



'creating a level playing field'

ZIMBABWE NATIONAL BROADBAND PLAN (2020-2030)

LEAVING NO ONE AND NO PLACE BEHIND IN THE DIGITAL ECONOMY

PREFACE

It is no longer a matter of conjecture that broadband, as a general-purpose technology, holds the future for the success of all nations as we plunge into the Fourth Industrial Revolution(FIR). Hence, it is incumbent upon any serious nation to ensure that high speed broadband is available, accessible, affordable and usable to all citizens. It is in this vein that the Ministry of ICT, Postal and Courier Services in partnership with the Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) has formulated the National Broadband Plan in consultation with all relevant stakeholders.

The National Broadband Plan as proposed in this document is meant to augment the National ICT Policy, as periodically reviewed. As a living document, the National Broadband Plan of necessity should be subjected to continual review and updates in order to keep in step with technological developments and evolving consumer needs and choices. This will also enable the monitoring of initiatives contained in the National ICT Policy and the National Broadband Plan to be continuously intertwined to the National Development Strategy (NDS 1).

EXECUTIVE SUMMARY

1. INTRODUCTION

Broadband is the bedrock of the Fourth Industrial Revolution upon which future life changing technologies such as Artificial Intelligence, Block chain, Internet of Things and Autonomous Vehicles will ride. Accordingly, it will be remiss on the part of the Government of Zimbabwe not to recognise the socio-economic importance of Broadband and its transformative benefits to national development and overall quality of life. Such benefits include global competitiveness; job creation; increased productivity; improved national security; improved education; agriculture, health and governance in general, all of which are prerequisites for achieving the sustainable development goals.

This National Broadband Plan is a nationwide initiative to provide access to and adoption of Broadband services at Government, business, household and individual levels, with the aim of transforming Zimbabwe's growth trajectory from being largely driven by resource based exploits to innovation driven growth. The aspired vision is "**An All Inclusive Digital Society Powered by Premier Innovations by 2030.**"

The plan is developed to provide a shared vision and coordinate activities across Government Ministries, Departments, industry and academic institutions in a holistic manner, for the digital future of Zimbabwe. Thus, the National Broadband Plan will be coordinated at Cabinet level, with the Ministry responsible for ICTs, being the major driver of the plan. The Plan is flexible and can be periodically reviewed in order to adapt to ever-evolving technologies and services, hence flexibility in planning is key.

2. KEY ELEMENTS OF THE PLAN

2.1 VISION AND GOALS

Chapter 1, which is the introductory part, begins with a definition of Broadband as Internet speed of at least 256kbps in line with the ITU definition. This will be used for benchmarking purposes and as a baseline for setting Broadband availability targets based on speed and capacity in terms of services delivered. The chapter also dwells on the importance of Broadband, focusing on studies by the World Bank which have established that in low- and middle-income countries, every 10 percentage point increase in Broadband penetration accelerates economic growth by 1.38 percentage points—more than in high income countries and more than for other telecommunication services.

The chapter also unveils the vision of the Broadband plan and identifies five broad goals and a set of objectives for realizing the Broadband dream. The goals are as follows:

- **Goal 1 - Growth: Enable and foster adoption and increased use of Broadband by all citizens to support attainment of the upper middle-income economy status and sustainable development goals by 2030.**

Focus will be on increasing investment in Broadband to achieve 100% Broadband coverage, improve on Broadband speed and ensure increased adoption and use of Broadband for increased productivity and economic growth.

- **Goal 2 – Inclusivity: Ensure Broadband connectivity, availability and affordability for all by 2030 at affordable costs.**

Focus will be directed at fostering 100% population coverage of Broadband services, adoption and increased use of Broadband. This entails ensuring non-discriminatory connectivity and access to Broadband at affordable prices across all provinces, districts and urban areas across the country on a non-exceptional basis and creating relevant Broadband use cases to stimulate adoption and use.

- **Goal 3 – Sustainability: Manage all emerging risks, challenges and opportunities emanating from Broadband based growth**

Focus will be on building confidence and trust in the use of Broadband services through managing all risks, challenges and opportunities associated with Broadband connectivity, use and integration into the economy. This entails ensuring Broadband network security and resilience, enhancing Broadband quality, reliability and speed as well as human safety, security and protection of the environment.

- **Goal 4 – Innovation: Enable Broadband based innovation and integration across all sectors of the economy in support of the digital transformation of society**

Focus will be on nurturing a Broadband based innovation culture through creating an innovation conducive environment by building partnerships with relevant external and national research organizations and the productive sectors of the economy.

- **Goal 5 – Collaborative and coordinated engagement for Broadband development.** Focus will be on strengthening coordination, collaboration and engagement spanning across all sectors of the economy, private and public institutions as well as regional, continental and international organisations.

2.2 ADDRESSING THE SUPPLY SIDE: BROADBAND INFRASTRUCTURE

Chapter 3 presents an analysis of the state of Broadband infrastructure, which is one of the key elements of the Broadband ecosystem. The chapter gives a detailed description of the status of Broadband infrastructure. It acknowledges the country's limited capacity concerning International Internet Connectivity, extent of the national fibre backbone, which is yet to be

fully linked across the country, middle mile connectivity as well as other Broadband supportive infrastructure such as Data Centres, which are still relatively few and may not be able to cope with future data storage demands.

Concerning digital devices, it is noted that there is limited availability of Broadband devices. Smart phone penetration remains very low at around 15%. The available broadband devices are unaffordable for the majority. This is largely attributable to the fact that the devices are imported and require foreign currency, which is scarce. The same devices are also dutiable at 25%, thereby making them more unaffordable. Access to and affordability of devices is affected by the risks of technological dumping, counterfeits and technological obsolescence due to rapid technological changes.

As for applications and services available to users, it is observed that the variety of Broadband applications remains skewed mainly along payment systems. There are not many useful and relevant applications in other key sectors of the economy such as agriculture, manufacturing, health and commerce. Progress on this front is hampered by lack of a National Innovation Framework, which would coordinate economic application of scientific results.

On the demand side, an in-depth analysis of the barriers to Broadband use and adoption reveals that there is still untapped demand for Broadband. This presents vast opportunities for Broadband development. The Broadband demand inhibiting factors include non-connectivity and availability of Broadband services, especially in remote areas, lack of relevant content to induce Broadband uptake and use, affordability of Broadband devices and services, language barriers as well as digital literacy among others.

2.3 KEY BROADBAND PROJECTS

Identified key Broadband Projects are indicated in the table below:

Table 1: Key Broadband Projects

Project	Objectives	Expected Outcomes	Estimated Cost (USD)	Responsibility
Operationalising the Regional Internet Exchange Points	To reduce costs of international internet capacity	Increased affordability of and use of Broadband services	100,000 per month	Government; POTRAZ; Operators
National Fibre backbone	To increase coverage of the national fibre backbone.	Increased national Broadband coverage		Government; POTRAZ; Operators

MORAN base stations	To increase Broadband connectivity	Increased Broadband connectivity	150,000,000.00	Government; MoICTP&CSs; USF; Operators
1 Data Centre in BYO	To increase data storage capacity for data intensive applications.	Increased data storage capacity for data intensive applications	10,000,000	Government; MoICTP&CSs; POTRAZ; Operators
350 shared base stations	To increase broadband connectivity	Increased broadband connectivity	100,000,000	MoICT,P&CSs; POTRAZ Service Providers
Innovation Hubs	To increase innovation capacity	Increased innovation capacity.	1,500,000	MoH&TE;POTRAZ
Computer Incidence response Centre	To increase confidence and trust in the use of Broadband.	Increased use of Broadband services	450,000.00	OPC; MoICTP&CSs;MoE&T;

2.4 ADDRESSING THE DEMAND SIDE: BROADBAND, AFFORDABILITY, PALATABILITY, USABILITY AND BUILDING CONSUMER AWARENESS, TRUST AND CONFIDENCE.

Chapter 4 addresses barriers to broadband adoption and use and proposes strategies that can be used to stimulate the uptake and use of broadband, focusing on enhancing Broadband affordability, usability, palatability digital literacy and awareness, as well as building confidence and trust among consumers.

More still needs to be done to increase usage and increase the penetration rate by at least 5% per annum until 2020. Although mobile broadband subscriptions are quite high, fixed broadband subscriptions are still very low, owing to sparse fixed broadband connectivity. The main inhibiting factor for increased broadband adoption is the cost of broadband and that of smart gadgets as well as the lack of relevant content to stimulate broadband uptake.

According to the Alliance for Affordable Internet (AAI), the test of affordability is to divide 1GB of mobile data by the average monthly salary; the cost of accessing 1GB of mobile data should be less than 2% of average monthly income. In Zimbabwe, the cost of data relative to the average monthly income is approximately 10.1% according to AAI (2019). There is need to focus on developing various incentives to reduce the cost of broadband access and widening the community access. {High cost of service provision; inflationary pressures eroding incomes; forex shortages}

There are limited content development initiatives at national level. Current initiatives are not all inclusive as they are apparently focused on entertainment content, instead of being focused on the development of content across all sectors of the economy, including the academia.

2.5 FUNDING BROADBAND DEVELOPMENT

Chapter 5 discusses funding gaps and possible funding modalities for key projects and programmes of the plan. It is noted that a big chunk of funding for broadband deployment would require offshore funding, as most of the equipment requires foreign currency. This requires serious effort towards enhancing export performance, attracting Foreign Direct investment, as well as soliciting donor funding. It is also recommended that government takes a leading role in raising funding for broadband deployment. Apart from direct budgetary allocations for broadband deployment, the Universal Services Fund can also be expanded to fund ICT in education programmes and other initiatives to stimulate broadband adoption such as subsidising access devices, content development and training for marginalised communities. Government can also support broadband development through issuing bonds/ debt, grants and risk mitigation support and guarantee debt arrangements. The government should also solicit funding from development partners and partner with major equipment suppliers to provide support through export credit agencies and development finance institutions. Government may also need to consider providing grants for specified Broadband projects and incentives such as tax breaks to operators investing in infrastructure projects. It should however be cautioned that public funding should target under-served uneconomic areas which are unattractive to private investment and should not be seen crowding out the latter as this is inimical to innovation and competition.

As for private investment, the main sources of funding include debt, equity investment and retained funds. Sources of debt financing include banks, institutional investors, pension funds, insurance companies, equipment vendors and Infrastructural Development banks such as the Infrastructure Development Bank, the Development Bank of Southern Africa, African Development Bank amongst others. Partnerships with global Tech companies and Operators need to be supported when they venture into such partnerships. Other financing models that such as the **Public utility financing model**, where local authorities/municipalities collaborate with investors such as pension funds and banks to provide Broadband within their localities, as well as other **Public Private Partnerships (PPPs)**

2.6 IMPLEMENTATION MODALITIES

Chapter 6 of the plan is about operationalising the National Broadband Plan. It sets out the implementation modalities in terms of the governance structure, stakeholder engagement as well as monitoring and evaluation of the outcomes and impact of the plan. Underpinning the

monitoring and evaluation framework will be the use of Results Based Management (RBM) as has been adopted in the public sector to achieve set Key Performance Indicators (KPI).

A Broadband Committee will be created to provide periodic evaluation of progress, facilitate coordination and collaboration, and highlight areas of program adjustment to permit the realization of new and emerging opportunities. In addition, the Committee shall be the forum for relevant agencies to discuss and fine-tune implementation strategies, assign responsibility for joint duties, share best practices and coordinate broadband funding. The Committee shall ensure that a six-monthly periodic assessment is published to report where the country stands in Broadband deployment, adoption and utilization, in benchmarked competition across networks, devices and applications.

The Monitoring and Evaluation Framework is also set to monitor progress and ensure attainment of the set goals and targets of the Plan. Progress will be measured through a set of Key Performance Indicators that will be monitored periodically. The National Broadband Committee shall also provide periodic evaluation of progress and highlight areas of program adjustment to permit the realization of new and emerging opportunities.

TABLE OF CONTENTS

PREFACE	ii
EXECUTIVE SUMMARY	iii
1. INTRODUCTION	iii
2. KEY ELEMENTS OF THE PLAN	iii
2.1 VISION AND GOALS	iii
2.2 ADDRESSING THE SUPPLY SIDE: BROADBAND INFRASTRUCTURE	iv
2.3 KEY BROADBAND PROJECTS	v
2.4 ADDRESSING THE DEMAND SIDE: BROADBAND, AFFORDABILITY, PALATABILITY, USABILITY AND BUILDING CONSUMER AWARENESS, TRUST AND CONFIDENCE	vi
2.5 FUNDING BROADBAND DEVELOPMENT	vii
2.6 IMPLEMENTATION MODALITIES	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF ACRONYMS	xiii
CHAPTER 1: INTRODUCTION	1
1.1 DEFINING BROADBAND	1
1.2 WHY BROADBAND IS IMPORTANT?	2
1.3 THE BROADBAND VISION, GOALS AND TARGETS	3
1.4 BROADBAND DEVELOPMENT GOALS AND OBJECTIVES	3
1.4 KEY PERFORMANCE TARGETS AND INDICATORS (KPIs)	4
CHAPTER 2: CONTEXTUALISING BROADBAND DEVELOPMENT	5
2.1 ENVIRONMENTAL SCAN	5
2.1.1 GEOGRAPHY AND POPULATION	5
2.1.2 POLITICAL ENVIRONMENT	5
2.1.3 SOCIO-ECONOMIC ENVIRONMENT	6
2.1.4 REGULATORY ENVIRONMENT	7
2.2 SWOT ANALYSIS	8
2.3 CREATING AN ENABLING ENVIRONMENT FOR BROADBAND DEVELOPMENT	10
2.4 TARGETS FOR AN ENABLING ENVIRONMENT FOR BROADBAND DIFFUSION	12
CHAPTER 3: INFRASTRUCTURE, CONNECTIVITY AND DEVICES	15
3.1 INTRODUCTION	15
3.2 CURRENT STATE OF INFRASTRUCTURE	15
3.1 INTERNATIONAL CONNECTIVITY INFRASTRUCTURE	15
3.2 BACKBONE NETWORK AND BACKHAUL INFRASTRUCTURE	17

