Executive summary

South Africa is aspiring to be a developmental state and, therefore, to achieve this it needs to increase its capacity to innovate and, thereby, fully participate in the knowledge economy. For this to happen, the Gauteng Province will have to be a more significant driver of this very important pillar of the Gauteng Employment, Growth and Development Strategy. One major driver of the knowledge economy is Information and communication technology (ICT). ICT should, therefore, increasingly become a major factor in our developmental agenda through improving service delivery and creating employment.

In this regard, this ICT strategy for the Province has been developed and it is informed by the objective that seeks to create ubiquitous connectivity to every household, Small, Micro and Medium Enterprises (SMMEs), communities, government institutions (schools, clinics, etc.) and citizens across Gauteng. This will, amongst other things, lower the cost of doing business for vital economic players such as SMMEs and increase economic participation by the broader society. In the long run, this will contribute towards reshaping the provincial economy to be more inclusive and broad-based by opening up new opportunities for the marginalised communities. The strategy also takes Green ICT into consideration and expounds on how the province can reduce the carbon footprint whilst at the same time ensuring economic growth and development.

The provincial government will play a collaborative and mobilisation role by accelerating broadband connectivity and bringing ICT services to the metro areas. The provincial government will efficiently coordinate and optimally manage its own investments in network infrastructure through the G-Link initiative and it will further be strengthened by adopting a formal public-private partnership model. Gauteng Provincial Government (GPG) will co-invest with other partners in implementing broadband network extension into non-metro areas whilst creating the demand for and facilitating technology adoption to bridge the digital divide. Therefore, intergovernmental cooperation, public-private partnerships as well as academic linkages will be necessary conditions for the success of this initiative.

ICT alone without innovation is counterproductive. The Gauteng province shall, therefore, galvanise the utilisation of the Innovation Hub to increase the capacity to innovate. This shall be achieved by strengthening interdisciplinary research and development between various stakeholders in the National System of Innovation which includes the Science Councils, academic institutions and industry.

The Gauteng provincial government shall continue to implement e-government initiatives to improve health care, education and social development. Multiple action plans have been developed for the period from 2011-2014 to achieve the provincial economic goals which will entail, increased economic productivity, vast economic networks and increased ICT capacity.
The stated objectives that should be used to measure the success of this strategy are as follows:

1. To provide universal access to broadband (as defined by the national broadband policy) for citizens, business as well as government institutions.

2. To build the Network Infrastructure and Information Super-highway to encourage the development of advanced workforce with better ICT skills;

3. To enhance economic productivity through ICT infrastructure development in order to lower the cost of doing business and increase connectivity for companies especially SMMEs

4. To Increase the ICT skills capacity within the public and the private sectors to create a pool of ICT practitioners and entrepreneurs

5. To improve service delivery by providing high quality ICT services through e-government

6. To build an economic and industrial sector with a focus on ICT, and in particular, software industry

7. To ensure that innovation becomes part of the economic network in Gauteng Province in relation to ICT

8. To reduce the carbon footprint of the province through Green ICT

9. To create employment in the ICT sector

These objectives are all interrelated and to ensure that the objectives are achieved three goals were formulated:

- Productivity,
- Connectivity Networks and lastly,
- ICT skills capacity.

The implementation of the strategy will be monitored and evaluated on an ongoing basis in relation to each objective identified and also the programmes that are developed to achieve the objectives.
# Table of Contents

Executive summary ................................................................. 1  

Table of figures ........................................................................ 4  

1. Introduction ........................................................................ 5  

2. Vision statement ............................................................... 6  

3. The strategic objectives of the Gauteng ICT strategy ........... 7  

4. SWOT analysis .................................................................... 8  

5. Background .......................................................................... 9  

5.1. ICT sector in South Africa and Gauteng ............................ 11  

5.1.1. Gauteng ICT profile .................................................... 11  

5.1.2. Gauteng ICT Diffusion ............................................... 13  

5.1.3. State of ICT infrastructure in Gauteng ......................... 14  

5.1.4. ICT within Gauteng Provincial Government ................. 21  

6. The strategic focus Areas (2011-2014) ................................. 24  

6.1. Productivity ................................................................. 25  

6.1.1. Innovation and Small, Medium and Micro-Enterprises (SMMEs) ........................................... 25  

6.1.2. ICT and the broader economy .................................... 30  

6.1.3. ICT in the Public Sector .............................................. 31  

6.1.4. Green ICT ............................................................... 33  

6.2. Connectivity Networks .................................................. 35  

6.2.1. Gauteng Province Broadband Initiative ....................... 35  

6.2.2. International link network .......................................... 37  

6.2.3. Digital broadcasting .................................................. 38  

6.2.4. Local loop unbundling .............................................. 39
6.2.5. The economics of broadband infrastructure development in Gauteng

6.3. ICT Skills Capacity

6.4. Monitoring and evaluation of the Information Economy and Development

7. Way forward

8. Conclusion

9. Annexure

Table of figures

Figure 1: Gauteng priorities and the ICT strategy

Figure 2: an illustration of the Size of ICT clusters in South Africa

Figure 3: City of Johannesburg Network coverage design

Figure 4: Ekurhuleni broadband network coverage

Figure 5: City of Tshwane coverage map

Figure 6: GPG maturity level in 2007

Figure 7: ICT strategy formulation and implementation approach

Figure 8: Diagrammatic decomposition of the ICT strategy

Figure 9: Enterprise development framework

Figure 10: Stakeholders for a successful innovation cluster

Figure 11: GPG ICT strategic drive

Figure 12: Broadband Ecosystem

Figure 13: Illustration of the orchestrated G-Link Network

Figure 14: Emerging undersea cable system for Africa (South Africa)
1. Introduction

Information and Communication Technology (ICT) provides a platform for an economy to unlock new economic opportunities for growth and development. ICT includes hardware, processes, and systems that are used for storing, managing, communicating and sharing information. These tools can be either manual or computerised (digital). This definition of ICT extends to older non-digital devices such as analogue radio and television. Beyond hardware, i.e., computers, wireless devices, telecommunications towers, etc. ICT include computer software and associated systems such as management methods and practices, or the so-called application layer.

The New Growth Path has identified rapidly extending access to and use of ICT based on a continual and rapid reduction in broadband costs, as part of the technology policy. In this light, Gauteng ICT Development Strategy aims to foster realisation of the potential value that information and communications technology can bring to employment, growth and economic development in Gauteng. It derives its foundations from the Gauteng Employment, Growth and Development Strategy which focuses on the need to resuscitate industrial development through appropriate policy measures, while also recognising the economic value of the services and innovation input sectors.

One of the main objectives of ICT policies and strategies is to ensure the greatest possible diffusion of ICTs, commensurate with national needs, ambitions, specificities and concerns. Thus, information and ICT policies must take into account local, national and international issues, as well as sectoral concerns. The strategy notes the trend for the services sector, in particular the ICT services sector, to grow in tandem with development in the manufacturing and construction sectors. The strategy, therefore, is aimed at facilitating the contribution of ICT to economic participation, while also lowering the cost of such participation, with the particular focus on reducing the communications barriers for small and micro-enterprises.

The document is structured as follows: Section 2 provides the vision statement for the Gauteng provincial government (GPG) knowledge economy which is followed by the strategic objectives in Section 3. Section 4 provides the SWOT analysis for ICT development in the province. Section 5 gives a brief background to the strategy and Section 6 outlines the strategic areas that will become the focus for GPG in order to achieve the identified strategic objectives and recommends action plans that have to be undertaken for the vision to be realised. Section 7 gives an ideal institutional arrangement for the implementation of the strategy. And lastly, Section 8 concludes the strategy.

---

2. Vision statement

‘A fully fledged knowledge economy in Gauteng wherein the information society harnesses the evolution of ICT and ensures that knowledge creation, sharing as well as information manipulation become the engine for economic growth and development’

Information society together with ICT forms the basis of a knowledge economy. The information society is defined as “a society in which the creation, distribution, diffusion, use, integration and manipulation of information is a significant economic, political, and cultural activity.” It is evident from the definition that citizens who are regarded as part of the information society have to be prepared through education in schools, skills development programmes and apprenticeship.

For the information society to perform its functions it requires information and communication technologies. It is through these technologies that information is transmitted and made available to citizens, business and government universally. Broadband infrastructure is required for this to become a reality. The Gauteng Provincial Government has set itself in a path to develop Gauteng into becoming a knowledge society. Thus, it is investing in both comprehensive skills development and broadband infrastructure in the Province.

The vision is, therefore, interpreted through the following Goals:

**Goal 1** Productivity: To create a heightened environment for ICT-enabled economic activity amongst large firms and SMEs; for electronic government services to citizens and business; and for support measures for ICT research and development (R&D).

**Goal 2** Connectivity Networks: To foster the diffusion of ICT fixed and mobile broadband infrastructure and the connectedness of SMMEs, schools and households, in ways that contribute to reducing the cost of communications and, therefore, of economic participation.

