NATIONAL BROADBAND STRATEGY
2019 - 2023

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The Malawi Government through the National ICT Policy of 2013 has a deliberate policy whose objective is to ensure that all its citizens access ICT services which are a catalyst for socio economic development. Further, through the Malawi Growth and Development Strategy (MGDS III), Government recognizes that access to ICT services including advanced internet services are key to national development and focuses on ICT infrastructure development.

Considering that Internet and Broadband are globally recognized as the basis for transformation to a knowledge-based economy, and in line with the National ICT Policy and MGDS III, the Government has developed a five year National Broadband Strategy (2019 -2023) whose objectives are to promote broadband deployment, increase broadband adoption and usage as well as ensure availability of broadband services at affordable prices. The development of the Strategy is in line with the advancements in technology which are rapidly transforming the way we communicate, work, access information, and do various daily operations. These new capabilities are driving economic growth and innovations that were not possible a decade ago. However, most Malawians still lack a critical connection to the wealth of opportunities that the broadband technology presents.

The latest statistics indicate that about 16 per cent of Malawi's population lives in areas that are unserved by mobile coverage of any kind. Statistics show that 2G has a population coverage of 84% while 3G and 4G/LTE coverage is at 56% and 25%, respectively, however, this is mostly in the urban and semi-urban areas. This calls for the government interventions of which this Broadband Strategy strives to address. The Government is committed to addressing the challenges identified in the Broadband Strategy and calls for cooperation among all stakeholders who are key to the achievement of the targets in this Strategy.

Hon. Gospel Kazako
MINISTER OF INFORMATION

PREFACE

Access to broadband is rapidly becoming a prerequisite for being able to benefit from basic social services and for participating completely in society. Access to broadband provides various opportunities in life and has in recent years transformed peoples' lives in different ways and continues to shape the modern economy. The World Bank Report on Information and Communications for Development considered broadband impact on growth in some 120 countries for a period of 25 years from 1980 to 2006. The report indicates that each 10% increase in broadband penetration results in 1.21% increase in per capita Gross Domestic Product (GDP) in developed countries, and 1.38% increase in developing countries. This shows that broadband penetration has an impact on GDP.

The National Broadband Strategy seeks to achieve an increase of broadband penetration from 4.5% to 35% in 2023 and improve broadband bandwidth from 256 kilobytes per second (kbps) to 5 megabytes per second (mbps) between 2019 and 2023.

The strategy underscores the role of both the public and private sector in funding of broadband infrastructure and emphasizes the participation of government, private sector investments and development partners in financing broadband projects particularly by incentivizing infrastructure rollout in remote areas and in areas encumbered by challenges concerning the profitability of broadband investments.

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ACRONYMS

3G	3rd Generation
3GPP	3rd Generation Partnership Project
4G	4th Generation
ARPU	Average Revenue Per User
BB	Broadband
BWA	Broadband Wireless Access
CAPEX	Capital Expenditure
CIR	Committed Information Rate
CPE	Customer Premise Equipment
DSL	Digital Subscriber Line
EDGE	Enhanced Data rates for GSM Evolution
ESCOM	Electricity Supply Company of Malawi
FTTx	Fibre To The... (Kerb, Cabinet, Premise, Building)
FWA	Fixed Wireless Access
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
GSM	Global System for Mobile
HEI	Higher Education Institution
HOM	Higher Order Modulations
HPSA	High Speed Packet Access
HW	Hardware
ICT	Information and Communications Technology
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunications Union
KPI	Key Performance Indicator
LTE	Long Term Evolution (4G)
MACRA	Malawi Communications Regulatory Authority
MAREN	Malawi Research and Education Network
MoI	Ministry of Information
MIMO	Multiple Input Multiple Output
MOCN	Multi Operator Core Network
MoF	Ministry of Finance
MORAN	Multi Operator Radio Access Network

MVNO	Mobile Virtual Network Operator
MW	Microwave
NBS	National Broadband Strategy
NGO	Non- Governmental Organization
NRRD	Network Redundancy, Reliability and Diversity
OPEX	Operating Expenditure
POP	Point of Presence
PPPC	Public Private Partnership Commission
QoE	Quality of Experience
RAN	Radio Access Network
RF	Radio Frequency
RIO	Reference Interconnection Offer
SME	Small and Medium sized Enterprise
SMP	Significant Market Power
SW	Software
SWOT	Strengths, Weaknesses, Opportunities, Threats
TCO	Total Cost of Ownership
UHF	Ultra-High Frequency
UMTS	Universal Mobile Telecommunications Service
UPS	Uninterruptible Power Supply
USF	Universal Service Fund
USO	Universal Service Obligation
VAT	Value Added Tax
VDSL	Very high speed Digital Subscriber Line
VSAT	Very Small Aperture Terminal
W-CDMA	Wideband Code Division Multiple Access
WRC	World Radio-communication Conference