3.3	ACCESS NETWORK TECHNOLOGIES AND ROLLOUT	18
3.4	SUPPORT RESOURCES AND INFRASTRUCTURE	22
3.2.4.1	Radio Frequency Spectrum	22
3.5	INTERNET EXCHANGE POINTS (IXPs).....	24
3.6	DATA CENTRES	24
3.7	IPV4 to IPV6 Migration	24
3.4	STRATEGIES FOR UNIVERSALISING BROADBAND	27
3.5	KEY BROADBAND INFRASTRUCTURE PROJECTS.....	29
3.6	TARGETS FOR UNIVERSALISING BROADBAND.....	30
	CHAPTER 4: BROADBAND ADOPTION AND USE	32
4.1	CURRENT STATE OF BROADBAND ADOPTION AND USE.....	33
4.1.1	ACTIVE SUBSCRIPTIONS	33
4.1.2	ACCESS & USE BY HOUSEHOLDS.....	34
4.1.3	INTERNET ACCESS & USE BY EDUCATIONAL INSTITUTIONS	34
4.1.4	INTERNET ACCESS & USE BY HEALTH FACILITIES	35
4.1.5	INTERNET USE AT GOVERNMENT LEVEL	35
4.1.6	BROADBAND COST AND AFFORDABILITY	36
4.1.7	ACCESS DEVICES	37
4.1.8	BROADBAND USABILITY AND CONTENT DEVELOPMENT.....	38
4.2	TRUSTED ENVIROMENT: CONFIDENCE BUILDING AND SUSTAINABILITY	38
4.3	SWOT ANALYSIS FOR BROADBAND USE AND ADOPTION	39
4.4	FOSTERING BROADBAND ADOPTION AND USE.....	41
4.5	TARGETS FOR BROADBAND ADOPTION AND USE	44
	CHAPTER 5: FUNDING BROADBAND DEVELOPMENT.....	46
5.1	CURRENT STATUS	46
5.2	SWOT ANALYSIS	47
5.3	SOURCES OF FUNDING & FINANCING MODELS	47
	CHAPTER 6: IMPLEMENTATION MODALITIES.....	50
6.1	INSTITUTIONAL ARRANGEMENTS.....	50
6.2	STAKEHOLDER ENGAGEMENT PLAN.....	53
6.3	STAKEHOLDER ENGAGEMENT STRATEGIES.....	54
6.3.1	<i>Roadshows and Stakeholder Forums</i>	<i>54</i>
6.3.2	<i>Promotional Memorabilia.....</i>	<i>54</i>

LIST OF TABLES

TABLE 1: KEY BRAODBAND PROJECTS	V
TABLE 2: SWOT ANALYSIS: OPERATING ENVIRONMENT	9
TABLE 3: KEY POLICIES AND LEGISLATION.....	11
TABLE 4: TARGETS FOR BROADBAND DIFUSSION.....	13
TABLE 5: STATUS OF INTERNATIONAL CONNECTIVITY INFRASTRUCTURE IN ZIMBABWE	16
TABLE 6: BANDS IDENTIFIED FOR IMT.....	23
TABLE 7: SWOT ANALYSIS FOR BROADBAND DEPLOYMENT	25
TABLE 8: STRATEGIES AND OUTPUTS FOR UNIVERSALISING BROADBAND IN ZIMBABWE.....	27
TABLE 9: KEY BROADBAND INFRASTRUCTURE PROJECTS	29
TABLE 10: TARGETS FOR UNIVERSALISING BROADBAND.....	30
TABLE 11: ACTIVE BROADBAND SUBSCRIPTIONS.....	33
TABLE 12: ICT ACCESS BY EDUCATIONAL INSTITUTIONS	34
TABLE 13: ICT ACCESS BY HEALTH INSTITUTIONS.....	35
TABLE 14: REGIONAL TARIFFS COMPARISON FOR OUT OF BUNDLE MOBILE DATA PER MB.	36
TABLE 15: SWOT ANALYSIS FOR BROADBAND USE AND ADOPTION	39
TABLE 16: OUTCOMES AND STRATEGIES FOR INCREASING BROADBAND ADOPTION AND USE	42
TABLE 17: TARGETS FOR FOSTERING BRAODBAND ADOPTION AND USE	44
TABLE 18: TOTAL INVESTMENT IN THE SECTOR IN USD.....	46
TABLE 19: SWOT ANALYSIS OF THE OPERATING ENVIRONMENT IN TRMS OF FINANCING.....	47
TABLE 20: SOURCES FOR KEY BROADBAND PROJECTS/PROGRAMMES.....	49
TABLE 21: STAKEHOLDER COMMITTEE AND RESPONSIBILITIES	50

LIST OF FIGURES

FIGURE 1: FIBRE OPTIC BACKBONE AND BACKHAUL NETWORK 17

FIGURE 2: 2G COVERAGE..... 19

FIGURE 3: 3G NETWORK COVERAGE BENCHMARK..... 20

FIGURE 4: LTE NETWORK COVERAGE BENCHMARK..... 21

LIST OF ACRONYMS

2G	Second Generation
3G	Third Generation
ACPU	Average Cost per User
AMPU	Average Margin per User
ARPU	Average Revenue per User
ADSL	Asymmetric Digital Subscriber Line
GB	Gigabyte
Gbps	Gigabits per second
GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunications
LTE	Long Term Evolution
MB	Megabyte
TB	Terabyte
Mbps	Megabits per second
UMTS	Universal Mobile Telecommunications Service
VoIP	Voice over Internet Protocol

CHAPTER 1: INTRODUCTION

Information and Communication Technologies (ICTs) are expected to play a central enabling role in transforming the economy of Zimbabwe and in the attainment of the country's Vision 2030 of an inclusive upper-middle income economy, as well as the United Nations Sustainable Development Goals. This National Broadband Plan addresses the following key areas:

- i. Creating an enabling environment for broadband development through fostering investment, innovation and competition and its absorption in the economy;
- ii. Deployment of broadband infrastructure and ensuring availability of broadband devices at affordable costs;
- iii. Stimulating broadband adoption and use, focusing on broadband affordability, usability, palatability, digital literacy and awareness as well as building confidence and trust in the use of broadband;
- iv. Funding mechanisms for the Broadband Plan and;
- v. Implementation modalities.

1.1 DEFINING BROADBAND

The term “broadband” does not have a single, standard definition. The term is sometimes used to refer to aspects of the network and services including infrastructure used to deliver services to users as well as the speed of accessing the Internet and the type of services and applications that can be accessed via the Internet. Some countries such as Brazil and international organizations such as the OECD have chosen not to categorize broadband in terms of speed, but are instead defining broadband in terms of functionality, focusing on what can and cannot be done with a certain type of connection.

Traditionally, broadband has often been defined in terms of data transmission speed usually referring to the amount a user can download, (i.e. the amount of data that can be transmitted across a network connection in a given period of time, typically one second, also known as the data transfer rate or throughput). Defining broadband in terms of speed makes it easy to understand the meaning of broadband on account of the fact that the data transfer rate determines whether users are able to access basic or more advanced types of content, services and applications over the Internet. The statistical definition of broadband according to the International Telecommunications Union (ITU) is ‘any internet connection with a minimum download speed of 256 Kbps’. The definition of broadband, however, varies widely across the world due to each country's unique needs and history, including economic, geographic and regulatory factors. The SADC Ministers responsible for ICTs defined broadband for the region as ‘internet connection with a minimum download speed of 1 Megabit per second (Mbps)’.

For purposes of this plan, the SADC definition of broadband as '*any internet connection with a minimum download speed of 1 Megabit per second (Mbps)*' will be used until further review. This will be used for benchmarking purposes and as a baseline for setting broadband availability targets based on speed and capacity in terms of services delivered.

1.2 WHY BROADBAND IS IMPORTANT?

Just as steam and electricity powered the First and Second Industrial Revolutions respectively, and electronics and the internet powered the Third Industrial Revolution, broadband is now catalysing the current Fourth Industrial Revolution (digital revolution). Broadband is the gateway to the future society and economy and is capable of the following:

- (i) Driving innovation in terms of new technologies, services, applications and business models;
- (ii) Improving the efficiency and productivity of enterprises; development of new services and applications; business models and processes that are not possible without Broadband;
- (iii) Enhancing the potential of human capital through easier acquisition of knowledge and technical skills;
- (iv) Increasing community competitiveness by attracting knowledge-based businesses;

Everything in our lives is going digital, from governance, warfare, healthcare, agriculture, education, entertainment, manufacturing, retail, mining, international trade, travel and tourism, sport as well as social life among others. Indeed, broadband access has become the new catalyst for economic growth, job creation, global competitiveness and a better way of life. It is enabling entire new industries and unlocking vast new possibilities for existing ones. Broadband supports business continuity, perpetuates knowledge transfer and enables civil society participation and engagement using e-government services. Broadband also facilitates the adoption of Artificial Intelligence (AI), Internet of Things (IoT) and Machine Learning thus bridging the technology gap between developed and developing countries. Broadband access will also result in improved access to services e.g. e-commerce, e-health, e-agriculture and reducing the marginalisation of under-served communities

The ITU (2019) study on the economic contribution of broadband, digitization and ICT regulation in Africa provided useful insights on the impact of broadband on the economy. This was an econometric modelling study of data from 34 countries, Zimbabwe included. The study found that a 10 per cent increase in mobile broadband penetration in Africa would yield an increase of 2.5 per cent in the Gross Domestic Product (GDP). According to the same study, a 10% increase in fixed broadband in Africa would yield a 0.3% increase in the Gross

Development Product (GDP). The study supported the hypothesis that the impact of mobile broadband on the global economy is higher than that of fixed broadband.

Countries, communities, businesses, and individuals that lack access to Broadband may miss economic and social opportunities. Broadband cities attract more service firms and so create more jobs than their narrowband counterparts create. Communities can also benefit from faster Internet access as it enhances real and virtual opportunities for communication as well as access to government services and public officials. Broadband has potential to redefine business transactions and enhance the value of supply chains. Transaction costs will be decreased and wastefulness associated with existing processes will be further reduced.

1.3 THE BROADBAND VISION, GOALS AND TARGETS

VISION: A highly connected Information Society enabled by universal and reliable broadband networks, services and applications, by 2030.

1.4 BROADBAND DEVELOPMENT GOALS AND OBJECTIVES

The following are the attainable broadband goals by 2030:

Goal 1: Ubiquitous (100%), broadband coverage in all areas where people live, work, travel and learn with high speed of not less than 1 Mbps by 2030.

Focus will be on rolling out broadband infrastructure to cover all government, educational, health institutions, road and rail networks, local authorities and communities as well as improving broadband speeds through effective management of spectrum resources and rights of way; adoption of Dig once policy and infrastructure sharing; fostering competition and investment in broadband networks.

Goal 2: Inclusivity– Access to quality and affordable Broadband services that are relevant and usable at government, business, and community, household and individual levels by 2030.

This entails fostering the adoption and use of broadband at government, business, community, household and individual levels, by ensuring service availability, affordability, palatability and usability through adopting measures that reduce the cost of broadband services, fostering digital literacy and awareness, development of attractive and relevant

content, enforcing quality of service, creating awareness as well as building confidence and trust in the use of Broadband.

Goal 3: Digital Innovation-To be amongst the top performing digital innovation economies within the SADC region by 2030.

Focus will be on enhancing digital innovation capacity and performance, capitalising on the highly literate demographic dividend and cultivating partnerships to develop high quality tech-entrepreneurs.

GOAL 4: Accelerated digital transformation of the economy

This entails developing new policies and reviewing existing ones; setting standards and coming up with incentive packages to create an enabling environment for increased investment in Broadband and enhancing the economy's absorptive capacity of Broadband. This also involves harnessing Artificial Intelligence (AI), Big Data, Cloud Computing, Block-chain, Internet-of-Things, amongst others, for economic transformation.

Goal 5: A safe and secure broadband environment

To manage challenges resulting from ICT development to ensure sustainability and security of Broadband networks and human safety in the use broadband applications.

1.4 KEY PERFORMANCE TARGETS AND INDICATORS (KPIs)

Key Performance Indicators (KPIs) for tracking progress towards the goals set out above will be monitored and reported by the Postal and Telecommunications Regulatory Authority of Zimbabwe in collaboration with relevant stakeholders. The proposed KPIs for the National Broadband Plan in terms of the short term (2020-2022), medium term (2023-2025) and the long-term (2026-2030) targets are listed at the end of each chapter where applicable.

CHAPTER 2: CONTEXTUALISING BROADBAND DEVELOPMENT

Before mapping the course of Broadband development in Zimbabwe, it is important to set out the context within which the National Broadband Plan is developed. Hence, this chapter provides a summary of the context within which this plan is formulated in terms of the country's geography, demography, policy, legal and regulatory environment as well as the socio-economic landscape. It also includes a Strengths Weaknesses Opportunities Threats (SWOT) analysis, as well as objectives and strategies aimed at improving the policy, legal and regulatory environment for purposes of accelerating broadband-based socioeconomic transformation.

2.1 ENVIRONMENTAL SCAN

2.1.1 GEOGRAPHY AND POPULATION

Zimbabwe is a landlocked country with a land area of 390,757 square kilometres. It shares borders with, Botswana to the west, South Africa to the south, Mozambique to the east and Zambia to the north and northwest. The country is divided into 10 administrative provinces and 62 districts. According to the 2012 Census, Zimbabwe had a population of 13.1 million, which is projected to grow at a rate of 2.2% per annum; 67% of the population reside in the rural areas. The 15-49 years age group constitute 50.5% of people living in rural areas. Zimbabwe's diaspora population is estimated to be between 4 and 5 million and the country received tourists in exceeding 2 million annually before the COVID-19 pandemic. Zimbabwe has a youthful population. According to the 2012 census 61.1% of Zimbabwe's population was below the age of 25. The median age was 20.2 years i.e. 19.9 years for males and 20.4 years for females. A youthful population is ideal for the development and growth of ICTs growth through innovation and consumption. According to the ZIMSTAT Labour Force Survey (2019), the age 15-19 years age group constituted the largest proportion of the working-age population (19.2%) followed by the 20-24 years age group constituting 12.8%. The survey also showed an inverse relationship between the working-age population in Zimbabwe and age, that is, as age increases, the working-age population decreases.

2.1.2 POLITICAL ENVIRONMENT

Broadband and ICT development have full political support from the highest level. His Excellency, President E.D. Mnangagwa in March 2018 launched the ICT Policy document whose main objectives are:

- a) To enable and foster access to and increased use of ICTs across all sectors of the economy;

- b) To bridge the digital divide and provide Broadband for all;
- c) To manage challenges resulting from ICT development to ensure sustainability; and
- d) To lead, improve and adapt to the changing ICT environment through innovation and partnerships.

However, more broadband supportive policies should be developed to create an enabling environment for investment in broadband as well as facilitate faster roll-out of broadband. New policies are also needed to stimulate broadband adoption and use as well as to increase the economy's absorptive capacity for broadband. Zimbabwe has strong bilateral relations with countries within the region; these bilateral relations could be exploited for access to international internet connectivity.

2.1.3 SOCIO-ECONOMIC ENVIRONMENT

Zimbabwe's economy has been experiencing challenges over the past decade, characterized by low foreign direct investment inflows and higher lending rates for foreign borrowings due to high-perceived country risk. Furthermore, the liquidity crunch currently bedeviling the country has made it almost impossible to secure long term domestic funding for ICT projects. Inflation and foreign currency shortages continue to dog the economy, with adverse effects on infrastructure development as well as its upgrade and other support requirements such as ICT gadgets and software, which are mostly imported.