**Goal 3** ICT skills Capacity: To address the demand for skills in the broad ICT infrastructure and ICT services sectors, as well as in the society at large; and to provide for online learning in every primary and secondary school classroom; as means to increasing South Africa’s future competitiveness and laying the foundation for ICT innovation and sector development.
3. The strategic objectives of the Gauteng ICT strategy

1. To provide universal access to broadband (as defined by the national broadband policy) for citizens, business as well as government institutions.

2. To build the Network Infrastructure and Information Super-highway to encourage the development of advanced workforce with better ICT skills;

3. To enhance economic productivity through ICT infrastructure development in order to lower the cost of doing business and increase connectivity for companies especially SMMEs

4. To Increase the ICT skills capacity within the public and the private sectors to create a pool of ICT practitioners and entrepreneurs

5. To improve service delivery by providing high quality ICT services through e-government

6. To build an economic and industrial sector with a focus on ICT, and in particular, software industry

7. To ensure that innovation becomes part of the economic network in Gauteng Province in relation to ICT

8. To reduce the carbon footprint of the province through Green ICT

9. To create employment in the ICT sector
4. SWOT analysis

Strengths

- Ability to source funds
- Vast private and public sector investment on ICT infrastructure
- Numerous institutions operating in the ICT space
- Growing number of SMMEs
- Large municipal investments on broadband networks
- Growing knowledge economy in the province
- Numerous academic institutions
- Growing young population
- Political will
- Broadband subscriber growth continues at a strong pace.
- High penetration of mobile communications

Weaknesses

- Shortage of ICT skills nationally
- Skills asymmetry in private/public engagements that favours the private sector
- Lack of broadband connectivity to businesses and households
- High communications costs
- Lack of internet connection to a large percentage of schools and health facilities
- Low maturity of e-government in the province
- Slow pace of implementation of programmes in government
- Low innovation index in the province compared to other regions of same economic size

Opportunities

- Partnerships with institutions for skills development
- Partnerships for SMME development
- Partnerships for infrastructure development
- Growing number of international communication links through broadband cables
- Developing ICT products for the African market

Threats

- The regulatory framework
- Societal resistance to change

The strengths and the opportunities will be used to overcome the weaknesses and the threats.
5. Background

Gauteng province has formulated the Gauteng Employment, Growth, and Development Strategy (GEGDS 2010-2014), with several pillars one of which is innovation and knowledge economy. Knowledge economy is defined as the use of knowledge to derive economic benefits. One of the key drivers of the knowledge economy is ICT. In addition, Gauteng Vision 2055, which takes its mandate as one of the 11 Strategic Pathways of the Gauteng City Region (GCR) Road Map, aims to set the direction for provincial economic development for the long term. In this regard, Gauteng wants to become a Global City Region (GCR) to enhance Gauteng’s global competitiveness. GCR requires the capacity and ability to manage a modern knowledge economy, innovation and research and development. It is within the context of the knowledge economy that an ICT strategy is being put forward to assist in making the knowledge economy in Gauteng a reality. The ICT strategy is informed by the strategic aims encapsulated in the GEGDS and Government priorities which are a subset of the Vision 2055 as illustrated in Figure 1.

ICT is a sector that cuts across all the other sectors of economic activity which includes banking, manufacturing, agriculture, tourism and many others. It is, therefore, envisaged that the role of ICT in Gauteng’s future development will be to:

- Bridging the digital divide
- Enabling government service delivery in areas such as health, education, safety and security, social development, etc.
• Strengthening economic development to ensure increased competitiveness and productivity
• Creating a productive and competitive economy by removing barriers to entry for economic participants and lowering the cost of doing business
• Enabling virtual mobility for economic actors which will reduce the carbon footprint in the province
• Encouraging innovation, research and development to strengthen the knowledge economy

The Gauteng ICT strategy locates the role of ICT within three interrelated goals namely, Productivity, Connectivity Networks and lastly, ICT skills capacity. In the pursuit of these goals monitoring and evaluation of the information economy and e-Development will be required to understand how to move forward at each and every step of the implementation of the ICT strategy. The achievement of these goals will lead to the development of new businesses, participatory e-government and new ways of educating society. In essence, Gauteng aims to exploit the convergence of the Internet, broadcasting, telecommunications and mobile technologies with computer software to create a networked society from citizens, businesses and government. Simply put, GPG seeks to create an inclusive knowledge economy.

The current costs of communications in South Africa are high compared to other countries of similar economic setting and as a result, create a barrier for businesses in particular SMMEs and citizens to participate in the knowledge economy. Hence, to create a society that has access to ICT will require an investment in broadband infrastructure by the Provincial Government which will lead to the lowering of the cost of communications. In this regard the Gauteng metro municipalities, Johannesburg city, Tshwane and Ekurhuleni have already invested in broadband infrastructure. In addition, the private sector in Gauteng has also invested in vast broadband infrastructure. However, the fact that the cost of communications has not come down demonstrates that more work still needs to be done to consolidate existing infrastructure and to further make more investments for the benefit of the Gauteng economy.

ICT usage by the business community will contribute to efficiencies thereby leading to higher productivity. For example, ICT can improve supply chain management in the manufacturing sector, can lead to efficiencies in the services sector through the speed and security of electronic transactions, and can increase business sophistication in the SMME sector through ease of access to business intelligence and markets. SMMEs contribute a significant proportion of the Gauteng Gross Domestic Product (GDP) and also create a large number of jobs. Two-thirds of the more than 1 million SMMEs in the local economy are engaged in small-scale trading or the sale of goods and are survivalist businesses. ICT can open up new opportunities for these SMMEs and also more SMMEs will emerge in the ICT industry leading to job creation and more productivity in the province.

The provincial government has endorsed and funded three large-scale undertakings, namely the Gauteng online schools programme, the e-Government programme (e-Government Blueprint) and the G-Link broadband infrastructure project. There are other e-government initiatives that have been implemented at departmental level such as the Gauteng Emergency Medical Services which is under the Department of Health and the SAPS2 Gauteng call centre. The efforts to put together an e-Health system have not been successful but much work has been done to introduce ICT in healthcare facilities. These efforts demonstrate the willingness of the Gauteng Provincial government to create a knowledge economy. The maturity level of the GPGs e-government is still very low and therefore, requires attention and more work.

---

2 South African Police Services
Currently, there is a shortage of ICT skills in South Africa nationwide. In order to achieve high levels of technology adoption and socio-economic value, the range of skills and capacities required for information economy evolution include ICT user skills; the capacity for operating and maintaining systems and services; research skills for designing new applications of hardware and software; and project management skills. The population as a whole will need to develop the capacity to utilize a range of computing devices and Internet-based services. The society will have to acquire these skills at a faster pace through regular use of ICT in the course of living, schooling and working.

5.1. ICT sector in South Africa and Gauteng

The Department of Trade and Industry has identified ICT and electronics among 11 priority sectors that have the highest growth and investment potential in South Africa. ICT is a growing industry in South Africa and its market has grown to R179 billion in 2010 and it is expected to grow to R187 billion in 2011 and to R250 billion by 2020. ICT is one of South Africa’s leading sectors and contributes about 7% to the country’s GDP. South Africa has nine provinces, three of which have thriving ICT industry clusters as illustrated in Figure 2:

- Gauteng which accounts for 57% of all ICT firms
- Western Cape (Cape Town), which accounts for 17%; and
- KwaZulu-Natal (Durban and Pinetown), which accounts for 8%

The three clusters have the potential to grow and make South Africa a technological hub of the African continent. In this regard the Western Cape has created Silicon Cape modelled on Silicon Valley in the United States of America and Bangalore in India with the aim of fostering technology innovation. Gauteng, as the largest cluster and the largest commercial centre in Africa, has the potential to lead in innovation and research in ICT.

