- o Mapping current and planned network infrastructure
- o Network build models
- o Economic models

- Planning activities
- o Desktop and other studies
- o Workshops
- o Modelling demand and supply options
- o Economic modelling

- Outputs
- o Shared common vision
- o Future network architecture
- o Timeline
- o Monitoring and evaluation framework

- Outcomes
- o Consensus amongst all key stakeholder in the public and private sector around a vision
- o Roadmap to achieve the vision, facilitating investment by the public and private sector
- o A vibrant ICT ecosystem.
- o Open competitive market, with better co-ordination by state of national resurfaces???, collaboration with private sector for delivery
- o Leverage of public and private resources, energy and capability towards South Africa's Broadband vision
- o Optimising spectrum use through open access