The ICT sector is also heavily taxed. The re-introduction of 25% duty on ICT gadgets and equipment in October 2014 had the effect of increasing the costs of ICT equipment and gadgets as they are imported into the country. This in-turn affects demand for telecommunication services, Internet in particular, thereby lowering the growth of Internet and data usage and revenues. The introduction of the 5% health levy in January 2017 added to the 5% excise duty on airtime that was introduced on the 1st of October 2014 have the effect of increasing the cost of accessing telecommunications services at a time when disposable incomes are dwindling.

Erratic power supply has led to high operating costs for local operators, as they have to make use of alternative power sources such as generators and solar system. The country requires 2 200 megawatts (MW) but is only producing about 1300MW and has a deficiency of about 900MW. There has been under-investment in the energy infrastructure, especially in rural areas leading to high operational costs for telecommunications operators who want to extend services to these under-served areas. These deficiencies need to be addressed to make the country attractive for investment. Theft and vandalism of critical infrastructure is also high.

Zimbabwe has an aggro-based economy and unfavourable conditions like poor rainfall affect the economy and subsequently consumer spending power. On international trade, national

competitiveness has been eroded by the high cost of doing business in Zimbabwe. According to the World Bank, Zimbabwe ranked number 140 out of 190 on the ease of doing business index in 2020. Zimbabwe fared poorly on electricity availability, ease of starting a business, construction permits, and contract enforcement amongst other aspects.

Zimbabwe is a highly informal economy, contributing 48% of economic activity as well as accounting for 42% of total national employment and 58% total employment in the capital, Harare, according to SHAPE (2020) report on Rethinking the Urban Informal Sector. Depressed economic activity has affected rural areas, triggering increased rural to urban migration. This in turn has widened the rural-urban digital divide as the youth turn to the cities in search of economic opportunities. Depressed economic activity has also triggered massive migration of active population to the diaspora as people search for greener pastures, resulting in skills flight to other countries. Accordingly, there is need for the review of existing industrial and agricultural policies aimed at creating more employment opportunities, increase GDP and disposable incomes.

2.1.4 REGULATORY ENVIRONMENT

The Postal and Telecommunications Act [Cap 12:05] is the primary legislation providing for the establishment of the Postal and Telecommunication Regulatory Authority of Zimbabwe (POTRAZ), setting out the Authority's mandate and powers, including running the Universal Services Fund. Having been promulgated back in 2000, the Postal and Telecommunications Act is now largely outdated considering the context of convergence, emerging technologies, services and applications. Review of the Act is ongoing with the objective of adequately covering Broadband and convergence issues. The Authority developed a converged licensing framework, which was promulgated under SI 12 of 2021 on Postal and Telecommunications (Licensing, Registration and Certification) Regulations. The converged licensing framework will help open up the sector to more players at the infrastructure, service/applications at both retail and wholesale levels. The Authority has also put in place a framework for Value added services, which is aimed at fostering digital innovation and the development of applications.

At institutional level, Zimbabwe still has two institutions with regulatory jurisdiction over converging electronic communications. The Postal and Telecommunications Regulatory Authority of Zimbabwe is the ICT sector regulator under which broadband falls. The Broadcasting Authority of Zimbabwe (BAZ) remains responsible for the regulation of broadcasting services. This has resulted in fragmented institutional arrangements that are duplicative in some instances and results in unnecessary costs in terms of infrastructure, operating costs as well as regulatory tools and equipment. Given the crosscutting nature of

digital technologies, collaborative arrangements are in place with co-regulators such as the Reserve Bank of Zimbabwe, Competition and Tariffs Commission amongst others.

As for the ease of doing business pertaining to the roll out of Broadband infrastructure, there is no national coordination among the various Authorities that issue permits for infrastructure roll out. This includes local authorities, chiefs, Environmental Management agency, National Museums and Monuments, amongst others. This means operators have to secure multiple approvals from the various authorities to build infrastructure, which can be tedious, costly and time consuming. There is need for the harmonisation of approvals pertaining to broadband infrastructure deployment to facilitate the enforcement of infrastructure sharing.

Zimbabwe is working on cybersecurity laws as well as putting in place the institutional framework to enhance cybersecurity. According to Global Cybersecurity Index rankings for 2018, Zimbabwe is still in the initiating category. This is the lowest ranking after the maturing category and the leading category respectively. Zimbabwe had a cybersecurity index of 0.192 and 0.186 in 2017, and 2018 respectively, and ranked at 24 out of 42 countries in Africa in 2018.

Vandalism and theft of telecommunication and electricity infrastructure is rampant. Such acts disrupt supply of services. Hence, the need for a comprehensive ICT Critical Infrastructure Act, which classifies all public ICT/broadband infrastructure deployed by licensed operators as critical national security, and economic resources that must be protected from vandalism, theft, unauthorised tampering.

2.2 SWOT ANALYSIS

The Strengths Weaknesses Opportunities Threats (SWOT) analysis of the operating environment is shown below:

Table 2: SWOT ANALYSIS: OPERATING ENVIRONMENT

	Strengths	Weaknesses	Opportunities	Threats
Geography and population	<p>Centrally located within the SADC Region</p> <p>Lots of sunshine, which can be exploited for solar energy.</p>	<p>Landlocked country</p>	<ul style="list-style-type: none"> • Friendly neighbours • Key Member of SADC 	<p>Unpredictable climatic patterns</p>
Political & Economic environment	<p>Political stability</p> <p>Abundant mineral resources</p> <p>Strong tourism and agricultural sectors.</p>	<ul style="list-style-type: none"> • Liquidity crunch and currency volatility • Limited off shore funding due to perceived high country risk • high cost of borrowing • Inflation • High taxation • Corruption • Infrastructure decay and underinvestment • Low disposable incomes • Economic sanctions 	<ul style="list-style-type: none"> • New revenue streams from new services • Growing demand and use of Broadband. • Public Private Partnerships • Corporate/ private financing • Universal Service Fund • Foreign Direct Investment • Manufacturing of ICT gadgets • Assembly of lithium batteries in support of green energy • Untapped human capital • E-government services 	<ul style="list-style-type: none"> • Currency instability • Regional political instability • Uneven /unbalanced market share • Trade wars

policy and regulatory environment	<ul style="list-style-type: none"> • Support from the highest level • Credible sector regulator • Good stakeholder relationships • Clear Vision 	<ul style="list-style-type: none"> • Lack of national coordination on Broadband development. • Fragmented regulatory Authorities • Slow and inconsistent policies • Bureaucracy 	<ul style="list-style-type: none"> • Regional and international coordination • Collaboration among government, private sector, civil society, academia. • Collaborative regulation • Technological convergence 	<ul style="list-style-type: none"> • Bureaucracy • Turf wars
Social Environment	<ul style="list-style-type: none"> • Strong cultural values • Youth dividend. 	<ul style="list-style-type: none"> • HIV/AIDS epidemic • High unemployment 	<ul style="list-style-type: none"> • Strong social networking 	<ul style="list-style-type: none"> • Pandemics

2.3 CREATING AN ENABLING ENVIRONMENT FOR BROADBAND DEVELOPMENT

At the institutional level, the convergence of ICT, telecommunications and broadcasting, cannot be fully leveraged in the absence of a converged Regulatory Authority. To that end, the merger between POTRAZ and BAZ needs to be accelerated and the new primary legislation needs to be put in place to replace the now out of date Postal and Telecommunication Act [Cap 12:05] and the Broadcasting Act [Cap 12:06].

Broadband development requires substantial investment in the construction and modernization of both infrastructure and systems. This calls for the creation of an enabling environment that attracts efficient investment, foster innovation and enhance competition in broadband infrastructure and services. Hence, a modernized, technology and service neutral regulatory and licensing framework is a pre-requisite.

To foster faster broadband deployment, it is also imperative to address administrative barriers, faced in the deployment of broadband infrastructure, where operators have to obtain permits from various authorities. There is need to coordinate such approvals through the establishment of a one stop shop for permit for broadband deployment. This also includes spectrum management policies as well as other strategies that reduce the cost of deployment such as Dig Once Policy, enforcement of infrastructure sharing and the adoption of Open Access Interconnection. Such policies will need to be constantly reviewed in line with technological developments.

The need to protect broadband infrastructure against vandalism and theft cannot be over-emphasized; this is in view of the fact that broadband should be available 24/7. Accordingly there is need to designate all broadband related infrastructure as critical national infrastructure and ensure its protection at a national level, regardless of whether it is owned privately or publicly. In addition, the development of safety standards for broadband deployment is also critical for ensuring human safety.

On the demand side, there is need to develop policies and incentives aimed at increasing adoption and use of broadband as well as fostering its economy-wide absorption. This includes enacting data protection and privacy laws in order to increase confidence and trust in the use of broadband; developing e-policies across all sectors of the economy; fostering innovation for the development of applications, relevant and attractive content; enhancing digital literacy and ensuring that broadband is affordable. Accordingly, all relevant subsidiary legislations need to be reviewed to take into account broadband related issues such as convergence, service neutrality and emerging technologies and applications.

To create an enabling environment for broadband development, the following are key policies and legislations that need to be put in place:

Table 3: Key policies and Legislation

Outcomes	KEY POLICIES/ LEGISLATIONS	Timeline	Responsibility
Enhanced institutional capacity	Converged Regulator for Postal and Electronic communication services	2021	MoICT P&CS; MoM&BS OPC; POTRAZ; BAZ
Clear Broadband vision	Revised National ICT Policy	2022	MoICT P&CS
	National Broadband Plan	2021	MoICT P&CS; POTRAZ
	Spectrum Access Policy Digital dividend spectrum migration	2021	MoICT P&CS ; OPC; MoF;
	Updated USF Policy	2020	MoICT P&CS, POTRAZ, Operators
	IPv6 Roadmap	2021	MoICT P&CS, OPC, POTRAZ
	RIXP roadmap	2021	MoICT P&CS, POTRAZ, Operators
	5G Roadmap	2022	MoICT P&CS, POTRAZ, Operators
	Smart Zimbabwe Master Plan	2020	MoICT P&CS, POTRAZ, Operators

Enhanced ease of doing business	One –stop shop for approval for deployment of Broadband infrastructure	2022	MoLGR&UP POTRAZ; EMA
Increased absorptive capacity for Broadband.	<ul style="list-style-type: none"> Innovation Policy R&D framework for broadband 	2022	MoICT P&CS; MoH&TE;
	Innovation Steering Committee	2022	MoICT P&CS, OPC, POTRAZ
	e-policies: <ul style="list-style-type: none"> e-Government e-health e-agriculture e-education e-commerce smart city policy 	2023	MoICT P&CS OPC and sector ministries.
	National Cyber-security Policy	2021	OPC
	Data Protection and Privacy Framework	2021	OPC, MoICT P&CS, POTRAZ
	ICT Critical Infrastructure Act	2022	OPC, MoICT P&CST; POTRAZ, Operators
	Digital Identity Framework	2022	MoICT P&CS; MoHA, OPC;POTRAZ
	National Digital Transformation Adoption Plan (digital migration of government, education, health SMEs etc)	2024	MoICT P&CS; OPC;POTRAZ
Increased Broadband affordability	Digital economy Taxation Framework	2022	MoF, MoICT P&CS; ZIMRA,
	Dig once Policy	2022	MoLGR&UP; POTRAZ;
	Smart Devices Policy	2022	MoICT P&CS; MoI&C; `OPC;POTRAZ
Increased Competition	Open access Interconnection framework	2021	POTRAZ
	Converged Licensing Framework	2021	POTRAZ

2.4 TARGETS FOR AN ENABLING ENVIRONMENT FOR BROADBAND DIFFUSION

Targets for creating an enabling environment for broadband diffusion are summarised in the following table.

Table 4: TARGETS FOR BROADBAND DIFUSSION

Outcome	Outcome indicator	Base	2020-2022	2023-2025	2026-2030	Source
Increased Investment in Broadband	Annual growth in Broadband capital expenditure	\$77,558,015 (fixed broadband 2018)	> 20% per annum	>30% per annum	>30% per annum	Operators
	% of public investment in broadband to total national budget.	0.5%	>1%	>3%	>5%	MoF
	Average private investment in broadband infrastructure as a % of gross revenue.	10%	>10%	>15%	>20%	Operators; MoF
Increased competition in the services based competition	Hirschman Herfindal Index for mobile Broadband services	5,384	≤5,000	≤4,500	≤3,800	POTRAZ
	Hirschman Herfindal Index for fixed Broadband services	4,342	≤4,000	≤3500	≤3000	POTRAZ
	Proportion of shared Broadband infrastructure	35%	40%	50%	60%	POTRAZ, OPERATORS
	Number of functional ICT Innovation Hubs	7 (tertiary)	>13	>18	>25	POTRAZ, MoHTE
	% of successful incubates	TBA	TBA	TBA	TBA	POTRAZ, MoHTE

Improved innovation performance.	Global innovation index	22.3/100	30	40	50	WIPO
	Global innovation index country ranking	122	<110	<100	<90	WIPO
	Global innovation index country ranking- Africa	20	<18	< 15	< 10	WIPO

CHAPTER 3: INFRASTRUCTURE, CONNECTIVITY AND DEVICES

3.1 INTRODUCTION

Broadband infrastructure, user devices and the relevant support infrastructure are the foundational building blocks for a sustainable broadband ecosystem and, in turn, the digital economy. Digital infrastructure design, construction and deployment are therefore unavoidable and crucial initial steps in the building of a meaningful and future-proof broadband ecosystem. In characterising the infrastructure component of the ecosystem, the broadband network is broken down into five segments namely, International Connectivity, National Backbone Network and Backhaul Transmission, Core network and Access Network. User Devices and Support Infrastructure are also crucial elements falling within the infrastructure cluster of the broadband ecosystem and are therefore, presented under this Chapter.

3.2 CURRENT STATE OF INFRASTRUCTURE

The period 2009 to 2015 witnessed tremendous growth of the broadband ecosystem in Zimbabwe. The growth came about at the backdrop growth of mobile broadband and Voice over Internet Protocol (VoIP) as well as convergence-oriented policy adjustments. While tremendous progress was realised over the above-stated period, a lot remains to be done in terms of expanding network coverage to under-served and unserved areas as well as in deepening network capacity and capabilities across the country.