5.1.1. Gauteng ICT profile

Gauteng accounts for the 57% of the country’s ICT industry and it is the largest cluster in SA. ICT sector in the province contributes more than 6% to regional GDP. Gauteng has two ICT sub-clusters:

- Johannesburg and
- Tshwane

---

1 This was taken from Communication Minister Roy Padayachee on the Department of Communications’ 2011 budget speech debate in parliament.
3 This was taken from a report published on Gauteng Companies which is published by Global Africa Network found at http://www.gautengcompanies.co.za/pls/cms/itaccout.secout_prov?p_sid=14&p_site_id=128
Gauteng has all the elements required to create a large and successful ICT innovation cluster in South Africa. World class institutions of higher learning, as the largest province economically it has the Capital, young talented people flocking from all parts of South Africa, Incubation centres, a large market and the largest number of ICT multinationals in the whole of South Africa. All that is needed is a coordinated way of bringing these elements together to create an innovation ecosystem. The profile of these two clusters is illustrated in Table 1:

**Table 1: Profile of the two Gauteng ICT clusters**

<table>
<thead>
<tr>
<th>Innovation/ICT cluster</th>
<th>Education/ Research Institute</th>
<th>Multinationals</th>
<th>Other Benefits</th>
</tr>
</thead>
</table>
| Johannesburg           | Wits, UJ, JCSE, USAASA        | MTN, Vodacom, Microsoft, Oracle, hp, Cisco, IBM, Novell, Dell, LG, Sahara, SAP, LG, Alcatel, Unisys, Sahara, Mustek, Intel, BCX, and many more. | • Large number of graduates  
• Most advanced infrastructure  
• Gauteng is a major commercial centre  
• Access to capital |
| Tshwane                | UP, TUT, Innovation Hub, CSIR, Meraka Institute, TIA, UNISA |                  |                |
These two clusters currently serve the following key segments:

- Telecommunications services
- managed (outsourced) services
- e-Security
- biometrics and software development and
- Document management
- Web design and development
- Packaged application outsourcing

Innovation and start-up ventures cannot exist without the right environment for them to flourish. It is, therefore, imperative for the Gauteng ICT strategy to look into creating an attractive environment for entrepreneurs so that the current segments of ICT services offered in Gauteng can be rapidly expanded.

The South African Venture Capital Association, SAVCA, defines venture capital as follows: Funding (predominantly equity funding) of high growth potential businesses, whose growth potential is typically achieved through radical global scaling, and which normally have technological or other innovative concepts at their core. It is thus often the case that software-based or ICT businesses meet the needs of venture capital investments, as they have the potential to achieve all that is embodied in this definition\(^6\). South Africa has few early stage investors. During the Research and Development stage of a project, angel investors and government funding agencies such as the NRF (National Research Foundation), the DST (Department of Science and Technology) and a TIA (Technology Innovation Agency) play a role.

It is important that GPG supports start-ups to ensure that they overcome the barriers to venture capital funding. This means that the start-ups have to be innovative enough differentiate their products, develop products for the global market and they need to be given the business management coaching needed to sustain a start-up.

### 5.1.2. Gauteng ICT Diffusion

A study called OECD territorial review: Gauteng Telecommunications and ICT Sector\(^7\) was conducted in 2010 and it was found that in Gauteng there was a high penetration of mobile communication with mobile subscribers per 100 inhabitants estimated at 96% in 2007 which is not too far behind compared with OECD countries. The lag in penetration levels is mainly attributed to the greater number of very low-income households in South Africa. Furthermore, households were found to have more access to mobile phones, sitting at 80.3%, than to fixed line

\(^6\) Alexandra Fraser, Venture Capital Funding: Barriers to deal flows and globalization of investments, IEEE Computer Society of South Africa and Cape IT initiative, 16 march 2010

\(^7\) OECD territorial review: Gauteng telecommunications and ICT sector 2010
phones 24.4% in 2007. The penetration of fixed line communication has been on the decline as people prefer mobile communication for variety of reasons including the desirability of mobile communications, continued high fixed line prices, and the relative ease of procuring a mobile phone as compared to the still lengthy waiting periods for a landline phone. Households with Internet access is only 11.7% (high in Metros and low in district municipalities). Only 29% of all internet users have access to broadband. Lack of affordability is a key reason for low Internet connectivity.

Currently, City of Johannesburg metropolitan municipality has the highest proportion of households with Internet access (14.2%), while Westonaria local municipality has the lowest proportion (2.8%). It is a signal that shows that in addition the lack of affordability in non-metro municipalities there is also a shortage of infrastructure to deliver broadband internet. It is, therefore critical for the provincial government to find ways of delivering infrastructure that will lead to lowering the cost of communication so that a demand for broadband services can be created.

5.1.3. State of ICT infrastructure in Gauteng

As the technology evolves and bandwidth increases, the scope for broadband to act as an enabler for the transformation of the economy has increased as it affects an increasing number of sectors and activities. Direct effects result from investments in the technology and from rolling out the infrastructure. Indirect effects come from broadband’s impact on factors driving growth, such as innovation, firm efficiency, competition and globalisation. Broadband facilitates the development of new inventions, new and improved goods and services, new processes, new business models, and it increases competitiveness and flexibility in the economy. Broadband refers to the capacity to deliver high-speed Internet access. Service providers can use an array of technologies to offer broadband services—cable modems, digital subscriber telephone lines (DSL), wireless, satellite, fibre-optic cable to the home—but all share the capability to deliver large amounts of data.

One of the most important dynamics in developing ICT and building the Information Society in Gauteng is providing an advanced ICT network infrastructure that is characterized by a high performance broadband network and extensive penetration that covers all areas in Gauteng without exception. Infrastructure accessibility should be of a reasonable cost that corresponds to the purchasing power of individuals, in a way that enhances public accessibility in remote areas where the means of access to infrastructure and services are lacking. This can be achieved by establishing public access centres, such as community centres, post-offices, schools, libraries and archives.

Expanding of ICT infrastructure in Gauteng should improve its status according to international indicators of e-readiness. The fast-evolving nature of ICT makes it important for Gauteng to take rapid changes into account to be able to keep up with the global development in the coming years. By rapidly expanding of accessibility to infrastructure in Gauteng, the ability of individuals to access, process, and exchange information on the national and international levels, for the purpose of promoting socio-economic, political, educational, cultural, scientific, academic and health activities will be increased. Gauteng has a low broadband penetration, as mentioned above, and consolidation and new investments are required to provide universal access to broadband in the province.

8 OECD Broadband and the economy, 2008
Gauteng ICT infrastructure is dominated by both private and public institutions. The private companies are divided into fixed line and mobile companies. Fixed line includes Telkom, Neotel and Dark Fibre Africa. The mobile sector is dominated by MTN, Vodacom and Cell C. These companies have invested in vast broadband infrastructure in Gauteng especially in Metropolitan municipalities. Public institutions that have broadband infrastructure in the Gauteng province include, Johannesburg Metro, Tshwane Metro, Ekurhuleni Metro, Infraco, Sentech, SITA and GSSC (Gauteng on Line). Table 2 shows the areas that are covered by the private companies in Gauteng.

Table 2: Fixed line broadband companies coverage

<table>
<thead>
<tr>
<th>Company</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telkom</td>
<td>Johannesburg, Tshwane, Vereeniging, Vaal and East rand</td>
</tr>
<tr>
<td>Sentech</td>
<td>Johannesburg, Tshwane</td>
</tr>
<tr>
<td>I-burst</td>
<td>Johannesburg</td>
</tr>
<tr>
<td>Neotel</td>
<td>Johannesburg, Tshwane, Ekurhuleni</td>
</tr>
</tbody>
</table>

a. City Of Johannesburg

The city of Johannesburg in partnership with Ericsson is provisioning broadband infrastructure in the area covered by the municipality. By 2010 the City of Johannesburg had already spent R250 million in the trenching and deployment of just over 300km of fibre in nine core rings that link the South (Soweto) to Midrand. Over 600km of fibre and another R600 million was still outstanding. The network connects areas such as Midrand, Alexandra, Braamfontein, Jabulani Mall (Soweto), Randburg, Roodeport, Linasia, Martindale, Proton house, Finchwater Tower, Kensington, Sandton, Diepsloot, Florida, Bryanston, Honeydew, Enerdale, Diepkloof, Orange Farm, Meadowlands, Orlando, Princess Crossing, Horizon water tower, witoortjies water tower, Observatory Water Tower, South Hills Water Tower, Crown Gardens, Drieheoek, Zondi and Protea Glen. The areas that are covered are illustrated diagrammatically in Figure 3.

b. City of Tshwane

The Ekurhuleni metro encompasses the disestablished councils of Alberton, Benoni, Boksburg, Kempton Park, Germiston, Edenvale and Lethabong. The broadband infrastructure also covers all these areas with point of presence in Benoni, Nigel, Duduza, Alberton, Boksburg, Kempton Park, Sunny Ridge, Tembisa, KwaZulu, KaTema, Spruitview, Voslorus, Dawn Park, Palmridge, Mayersdal, Brakpan, Northmead, Geluksdal, Palm Brink and Samme. Figure 5 gives the deployment approach that was taken by the Ekurhuleni Metro in rolling the broadband infrastructure.

c. Ekurhuleni
Metro The City of Tshwane Metro Municipality (CTMM) covers an extensive municipal area (3,200 km²), stretching for almost 60 km east/west and 70 km north/south. The municipal area includes Pretoria, Centurion, Akasia, Soshanguve, Mabopane, Atteridgeville, Ga-Rankuwa, Winterveld, Hammanskraal, Temba, Pienaarsrivier, Crocodile River and Mamelodi. The area is inhabited by approximately 2.2 million people. The broadband network that the city is rolling out covers all these areas with point of presence in Temba, Olivenhoutbosch, Centurion, Wonderbloom, Mamelodi, Soshanguve, Rosslyn, Pretoria Central, Atteridgeville, Laudium, and Watloo. Figure 4 gives a clear picture of the deployment approach that was taken by the city of Tshwane in rolling the broadband infrastructure.

d. Sentech

Sentech also has coverage in Tshwane and Johannesburg Metros. In Johannesburg it covers areas such as Bedfordview, Brixton, Carlton City Centre, Cresta, Fourways, Halfway Gardens (Allandale Road), Helderkruin, Honeydew, Hurleyvale, Hyde Park, Horizon View, Johannesburg Airport, Killarney, Linksfield, Marlboro, Northcliff, Randburg, Rosebank, Sandton, Strydompark, Woodmead, Midrand, Aasvoelkop, Morningside, Wendywood, Honey Hills, Kempton Park.