EXECUTIVE SUMMARY

This document presents the National Broadband Strategy for Malawi for the period 2019 – 2023. It identifies realistic and appropriate targets for broadband service delivery in Malawi for the period of the Strategy separated between urban and rural areas. This is presented as target headline speeds as well as Committed Information Rates (CIR) that should provide an appropriate level of customer experience in Malawi when using broadband service. The proposed target speeds and penetration rates are shown in the following figures. The Strategy proposes an increase in broadband access minimum speed from 1Mbps to 5MBps for the year 2023. The Strategy further proposes a broadband access penetration rate to increase from the current 4.5% to 35 % in 2023.

The Strategy identifies Seven Strategic Priority Areas where actions are required and include both network and service provision as well as user support and demand stimulation. These Strategic Priority Areas are:
1. Increase access speeds and capacity of existing network infrastructure
2. Increase access network coverage into underserved (unserved) areas
3. National Backbone Network capacity
4. International Network capacity
5. Availability of broadband
6. Affordability of broadband
7. Promote demand

A range of individual Initiatives have subsequently been identified and documented within each Strategic Priority area. These 25 Initiatives make up this National Broadband Strategy for Malawi. They are presented to show the issues involved, responsible organizations, likely level of impact, implementation difficulty, time-period for implementation, risks and broad costs together with KPIs for each Initiative.

An implementation plan in the form of a road map is presented in the Strategy which includes an assessment of the impact, difficulty of implementation and broad cost for each of the initiatives. These are subsequently analyzed using a high level economic and social return on investment framework to rank the potential importance of the initiatives.

The Strategy is developed upon technology neutral principles whereby appropriate wire-based or wireless technologies will be preferred depending on reliability characteristics and capabilities. Where one type of technology is not practical, other types of appropriate technologies shall be deployed.

Responsibility for the successful ongoing development of broadband services in Malawi rests with a range of organizations including government, MACRA, existing network operators and service providers, new network operators and service providers, international organizations and users, especially within the public sector, as well as businesses and SMEs. In order to manage and coordinate these extensive activities it is recommended that a coordination function is set up as described in the Strategy to manage the implementation of the   National   Broadband   Strategy

1.0 INTRODUCTION

A number of activities have been undertaken in Malawi in recent years which are directly relevant to a National Broadband Strategy. These form the foundations upon which such a Strategy and Action Plan should be based.

Malawi developed a 'National Information and Communications Technology (ICT) Policy' in 2013, a 'National ICT Master Plan' for the period 2014 – 2031. These documents set out the strategic objectives for the ICT sector. The National ICT Policy provides for ten (10) priority areas which includes ICT Infrastructure Development, E-Government Services and Growth Sectors Development and Universal Access to ICT services. These priorities are the basis upon which the Strategy has been built on since ICT Infrastructure deployment is prerequisite to broadband services but also that broadband services facilitate e-government services. Further, the ICT Policy emphasizes universal access to ICT services in order to address the digital divide between the rural and urban areas in the country.

Further, a range of other initiatives, including the development of a Master Plan for Wireless Broadband Access 2015-2019, support the Broadband Strategy. This Wireless Broadband Access Strategy identified a range of issues expected to impact the growth and development of broadband access in Malawi.

Another significant element of the policy and legal environment which has been taken into account is the significant improvements in the powers and mandate of MACRA under the 2016 Communications Act, implementation of which is ongoing. Particularly with respect to subsidizing access to otherwise non-viable areas (through the newly established Universal Service Fund) and with respect to additional competition-regulating powers, it is expected that this new legal framework will, once implementation is complete, contribute substantially to regulator-driven efforts toward a more competitive sector and improved incentives for broadband deployment.

The National Broadband Strategy articulates Malawi's Vision and Mission Statements for broadband adoption and usage as well as the core elements of Malawi's approach to improving access of high speed internet by the general public. The Strategy is aligned to the Malawi's National ICT Policy objective which gives direction to ICT development in the country to support the national goal of wealth creation and reduction of poverty. The Strategy is underpinned by a number of guiding principles that ensure the Strategy fosters extensive deployment and usage of broadband throughout the country. The following principles would enable effective implementation of the Strategy:

2.1 Vision
Broadband connected Malawi society that correspond to the users' need for connectivity by 2023.

2.2 Mission
"To promote the deployment of broadband services that provide always on connectivity to the citizens in the country"

2.3 Mandate
The development of the Strategy is drawn from the Communications Act, 2016 which gives mandate to MACRA to encourage introduction of new and innovative technologies. It also promotes universal access to ICT services which includes access to broadband technologies.