3.1 INTERNATIONAL CONNECTIVITY INFRASTRUCTURE

The International connectivity segment is the portion of the broadband network that is responsible for conveying traffic to and from international destinations. Due to the increasingly high level of traffic on this segment, optic fibre, including undersea optic fibre cables, is the predominant technology with satellite systems being used as back up. As at 31 December 2019, Zimbabwe had an aggregate international connectivity capacity of 140Gbps shared between TelOne, PowerTel Communications and Liquid Telecom Zimbabwe. The table below provides a summary of the status of international connectivity infrastructure in Zimbabwe:

Table 5: Status of international connectivity infrastructure in Zimbabwe

OPERATOR	ENTRY/EXIT POINT	CONNECTED CAPACITY	UPSTREAM CARRIER	UNDER SEA CABLE SYSTEM
TelOne	Beitbridge	32 x STM1 (5Gbps)	Liquid Telecom	EASSY
	Beitbridge via Bulawayo	32 x STM1 (5Gbps)	Broadband InfraCo SA	EASSY
	Plumtree	32 x STM1 (5Gbps)	Botswana Fibre Networks (BoFiNet) Ltd	EASSY
	Forbes Border – Mutare	16 x STM1 (2.488Gbps)	TDM Mozambique	EASSY
Liquid Telecom	Beitbridge – Liquid	4 x 10Gbps	Liquid Telecom	SEACOM / EASSY / WACS / SAT3
	Beitbridge – Broadband Infraco	4 x 10Gbps	Broadband InfraCo – SA	SEACOM / EASSY / WACS / SAT3
	Routes to Zambia	4 x 10Gbps	Liquid Telecom	n/a – to Zambia
PowerTel	Plumtree Border Post	STM16	Botswana Fibre Networks (BoFiNet) Ltd	EASSY
	Mutare/Forbes Border Post	STM16	TDM Mozambique	EASSY

Being a landlocked country, Zimbabwe faces a number of complex difficulties on international connectivity, characterised by high transit costs, limited international internet connectivity and limited competition in the number of cross border carriers.

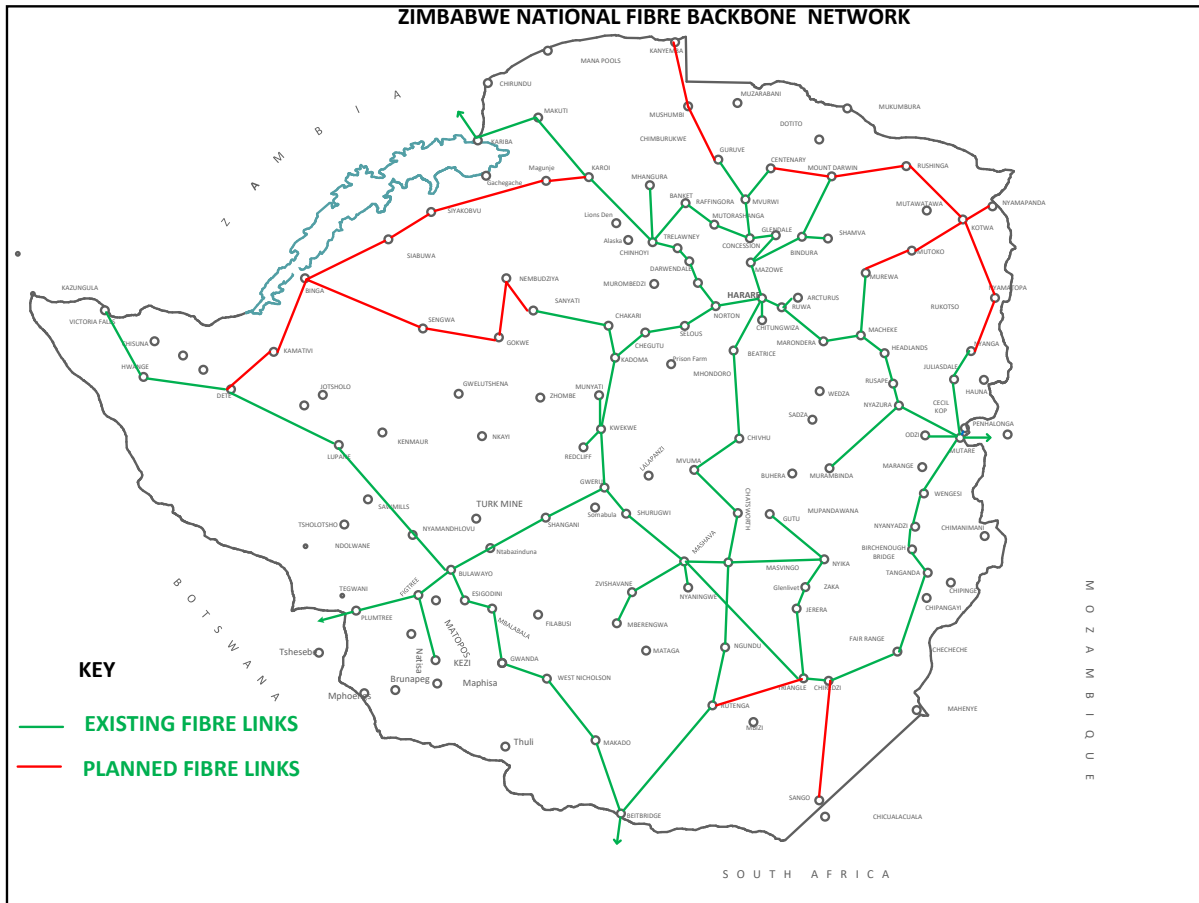
Gap Analysis

There is need for the Government to keep engaging respective governments across the border with the aim of securing reasonable rates for transiting through their territories. In respect of the aforementioned exposure and vulnerabilities, there is need to strengthen network resilience through redundant links and routes. The bulk of the internet is coming through Beitbridge. There is need to use other border posts such as Forbes Boarder Post, Nyamapanda, Chirundu, Kariba, Victoria Falls amongst others, in order to improve network resilience. In addition, there is need for operators to access undersea cables from multiple docking stations in South Africa, Mozambique, Tanzania and Namibia. Of late, availability of commercial power in the country has been erratic; there is need to ensure a stable supply of uninterrupted power for all the routes to guarantee reliability and resilience.

3.2 BACKBONE NETWORK AND BACKHAUL INFRASTRUCTURE

Zimbabwe has a fibre optic cable backbone and backhaul network built in the form of rings, which connect all urban centres and some district centres as shown in the Figure 1 below:

Figure 1: Fibre Optic Backbone and Backhaul Network



To complement the fibre optic backbone and backhaul links, there is an extensive network of microwave links. The main providers of backbone and backhaul capacity are TelOne, Liquid Telecom and Powered.

Gap Analysis

Out of the desired optic fibre cable length of about 12,000km, a total of 10,152km has been laid to date. The outstanding length is required to extend the backbone network to reach and serve every district around the country. An estimated USD124 million is required to cover the gap. Furthermore, there is need for the deployment of complementary backhaul transmission systems to feed access nodes. To enhance network reliability there is need for network

redundancy for all the links. The requirement for stable and uninterrupted power can never be overemphasized. A considerable parentage of the optical fibre cable is over-head, which brings about vulnerability to theft, vandalism and fire. There is need to invest more in underground fibre and optical ground wire (also known as an OPGW) on power pylons.

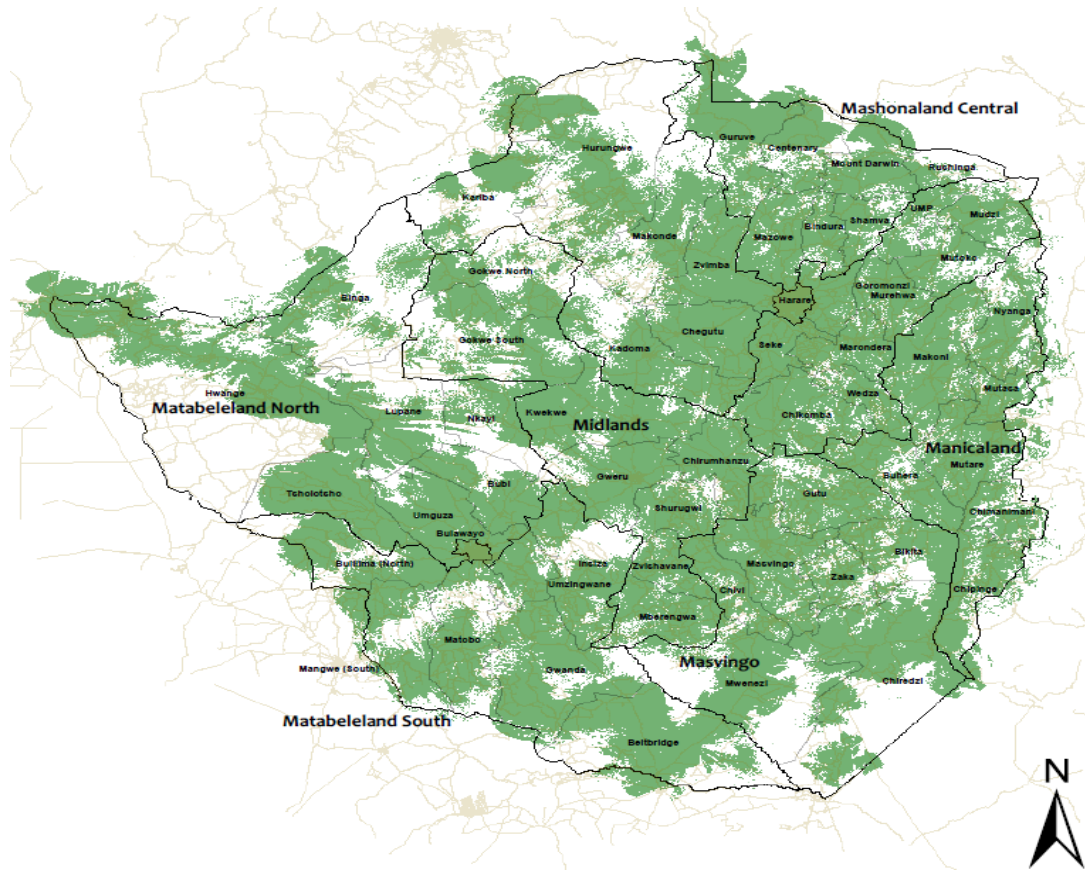
3.3 ACCESS NETWORK TECHNOLOGIES AND ROLLOUT

2G and 3G mobile technologies are widely used for the provision of mobile network services around the country. It should however be noted that while 2G provides mobility and data services, it does not the data speeds for broadband as defined in this Plan. Accordingly, 3G is considered as the minimum mobile technology for the provision of broadband, while 4G provides enhanced broadband experience and higher speeds to end users. Apart from the aforementioned mobile access technology, fixed network technologies including copper wireline, fibre optic and fixed wireless play a significant role in the provision of broadband to households, schools, hospitals, public offices and business.

3.2.3.1 Mobile Network Coverage (2G)

2G mobile technology has the widest geographical coverage of 75% and a population coverage of 93.42%. Population coverage in the rural areas was 74.67%, whereas the population in urban areas was 99.85% at of 31 December 2019. The map below shows the combined geographical 2G network coverage by the three Mobile Network Operators (MNOs).

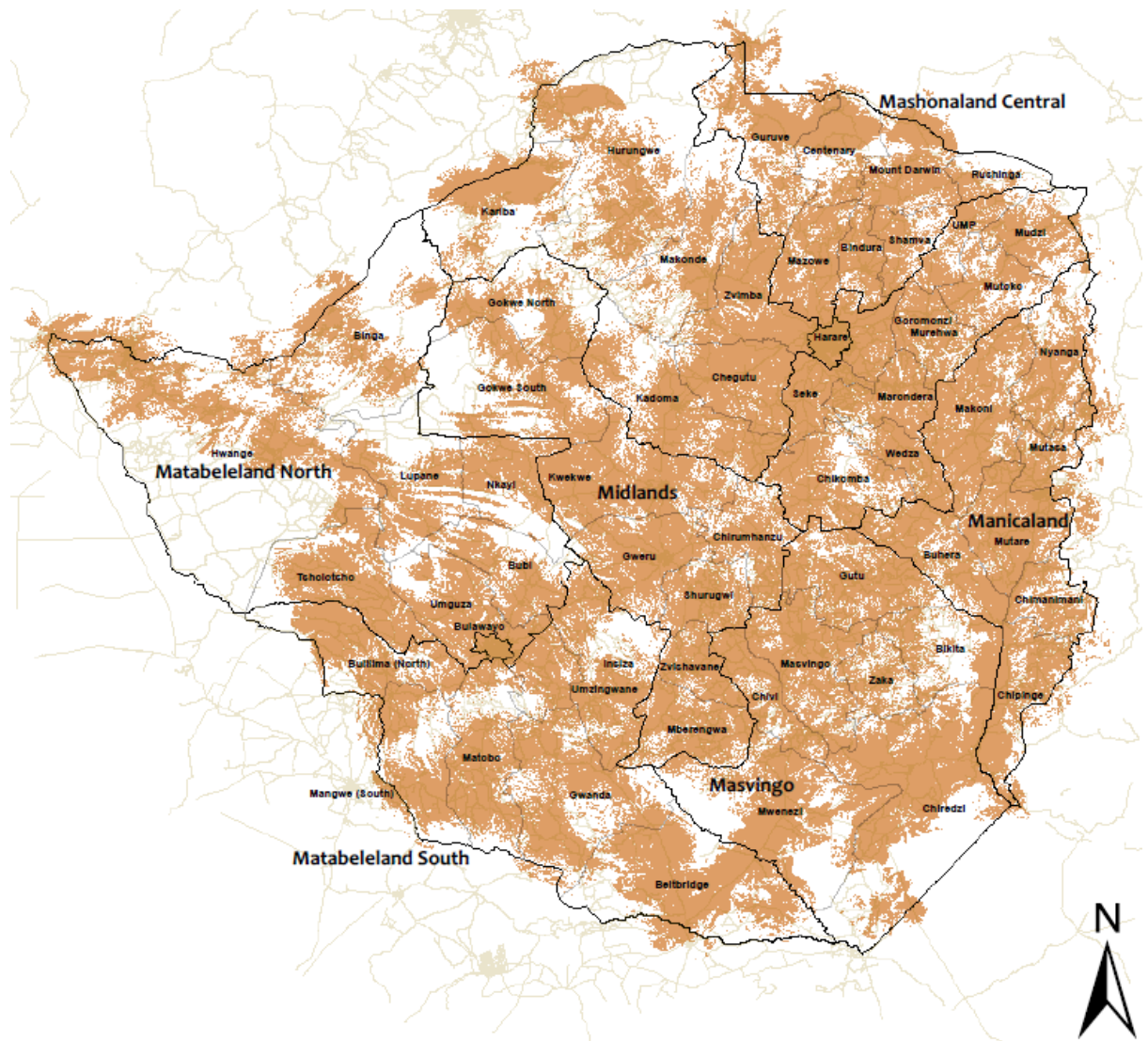
Figure 2: 2G Coverage



3.2.3.2 Mobile Network Coverage (3G)

As stated above, 3G is the minimum mobile technology required for accessing broadband services. The population coverage of 3G was 83.9% as at 31 December 2019, while geographic coverage was 70.5%. Plans for continuous rollout are curtailed by the prevailing economic challenges. The map below shows the combined geographical coverage of 3G network as at 31 December 2019.