Cisco Advisory Services, Review of Service Providers for Blue IQ, 16th July 2007
In Tshwane it covers Centurion Techno Park, Elardus Park, Hennopspark, Kilnerpark, La Montagne, Lukasrand, Menlopark, Pretoria Central, Rooihuiskraal, Clubview, Sunnyside, Brooklyn, and Waterkloof Ridge.

e. Gauteng online

The Gauteng Online (GOL) programme was initiated in 2002 through the Gauteng Department of Education and implemented by various services providers. In April 2007, the GoL program was transferred from the Gauteng Department of Education (GDE) to the Gauteng Department of Finance (GDF, previously known as the Gauteng Shared Services Centre (GSSC). The key objectives of the programme are to create a sustainable school based e-learning environment where learners maximize their educational experience as follows:

- To provide every learner in public schools with an e-mail address
- To provide every learner in public schools with free internet access
- To implement a technology enabled learning environment

The SMM Telematics Consortium (SMMT) was appointed as a service provider in December 2007 by the GDF to provide the Turnkey solution, “One-Stop” vendor for all GOL implementation deliverables for a period of 5 (five) years.

The GoL wide area or access network consists of the delivery of 121 local service nodes (LSN) that provide backhaul to the Central Services hub using satellite technology. To date (107) one hundred and seven such local service nodes have been delivered.

Figure 4: Ekurhuleni broadband network coverage

---

10 Ibid. 7
Figure 5: City of Tshwane coverage map
f. Gaps in infrastructure in Gauteng

In district municipalities there is limited to none of the fixed line broadband coverage besides the mobile broadband coverage and these are:

- Sedibeng District Municipality
  - Lesedi Local Municipality
  - Emfuleni Local Municipality
  - Midvaal Local Municipality
  - West Rand District Municipality
- Metsweding District Municipality
  - Mogale City Local Municipality
  - Nokeng Tsa Taemane Local Municipality
  - Kungwini Local Municipality
  - Westonaria Local Municipality
  - Randfontein Local Municipality

In these municipalities the digital divide is growing and the population is getting more and more excluded from the mainstream economic activities.

The state is still a significant player in the sector, through shareholdings in Telkom, Sentech and Infraco (through Eskom and Transtel), and even more so if one includes the broadcasting and IT sectors. However, there has been some movement in state ownership with the sale of Telkom’s unutilised subscription broadcasting services, Telkom Media, which was granted a licence in 2008. Telkom also sold a 15% stake in Vodacom to Vodafone and will distribute the remaining 35% to its shareholders.\(^{11}\)

The contribution of communications services to the GDP in 2008 was 2.8% which is below other lower middle income countries. Pricing has been a big issue in South Africa for a long while now. Two inquiries on pricing were held over the last three years, with no real policy change to signal a concern. In 2009, the Department of Communications commissioned an international peer benchmarking study which involved detailed comparative reviews of tariffs, usage, access and quality of service in five nominated peer countries. The five countries selected for its relevance to the South African market were Chile, Korea, India, Brazil and Malaysia. The study focused on aspects of fixed, mobile and data services. It was found that South Africa has some of the highest rates amongst its peer group.\(^{12}\)

\(^{12}\) Ibid 11
A broadband infrastructure investment in the province should look into achieving the following:

- Bringing down the price of communications
- Creating redundant bandwidth to attract investments in other areas of the economy such as Business Process Outsourcing (BPO).

In metropolitan municipalities which have put in place programmes for broadband infrastructure rollout the challenge is to get these programmes to create an interconnected whole. This means that the designs of the respective municipal networks should be optimized to interoperate in a way that will deliver value for the Gauteng province as a whole.

1.1.1. ICT skills in South Africa and Gauteng

The shortage of ICT skills or e-skills is a global phenomenon that is not unique to South Africa. However, South Africa suffers from shortage of skills in most of the professions especially in the sciences. In order for South Africa to take advantage of the knowledge economy it will require to increase the skills pool by a significant percentage. In an effort to begin to address the issue of ICT skills, the Department of Communications (DoC) has conducted a study on ICT skills in South Africa. According to the report of the study on the ICT skills conducted by the Department of Communications, the ICT skills have been categorized into three areas as follows:

- ICT skills needed for modern life outside the workplace: digital literacy/e-literacy
- ICT skills in the work place to respond to changes in business processes and industry structures: e-skills
- Technical skills for the ICT specialists needed in ICT and related jobs user industries

For Gauteng citizens to actively participate in the information society and the knowledge-based economy, ICT skills are the key. Every citizen, therefore, should be encouraged to acquire ICT skills to benefit from the new opportunities created by these technologies in private business and new professions. Special attention needs to be paid to opportunities that ICT provide for women to work and contribute to social and economic activities. In addition, consolidation of the utilization of ICT at all stages of education, training and human resource development, taking into consideration the special needs of the disabled, deprived, underprivileged, and destitute groups is important.

The widespread diffusion of ICT creates a persistent need for specialists and experts at all levels, and makes the issue of institutional capacity building a top priority. The limited ratio of technologically qualified people in Gauteng makes it necessary to take immediate and effective steps towards their development to achieve a greater skills pool. Special attention should be paid to human development to create intellectual and creative human resources, and to individual capability building at all levels in ICT. This will require a promotion of local capacity in R&D as regards ICT, and to establish strategic partnerships with institutions from countries well-advanced in R&D.

In a further attempt to deal with skills shortage, in 2007 a presidential e-Skills Council was formed and in September 2008 the e-Skills Council submitted a comprehensive report, arguing that a national programme is urgently required to achieve a large scale improvement in the supply of those ICT skills for which there is a need in industry, but also in society generally.
In 2009, 75% of the 157 businesses surveyed by online newspaper ITWeb and the University of the Witwatersrand’s Johannesburg Centre for Software Engineering said the ICT skills shortage was either having a major impact on their business or was affecting their viability, and in 2008 all 115 of the South African companies surveyed made this claim\textsuperscript{13}. The survey’s results also showed that if extrapolated across the whole sector SA needs about 72000 more people with ICT skills. Almost 75% of the companies were located in Gauteng, 60% were privately owned, with further 15% being South African-listed companies. The study analysis showed that Business Intelligence/Knowledge Management was the top-ranked priority, followed by Application Development and Software as a Service. These were supported by Service Oriented Architecture, Web Development and Mobile Computing.

But, between 1996 and 2007 SA produced 17705 information and communication technology degree and diploma graduates, while in 2005 only 823 graduated with a degree in electronic engineering, and only 596 were awarded a computer science degree\textsuperscript{14}. In 2006 these numbers were 916 and 540 respectively and in 2007, 928 and 502. While the ICT skills output from institutions has been on the increase it is still not sufficient to meet South Africa’s needs. It is evident that South Africa and Gauteng as the largest ICT cluster will require a concerted effort to create ICT skills.

The shortage of skills in South Africa pushes ICT companies to outsource, inflate salaries, and recruit from abroad which leads to the domination of the industry by foreigners. ITO is the largest outsourced service globally at an estimated value of US$132 billion in 2007 and still growing. Gauteng’s ITO revenues will reach R 1.3 Billion in 2012 from R 660 million in 2007 provided there are skills\textsuperscript{15}. The low number of pupils who passed Grade 12 with mathematics is also a worrying trend that will lead to a further shortage of ICT skills.

5.1.4. ICT within Gauteng Provincial Government

ICT, if properly deployed and used, can improve public service delivery. GPG has departments and different levels of government that have systems that do not talk to each other. GPG requires a single, holistic telecommunications infrastructure for the whole province. It should replace the existing approach where each government entity designs, develops, installs and maintains its own network – an approach which has led to fragmented and expensive service delivery. As well as reducing operating costs and complexity, the single network opens up new opportunities for information sharing and increasing public participation in governance.

The adoption and wider use of shared services in the public sector was an important step taken into making government more effective. By rationalising HR, finance and procurement delivery and making better use of current technology such as shared enterprise resource planning (ERP) platforms, major savings can be generated. The current systems used for shared services need to be capacitated technically and from a human resource perspective so that they can be optimised.