2.4 Goal

The goal of the Strategy is to improve broadband penetration rate from 4.5% to 35 % and to increase broadband speed from 1Mbps to 5Mbps by 2023.

2.5 Objectives
The main objectives of the Strategy are**:**
   (i) To promote Broadband deployment,
   (ii) To increase Broadband adoption and usage; and
   (iii)To ensure affordable broadband services.

2.6 Core Values

Implementation of the Strategy will be built on the following Guiding Principles:

(a) **Open access**: Broadband access and use will be available without discrimination. Multiple service providers will be encouraged to compete on shared platforms and services.

(b) **Technology neutrality**: Use of common, interoperable standards and protocols will be encouraged. All local broadband networks shall have the right to nondiscriminatory and cost-based interconnection with other broadband networks.

(c) **Research and innovation**: Continuous research and development will be pursued.

(d) **Multi-stakeholder approach**: The Strategy will seek to enhance the effectiveness of all key stakeholders in improving the deployment and adoption of broadband in the country by recognizing the various roles and responsibilities of different stakeholders in improving broadband connectivity in the country.

(e) **Co-ordination and collaboration**: PPPs shall be promoted and encouraged. The ICT stakeholders and the governments institutions will work together to deploy infrastructure and build awareness and capacity for use of broadband.

(f) **Sustainable initiatives and interventions**: Various initiatives will be promoted in order to build foundations for sustainable contestable markets including innovative technology solutions.

(g) **Competitive choice of technologies:** Broadband technologies use both wire-based and wireless technologies with different transmission bandwidth, reliability characteristics and capabilities. Where one type of technology is not practical, other types of appropriate technologies shall be deployed.

(h) **Market-based investment:** service providers opt to provide services in areas with appropriate return on investments and this will drive the provision of broadband connectivity by service providers. Where markets do not deliver services in a timely and affordable manner, government will intervene in the public interest.

3.0 STRATEGY LINKAGE TO OTHER POLICIES

The National Broadband Strategy will complement other strategies that are operationalizing the following policies:

(a) The National ICT Policy (2013) - The policy recognizes that Malawi needs to address issues of gaps in the access of ICT services and has put up Universal Access to ICT services as one of the Strategic Priority areas in the Policy.

(b) The National ICT Master Plan (2014 – 2031) - this is to operationalize the National ICT Policy.

(c) Malawi Growth and Development Strategy III (2017 -2022) – This highlights the need to have developed ICT infrastructure and thereby facilitate broadband adoption and usage among all Malawians. The MGDS III facilitates conducive environment development of ICT infrastructure which is prerequisite to access of broadband services.

(d) Master Plan for Wireless Broadband Access 2015-2019 which identifies a range of issues expected to impact the growth and development of broadband access in Malawi.

4.0 SITUATION ANALYSIS

4.1 Broadband Definition

A broadband network by definition is a network that is primarily designed to carry large volume of data in a manner that end-users experience an acceptable quality of service. This implies a network that should transit the data at a high speed. For the purpose of the National Broadband Strategy in Malawi the following definition will be adopted. This definition will be appropriate and relevant for the period of this Strategy and potentially a longer period into the future.

> *"Broadband is an ecosystem made up of high capacity, high speed and high quality communications networks, services, content and applications that provides high value information and communications to a variety of users and citizens."*

This definition recognizes that the use which will be made of broadband will change over time and that different user groups will make use of different services and

applications and will therefore demand different amounts of capacity and make use of different access speeds and at different levels of quality. Such user groups will include parastatals and large companies (not included as the target of Initiatives), small businesses and SMEs as well as individual users and their behaviors and needs will vary depending on their location (urban vs rural), spending power, access to terminal equipment, literacy levels and communications needs.

4.2 High-Level Statistics

Malawi population characteristics affect broadband demand and had been considered in the modeling and developing of the Strategy. These characteristics include -literacy levels, affordability and internet access and usage.