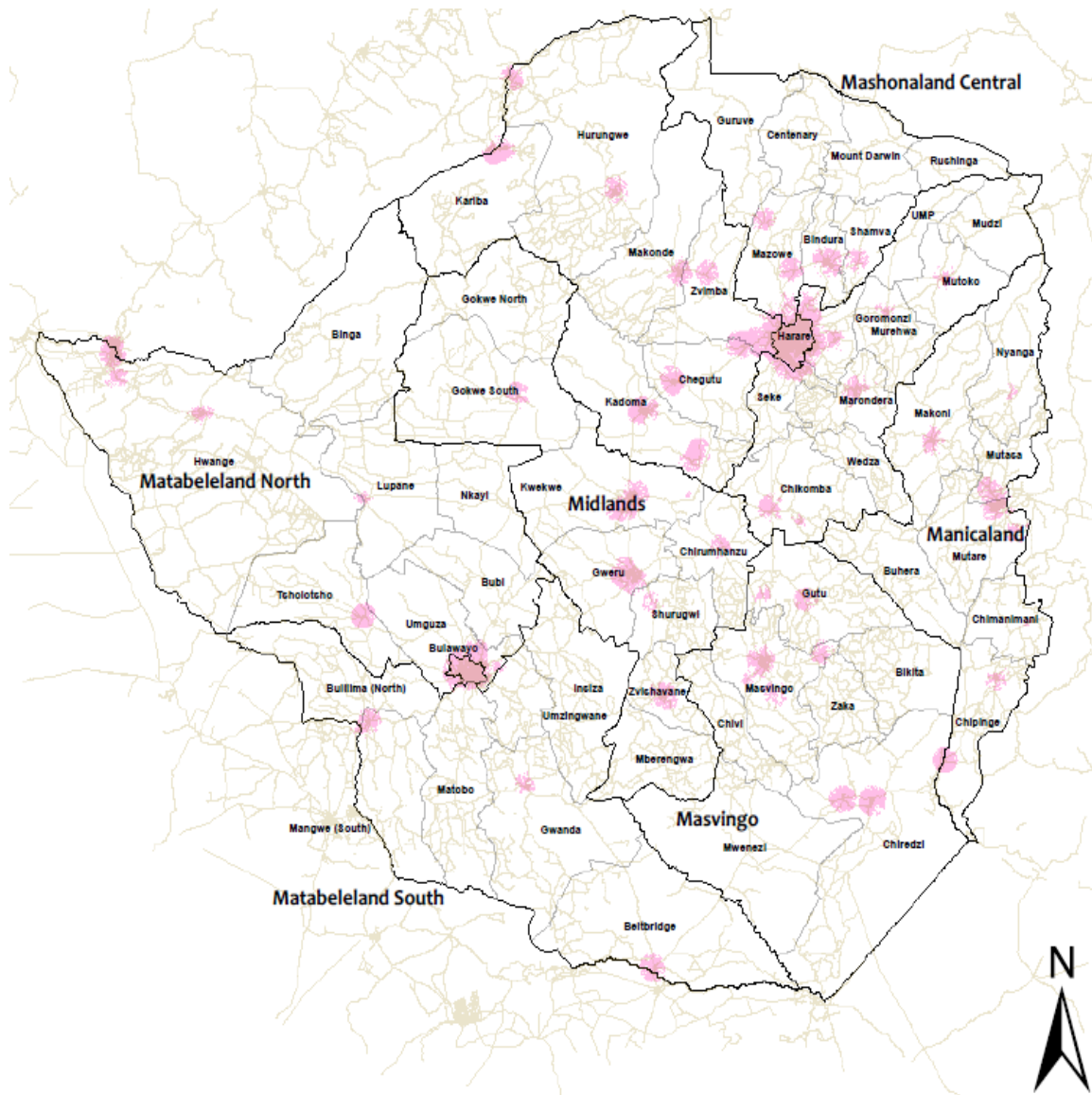
Figure 3: 3G Network Coverage Benchmark



3.2.3.3 Mobile Network Coverage (4G)

4G (LTE) technology is sparsely deployed in major cities and strategic economic centres. The map below shows the combined geographical network coverage of 4G by two of the three MNOs, as at December 2019.

Figure 4: LTE Network Coverage Benchmark



As at 31 December 2019, the geographical coverage of LTE was 4.07% and the population coverage was 34.97%. The rural population coverage for LTE was 1.83% compared to 83.89% for urban areas.

3.2.3.4 Fixed Network (Wireless, Optic Fibre and Wireline)

The Fixed Network service provider and Internet Access Providers (IAPs) are responsible for deploying the fixed network infrastructure. Fixed network technologies in use include leased

lines, xDSL, VSAT and optic fibre. Deployment of these technologies is needed to provide connectivity to strategic institutions, homes, schools and hospitals mostly in rural areas. The proportion of households covered by DSL was 14.1% whereas the proportion of households covered by fibre was 15.6% as at 30 March 2020, based on 3.2 million households at national level.

Gap Analysis

Whilst the geographical and population coverages for 2G and 3G technologies are considerable, both technologies have reached maturity in terms of intra-generational evolution. They are being replaced by 4G technology, which is capable of offering much higher broadband speeds. 4G (LTE) has a very low geographical coverage of 4.07%. Deployment of LTE to rural areas has been minimal, as operators focus on urban areas. At 35% LTE population coverage, Zimbabwe is still below the regional average of 42%, behind South Africa (88%), Botswana (64%), Lesotho (64%), Eswatini (44%) and Zambia (41%) amongst others.

In order to provide services to the end users on a fixed network, there is need for some civil works to be done before the customer is connected. These civil works come at a high cost to both the client and the operator. The overall cost of deploying network infrastructure is high in rural and remote areas due to the unavailability of support infrastructure in the form of commercial electricity, serviceable roads and bridges.

3.4 SUPPORT RESOURCES AND INFRASTRUCTURE

3.2.4.1 Radio Frequency Spectrum

Radio frequency spectrum for broadband services is agreed and allocated at international level. Zimbabwe actively participates in ITU and regional processes where these agreements are made. To date, the bands identified for International Mobile Telecommunications (IMT) that offer good coverage such as bands below 2100 MHz, are still being used by incumbent services such as GSM (mainly 2G) and UMTS (mainly 3G). The bulk of IMT spectrum is in bands that do not offer good coverage range from a single site. However, this spectrum has the advantage of giving high-speed data rates because channel sizes have large bandwidth. The spectrum also has the advantage that devices can use smaller antenna size, which enables the use of multiple antenna techniques, which in turn gives high spectrum efficiency. The following table summarises the bands identified for IMT to date.

Table 6: Bands identified for IMT

IDENTIFIED IMT FREQUENCY BANDS	BANDWIDTH (MHZ)
450 – 470	20
698 – 960	262
1,427 - 1,518	91
1,710 - 2,025	315
2,110 - 2,200	90
2,300 - 2,400	100
2,500 - 2,690	190
3,300 - 3,400	100
3,400 - 3,600	200
4,800 - 4,990	190
24,250 - 27,500*	3,250
37,000 - 43,500*	6,500
45,500 - 47,000*	1,500
47,200 - 48,200*	1,000
66,000 - 71,000*	5,000

In addition, Zimbabwe has adopted the use of technologies such as Wi-Fi in the 2,400 and 5,000 MHz bands, with high power outdoor usage allowed in rural areas in the band 5,725 – 5,850 MHz. WiGig is also permitted, enabling wider reach and semi-fixed connectivity for home and office users.

Gap Analysis

The frequencies that provide good coverage do not offer good capacity. There is very high demand by operators, for access to spectrum below the 2,400 MHz band; this affects availability. Outside of these bands, spectrum remains available, although for some of the bands, there are no agreed channel plans yet.

3.5 INTERNET EXCHANGE POINTS (IXPs)

Zimbabwe has two functional IXPs namely, the regional IXP called Harare Internet Exchange (HIX) and the Zimbabwe Internet Exchange Point (ZINX). ZINX was setup in the early 2000s by a group of ISPs using their own resources. Internet exchange points (IXPs) are critical resources as they eliminate the need to deliver local traffic via international upstream transit providers thereby reducing the Average Per-Bit Delivery Cost of service. Furthermore, the increased number of paths through the IXP improves routing efficiency and fault-tolerance.

Gap Analysis

There is need for all the players in the sector to start peering at the newly setup HIX because it was set up according to international best practice. The two IXPs are yet to be connected together and POTRAZ is working on merging the two IXPs and linking them with a direct fibre connection so that they operate as one IXP.

3.6 DATA CENTRES

Datacentres are critical support infrastructure for Broadband diffusion as they provide centralized computing resources, which include servers, storage systems, databases, devices, access networks, software and applications. They facilitate interconnection between various telecommunications players. Carrier-neutral datacentres allow interconnection between multiple telecommunication carriers and providers.

Zimbabwe has one carrier-neutral datacentre available, which is government-owned and resides at the TelOne Exchange. Another data datacentre, which is not carrier-neutral, is operated by the Ministry responsible for ICTs, exclusively for government services.

Gap Analysis

Zimbabwe has no private carrier-neutral datacentre. The only datacentre available is government owned and resides at the TelOne Exchange, which is a high security area and is difficult to access. There is no Disaster Recovery (DR) site for the datacentre hence there is very high risk of losing data in the event of an unforeseen disaster.

3.7 IPV4 to IPV6 Migration

IPv4 and IPv6 are used as numbering resources on the Internet. Internet Protocol (IP) numbering resources are an important part of the Internet ecosystem used for uniquely creating TCP/IP address identifiers. Their availability or lack therefore affects the deployment of the Internet, hence, it is important to ensure that Zimbabwe does not run out of Internet

numbering resources in the future upon depletion of IPv4 resources. This is in view of the anticipated increase in the number of devices connected to the Internet going into the future. Whilst Zimbabwe has not run out of IPv4 addresses, migration to IPv6, which is the next-generation Internet Protocol version, remains pertinent in view of the need to ensure business continuity upon depletion of IPv4 resources.

Gap Analysis

Not much effort has been channelled towards migration to IPv6. This is largely attributable to the cost of migration, which entails moving, converting devices and applications to IPv6, or installing new equipment, or equipment upgrades and training of IT personnel by individual organizations. Zimbabwe does not have an IPv4 to IPv6 migration strategy and there is no coordination mechanism to facilitate the migration.

Table 7: SWOT ANALYSIS FOR BROADBAND DEPLOYMENT

Ecosystem element	Strengths	Weaknesses	Opportunities	Threats
Mobile broadband	<ul style="list-style-type: none"> widespread passive infrastructure which can be leveraged for broadband rollout Extensive fibre backbone Skilled labour force to design, implement and operationalise broadband networks. 	<ul style="list-style-type: none"> Infrastructure duplication High infrastructure deployment costs Lack of national coordination on protection of critical infrastructure Lack of intra and inter sector coordination on infrastructure deployment Scarce financial resources. Heavy reliance on imported equipment and accessories. 	<ul style="list-style-type: none"> Emerging services and applications (IOT, e-Health etc) Digital dividend. Infrastructure sharing Regulations. Changing consumer preferences in favour of data-centric services Exploitation of green energy 	<ul style="list-style-type: none"> Criminal Attacks (theft and Vandalism) Technological obsolescence Cyber attacks Terror attacks Power outages Natural disasters Competition from OTT players delving into local broadband provision
Fixed broadband	<ul style="list-style-type: none"> Multiple Access to undersea cables Extensive fibre and microwave backbone and backhaul Legacy copper, which can be 	<ul style="list-style-type: none"> Inadequate National fibre backbone network Unstable commercial power supply Lack of intra and inter sector coordination on infrastructure deployment Scarce financial resources 	<ul style="list-style-type: none"> Untapped demand for broadband. Technological neutrality Convergence Dig Once policy Exploitation of green energy 	<ul style="list-style-type: none"> Criminal Attacks (theft and Vandalism) Technological obsolescence Cyber attacks Terror attacks Power outages Natural disasters Sabotage

	<p>used for broadband.</p> <ul style="list-style-type: none"> • Skilled labour force to design, implement and operationalise broadband networks. 			<ul style="list-style-type: none"> • Competition from OTT players delving into local broadband provision
National Backbone and Backhaul Network	<ul style="list-style-type: none"> • Functional backbone and backhaul links available in all major cities and towns 	<ul style="list-style-type: none"> • Limited capacity on backhaul connectivity to district level • Lack of redundancy and resilience in some backbone and backhaul links • Unstable commercial power • Harsh business environment 	<ul style="list-style-type: none"> • Available sharable infrastructure • Futuristic backbone and backhaul • Scalable and reconfigurable transmission network elements 	<ul style="list-style-type: none"> • Criminal Attacks (theft and Vandalism) • Technological obsolescence
International Internet connectivity (IIC)In	<p>Multiple access routes to undersea fibre optic cables</p> <ul style="list-style-type: none"> • Existence of National and Regional Internet exchange Point facilities • Scalable International bandwidth capacity. 	<ul style="list-style-type: none"> • Landlocked country with no direct access to undersea cable landing stations. • High transit IIC costs 	<ul style="list-style-type: none"> • Connection to the rest of the world • Implementation of SADC Regional Interconnection Framework 	<ul style="list-style-type: none"> • Regional Political instability • Network sabotage • Natural disasters e.g. bad weather, land and undersea earthquakes. • Sabotage
Data Centres	<ul style="list-style-type: none"> • Functional data centres in the country. 	<ul style="list-style-type: none"> • Limited competition • No Disaster Recovery (DR) sites available • Low awareness and adoption of virtualisation and cloud services 	<ul style="list-style-type: none"> • Untapped demand for data storage facilities • Untapped demand for data analytics. • High literacy rate • Youth dividend. 	<ul style="list-style-type: none"> • Technological obsolescence • Cyber attacks • Terror attacks • Power outages • Natural disasters • Sabotage
Access Devices	<ul style="list-style-type: none"> • Fully harmonised standards aligned with Africa, Middle East and Europe 	<ul style="list-style-type: none"> • High taxation • Limited competition in device manufacturing/assembling • Foreign currency shortages • Lack of tight quality control measures. 	<ul style="list-style-type: none"> • High level of device diversity • Growing demand for broadband services • Youth dividend • High smartphone adoption. 	<ul style="list-style-type: none"> • e-waste pollution • dumping • Cyber attacks • Privacy issues • Counterfeit devices.