GPG has an e-government blueprint which was developed in 2007\textsuperscript{16}. For government, the progression of capability can be represented in four distinct but complementary stages, known as an e-government maturity model (see Figure 6). The stages of maturity are information, interaction, transaction and transformation. Figure 6 also shows the

\textsuperscript{13} Adrian Schofield 2009-ITWEB-JCSE skills survey
\textsuperscript{14} Ibid
\textsuperscript{15} Frost & Sullivan, Gauteng BPO marketing strategy, 2009
\textsuperscript{16} Gauteng Provincial Government E-government blueprint, March 2007
maturity level of Gauteng Provincial Government (GPG) assessment done in 2007. GPG maturity has not changed although there are programmes such as Gauteng schools online which will connect 1600 schools by the end of 2011 and the Gauteng Online portal which has many challenges but making progress.

![GPG maturity level in 2007](image)

E-government can be subdivided into four different portfolios shown at the table 3. Demand for online public services and expectations of service quality continue to increase. Citizens and businesses expect the same levels of access and personalisation from public services as they receive from leading private sector organisations such as banks and airline companies. For GPG to make real progress in responding to this increased demand there needs to be a change in processes for interacting with government and also change in the infrastructure to recognise the clear shift to an online world.

Processes are not standardised and therefore software licensing costs are high. GPG departments largely operate as silos and as a result processes such as payment systems that can be standardised across all departments and levels of government are replicated which increases costs for government. In addition, more can be done to integrate GPG ICT approach so that there can be exploitation economies of scale when procuring software and hardware. This can contribute in reducing the cost of ICT for GPG.

Open source software usage is low. Apart from the Gauteng online schools project that has adopted open source software (OSS) for monitoring the usage of the facilities, other areas in government are not using OSS. There are many areas which are not very critical that can start adopting OSS in government and this can significantly reduce licensing costs for GPG.
### Table 3: E-government portfolios

<table>
<thead>
<tr>
<th>Government to Citizens (G2C)</th>
<th>Government to Business (G2B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• enquiring about and paying traffic fines; listing government services offered,</td>
<td>• tendering process,</td>
</tr>
<tr>
<td>• grade 12 and education results, past matric papers, schools search and online registration,</td>
<td>• remittance advice and online procurement policies and procedures, as well as</td>
</tr>
<tr>
<td>• e-learning</td>
<td>• preferential supplier registration, and</td>
</tr>
<tr>
<td>• online learners and drivers booking system, vehicle license enquiries,</td>
<td>• Trading license application and renewal.</td>
</tr>
<tr>
<td>• animal disease monitoring,</td>
<td>• Online support portal for SMMEs</td>
</tr>
<tr>
<td>• schedules of public transport</td>
<td></td>
</tr>
<tr>
<td>• Bana Pele portlet,</td>
<td></td>
</tr>
<tr>
<td>• e-grants and e-vital such as identity documents, birth registrations and passports</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Government to Government (G2G)</td>
<td>Intra-governmental: Internal efficiency and effectiveness</td>
</tr>
<tr>
<td>• schools/institution management system,</td>
<td>• e-recruitment,</td>
</tr>
<tr>
<td>• Share and integrate provincial and municipal data</td>
<td>• online HR policies and procedures,</td>
</tr>
<tr>
<td>• fleet management system,</td>
<td>• leave balances and application,</td>
</tr>
<tr>
<td>• e-legislation(rules),</td>
<td>• managers’ self service,</td>
</tr>
<tr>
<td>• e-records management,</td>
<td>• electronic purchasing catalogues,</td>
</tr>
<tr>
<td>• e-learning, and</td>
<td>• e-learning/training,</td>
</tr>
<tr>
<td>• Provincial Geographic Information System</td>
<td>• supply chain management</td>
</tr>
<tr>
<td>• disaster response management</td>
<td></td>
</tr>
<tr>
<td>• intelligent transportation</td>
<td></td>
</tr>
</tbody>
</table>
6. The strategic focus Areas (2011-2014)

The approach taken in developing the strategy was that of looking at the Gauteng needs and if the current state of ICT can be able to meet needs. The current state of communications infrastructure, the state of the ICT industry in Gauteng, the levels of internet penetration and the level usage of ICT within the Gauteng Provincial Government were assessed and gaps were identified. These gaps were then used as basis for the formulation of the ICT strategy. The approach taken for the strategy formulation and implementation is illustrated in figure 2 below.

The gaps that were identified were then segmented into goals that the strategy uses in order deal with the various gaps. These goals are Productivity, Connectivity Networks and ICT Skills capacity– these are important goals that will sustain Gauteng’s growth and development in the ensuing decades. Advances in connectivity networks and ICT skills capacity can contribute to greater participation in economic activity, thus lowering unemployment and achieving greater social inclusion. The next phase of the evolution in ICT diffusion, sophistication and value will be incremental, following the emergence of information infrastructure and new electronic media and their integration into the economy. While ICT investments are typically large-scale for operators and governments, they are nevertheless cumulative, unlike the significantly more risky investments in new knowledge fields such as third generation biotechnology and nanotechnology.

ICT as an enabler of transformation across sectors is mainly carried out through ICT components in projects of different sectors (e.g. Education, Health, Social Protection, Agriculture and Rural Development, Urban Development, Infrastructure, Environment, Social Development, Public Sector Management and Governance, Economic Management, Finance and Private Sector Development, etc.). It is, therefore, critical that going forward the strategy is socialized meaning that all the stakeholders which include, Gauteng government departments, private sector and society at large is given an opportunity to engage the strategy. This will help in the prioritization of implementation programmes to rollout.
The strategic objectives of the strategy should always be kept at the centre of the strategic thrust of each and every programme that is formulated to bring to life all the components of the strategy. Figure 7 illustrates the link of the strategic objectives and the themes that form the pillars of the ICT strategy.

![Diagrammatic decomposition of the ICT strategy](image)

6.1. Productivity

ICT usage touches every economic sector in Gauteng, from mobile and Internet banking, to web marketing, to paying fees and fines online, as well as online research for product buying. There are key strategic areas of focus that will be used to unlock the potential for increased economic productivity in the province:

6.1.1. Innovation and Small, Medium and Micro-Enterprises (SMMEs)

The opportunity to use ICTs for marketing, financial services, access to business information and in-house training can lead to increased efficiencies, knowledge and income for small businesses. In 2006, Gauteng was estimated to have 673,576 informal traders, 195,250 unregistered individuals and 184,992 registered small businesses, a total of
more than a million SMMEs. Thus, ICT infrastructure and services can provide a valuable resource to a sizeable portion of the Gauteng economy.

Start-ups need to be incubated so that they can grow and create jobs. It is therefore, critical for the Gauteng ICT strategy to create an enabling environment for start-ups to emerge and grow. Policies and standards, Cyber security, shared infrastructure and an ICT sector specific regulatory framework need to be coordinated so that enterprises can develop.

![Stages of Enterprise Development](image)

Figure 9: Enterprise development framework

Figure 9 diagrammatically illustrates how an enabling environment can be created to allow start-ups to emerge and develop into established businesses that are able to create jobs. Increasing SMME sophistication, strengthening innovation, supporting the software industry and empowering households with ICT will be looked at in order to increase productivity.

A shared technology infrastructure should form the basis under which start-ups are supported and incubated. Having shared infrastructure will reduce the cost of supporting the start-ups and it will make it easy to manage and to implement cyber security. Shared technology infrastructure also guarantees interoperability which is important when creating solutions for the global market. An interoperability framework should form the basis in which a shared infrastructure is developed. As the connectivity networks are expanded and the bandwidth increases it opens the space for malicious elements to inflict harm on unsuspecting people. Shared infrastructure gives the space for such malicious harm to occur on a bigger scale. It is, therefore important that cyber security becomes an important part of ensuring start-ups in the ICT sector flourish in safe environment. In this regard, GPG is going to invest in shared infrastructure that will be coupled with a cyber security strategy.

---

17 World bank, ICT strategy, 2010
GPG should develop and implement policies that promote innovation and gives space for start-ups emerge. This included policies such as Public procurement reform that will exploit GPG buying power to promote innovative behaviour and technology transfer; gives tax incentives to start-ups in the ICT sector, ensuring that GPG adopts opens standards in many of its systems to allow solutions from start-ups to be integrated existing systems and many other policies that can be identified to encourage innovation.

I. Increasing SMMEs business sophistication through ICT

Mobile call and data charges must be brought down to reduce the cost of doing business for large, small and medium firms. Free Internet zones or hotspots will aim to make broadband Internet access available to small and micro-enterprises. The GPG will seek commercial and non-governmental partners in creating basic wireless broadband access hubs for attracting survivalist SMMEs to embed themselves in small (proto-) economic hubs.

Computer literacy and the capacities to utilise the new electronic media have been shown to increase with regular usage. Hence, all role-players must encourage access to the varied layers of ICT including devices, broadband connectivity, Internet services and applications for small-scale businesses as the means to advance business development, including electronic mail, communication with the banking industry, marketing, online buying and selling, cross-border trade in the Southern African and wider African region, and compliance with government regulations.