4.2.1 Literacy Levels

Adoption of broadband services need basic literacy. This is why the potential broadband user population is limited to literate individuals. Below are the population characteristics according to the 2015 /16 Demographic and Health Survey (DHS) [1]for the active user group for Broadband services (15 to 49) of age: 72% of women and 82.9% of men are literate; while 3% of the women and 5% of the men attained secondary education; and 60.6% of women and 65.5% of men can read a whole sentence.:

Literacy was illustrated as being able to read only or read and write. This is why the respondents who can read and write and those with higher education are given separately above and suggest a conservative approach to equating literacy with ICT-use ability.

These statistics implies that in case of the capability to access broadband services, *at least 28% of women and 17% of men will not have any demand for broadband for lack of basic skills* to access or use it. The potential user population though significantly small, the population may not be able to access even the simple applications. Language has also been as most applications are in English which is a language that most rural population are

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[1] Malawi Demographic and Health Survey (DHS) 2015-16, Report by the Malawi National Statistical Office, published February 2017.

not conversant with. There is a huge literacy gap between urban and rural residents.

In considering broadband demand it has been noted from 2015-16 DHS that:

(a) Older women have not attained the primary school certificate and cannot use ICT. Gender gap in education is nearly disappearing among the young, there exists hope that this issue may be overcome in the near future but meanwhile remains a gender-specific obstacle among older population groups.

(b) Overall, the youngest generation entering adulthood and the labour market (15-24 year olds) show that the percentage of those having no education decreases substantially (4.4% of women in this age group relative to 12.1 for the overall 15-49-year-old cohort and 2.2% for men in the younger age group as opposed to 5.3% in the overall group).

(c) There is a relationship between high literacy and wealth. This means the educated will afford and use broadband services. For example, 31% of women and 41% of men in the wealthiest quintile completed secondary school or higher.

(d) There is a difference between urban and rural population in terms of literacy levels: While 59.4% of urban women and 76.8% of men have completed primary school or higher, the rural equivalent is only 14.1% of women and 37.8% for men.

Therefore, literacy levels will have to be considered when implementing the Strategy due to the effect that it has on broadband usage and adoption.

4.2.2 Affordability Indicators

Affordability indicators also affect broadband usage and access. Affordability applies to purchase of consumer device (i.e Smartphone, tablet, laptop, computer etc) and cost of subscription. In Malawi, consumers spend more on capital to acquire a terminal than on access. Affordability therefore acts as a barrier to access as the cost limits the demand for broadband.

Accord a total population estimate of 2018 estimates[2], of 18.8 million, the less-than thirty percent of the population above the international 1.90 USD per person and day poverty line amounts to less than 5.5 million persons even potentially able to afford a non-basic expenditure like broadband access.

In rural areas where agriculture is the main economic activity, not everyone has access to cash income. The cash income is not always steady across the year. For example, for women, less than two thirds (62.7%) of those having income from non-agricultural work are paid in cash or at least partly in cash, while in the agricultural sector only 21.8% claimed payment in cash or partly in cash (rather than solely in kind). This income is also unsteady across the year, with only 26.1% of women with agricultural and 51.3% with other sector incomes claiming year-round rather than part-year/sporadic work and hence income.

In terms of relevant household-level assets, the DHS 2015-16 data shows that terminal equipment ownership is nevertheless relatively widespread, though with a large divide as between urban and the rural areas. Comparatively, mobile phone ownership was 86.2% for the urban households against 47.8% for the rural households. Further, computer ownership was 15.5% for the urban households against 1.3% for the rural households.

Assuming that substantially less than all mobile phones will be smartphones capable of using broadband-enabled applications and services, it is likely that the rate of computer ownership (as an internet-capable terminal) may more properly reflect the segment of the population having the skills and income to afford broadband service and terminal devices – and suggesting that beyond the urban areas, demand and affordability will be relatively low.

Therefore, affordability indicators will have to be considered when implementing the Strategy due to the effect that it has on broadband access.

4.2.3 Internet Demand Indicator in Context

Current statistics for broadband penetration in Malawi is at 4.5%, however, the majority of those that access broadband services come from the urban

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[2] Malawi National Statistical Office population projection for 2018 available at http://www.nsomalawi.mw/index.php?option=com_content&view=article&id=136%3Amalawi-table-30-population-by-age-and-sex&catid=8&Itemid=3

population. Further, according to DHS 2015/16, the majority of demand for internet which might stand as a proxy for broadband was in the top 20% (quintile) wealthiest share of the population, with a second highest quintile accounting for most of the remaining present use. The subcategories for the frequencies of use further suggest that daily/near daily use is likely to be predominantly urban even for the wealthiest quintile. Usage of internet in rural areas is a mere fraction of urban demand as well as strongly gendered. Furthermore, men are dominating in the broadband access than women.