Internet Exchange Points	Two (2) functional IXPs in the country.	• fragmented operation of IXPs	Creation of a second Regional IXP	
IPv4 to IPv6 Migration	• Currently deployed ICT equipment is IPv4 ready	• sluggish migration to IPV6	• Inexhaustible unique IP addresses	Shortage of IP addresses to cater or Internet of Things (IOT)

3.4 STRATEGIES FOR UNIVERSALISING BROADBAND

Under this Plan, focus will be directed at achieving 100% population coverage of Broadband services. This entails extending broadband networks to provide high speed and quality broadband coverage to all areas where people live, work, learn and travel in Zimbabwe. The following table summarises the desired outcomes and identified strategies and outputs for universalising Broadband in Zimbabwe:

Table 8: Strategies and outputs for universalising Broadband in Zimbabwe

MOBILE BROADBAND			
OUTCOMES	STRATEGIES	OUTPUTS	RESPONSIBILITY
Increased Broadband coverage.	Enforce Broadband rollout obligations	Revised roll out targets	POTRAZ
	Ramp up the rollout of passive infrastructure by USF	Roll out Plan for Passive infrastructure	POTRAZ
	Enforce Infrastructure sharing regulations.	Database of infrastructure	MoICTP&CSs; MOF; MOT; MOE;MOLGRD;
	Assign additional spectrum for 4G rollout.	Additional 4G spectrum assigned	Operators; POTRAZ
	Assign 5G spectrum with rollout obligations	Develop 5G Roadmap developed	POTRAZ; Operators;
Increase broadband speeds	Re-farm and avail additional spectrum to enhance last-mile solutions.	Revised Spectrum assignment table	POTRAZ

	Operators to increase their respective base station densities in suburban, rural and resettlement areas	Additional base stations deployed.	POTRAZ
OPTIC FIBRE BROADBAND			
OUTCOMES	STRATEGIES	OUTPUT	RESPONSIBILITY
Increased Broadband connectivity	Ramp up the rollout of passive infrastructure in under-served and unserved areas.	Passive infrastructure roll out Plan	POTRAZ; MoICT,P&CSs
	Introduce, review and enforce rollout obligations, as appropriate.	Revised Roll out targets	POTRAZ
		Fully linked broadband backbone network	
	Implement the converged licensing framework and issue new licences, as appropriate.	Converged Licences	POTRAZ
	Develop and implement Dig Once policy	Digital map of existing and planned infrastructure projects	MOLGRUP;MOA; MOT; OPC; MOE; MOICT; Operators; POTRAZ
	Implement converged licensing framework	Converged licensing framework implemented.	POTRAZ; Operators.
	Coordinate access to rights-of-way	Framework for access to Rights of Way	MOLGRUP; Local Authorities
Increased Broadband Speeds	Increase and upgrade metropolitan links.	Robust middle mile connectivity.	POTRAZ; Operators.
INTERNATIONAL INTERNET CONNECTIVITY			
OUTCOMES	STRATEGIES	OUTPUTS	RESPONSIBILITY
Increased International	Enhance capabilities of Local Internet Exchange Points	Operational Regional Internet Exchange Points	POTRAZ, MoICT,P&CSs; SADC,

Internet connectivity			
Increased data storage capacity	Build data-centres of international standards	At least 2 data centres	MOICTP&CSs, SADC; POTRAZ CRASA
Increased network resilience/ redundancy.	Establish redundancy for domestic networks, International gateways and Landing Points.	Network redundancy framework	POTRAZ

3.5 KEY BROADBAND INFRASTRUCTURE PROJECTS

The broadband infrastructure projects that will be undertaken to drive broadband deployment as summarised in the following table:

Table 9: Key Broadband infrastructure projects

PROJECT	EXPECTED OUTCOMES	ESTIMATED COST (USD)	RESPONSIBILITY
Operationalising the Regional Internet Exchange Point	Increased broadband affordability	100,000 per month (USD1.2 Billion)	Government; USF; Operators
National Fibre backbone	Increased national Broadband coverage	124,000,000	Government; POTRAZ; Operators
MORAN base stations	Increased Broadband connectivity	150,000,000.00	Government; MoICTP&CSs USF; Operators.
1 Data Centre in BYO	Increased data storage capacity for data intensive applications.	10,000,000	Government; MoICTP&CSs POTRAZ; Operators

350 shared base stations	Increased broadband connectivity	100,000,000	MoICT,P&CSs; POTRAZ Service Providers
Innovation Hubs	Increased innovation capacity.	1,500,000	MoH&TE;POTRAZ
Computer Incidence response Centre	Increased use of Broadband services	450,000.00	OPC; MoICTP&CSs;MoE&T;
Fibre Last Mile Connectivity	Increased broadband connectivity		Government; POTRAZ; Operators

3.6 TARGETS FOR UNIVERSALISING BROADBAND

Table 10: Targets for Universalising Broadband

Outcome	Outcome indicator	Base	2020-2022	2023-2025	2026-2030	Source
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Increased Broadband population coverage	Proportion of total population covered by at least 3G	83.94%	88%	94%	100%	Operators/GIS
	Proportion of urban population covered by at least 3G	99.89%	100%	100%	100%	Operators/GIS
	Proportion of rural population covered by at least 3G	67.17%	78%	88%	100%	Operators/GIS
	Proportion of households covered by fixed Broadband	15.2%	25%	38%	50%	Operators/GIS
	4G geographical coverage	4%	10%	35%	50%	Operators/GIS
	5G geographical coverage	0%	5%	15%	20%	Operators/GIS
Increased Broadband speeds	3G speed at the cell-edge	3Mbps	5Mbps	10Mbps	14.4Mbps	Operators/GIS
	4G speed at the cell-edge	10Mbps	25Mbps	50Mbps	100Mbps	Operators/GIS
	5G speed at cell edge	100Mbps	100Mbps	200Mbps	250Mbps	Operators/GIS
100% National backbone	National backbone fibre length	10,323km	10,500km	11,000km	12,000km	Operators/GIS
Increased Broadband connectivity	Proportion of primary schools with Broadband connectivity	15.9%	35%	70%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of urban primary schools with Broadband connectivity	86.8%	91%	95%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of rural primary schools with Broadband connectivity	8.2%	25%	50%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of secondary schools with Broadband connectivity	36%	50%	80%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of urban secondary schools with Broadband connectivity	91%	94%	97%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of rural secondary schools with Broadband connectivity	29.1%	48%	70%	100%	POTRAZ-ZIMSTAT SURVEY

	Proportion of health institutions with Broadband connectivity	23%	45%	75%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of rural health institutions with Broadband connectivity	19%	40%	70%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of urban health institutions with Broadband connectivity	47%	60%	80%	100%	POTRAZ-ZIMSTAT SURVEY
	Proportion of households using fixed Broadband	4.9%	15%	35%	50%	POTRAZ-ZIMSTAT SURVEY; OPERATORS
	Proportion of Businesses with Broadband	TBA	TBA	TBA	TBA	POTRAZ-ZIMSTAT SURVEY;
	Smartphone penetration rate	42.1%	54%	75%	100%	OPERATORS; POTRAZ-ZIMSTAT SURVEY 2019
	Proportion of Primary schools with a Computer laboratory	17%	40%	60%	100%	POTRAZ-ZIMSTAT survey, MoP&SE
	Proportion of Secondary schools with a Computer laboratory	63%	75%	80%	100%	POTRAZ-ZIMSTAT survey, MoP&SE
Increased International Internet connectivity	Equipped international Internet bandwidth capacity	127,715M bps	+440,000 Mbps	+600,000 Mbps	+800,000 Mbps	Operators

CHAPTER 4: BROADBAND ADOPTION AND USE

Broadband is not just about developing infrastructure and improving the speed at which users can read online news, play video games, and engage in social networking. Whilst these are useful drivers of demand, they are useless unless the demand-pull aspects are also addressed. This chapter seeks to characterize the broadband demand and consumption situation in Zimbabwe. It presents strategies that are to be used to stimulate the uptake and

use of broadband, focusing on enhancing Broadband affordability, usability, palatability digital literacy and awareness, as well as building confidence and trust among consumers.

4.1 CURRENT STATE OF BROADBAND ADOPTION AND USE

4.1.1 ACTIVE SUBSCRIPTIONS

The uptake of 3G and 4G mobile broadband services have raised Zimbabwe’s performance indicators in recent years. As at 31 December 2020, the total number of active broadband subscriptions was 8,267,268 giving a penetration rate of 56.7%. Mobile broadband connections constituted 98% of all connections as shown below:

Table 11: Active Broadband Subscriptions

TECHNOLOGY	ACTIVE BROADBAND SUBSCRIPTIONS
Mobile Internet (3G, LTE...)	8,081,986
Leased Lines	2,056
DSL	110,981
WiMAX	1,927
CDMA	21,080
VSAT	2,661
Active Fibre links	46,577
TOTAL	8,267,268

Source: POTRAZ, Operator Returns

Within the Africa region, Zimbabwe was number 16 in 2019 in terms of broadband penetration (3G and above) behind countries such as Kenya (87.2%), Libya (74.2%), Seychelles (72.5%), Mauritius (67%), Tunisia (66.8%), Nigeria (61.2%) amongst others. Within the Southern Africa Development Community (SADC), Zimbabwe was in fourth place behind Seychelles (72.5%), Mauritius (67%) and South Africa (61.8%).

Gap Analysis:

More still needs to be done to increase usage and increase the penetration rate by at least 5% per annum until 2020. Although mobile broadband subscriptions are quite high, fixed broadband subscriptions are still very low, owing to sparse fixed broadband connectivity. The main inhibiting factor for increased broadband adoption is the cost of broadband and that of smart gadgets as well as the lack of relevant content to stimulate broadband uptake.

4.1.2 ACCESS & USE BY HOUSEHOLDS

According to the 2014 ICT Access and Use by Households and Individuals Survey, 33% of households had at least one member with a live Internet connection (both fixed and mobile). Of this 33%, the proportion of broadband connections was very small. The 2019 household penetration was projected to be around 45%. The total number of active household fixed broadband subscriptions as at 31 December 2019 was 152,871. Based on the 3,089,002 total national households as per 2012 census, this corresponds to just 5% of total households in the country. This low fixed broadband penetration is attributable to non-deployment of fixed broadband infrastructure e.g. Fibre, ADSL, in rural communities and most high-density areas. This is also attributable to the high fixed monthly cost of access

A comparison with Botswana and Malawi who also carried out ICT Access and Use by Households and Individuals Surveys in 2014 shows that Zimbabwe was behind Botswana, which had 40.6% households with a live Internet connection but ahead of Malawi, which had 6.5% households with a live Internet connection. Mauritius had the highest proportion of households with an internet connection of 64.14% in 2018 according to the 2018 CRASA Country Reports.

Gap Analysis:

The target is to have a household broadband penetration of 100%. More still needs to be done to improve fixed and mobile Broadband access and use at household level.

4.1.3 INTERNET ACCESS & USE BY EDUCATIONAL INSTITUTIONS

Out of the 7,910 primary and secondary schools in Zimbabwe, 1,728 (21.8%) had Internet access according the ICT Census on ICT Access and Use by Educational Institutions carried out in 2017. ICT Access by educational institutions is summarised in the table below:

Table 12: ICT Access by educational institutions

Area	Type of Institution											
	Primary Schools			Secondary Schools			Universities			Polytechnics		
	With access to the Internet	Without access to the Internet	Total	With access to the Internet	Without access to the Internet	Total	With access to the Internet	Without access to the Internet	Total	With access to the Internet	Without access to the Internet	Total
Urban	472	72	544	236	23	259	11	0	11	7	0	7
Rural	414	4,611	5,025	606	1,476	2,082	5	0	5	1	0	1

National	886	4,683	5,569	842	1,499	2,341	16	0	16	8	0	8
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Gap Analysis

The access and use gap for educational institutions was 78.2%; the target is to have 100% of educational institutions accessing and using the internet by 2030. Only 14.4% of educational institutions in rural areas had access to the internet whereas 88% of educational institutions in urban areas had access to the internet. More needs to be done to connect and equip and educational institutions in rural areas.

4.1.4 INTERNET ACCESS & USE BY HEALTH FACILITIES

There are a total of 1,489 Health Facilities in Zimbabwe; 1,267 of these are in rural areas. According to the Census on ICT Access and Use by Health Institutions (2017), 77% of health facilities did not have access to the internet; 88% of health facilities in rural areas did not have access to the internet whilst 53.2% of health facilities in urban areas did not have internet access. ICT Access by health institutions is summarised in the table below:

Table 13: ICT Access by Health institutions

Area	Type of Health Facility							
	Clinics/Rural Health Centres			Other Health Facilities			Total	
	With access	Without access	Total	With access	Without access	Total	With access	Without access
Urban	54	105	159	12	11	23	104	118
Rural	141	976	1 117	4	6	10	239	1 028
National	195	1 081	1 276	16	17	33	343	1 146

Gap Analysis:

The access gap for health institutions was 77%. More still needs to be done to improve access and use by health facilities in rural areas as only 23% had internet access compared to 88% for health facilities in urban areas.

4.1.5 INTERNET USE AT GOVERNMENT LEVEL

The deployment of ICTs and e-Government in Zimbabwe goes back to the early 1970s when the Central Computing Services (CCS) provided ICT services to the public services. The Office of the President and the Cabinet (OPC) is directly involved with e-government in Zimbabwe. To this end, the Government of Zimbabwe has established a Wide Area network (WAN) that is accessible to all government departments and ministries. Most government

departments are now computerised and there is deployment of large enterprise resource planning software (ERPs) like SAP.

The government is in the process of implementing E-Government in Zimbabwe under the 'ZimConnect' programme. It is aimed at allowing all Ministries, Departments and public entities to have flexibility in deploying e-applications online in order to reduce red tape, eradicate corruption and other institutional bottlenecks associated with the traditional methods of public service delivery. Government websites for ministries are up and running, which is a key milestone in the journey to a digital economy. The Zimbabwe government is developing the National Information Data Centre (NIDC). The NIDC will act as a central repository for public sector information and will anchor the e-government programme architecture.

Gap Analysis:

As at December 2019, the proportion of central government offices with internet connection was 72% whereas the proportion of central government entities with web presences was 88%. The unconnected government offices are situated in rural areas. For e-governance to take off, all government offices should be connected and all central government entities and departments should have web presence.

4.1.6 BROADBAND COST AND AFFORDABILITY

Broadband is available in various packages of different sizes to cater for different user needs. As at 31 December 2019, the out of bundle data tariff was ZWD0.19 (USD0.01). The price of broadband in Zimbabwe although comparable regionally is relatively unaffordable for the general populace given the low-income levels. The cost of broadband in Zimbabwe is largely attributable to the high cost of equipment and international Internet connectivity, infrastructure duplication and low usage traffic.

At the household level, Broadband is mostly provided via fibre to the home and ADSL riding on the fixed telephone. Demand for Fibre by corporates is currently on the rise whereas demand by households is declining due to low disposable incomes that affect effective demand; fixed Broadband remains out of reach for the majority of households.

Table 14: Regional tariffs comparison for Out of bundle mobile data per MB.