ICT usage, when combined with continued education and training in business skills or in particular knowledge fields, can create opportunities for SMMEs to move up the economic value chain, leading to a future economy where a much larger proportion of SMMEs operate in the ‘zone of transition’ towards more sophisticated businesses with higher turnovers, employing more staff; and towards more differentiated businesses engaged in services, construction, manufacturing, and professional pursuits.

The household is where home-based SMME production is located. The home also serves as a space for learning and utilisation of government services. A combination of these components creates the hub for both productive and reproductive economic activities. It is the site for a reciprocal relationship between economic development, social change and social inclusion. Hence, the Gauteng government sees the economic development value of household broadband Internet access and will facilitate fixed or wireless broadband to the home. Broadcasting, wired and mobile/wireless technologies will be used to connect the household to the broader Gauteng Province’s broadband network.

Government will play a leading role to encourage adoption and utilisation of this infrastructure resource, making SMS\textsuperscript{18} and email important channels for regular communication with households and SMMEs, thus reaching more than 90\% of the population through at least one of these channels. It will focus attention on the quality of government websites and information portals, particularly through investing in creative content production with respect to health-related information, education and training information and information for small businesses. It will encourage effective collaboration between government and the private sector to shift payment transactions into the online environment over the next 3 – 5 years, working with the banking system to design innovations, particularly in mobile phone-based payment systems, with respect to the major revenue categories and with respect to the majority of households and SMMEs.

\textsuperscript{18} Short message service over a mobile phone channel
II. Intellectual property and Innovation

ICT without innovation is unproductive and can lead to loss of competitive edge in the knowledge economy. Gauteng is the largest ICT cluster in South Africa and has the potential to expand this cluster through innovation. Innovation cluster has stakeholders/drivers that have to interconnect for a successful innovation cluster. These stakeholders are talented people with ICT skills to innovate, ICT multinationals that will provide platforms and support for talented people to innovate; Capital to be invested on talented people either from government or venture capitalists; Intellectual Property law to protect ideas from talented people; Universities and research institutions to train talented people, an incubation facility to allow talented people to develop their ideas to commercial products and grow their businesses and lastly, a widened Market for innovative products to be consumed and as result attract capital. Figure 4 captures the stakeholders of the innovation ecosystem.

Government has institutions such as the Innovation Hub that is used for incubation of start-up businesses. Innovation in ICT is largely driven by the start-ups and for this to happen start-ups need to be nurtured and empowered through deliberate programs. The Gauteng province will expand its incubation program in the Innovation Hub to include more start-ups in the ICT sector so that innovative ideas are developed and funded for commercialization.

The ICT industry globally is largely driven by intellectual property (IP) and innovation. Universities, as centres for research and development, are better positioned to create Intellectual properties and talent that can be utilized for the benefit of all South Africans. The intellectual property Act of South Africa has made a provision that intellectual property emanating from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for a social, economic and political means. The Gauteng province will therefore create a linkage between the university and Innovation Hub where start-ups will
be incubated and enabled to take advantage of IPs. This approach has to be coupled with a strengthened Intellectual Property protection act that will ensure people’s ideas are properly protected.

The Gauteng ICT cluster should be repositioned so that it becomes a centre of innovation for the whole of the African continent. The Gauteng cluster should be centered on the Innovation Hub which will be strategically be repositioned with the aim of:

- Positioning the Innovation Hub incubator as the prime location for innovative ICT start-up companies
- Becoming a leader in South African best practice incubation especially for ICT sector start-ups.

**Action plans**

1. Review the current incubation framework at the Innovation Hub with view to expand the SMME incubation, in particular in the ICT sector

2. Develop a framework to exploit the intellectual property policy on publicly funded research development

3. Ensure that public funds give priority to fundamental research with a strong link to industry

4. Forge relations with International institutions of innovation to expand the Gauteng Innovation network

5. Create a panel of experts that will assist in Start-up evaluation

6. Partner with ICT multinationals to create platforms for start-ups to flourish

7. Create an incentive scheme and a risk reduction mechanism for Venture Capitalist institutions to fund start-ups

8. Developing an ICT outsourcing framework that encourages innovation

**III. Software industry**

The South African software industry is dominated mainly by big corporate players with a small sector of SMMEs. There are opportunities of growing this industry so that it can start creating jobs. Some of the big players are willing to work with SMMEs to give them an opportunity for growth and to gain access to new markets. The Gauteng Provincial Government will partner with these players to ensure that these programmes become as broad as possible. In addition, GPG will partner with governmental and non-governmental institutions in growing the software industry.

Open source software allows for software users and ICT practitioners to participate in shaping the content of the applications. In this context open source software provides a platform for innovation and fosters collaborative learning which is important for the development of the knowledge economy. From the economic point of view, choice of software is equivalent to other types of investments, in that the acquired piece of software provides a return by creating value over a long period of time. At the same time, acquisition of a program is an option that is irreversible, risky and happens in a world that is undergoing rapid technological evolution, which may lead to the emergence of far better programs. Open source software provides a platform for the users to upgrade a piece of software in relation to changing needs of the operational space. Economically, if exploited, open source software can benefit the economy
in the long run. The Gauteng Provincial Government will partner with institutions that work with the open source software space and link these institutions with the Innovation Hub.

The levels of penetration of mobile communications high in Gauteng and this gives an opportunity for the software developers to create local content that is relevant for local communities. E-government services can also be packaged through applications suitable for mobile communications.

**Action plans**

1. Partner with centres that are in the software development industry
2. Establish a relationship with institutions and foundations to develop open source software initiative in partnership with SMMEs
3. Organize an exhibition event where local software developers can showcase their new developed applications
4. Development a government procurement plan for software from local developers

**6.1.2. ICT and the broader economy**

The key economic sectors – the services and knowledge sectors, manufacturing, construction, agriculture and mining – can all be better served by ICT networks and services. For example, the automotive sector is a ‘priority focus area’ for the province, which could better utilise ICT in supply chain management and build a vibrant international web presence to showcase its offerings, as the tourism sector already does. Similarly, the future evolution of the energy sector towards greater energy security can be supported by ICT applications that guide energy conservation, re-use and management.

The services sector provides services to households, SMMEs and large manufacturing and construction enterprises. It also provides services to its own components, including government. Many of these services are mediated through voice communications and the Internet, or could be. Since the price of electronic communications services is a barrier to greater usage, this is an important area of strategic focus for government in shaping how it should influence the regulatory environment. ICT cuts across all spheres of economic activity and it will especially open more opportunities in the services sector, which has not experienced the level of growth that is on par with other developing economies.

The various economic sectors use ICT but each to a varying degree. The banking, finance, tourism services and entertainment sector are leading with the manufacturing sector lagging. Information and Communication Technologies (ICT) is considered to be a key driver for an advanced manufacturing strategy. ICT forms the basis for most advances in manufacturing technologies. The implementation of the broadband initiative will assist in making the manufacturing sector realise the benefits of ICT.
Action plans

1. Identify trends and respond to needs of the manufacturing and services sectors
2. Create an advisory panel on sector specific needs on ICT
3. Partner with ICT sector companies to create new industries leveraging on existing infrastructure owned by GPG.

6.1.3. ICT in the Public Sector

One of the key pillars of GEGDS is transforming the provincial economy through efficiencies and this applies to how government delivers services to people. In order to realise efficiencies within government GPG will have to transform the way ICT is currently being so that more value can be derived and there can be more cost saving. The strategic drive in GPG is to create common platforms that will lead to efficiencies in the way processes within government operate and also in the delivery of services. This includes creating a single public sector communications network that will lead to the lowering of the cost of communications within government; consolidation of all shared services across all GPG departments to reduce costs arising from replication and repetition; and rationalisation of data centres so that there common backup systems and recovery systems (refer to Figure 10). Critical to this initiative is cyber security and information assurance for the common infrastructure to have integrity and to be trusted.

Rationalisation of the data centres that provide information-based services to public sector organisations is very important. Such rationalisation will bring substantial savings in ICT cost and greening of ICT through reduced energy consumption; at the same time, it will improve service standards and increase the ability to cope with disruption. Additionally, data centre rationalisation will allow government to implement and use cloud computing. Cloud computing delivers Infrastructure, Platform, Storage or Software as a service. Cloud computing will deliver the following benefits to government:

- Lowest cost way of delivering and supporting applications
- Ability to use commodity server and storage hardware
- Ability to drive down data centre operational costs
- Allow developers, especially SMMEs, to generate innovative solutions

For government to realise further savings in terms of maintenance and procurement a desktop strategy will need to be developed that looks at forging partnerships with original equipment manufacturers (OEMs). This will help government standardise on hardware which reduces the cost of maintenance and refurbishment. On the software side, strategic partnerships will have to be formed with OEMs as well to take advantage of economies of scale during procurement. In addition, it will reduce mean time between failures in government ICT systems because maintenance becomes much easier to manage.