4.3 Observations

In the context of the infrastructure characteristics and limitations in Malawi, such as limited coverage of the power grid and reach of the (primarily wireless) infrastructure leaving substantial populations without coverage at present tend to suggest that demand for broadband in Malawi will be constrained by the following:

(a) Skill limitations (literacy) of a substantial share of the population which, even as educational attainment is rising;

(b) Affordability limitations due to widespread poverty and income insecurity/limitations on cash incomes, including likely with respect to both terminals and service costs;

(c) With the bulk of demand for individual broadband access coming from the top 20% by wealth of the population, with the second highest quintile providing some additional demand; while

(d) The remainder of the population and particularly large segments of the rural population will require subsidized/free access, including provision of terminals through measures like shared access/telecentres.

5.0 STRATEGIC PRIORITY AREAS

5.0 STRATEGIC PRIORITY AREAS

In order to promote the development of ICT in the country, the Strategy will be guided by the Seven Strategic Priority Areas in the deployment of broadband networks in underserved areas as well as in areas without broadband.

Furthermore, the Strategy will focus on improving access to high-speed broadband and to reliable high-quality mobile services. The Strategic Priority Areas are as follows:

(a) Increase access speeds and capacity of existing network infrastructure

(b) Increase access network coverage into underserved (unserved) areas

(c) Increase National Backbone Network capacity

(d) Increase International Network capacity

(e) Improve Availability of broadband

(f) Improve Affordability of broadband

(g) Promote demand

5.1 Strategic Priority Area 1 : Increase Access Speeds and Capacity of Existing Network Infrastructure

With a 2G penetration at 84%, there is a need to achieve the broadband speeds and penetration projection targets in Malawi. This can be achieved through rolling out 3G on all existing towers in the short-term and 4G in the longer-term. The decision to migrate from one technology to another and how it can be phased will require requires solid financial and business case planning. Nevertheless, this is a high impacting opportunity for achieving broadband roadmap targets. The most economical mechanism to increase the capacity is to add more spectrum. MACRA should work closely with the operators to assess the spectrum requirement/demand whilst ensuring spectrum is not hoarded, i.e. used efficiently. To increase the availability of connectivity, the deployment of renewable energy, in particular in remote areas will be advantageous due to low running cost therefore advocating the use of solar power under the Broadband Strategy program is essential to overcome the challenge of power blackouts.

5.1.1 Roll out 3G and 4G to all existing towers

Actions:
  a) MACRA should
  (i) Review and revise license conditions
  (ii) Increase access speeds and capacity for existing networks

(iii)Offer incentive spectrum pricing

(iv)Ensure appropriate and relevant spectrum is available

(v) Consider use of USF for hard to reach areas

(vi)Ensure operators plans are submitted

(vii)   Monitor performance of operators

(viii)   Ensure appropriate plan is in place

b) Network operators should:

(i) Devise a robust plan containing commercial and financial planning;

(ii) Share the plan with MACRA;

(iii)Report to MACRA on a regular basis;

(iv)Provide KPIs in alignment with broadband targets.

5.1.2 Migrate to Newer Technologies (3GPP Based)

Actions:

a) MACRA should:

(i) establish and lead activities to:

- Initially establish the objectives and governance of the group;
- Discuss the issues associated with migrating to newer technologies;
- Discuss operators' migrations plans, thus highlighting any technical, financial and commercial issues;
- Formulate a migration plan based on the above upfront activities;
- Meet at a regular interval to discuss progress on various items of the migrations plan.

(i) Ensure that all relevant licenses are issued to support the migration plan.

(ii) Review and revise license conditions to support the migration plan.

(iii)Ensure migration plans are submitted.

(iv)Ensure the availability of appropriate spectrum bands for access (see the figure below depicting the available bands suitable for LTE deployment).   In particular, offer to the operators more suitable spectrum for wide area coverage.

(v) Offer incentive pricing for spectrum for access and transport network.

(vi)Consider use of USF for the migration plan.

(vii)   Monitor the progress of the migration plan by establishing mutually agreed KPIs.