Country	Operator	Data per MB in USD
Botswana	Mascom	0.086
	BTC	0.086

	Orange	0.086
Eswatini	Eswatini Mobile	0.047
	MTN	0.047
Lesotho	Vodacom	0.074
	Econet Lesotho	0.074
Malawi	Airtel	0.042
	TNM	0.044
Mozambique	Vodacom	0.056
Namibia	MTC	0.053
	TN Mobile	0.053
South Africa	MTN	0.009
	Vodacom	0.009
Zambia	MTN	0.055
Zimbabwe	Econet/NetOne/Telecel	0.015
REGIONAL AVERAGE		0.052

Gap Analysis:

According to the Alliance for Affordable Internet (AAI), the test of affordability is to divide 1GB of mobile data by the average monthly salary; the cost of accessing 1GB of mobile data should be less than 2% of average monthly income. In Zimbabwe, the cost of data relative to the average monthly income is approximately 10.1% according to AAI (2019). There is need to focus on developing various incentives to reduce the cost of broadband access and widening the community access. {High cost of service provision; inflationary pressures eroding incomes; forex shortages}

4.1.7 ACCESS DEVICES

Broadband-compatible devices facilitate communication between networks and consumers. They include desktop computers, laptops, smartphones, netbooks and tablets. As at end of 2020, Zimbabwe`s smartphone penetration was estimated to be 41.2%. This implies that the majority of mobile phones in the market are generic low-end devices, which are limited in their capabilities.

Gap Analysis

The country relies on imports, which are levied a duty of 25%, thereby making them unaffordable and beyond the reach of the majority. The high cost of devices is a critical factor that is precluding the adoption and use of Broadband services and hence needs to be

addressed. The duty on handsets has made these devices more expensive in Zimbabwe compared to what is obtaining in other markets. Consumers also fall prey to unscrupulous dealers who sell used as well as counterfeit devices, thereby posing risk of e- waste dumping and serious health risks to consumers.

4.1.8 BROADBAND USABILITY AND CONTENT DEVELOPMENT

In order to generate demand for broadband, consumers must not only be able to afford broadband; they must also see its relevance and attractiveness. This is facilitated by ensuring that the market provides sufficient choice and diversity of services, applications, and content to appeal to all consumers. Hence, the importance of relevant, understandable and interesting content as a stimulant for broadband roll out and use cannot be overstated. Some internet content is either unattractive or irrelevant because of high latency and high costs in accessing it. Investments in projects, which bring content closer to the consumers through edge computing, could drive down costs and make it possible for latency stringent content to be accessed. Policies, which support investment in edge infrastructure, need to be explored. Peering at this level can also be done by the various ISPs; this also enables local content to be distributed at a lower cost.

Gap Analysis

Currently in Zimbabwe, there are no focused content development initiatives at national level. Current initiatives are not all inclusive as they are focused on entertainment content, instead of the development of content across all sectors of the economy, including the academia.

4.2 TRUSTED ENVIROMENT: CONFIDENCE BUILDING AND SUSTAINABILITY

Broadband services and applications are increasingly expanding into every aspect of human life. An ever-increasing number of consumers are joining the online bandwagon for daily chores, education, health, agriculture, entertainment, banking, and shopping as well as to interact socially and with their governments. Businesses are using broadband to enhance their internal efficiencies and productivity, and online web representation has become more important for many businesses than traditional marketing channels such as printed publicity materials. Furthermore, essential services, such electricity, banking, and shopping are increasingly relying on ICT infrastructure.

The use of digital personal data, which can be aggregated to create digital profiles that are used to provide online-personalised services to consumers, in particular for tele-marketing purposes, is on the increase. This brings a new dimension on data privacy and ownership. The emerging challenge is empowering consumers to be in charge of their personal data in terms of collection and use by third parties. There is need to incorporate cybersecurity issues in education and awareness programmes to enhance trust and confidence among users. The use of local data centres should also be encouraged for improving accountability by local operators on data protection.

Gap Analysis

Efforts have been directed towards the enactment of cyber security related laws, including data protection and privacy. These are still under debate at Parliament. Without an up to date cyber security and cybercrime law, the traditional legal concept of jurisdiction and arrest warrant may be difficult to enforce due to the cross-border and transnational character of the broadband applications and services. Conventional national laws are increasingly proving inadequate to address the legal challenges emanating from the cyberspace.

4.3 SWOT ANALYSIS FOR BROADBAND USE AND ADOPTION

The following table provides a SWOT (Strengths, Weaknesses, and Opportunities & Threats) Analysis of broadband adoption and use in Zimbabwe:

Table 15: SWOT Analysis for Broadband Use and Adoption

	Strengths	Weaknesses	Opportunities	Threats
Broadband connectivity	<ul style="list-style-type: none"> • High 3G coverage • Choice-multiple service providers 	<ul style="list-style-type: none"> • Limited access especially in rural areas. Low Broadband speeds (poor Quality of service. Low fixed internet connectivity at household level. • 100% reliance on imports in relation to infrastructure and spare parts thereof. 	<ul style="list-style-type: none"> • 4G diffusion • 5G adoption • 	<ul style="list-style-type: none"> • Energy shortages • Weather • Vandalism • Congestion

Users	<ul style="list-style-type: none"> • Highly literate and trainable users. • Youth dividend • High mobile penetration rate and critical mass of mobile users. • Large diaspora population- need to stay connected. 	<ul style="list-style-type: none"> • Poor ICT skills. • Low confidence • Limited relevant content. • Low disposable incomes. • Language barriers • Low digital literacy levels • Limited awareness of broadband technologies and applications. 	<ul style="list-style-type: none"> • Growing subscriptions and demand (network effects) • e-government • e- health • e-education • e-commerce • e-entertainment • e-agriculture 	<ul style="list-style-type: none"> • Cyber attacks • Cyber bullying • Privacy breaches • Deteriorating economic environment • Rapid technological changes affecting user devices.
Access Devices	<p>High appetite for smart gadgets</p>	<ul style="list-style-type: none"> • 100% reliance on imports, no local manufacture of gadgets. • Low penetration of advanced mobile devices. • High taxation on gadgets. • High cost of gadgets. 	<ul style="list-style-type: none"> • High literacy rates • Growth of SME sector • Youthful population • unserved areas • Consumer awareness and education • Convergence • Regional / international collaboration and partnerships 	<ul style="list-style-type: none"> • The digital divide • Counterfeit devices • Cyber-attacks. • E-Waste dumping

Applications/ services	<ul style="list-style-type: none"> • High adoption of mobile Internet • High uptake of payment and banking applications. • High literacy rate 	<ul style="list-style-type: none"> • Limited relevant applications • Limited funding for R&D capacity and venture capital • Language barriers (mostly English) • Limited interoperability of applications. • Limited entrepreneurship culture. • No framework for economic application of scientific results. • Absence of policies and strategies for e-applications (e-Health; e-Agriculture; e-Education) • Absence of e-commerce laws • Lack of Awareness on Intellectual Property Protection • Limited technology parks 	<ul style="list-style-type: none"> • Technological evolution (IoT, M2M, 5G etc) • Innovation Drive • Research and development • Convergence of technologies • Growing demand for payment applications • Partnerships for technology transfer opportunities. • Innovation incentives • E-commerce 	<ul style="list-style-type: none"> • Abuse of Social Media • Technological obsolescence) • Cyber crime • Data Privacy issues • Poor quality of service
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4.4 FOSTERING BROADBAND ADOPTION AND USE

A combination of push and pull measures are required to support and stimulate more consumption and enrich the broadband ecosystem. Demand-side strategies focus on expanding the market through programs designed to encourage broadband Internet access, adoption and use. This includes measure to increase broadband affordability by ensuring that the cost of broadband devices and services are affordable to all consumers across the social spectrum. With more visible demand, infrastructure providers are more likely to make the investments needed to spur greater broadband development,

Building confidence and security in the use of broadband is a critical success factor. Hence the need to focus attention on law-and-order and socioeconomic issues that arise from cyberspace. It is therefore pertinent to maintain a cyber-environment that encourages innovation and certainty of transaction execution whilst ensuring safety, security, privacy and business confidentiality. This entails the enactment of comprehensive cyber security laws that address the liability and criminal risks emanating from fraudulent and inappropriate use of

broadband applications and services, including spam, privacy violation, copyright infringement, online defamation and other modes of cybercrime.

The following table summarises key outcomes and strategies for increasing broadband adoption and use through fostering broadband affordability, usability, palatability, digital literacy and awareness:

Table 16: Outcomes and strategies for increasing broadband adoption and use

OUTCOMES	STRATEGIES	OUTPUTS	RESPONSIBILITY
Increased Broadband affordability	Remove customs duty on High-end User Devices (smartphones, computers etc.)	Revised taxation policy to suit the digital economy.	MoF, ZIMRA
	Provide tax incentives/subsidies for deployment of broadband infrastructure in rural and under-served areas.	Tax Incentives/Subsidies	MoF, ZIMRA
	Enhance competition by licensing more players.	Converged licensing Framework	POTRAZ, MoICTPS
	Reduce taxation on broadband services.	Taxation	MoF, ZIMRA
	Encourage all local ISPs to connect to the Regional Internet Exchange Point to reduce peering costs.	Integrated IXP	POTRAZ, MoICTPS
	Subsidise end-user broadband costs for health and educational institutions.	Government broadband subsidy scheme	MoF
	Incentivize large-scale content providers to install cache servers in Zimbabwe.	Caching servers established.	OPC; MoICT; POTRAZ
	Promote government-led demand aggregation.	e- government services	OPC; MoICT; POTRAZ
Increased digital literacy and awareness	Conduct education and awareness campaigns on relevance of existing and emerging Broadband technologies, services and applications.	Awareness campaigns on Broadband technologies, services and applications conducted.	POTRAZ; MoICTPS; MoIP&BS;
	Utilise community Information Centres as digital literacy hubs.	Digital literacy training facilities at all CICs.	MoICTPS
	Develop e-government digital literacy curriculum for citizens.	Online Digital Literacy Portal developed	MoP&SE; MoH&TE
	Facilitate the roll out of e- learning facilities across all levels of learning.	E-learning programs across all levels of learning implemented.	MoP&SE; MoH&TE; ZIPAM;
	Coordinate digital literacy capacity building among training institutions, government and industry.	Digital literacy Development Programs.	MoH&TES&TD, MoI&C
	Promote digital scholarship by encouraging participation in academic, professional and research practices that depend on digital systems.	Digital scholarship awareness campaigns conducted.	MoH&TES&TD

Increased confidence in the use of broadband	Develop relevant content including for people with special needs & interests, in local dialects.	Digitised local content.	MoBI&P
	Translate the language of online content and services into local languages.	Translation program established	All Government departments; MoBI&P
	Create public awareness on available online content.	Public awareness campaigns on available online local content conducted.	POTRAZ;
	Develop Policy on creativity and artistic expression.	Policy Framework for creativity and artistic expression.	MoSA&C MoBI&P
	Develop high impact e-government services and applications (Digital government services).	High impact e-Government applications and services developed.	All government ministries and Departments.
	Develop standards and guidelines for local content development.	Handbook on Guidelines and Standards for content development produced.	MoBI&P; MoSA&C
	Monitor and benchmark Zimbabwe' Global Cyber Security Index rankings.	Database on Global Cyber security rankings maintained.	POTRAZ
	Develop cybercrime laws in line with technological developments.	Cybercrime laws enacted.	OPC; MoICTP&CSs POTRAZ
	Establish self-regulatory and co-regulatory mechanisms to deal with Broadband related public policy issues such as spam, child protection and cybercrime.	Multi-stakeholder governance bodies to deal with Broadband public policy issues established.	MoICTP&CSs; POTRAZ
	Ensure data privacy and protection.	1. Data privacy and protection laws enacted and enforced. 2. Institutional arrangements for implementation established	OPC; MoICTP&CSs POTRAZ
	Conduct consumer education and awareness campaigns on human safety	Consumer education and awareness	POTRAZ; CCZ;
	Strengthen cooperation/ collaboration among all stakeholders at national, Regional and international levels.	Establish Broadband councils, task forces, and associations as tools to examine Broadband challenges and opportunities and promote these issues.	ALL government departments, operators
Increased broadband adoption and use	Policies and strategies on E – education, e – agriculture, e – health, e – commerce, E – Government, DFS	Policies and strategies reports	POTRAZ, MoICTP&CS, Min of Agric, Min of Education, Min of Industry and Commerce, OPC, Operators

4.5 TARGETS FOR BROADBAND ADOPTION AND USE

The KPIs as well as the long term, medium term and the short-term targets for fostering broadband adoption and use are summarised in the following table:

Table 17: Targets for fostering Broadband adoption and use

Outcome	Outcome indicator	Base	2020-2022	2023-2025	2026-2030	Source
Broadband Increased affordability	Proportion of mobile broadband 1GB to average monthly incomes.	10.1%	<9%	<7%	<5%	POTRAZ; MoF
	Proportion of fixed broadband to average monthly incomes.(entry level 25G)	13.7%	<11%	<8%	<5%	POTRAZ; MoF
digital Improve literacy	ICT skill index	3.58/10	>4	>5	>6	ITU
	ICT skills country ranking- global	139	<130	<115	<100	ITU
	ICT skills country ranking- regional	15	<13	<10	<5	ITU
Increased use of Broadband	Used international incoming bandwidth capacity	87,720Mbps	150,000Mbps	250,000Mbps	400,000Mbps	Operators
	Used international outgoing bandwidth capacity	29,820Mbps	75,000Mbps	120,000Mbps	200,000Mbps	Operators
	Per capita Broadband usage in MB per year	3,529MB	1GB	3GB	5GB	Operators

Increased availability of local content applications	No. of local online content applications produced per annum	TBA	TBA	TBA	TBA	
Increased confidence and security in the use of Broadband services	Cyber security index	0.186 out of 1 ¹	0.25	0.35	0.5	ITU
	Cyber security country ranking- global	124	<110	<105	<100	ITU
	Cyber security country ranking- Africa	24	<20	<15	<10	ITU
Increased collaboration and coordination activity on Broadband issues	Number of partnerships that foster Broadband development ecosystems					
	Number of broadband collaborative initiatives/					

¹ The baseline year for the Cyber security index is 2020, at which time Zimbabwe had no Cyber security law.

CHAPTER 5: FUNDING BROADBAND DEVELOPMENT

5.1 CURRENT STATUS

The Zimbabwe ICT sector is currently financed through various uncoordinated means. The licensed operators have been the biggest investors in the provision of ICT infrastructure, largely through off shore loans. The Government of Zimbabwe has also been providing funding for the construction of the National Backbone. However, funding has not been flowing to areas where operators do not regard as commercially viable such as rural areas and remote sparsely populated locations. The Universal Service Fund has been involved in initiatives to help bridge the funding gap for extending services to rural and under-served areas.

Total investment in United States Dollar (USD) terms in the sector for the period 2013 – 2018 is shown in the table below:

Table 18: Total investment in the Sector in USD

	IAPs	Fixed	Mobile	Total Telecommunications Investment
2013	28,522,157	7,564,214	224,398,478	260,484,849
2014	38,862,807	10,115,309	157,098,350	206,076,466
2015	63,768,076	16,369,184	237,509,091	317,646,351
2016	39,600,975	5,926,278	186,009,336	231,536,589
2017	38,881,537	57,784,667	100,853,947	197,520,151
2018	77,558,015	22,412,620	59,538,288	159,508,923

Total investment by telecommunications operators in 2019 was ZWL280,327,499. Mobile network operators invested ZWL70,174,478; capital expenditure by the fixed network and Internet Access Providers was ZWL42,097,844 and ZWL68,055, 177 respectively.