From the review of the e-government portfolios, it still evident that more work still needs to be done and the current departmental implementation route needs to be shifted to take provincial route that will be overarching with a long-
In taking the e-government forward GPG will prioritise the top 20 e-government services that will form a priority list for implementation in the next 3 years.

At the heart of the ICT Strategy is the creation of a common, secure and flexible infrastructure that is available across the public sector. To achieve this, the strategy sets out the vision for the following:

1. **The Public Sector Network**
   - A single holistic telecommunication infrastructure that will deliver converged voice and data communications.

2. **Shared services**
   - Reoptimization of the current shared services in the Human Resources, Finance, Procurement space.

3. **Data centre rationalisation**
   - Data centre consolidation strategy that will deliver large cross-government economies of scale.

4. **Cloud computing**
   - Cloud computing delivers network infrastructure, software or platform as a service.

---

**Action plans**

1. Select top 20 e-government services to be implemented in the next 3 years.
2. Audit the current e-government applications.
3. Continuous assessment of the government E-readiness and maturity level.
4. Develop a Data Centre strategy.
5. Develop a desktop strategy.
6. Forge strategic partnerships with Software OEMs.
7. Develop a multimedia content aimed at households/learners.
8. Develop a cloud computing implementation strategy.
6.1.4. Green ICT

South Africa has become a major player in the global debate on climate change and thus, needs to take a leadership role in reducing the global carbon footprint. It is within this context that the IT sector can act as a catalyst for change in this very important global challenge. It is estimated that the IT sector has a carbon footprint that is approximately equal to that of the aviation industry and it is responsible for 2-3% of the Global footprint\(^1\).

Gauteng province has three Major metropolitan centres which are significant drivers for the economy not just for the province but for the country as a whole. The ICT penetration in the province is very high in both the public and the private sector. The Gauteng ICT strategy has to encompass Green IT as part of the strategic objectives for the province. It is therefore, imperative for the government to lead with a Green IT strategy that will encourage both big corporations and up and coming SMMEs to adopt an environmentally friendly approach to IT usage.

It is important when engaging in a Green ICT strategy to start by understanding how the province is doing to understand where the province is and then, base-lining the current ICT carbon footprint. This should be done to understand the effectiveness of the initiatives aimed at reducing the measured carbon footprint.

Initiatives that should be used to improve the carbon footprint have two main focus areas:

- **Direct: Greening ICT-Greener ICT use (the 2%).**
  - Green servers- servers that consume less energy
  - Electronic case and records management rather than paper archives
  - Green Printing-limited printing
  - Green Desktops-power management embedded
  - Data centres environmental considerations consuming less energy

- **Indirect: Greening through ICT- ICT solutions for a sustainable future (the 98%)**
  - Production activities- Production management system, Energy consumption management
  - Utilisation (business)- Energy management (BEMS), IT promotion at offices (ERP, etc.), E-commerce, Telework and video conferencing
  - Utilisation (home)- Use of energy-saving, domestic electrical appliances, Distribution of music and Software, Energy management (HEMS) with smart meters etc

Government is the largest buyer of ICT equipment and tools in the country and has multitude of suppliers. The government will use the tendering process when procuring equipment and services to compel suppliers to take cognisance of climate change. It is important that when government issues a request for proposal from suppliers that it also include the Green ICT requirements. Therefore, suppliers will be required to demonstrate that they are going to supply environmentally friendly technology. The province will also work together with other institutions to encourage the implementation of Green ICT.

One of the major technological advances that have emerged in the power industry is the development of the Smart Power Grid which will be referred to as Smart Grid. Smart Grid is the application ICT to the power grid in order to save energy and to make the grid more reliable. One aspect of the Smart Grid is the installation of Smart meters which are used as energy management tools for households as well as businesses. These meters assist in curbing and monitoring energy wastage as well as energy theft. GPG will implement a broadband infrastructure development initiative that will create a platform for Smart Meters to communicate with the power supplier. Energy management through Smart Grid will also give an opportunity for SMMEs to produce hardware and software for the meters. GPG will support SMMEs involved in the production of devices energy industry that will help green the economy.

**Action Plans**

1. Develop a green ICT master plan for the Gauteng province
2. Develop a Green IT information campaign especially targeted at the youth and children
3. Develop a framework of evaluating environmental contributions of ICT to carbon emissions
4. Work with department of Transport to develop a framework for Intelligent transportation
5. Support for R&D in green IT
6.2. Connectivity Networks

Broadband infrastructure is the backbone of any ICT initiative. It is through broadband infrastructure that access to services such as e-government can be facilitated. In essence, broadband infrastructure is an enabler.

The World Bank has proposed that broadband be viewed as an ecosystem that includes its networks, the services that the networks carry, the applications they deliver, and users. Each of these components has been transformed by technological, business, and market developments (see figure 12). This model helps to foster a thinking that keeps supply and demand of broadband at the centre of broadband implementation which is the economics of broadband implementation. It is critical to create an enabling environment for supply-side growth in terms of access to networks and services but is also important to facilitate demand for and adoption of broadband. Gauteng provincial government will adopt this model in the implementation of broadband.

![Figure 12: Broadband Ecosystem](image)

6.2.1. Gauteng Province Broadband Initiative

The Gauteng Broadband is an initiative envisaged by the Gauteng Provincial Government (GPG) to consolidate resources and capabilities of public-sector institutions and private-sector stakeholders, allowing the effective rollout and subsequent management of a provincial broadband infrastructure that is both accessible and affordable.

The Gauteng broadband space has players from private (Wired and mobile companies) and the public sector (state owned enterprises (SOEs) and Municipalities). These players have invested in a vast network of broadband infrastructure and most of them have plans to expand the current network. In consolidating the broadband initiative the provincial government will seek to engage and partner with these players so as to achieve the strategic objectives.

---

21 Yongsoo Kim, Tim Kelly, and Siddhartha Raja, Building broadband: Strategies and policies for the developing world, World bank, January 2010

35
of the project, which are mainly to lower the cost of communication and to ensure a broad accessibility of broadband infrastructure.

G-Link, as envisaged by GPG, calls for a consolidated and combined effort by all the local and provincial entities to consolidate their energies into a combined and seamless broadband network infrastructure to be delivered for the benefit and access of all stakeholders. This broadband network and infrastructure would be operated across the entire province, offering unlimited access to network resources by all provincial and local government structures, as well as by all residents. Figure 14 illustrates the envisaged approach to the G-link project.

Figure 13: Illustration of the orchestrated G-Link Network

The key objectives of the G-Link programme are:

- Digital Inclusion - Affordable broadband access for everyone, including marginalised and outlying communities
- Social Inclusion - Universal broadband access will enable new responses to socio-economic challenges
- Service Delivery - Facilitate more efficient and effective government and business
- Knowledge Creation - Focusing on the educational learning portal for literacy, numeracy and network support
- Economic Growth - Stimulate growth through job creation and participation of SMME’s.

G-Link targets realizing these objectives in 3 steps:

- Provide basic broadband connectivity to 95% of Gauteng
• Enrich the speed of connectivity to include High-Content broadband to be deployed to 20% of Gauteng, inclusive of the 20 Priority Townships and Urban Renewal Nodes
• Provide a “last inch” or connectivity solution to all citizens.

Gauteng Department of Economic Development (GDED) together with the Gauteng Department of Finance (GDF) will establish a Programme Management Office (PMO) that will manage and implement the Gauteng broadband initiative or G-Link.

6.2.2. International link network

The apparent disadvantages of distance from global markets can be reduced by connecting the Gauteng economy to a continental resource base and to global markets in products and services, via electronic networks, thus setting the pace for a digital future. Already, Gauteng is connected – through its banking and financial systems and through increasing utilisation of the Internet as a tool for business from agriculture to tourism. The undersea cable system (Figure 3) brings international bandwidth to South Africa’s shores, providing the infrastructure for international inbound and outbound Internet traffic. There are undersea cables that are already in existence and also those that are being commissioned. These include:

– Seacom
– Satcom
– ACE
– EASSy
– WACS

The cables that are new such as Seacom and WACS have a much higher capacity to carry more information while reducing costs. The Gauteng broadband infrastructure will interconnect to these international links by taking advantage of the World Cup legacy projects infrastructure which includes a link between Gauteng and Kwazulu-Natal as a way of linking Gauteng to the other global cities.
6.2.3. Digital broadcasting

South Africa has developed a strategy to migrate from analog to digital television signals and this will be done under the migration programme called the Digital Dzonga. This programme will encourage the adoption of set-top boxes that will convert analog signals to digital signals mainly for televisions that are widespread in South Africa that are equipped with analog signal receivers. The set boxes will also include the following capabilities:

- Accept a Customer Premise Equipment (CPE) that allows the user to access the internet through latest last mile technologies,
- Process and render web pages, and
- Provide support for interactive transactions (communications) and services (applications, payments, etc.)
The capabilities outlined above have the potential to transform every household in the province and South Africa as a whole into an ICT portal for government service information and communications. The set-top boxes will easily interface with the G-link broadband infrastructure. GPG will continue to influence the adoption of the policy that will include these capabilities in set top boxes.