5.1.3: Release More Spectrum

Actions

a) MACRA should:

   (i) Review existing spectrum holdings, spectrum utilisation, spectrum available and what else can be re-farmed for wireless broadband allocation, e.g. 700MHz band, in line with WRC and ITU regional allocations;

   (ii) Review and revise license conditions, if necessary;

   (iii) Ensure appropriate and relevant spectrum is available;

   (iv) Ensure that spectrum is priced appropriately, in particular its usage is incentivised in rural areas through appropriate pricing mechanism;

   (v) Review the MW bands assigned and used and ensure appropriate spectrum for backhaul (MW links) is available and assigned in alignment with the overall national broadband strategy;

   (vi) Monitor spectrum usage to ensure hoarding does not take place, especially with incentives.

b) Network operators should:

(i) Provide evidence of efficient used of spectrum assigned and their needs for additional spectrum;

(ii) Provide KPIs in alignment with the impact of using additional spectrum

5.1.4: Promote Use of Renewable Energy Sources

a) Government should:

  (i) Develop policies to promote rollout and use of renewable energy sources;

  (ii) Consider subsidies and incentives, including reduced import duties, for such equipment;

  (iii) Incentivise the use of renewable energies for operators;

  (iv) Incentivise the use of renewable energies for private sectors and SMEs.

b) MACRA should:
(i) Conduct cost-benefit analysis of using renewable energies;
(ii) Share its analysis as an input into the Government related policies;
(iii)Consider use of USF to promote use of renewable energy sources.

c) Wireless network operators should

(i) Provide MACRA with figures regarding power consumption, measured based on providing reliable service during black-out and their running cost, where they see renewable energy will benefit them;
(ii) Deploy renewable energies in areas where the running cost justifies the cost of deploying them;
(iii)Provide KPIs concerning the benefits of using renewable energy in maintaining the operation of their networks along with other means of power back up.

5.1.5 Network reliability, redundancy and diversity

Actions

a) MACRA should

(i) Develop an ICT Network Redundancy, Reliability and Diversity (NRRD) framework through an intensive engagement with the network operators and governmental agencies to identify the underlying issues and how they may be addressed;
(ii) Develop initiatives for increasing the reliability and availability of ICT networks;
(iii)Conduct cost-benefit analysis as a result of increased reliability and availability;
(iv)Share its analysis as an input into the Government related policies;
(v) Bridge this initiative appropriately with the other broadband strategy initiatives;
(vi)Consider use of USF to increase ICT networks reliability and availability.

b) Network operators should
(i) Provide MACRA with reports on NRRD metrics of their networks;
(ii) Provide MACRA with their business continuity plans and measures in place;

(iii) Collaborate with MACRA in the development of the NRRD framework by proving the requested data including financial analysis of introducing NRRD in conjunction with revenue benefits that will yield as a result.

5.2 Strategic Priority Area 2: Increase access network coverage into underseved (unserved) areas

Broadband speeds and penetration projection in Malawi can be achieved through operating technologies that provide connectivity economically, have a long-term evolution path and facilitate/enable a multi-technology connectivity approaches and solutions. The best overall solution should consider the trade-off between cost, performance and reach. There is a need increase the coverage of the network, either through additional sites or using lower frequencies, generally termed "sub-1GHz". The latter is the most economical mechanism to increase the coverage. In addition, sub-1GHz frequencies will be ideal for FWA operators to migrate to new technologies.   For both enhancements, it is required to increase the bandwidth of the existing backhaul (transport) legs as well as requiring backhaul for the new radio sites.

Another way is to put in place regulatory incentives capable of lowering the cost of broadband-capable infrastructure deployment for wireless platforms (towers and air interfaces) through mandates enabling/requiring the sharing of such access infrastructures, including both passive and active network elements, and also specifically with regard to conditioning any infrastructure subsidies through the newly set up Universal Service Fund – including to expand coverage into presently unserved areas, bearing in mind the need for policy coherence in terms of broadband strategy and appropriate prioritization of initiatives within it to incentivize network extension and upgrades and implementation of competition, price control and collocation/facilities and network sharing remedies as well as Universal Service Fund subsidy structures.