Gap Analysis

The desired level of investment in the sector is still low. This is attributable to various factors, which include the structure of the market, which is characterised by few private players, and several government owned companies, the credit crunch as well as foreign currency shortages. The financing methods used to finance the investment are constrained by non-availability of cheap lines of credit and local financing market. Operators have not been able to access local financing channels, mainly relying on foreign loans that are payable in foreign currency. The government on its part has not been able to provide enough funding for

investment in the sector, save for minimal budget allocations for construction of the National Fibre backbone and the National Data Centre.

The migration from the multicurrency system to the mono currency system has also posed another challenge as USF contributions that were accumulated in USD were converted to ZWL, at parity. This has further reduced the ability of the sector to effectively invest in much needed capital-intensive infrastructure

5.2 SWOT ANALYSIS

The Strengths Weaknesses Opportunities Threats (SWOT) analysis of the operating environment in terms of financing is shown below:

Table 19: SWOT Analysis of the Operating Environment in Terms of Financing

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Government guaranteed offshore funding. • Retained Operator revenue funding • Universal Service Funding • Open for Business policy 	<ul style="list-style-type: none"> • Limited Public funding • Limited venture capital • High country risk perception • Limited and high cost of offshore funding • Depreciating local currency • High interest rates • Foreign currency shortages • High taxation • Longer rate of return 	<ul style="list-style-type: none"> • New revenue streams from new services • Growing demand for Broadband- opportunity for BOT models. • Public Private Partnerships • Corporate/ private financing • Debt/equity funding 	<ul style="list-style-type: none"> • Economic uncertainty • Low disposable income • Negative country perception-impeding investment in the sector • Disruptive nature of new technologies • High taxation regime on Broadband services. • Shift in government policy

5.3 SOURCES OF FUNDING & FINANCING MODELS

The major sources of funding for the deployment of Broadband infrastructure are private lending institutions, public funds (through grants or low interest loans), and equity investors (governments, multilaterals or the private sector), through a variety of mechanisms and partnerships. Given that broadband deployment requires a substantial amount of foreign currency as most of the equipment is imported, a big chunk of funding would need to be raised offshore. This requires serious effort towards attracting Foreign Direct investment, improving the high country risk perception as well as soliciting donor funding.

Given the critical nature of broadband going into the future, it is pertinent that government takes a leading role in raising funding for broadband deployment. Apart from direct budgetary allocations for broadband deployment, the Universal Services Fund can also be expanded to fund ICT in education programmes and other initiatives to stimulate broadband adoption such as subsidising access devices, content development and training for marginalised communities. Government can also support broadband development through issuing bonds/ debt, grants and risk mitigation support and guarantee debt arrangements. The government should also solicit funding from development partners and partner with major equipment suppliers to provide support through export credit agencies and development finance institutions. Government may need to consider providing grants for specified Broadband projects and incentives such as tax breaks to operators investing in infrastructure projects. It should however be cautioned that public funding should target under-served uneconomic areas which are unattractive to private investment and should not be seen crowding out the latter as this is inimical to innovation and competition.

Concerning private investment, privately owned operators should be allowed to continue building an alternative Internet backbone facility to augment the government National backbone for redundancy, as well as fostering competition. The main sources of funding include debt, equity investment and retained funds. Sources of debt financing include banks, institutional investors, pension funds, insurance companies, equipment vendors and Infrastructural Development banks such as the Infrastructure Development Bank, the Development Bank of Southern Africa, African Development Bank amongst others. Partnerships with global Tech companies and Operators need to be supported when they venture into such partnerships. Other financing models that can be used for broadband development include:

Public utility financing model: where local authorities/municipalities collaborate with investors such as pension funds and banks to provide Broadband within their localities. Under this model, local authorities/ municipalities make financial and non-financial contributions, such as feasibility studies, right of way permits and ducts access); whilst investors provide funding for equity. Lenders require a collateral interest in assets, including rights to receive senior pledge of revenue.

Public Private Partnerships (PPPs): this entails investors (construction companies, banks, pension funds, infrastructure funds) and lenders (private sector project finance banks) coming together to create a Special Purpose Vehicle. Lending for such projects is based on the projected income, which is ring, fenced and project assets are used as collateral.

The following table shows the possible sources for key Broadband Projects/Programmes:

Table 20: Sources for key Broadband Projects/Programmes

Type of funding	Sources of funding	Sponsors	Projects
Public Funds	National Budget	SOEs	<ul style="list-style-type: none"> • Data Centres • National Backbone • Innovation Hubs
	USF	USF	<ul style="list-style-type: none"> • Shared Telecommunication Infrastructure (shared base stations and Optic Fibre links) • Community Information Centres • e- government • Digital literacy • Innovation Hubs
	National Budget	Ministry of Youth, Arts Sport and Culture	Content Development
Debt	Government bonds	Operators	Broadband networks FTTX
	Financial Institutions	Operators	4G and 5G networks
	Vendor Financing	Operators; USF	Shared base stations
	Development Banks	Operators	4G and 5G networks
	Multilateral Institutions	Government	National Backbone
Development Aid	ITU; ATU; SADC	Government	<ul style="list-style-type: none"> • e- health • schools connectivity • Innovation Hubs • Regional Internet Exchange Point • Computer Incidence response Centre • Digital literacy

CHAPTER 6: IMPLEMENTATION MODALITIES

The National Broadband Plan is a whole-of-government initiative whose implementation will be fully controlled by government with private sector participation. This in view of the fact that targets set in the National Broadband plan require sector wide coordination at Government level. The Ministry of Information Communication Technology, Postal and Courier Services has the general responsibility for the coordination of ICT policy implementation, monitoring, and review. Accordingly, the Ministry of Information Communication Technology, Postal and Courier Services will spearhead the formulation and implementation of the Broadband Plan with the assistance of the Postal and Telecommunications Regulatory Authority of Zimbabwe, which is responsible for ICT policy advice and implementation.

6.1 INSTITUTIONAL ARRANGEMENTS

6.1.1 BROADBAND STEERING COMMITTEE

The Steering Committee will be responsible for overall coordination, to ensure progress in the implementation of the Broadband Plan. The steering committee will also monitor progress for the fulfilment of the initiatives throughout the Plan’s lifetime and ensure targets are met. The Steering Committee will have the following members and such other members on an ex-officio basis as determined by the Committee Chair from time to time.

Table 21: Stakeholder committee and Responsibilities

STAKEHOLDER	ROLES & RESPONSIBILITIES
Ministry of ICT, Postal & Courier	<ul style="list-style-type: none"> • Review and develop appropriate policies, laws, regulatory frameworks • Spearhead the coordinated approach to National broadband plan implementation • Provide national policy objectives in regard to Broadband, e.g. provide data on the estimated Broadband demand from government ministries and departments as well as nation as a whole • Ensure that interests of all stakeholders are catered for in the policy that will emerge • Provide support and guidelines for the Transition to IPV6 • Coordinate demand aggregation from the public sector
Regulator (POTRAZ)	<ul style="list-style-type: none"> • Provide data on existing operators and lessons from other countries; interpretations thereof

	<ul style="list-style-type: none"> • Provide policy advice and guidance on the existing regulatory framework and how it could be made more efficient to deliver Broadband services • Efficient and timely implantation of agreed Broadband and related policies • Provide technical guidelines on infrastructure sharing • Provide data on existing ISP operators • Initiate collaborations and partnerships with relevant stakeholders on National broadband plan implementation
Legislators	<ul style="list-style-type: none"> • Build necessary legislations into the Broadband national policy
Other Ministries	<ul style="list-style-type: none"> • Provide guidance on the Broadband needs to support respective sector policies and objectives • Provide more accurate estimates of the future Broadband demand • Government budget allocation to support the ICT sector
Telecommunication operators	<ul style="list-style-type: none"> • Provide data on existing telecom operators Broadband plans and existing investments in infrastructure • Adequately invest in Broadband infrastructure and technologies, including transmission (domestic, regional and global) and last mile • Affordable rates for Broadband services; stimulate demand • Present a clear plan on the migration to IPv6
Local Government Authorities	<ul style="list-style-type: none"> • Educate the community of the need to protect Broadband infrastructure from possible vandalism • Articulate specific local needs and requirements thus creating relevance by localizing the content
Zimbabwe Investment Development Authority (ZIDA)	<ul style="list-style-type: none"> • Give input into the planned number and nature of investors in the near future • Provide data on the interests of the investors and consumers
Academia, Civil Society, Consumers	<ul style="list-style-type: none"> • State the needs of institutions of higher learning and research institutions • Provide data on the interests of the investors and consumers
Energy sector	<ul style="list-style-type: none"> • Improve access to electricity for powering terminal equipment and telecom infrastructure • Rural Electrification programme

The Broadband Steering Committee is empowered to:

- i. Make necessary decisions pertaining to the prioritization or amendments to activities of this plan and recommend additional policy actions, where need be.
- ii. Form consortia or committees with stakeholders from the industry, with common identified policy objectives. This may include the following among others:

- a. Universities
 - b. Licensed Operators
 - c. Local Authorities
 - d. Real Estate Developers
 - e. Educational Institutions
 - f. Health institutions
 - g. Actors in the Digital Financial ecosystem
- iii. Establish cross-sectoral working groups, which will be responsible for carrying out the initiatives contained in the Plan whereby:
- a. Nominated champions will interact with the Steering Committee on relevant policy actions on behalf of all stakeholders.
 - b. The working groups will report on a regular basis to the Steering Committee, indicating achieved progress, identifying key bottlenecks and requesting eventual support periodically.
 - c. Stakeholders will be responsible for defining their own detailed implementation plans of the policy actions they need to fulfil. They will ensure that the plans address the relevant policy objectives to which the stakeholders have been assigned, and that they respect the set target deadlines.
 - d. Each implementation plan will be validated by the Steering Committee. The Steering Committee will be responsible for ensuring feasibility and coordination among the different implementation plans.
 - e. Stakeholders shall identify bottlenecks during project planning so that mitigation strategies are put in place.
- iv) Define tracking mechanisms to enable both the working groups and the Steering Committee to assess progress. This will entail:
- a. Validation of understanding of each stakeholder's responsibilities for each of the initiatives. In the event that initiatives have to be prioritized, reassigned or changed, this will need the approval of the supervisory committee.
 - b. Breaking down the policy actions into a set of smaller actions by each stakeholder or cross-sector working group where necessary.
 - c. Assigning implementation deadlines for these sub-actions, and validating them by the supervisory committee, taking into account the need to respect overarching targets included in the Plan.
 - d. Financial guidance on ensuring the proposed plan does not go off budget, procurement and analysis of return on investment.
 - e. Tracking target achievements.

6.2 STAKEHOLDER ENGAGEMENT PLAN

Stakeholder communication is a prerequisite for constructing and implementing the National Broadband Plan. This section maps out the communication and engagement activities for the National Broadband Plan. This is necessary to facilitate the free flow of information to the following stakeholders amongst others:

Government: Government through the Ministry of ICT, Postal and Courier Services needs to be fully appraised of all aspects of the National Broadband plan. This will enable buy-in and rational decision-making in harmonizing the broadband ecosystem and the alignment of policies. This will be critical to develop a strong Plan from the onset, thereby inculcating a foundation of trust and constructive engagement.

Network Operators and Service Providers: Broadband operators are central in the rolling out of infrastructure and service provision. As such, they bring in technical expertise in broadband infrastructure and service rollout.

Business: Successful broadband projects need engagement with business i.e. non-profit making organizations, Small to Medium Enterprises (SME), manufacturing sector, retail sector, transport and logistics, agriculture, mining, amongst others. Business is critical, as they are critical users of broadband.

Consumers: All consumers, at community, household or individual level are critical voices as they are end-users of broadband. They provide important information for decision making on broadband roll out and service delivery. They also need to be empowered through education and awareness. This will be done through workshops across the whole country, outreaches, and physical campaigns, virtual campaigns using both mainstream and social media.

Other Regulators: These include other sector regulators such as ZERA, BAZ, RBZ, CCZ, and CTC among others. ICTs permeate every sector and therefore these are important partners as services are converging on broadband driven platforms. This calls for collaborative regulation and interoperability of platforms across all sectors to facilitate seamless and convenient service provision.

Regional and International Organisations: These include International and regional organisations such as the ITU, UPU, ATU, PAPU, SADC and CRASA amongst others. These standard setting bodies also provide capacity and technical assistance in the development and implementation of broadband projects.

Internal Stakeholders: The NBP and its full details must be clearly articulated to the internal stakeholders, such as the Board and employees of implementing agencies, to garner maximum commitment, support and participation for the successful implementation of the National Broadband Plan.

6.3 STAKEHOLDER ENGAGEMENT STRATEGIES.

The NBP communication and engagement strategies for the various stakeholders will include the following:

6.3.1 Roadshows and Stakeholder Forums

POTRAZ will carry out NBP educational and awareness campaigns in all provinces of the country in collaboration with popular radio stations. The main targets will be those in the remote areas and the roadshow will be in the edutainment format where prizes will be won for answering questions correctly. Educational material will be distributed in vernacular. The roadshows will be live on radio so that the listening audience will also be educated. Stakeholder forums will enable exchange of ideas and in the process encourage participation by all stakeholders. The forums will be in the form of capacity building workshops to educate stakeholders.

Dissemination of information to Broadband stakeholders will be done through print, radio and electronic media. Awareness messages will be targeted at the different market segments with emphasis on the marginalized areas. Press releases, news stories and advertorials will be utilized. The deliverables include:

- Sponsored Radio and TV programs will be used to raise awareness in and around the country.
- A dedicated website for the national Broadband plan needs to be developed so as to constantly update and educate stakeholders on all issues regarding the project
- An up to date market developed website will allow consumers to provide reviews of, and feedback on various issues in the NBP.
- Social media platforms i.e. Twitter, Facebook, blog, LinkedIn and Instagram amongst others, will be used to disseminate online content and feedback from Broadband consumers.
- Dissemination will also be done through village heads, chiefs, and engaging school pupils through competitions.

6.3.2 Promotional Memorabilia

Various promotional material will be distributed so that the message is always remembered and understood. This will be done at Roadshows, agricultural shows, Trade fairs and any other exhibitions which attract crowds. Educational brochures, e-books amongst other educational material that will be provided disseminated. Educational messages will also be inscribed on billboards, t-shirts, caps, and rulers to reach out to as many stakeholders. Other effective programs include schools, university outreach campaigns and basic teaching on ICT and broadband at primary school level by having a formal education curriculum modelled in such a way that it gives greater prominence to digital technologies.