### 6.2.4. Local loop unbundling

ICT has a vital role to play to encourage economic growth. Local loop unbundling is a process that covers a series of regulatory offers that is intended at providing new operators with rights to use the copper-based local loop in a competitive environment. Unbundling is aimed at increasing innovation, increasing the quantity and quality of services, reduce the prices paid by customers and increase the number of available business opportunities.

The local loop unbundling has been made a policy in South Africa to be implemented. The local loop unbundling will provide a solution to the last mile connection for households. The provincial government will keep track of the implementation of this national policy so that it becomes part of the broadband initiative. The local loop is, however, limited and therefore, last mile infrastructure will still require capital expenditure. Therefore, other access technologies will be used to provide last mile connectivity.

### 6.2.5. The economics of broadband infrastructure development in Gauteng

Broadband infrastructure may accelerate the distribution of ideas and information and foster competition for and development of new products, processes, and business models, thereby further facilitating economic growth. Many of the private companies listed above as role players have business models that are currently not geared towards reducing the cost of communications. It is therefore, important for GPG to structure its engagement with these companies in a way that leads to low communications cost. The state owned enterprises are currently reshaping themselves to play a developmental role in the economy of South Africa. GPG needs to engage with these enterprises with the view to take advantage of this role they are now gearing themselves to play.

The development of broadband infrastructure will give government an important role to play in the economy, not only as an infrastructure provider but also a service provider by partnering with the service providers that are licensed to provide services. The opportunities for variety of industries to change their business models due to the limitless availability of broadband infrastructure, (i.e. security industry especially in remote video monitoring, Entertainment industry, retail supermarkets adopting e-commerce, banking sector lowering the costs of transactions which will cascade down to consumers, etc). In a nutshell the Economic benefits include:

- Lowering the cost of doing business in Gauteng by lowering communications cost especially for SMMEs
- Lowering the carbon footprint of the province by reducing activities such as travelling and creating a platform for energy management which will be a major boost to green economy
- Realisation of efficiencies in business operations leading to higher productivity in the province
- Creating a foundation for the creation of a dynamic ICT industry in Gauteng which include the software industry and the telecommunications services sector
• Creation of jobs within the ICT industries and other sectors
• Creating a platform for innovation and intellectual property development and commercialisation
• Attraction of foreign direct investments

**Action plans**

1. Work together with the Gauteng Department of Finance to establish the PMO for the broadband initiative implementation.
2. Develop a model for private/public partnership in broadband implementation
3. Develop a framework for creating broadband demand in Non-metro areas
4. Keep track and take advantage of the implementation of the local loop unbundling policy
5. Take advantage of the digital broadcasting infrastructure
6. Create hotspots and free Internet zones
6.3. **ICT Skills Capacity**

To sustain the knowledge economy through ICT, capabilities need to be developed. ICT skills development will happen at three levels:

- ICT skills needed for modern life outside the workplace: digital literacy/e-literacy
- ICT skills in the work place to respond to changes in business processes and industry structures: e-skills
- Technical skills for the ICT specialists needed in ICT and related jobs user industries

Government will push wireless broadband to the classrooms; progressively work to connect all teachers and all 1.8 million and more learners in Gauteng. It will push broadband (fixed or wireless as appropriate) to households, in order to supplement school-based educational development for both teacher and learner use. This approach aims to make good the investment in ICT in schools, by placing computers in classrooms, by giving schools flexibility to use the Internet within budget constraints and by encouraging procurement and use of appropriate software based on institutional requirements. This approach will assist in increasing ICT skills at all the three levels identified. The next generation of high school graduates will be e-literate, which means they will be able to use ICT for their own benefit and also in the places of their work.

To develop technical skills for ICT specialists, institutions of higher learning need to take an active role with the support of government in developing experts in the field of ICT. Gauteng must position itself as a centre for ICT skills in Africa. To meet the skills required in priority areas such as Business Intelligence/Knowledge Management, Application Development, Web Development and Mobile Computing a skills development revolution will be required.

**ICT Skills Development objectives**

1. To ensure that the education sector is adequately resourced and to lobby national government in making sure that immigration conditions are such as to produce employment outcomes expected by industry
2. Stimulate an appropriate level of interest in IT by targeting underrepresented groups including females and older workers in creative and non-traditional ways
3. To be able to place female and other ICT minorities in good, challenging positions in excellent government. To understand gender and other diversity and appropriate recruitment practices for gender and cultural diversity. To educate/challenge employers to use non-traditional skill sources.
Action Plans

1. One computer per classroom model combined with ICT mediated learning
2. Partner with institutions involved in ICT skills development to strengthen the current skills development programme
3. Utilise the development and validation centre for training
4. Develop IT governance capabilities within the province
5. Encourage investment in human resources and R&D capacity
6. Engage with ISETT SETA on skills plan
7. Partner with ICT multinationals to ensure their skills development plans are in line with the strategy
8. Partner with universities and other institutions of higher learning to better understand skills development challenges
9. Create a panel of experts to advise on skills development strategies

6.4. Monitoring and evaluation of the Information Economy and Development

Monitoring and evaluation for information economy and e-government evolution will be conducted on an ongoing basis, using the Framework for Monitoring and Evaluating e-Government in the Gauteng City-Region. Monitoring and evaluation of such complex and dynamic phenomena as the information economy and e-government is a major challenge that requires coordination, cooperation and collaboration among various components of government. The e-Government M&E Unit within the Gauteng Department of Economic Development (GDED), M&E Units in departments and agencies, an e-Government Council (currently the CIO Council), and the Premier’s Office are the key actors involved in the implementation of the Monitoring and Evaluation Framework.
7. Way forward

A GPG Technology Council working under the aegis of the Economic Development and Finance, and involving representatives from other GPG departments should be formed. The council will perform planning, coordinating, advisory, and monitoring and evaluation functions. The council will collaborate with CIOs of the individual departments. Technology programmes of work that cuts across government departments will have to be centrally coordinated. Unique programmes of work will be delivered by affected government department with GPG Technology Council oversight.

Various programmes will be divided into portfolios managed by portfolio managers. With this portfolios business plans will be developed and a cost allocation will be done for each programme. The socialization of the strategy will ensure that all the stakeholders are able to state their priorities so they can be prioritised in ICT implementation programmes. These stakeholders include:

- Department of Agriculture and Rural Development
- Department of Health
- Department of Finance
- Department of Education
- Department of Community Safety
- Department of Housing
- Department of Social Development
- Department of Local Government
- Department of Sports, Arts and Culture
- Department of Roads and Transport
- Business
- Labour (through COSATU)
- Academia
- Gauteng Metros and Local Municipalities (through the IGR, possibly supported by National Treasury);
- Communities, Ward Committees and Non-Government Organisations
- SOEs
8. Conclusion

Gauteng ICT strategy is informed by the objective that seeks to create a knowledge economy by creating ubiquitous connectivity to every household, Small, Micro and Medium Enterprises (SMMEs), communities, government institutions (schools, clinics, etc.) and citizens across Gauteng. The stated objectives that should be used to measure the success of this strategy are as follows:

1. To provide universal access to broadband (as defined by the national broadband policy) for citizens, business as well as government institutions.
2. To build the Network Infrastructure and Information Super-highway to encourage the development of advanced workforce with better ICT skills;
3. To enhance economic productivity through ICT infrastructure development in order to lower the cost of doing business and increase connectivity for companies especially SMMEs
4. To Increase the ICT skills capacity within the public and the private sectors to create a pool of ICT practitioners and entrepreneurs
5. To improve service delivery by providing high quality ICT services through e-government
6. To build an economic and industrial sector with a focus on ICT, and in particular, software industry
7. To ensure that innovation becomes part of the economic network in Gauteng Province in relation to ICT
8. To reduce the carbon footprint of the province through Green ICT
9. To create employment in the ICT sector

These objectives are all interrelated and to ensure that the objectives are achieved three goals were formulated:

- Productivity,
- Connectivity Networks and lastly,
- ICT skills capacity.

Implementing the strategy with these goals in mind will ensure the stated strategic objectives are achieved. The implementation will also see the expansion of the Gauteng ICT cluster. In the end, the ICT strategy has to be within the context of the GEGDS and government priorities. The monitoring and the evaluation of the programmes within this strategy must always be referred to these provincial initiatives.
9. Annexure

Annexure B  OECD territorial review input paper: Gauteng ICT infrastructure, LINK Centre report for Gauteng City Region Observatory


Annexure E  Frost & Sullivan, Gauteng BPO Marketing Strategy, An analysis of market and industry conditions for the development of an effective marketing strategy, 2009

Annexure F  E-government Blueprint