5.2.1 Deploy new infrastructure – Mobile, FWA and use of broadband satellite

Actions

a) MACRA should
(i) Initiate a "Measurement Campaign" to identify populated areas unconnected. This should be a joint effort with the mobile, FWA operators and other stakeholders, as deemed necessary;
(ii) Initiate a consultation process to encompass "Deployment of New Infrastructure" targeting coverage and internet access to areas uncovered. It should include mobile FWA, and satellite broadband deployment.
(iii) Work with the FWA operators to ascertain the issues surrounding extension of FWA connectivity in rural areas. Ensure plans including financial and business cases are submitted by FWA operators;
(iv) Work with service providers to ascertain the issues surrounding deployment of satellite broadband in Malawi, in particular in rural areas;
(v) Identify the role of the satellite broadband and associated regulatory issues that should be addressed to facilitate market entry for the to-be-service providers;
(vi) Review spectrum related aspects:
- Review the spectrum plan for mobile, FWA and satellite broadband so that more suitable spectrum is made available for wider area coverage, based on existing infrastructure and further coverage footprint for newly deployed infrastructure;
- Re-farm spectrum below 1GHz, in particular 700/800 MHz and make them available to the market;
- Offer incentive spectrum pricing for access and transport networks for rural areas;
- Revise coverage obligations in licences.
(vii) Ensure that relevant licenses are reviewed and issued to support the infrastructure expansion based on multi-technology deployment;
(viii) Consider use of USF for deploying new infrastructure including satellite broadband;
(ix) Devise a sustainable plan to monitor the progress of coverage extension based on mobile new infrastructure, FWA extension and deployment of satellite broadband.

b) Network operators should

(i) Provide details of coverage not-spots for voice, basic internet access (GPRS/EDGE) and broadband access (3G/4G)" to identify populated areas unconnected;

(ii) Devise an extension plan identifying technical, regulatory, commercial and financial issues/challenges;

(iii) Share the plan with MACRA;

(iv) Report to MACRA on a regular basis;

(v) Provide KPIs highlighting the progress of expansion, e.g. population covered.

(vi) Provide their existing coverage reach and types of customers served identify quality of service offered;

(vii) FWA operators should devise an extension plan identifying technical, regulatory, commercial and financial issues;

(viii) Share the plan with MACRA;

(ix) Report to MACRA on a regular basis;

(x) Provide KPIs highlighting the progress of expansion, e.g. population covered.

5.2.2 Release sub-1GHz Spectrum for Wider Coverage

Actions

a) MACRA should:

(i) Review the existing sub-1GHz spectrum concerning the bands available and what else can be re-farmed for wireless broadband allocation, e.g. 700MHz band, in line with WRC and ITU regional allocations;

(ii) Review and revise license conditions, if necessary;

(iii) Ensure appropriate and relevant spectrum is available and offered through incentive spectrum pricing for rural areas;

(iv) Monitor spectrum usage to ensure hoarding does not take place, especially with incentive.

b) Network operators should:

(i) Provide evidence of efficient use of spectrum assigned to them and their needs for sub-1GHz spectrum based on sound commercial and financial analysis;

(ii) Provide KPIs in alignment with the impact of using sub-1GHz spectrum both in terms of coverage and capacity.

5.2.3 Incentivize the use of Suitable Spectrum for Backhaul Connectivity

Actions

a) MACRA should:

(i) Review the existing MW frequencies assignments and try to optimise their assignment roadmap;
(ii) Ensure appropriate and relevant spectrum is available and assigned through an incentive pricing for rural areas;
(iii) Monitor spectrum usage to ensure hoarding does not take place, especially with incentive.

b) Network operators should provide evidence of their needs based on financial quantification for MW frequencies falling into incentive based pricing and assignment.

5.2.4: Promote infrastructure and network sharing through regulatory Incentives

Actions
a) MACRA should
(i) Develop (in cooperation with the overall competition regulator) SMP regulations, guidelines for SMP determinations and conduct the appropriate market studies to allow for the application of asymmetric obligations, including particularly for access to infrastructures and network elements; and

(ii) provide for the expeditious drafting and implementation of infrastructure (site and/or network) sharing regulations under Articles 70 to 73 of the Act, including in its scope both passive (towers, ancillary inputs) and active (air interface) infrastructure sharing at cost-based rates, including providing for speedy and effective dispute resolution mechanisms in this context; and

(iii) Consider developing and implementing a national roaming requirement either as a stand-alone regulation or as part of the impending relicensing of operators under the 2016 Act.

(iv) MACRA should develop funding strategies and mechanisms that include the option of providing funding support to operators to locate infrastructure

in un- or under-served (rural) areas across the capex/opex elements of infrastructure deployment, while tying such support to enforceable and enduring additional obligations to share supported infrastructures with other operators (and excluding grounds for rejection permissible under the Act for non-USF-supported sites).

b) **Telecommunications Operators,** particularly the mobile operators, should, potentially under the auspices of MACRA's supervision:

(i) Consider model codes and practices for infrastructure and/or network sharing solutions tailored to Malawi and the respective operator platforms and network designs. MACRA could seek to support such efforts by organizing and hosting periodic working groups to this end.

(ii) Provide input and feedback to MACRA and the line ministries on national roaming regulation, as well as tower siting and planning issues and obstacles that may be amenable to regulatory/administrative improvements or solutions.

c) **Government** should:

(i) review and evaluate siting and planning requirements for towers and associated base station infrastructures; and

(ii) Provide incentives and legal/regulatory measures.

5.3 Strategic Priority Area 3: National Backbone Network capacity

The high cost and difficulties of constructing backbone network transmission infrastructure, e.g. primarily buried fibre in conduit, limit the incentives for network operators to extend the reach and capacity of their backbone networks to handle increases in traffic volumes resulting from broadband and the applications and services enabled by it. Duplicated investments are rarely worth undertaking, leading to a risk of monopolistic or oligopolistic control of essential facilities.

Moreover, as described above, duct construction in existing infrastructure is relatively less efficient than planning for and constructing ducting along with civil works construction or reconstruction in strategic locations and offering such ducting on cost-based rates to operators for deployment of their fibre lines. The government should take a leading role in putting up deliberate policies that would facilitate comprehensive planning, construction and

documentation of such duct infrastructure whether through public-private partnership arrangements or other models and the resulting duct network should be made available to operators. This would assist the rollout of broadband transport infrastructure, eliminating bottlenecks, as well as providing a source of revenues to the government as the road network owner-operator.

5.3.1: Policy for Telecoms Ducts to operators

Actions

Put up a policy that ensures new or constructed civil works include telecoms duct available to operators.

a) **MACRA should**:

(i) Consult with industry stakeholders on the needs for, location priorities, and lease models and modalities for backbone conduit;

(ii) (ii)Liaise with the Roads Authority and the relevant Ministries of ICT and Infrastructure to develop a high-level policy and plan to integrate duct construction as a routine component of road development/redevelopment and upgrading plans across the country;

(iii)(iii)Coordinate and lead the development of cross-sectoral policies governing access to duct infrastructures to ensure cost-based leasing rates and non-discriminatory access, so in order to ensure coherence among duct owners across sectors (electricity and transport infrastructures primarily), and including also the Malawi Energy Regulatory Authority in this process.

a) **Government should:**

(i) Support MACRA's initiative of institutionalization of a cross-sectoral policies.

b) **The Roads Authority** should;

(i) work with MACRA and the relevant Ministries to develop national plans, standards and conduit access/leasing standards

(ii) Set appropriate construction standards for such ducting in line with international standards and industry inputs.

c) **The Energy Regulatory Authority** should;

(i) Work with MACRA and the Roads Authority to ensure that conduit access and leasing standards are uniform across industries, avoid anti-competitive effects, be cost based and return value for investment to the infrastructure (government) owners.

d) **Telecommunications Operators** should;

    (i) Provide input and suggestions to MACRA and the other concerned parties to ensure that policies, plans and standards developed with regard to conduit infrastructures are appropriate to Malawi and the needs of industry looking forward.

e) **ESCOM should provide fibre corridors to other telecom operator**

    Using its existing rights of way for the electric grid.

5.3.2: Reference Wholesale Offers from Network Service Licensees

Actions: Require Reference Wholesale Offers from Network Service Licensees

a) **MACRA should;**

(i) Develop and pass market assessment regulations and guidelines for such assessments;

(ii) Prepare and publish regulations/guidelines for reference offers and related matters, including request, acceptance and dispute resolution procedures;

(iii) Where dominance is identified for this sub-market, apply ex-ante controls to such dominant operators including specifically the requirement to develop reference offers for MACRAs review and approval;

(iv) Encourage operators in this sub-market to publish reference offers even where they are not identified as dominant, but as a voluntary measure;

(v) Ensure effective enforcement of the reference offer process, including particularly the timely resolution of inter-operator disputes with regard to these.

b) **The Competition and Fair Trading Commission** should cooperate with and support MACRA in the above-listed actions.

c) **Network Operators** should, upon implementation of the above regulatory requirements prepare reference offers and prices for the regulated services therein and, upon MACRA approval, enter into appropriate agreements with requesting operators.

5.3.3 Periodic reviews of wholesale tariffs based on cost models

Actions: Undertake periodic reviews of wholesale tariffs based on cost models

a) **MACRA** should;

(i) in the process of developing appropriate implementing regulations called for under the Communications Act, 2016:

(ii) Develop standardized cost-models and regulations governing their applications in cooperation with the overall competition regulator allowing for their periodic application to the market to identify inefficiencies and unjustified price levels in submarkets; and

(iii) Develop and implement regulations for the imposition of price caps and their monitoring and enforcement under the authority of Art 78 of the Act.

b) **Network Operators** should upon implementation of the above regulatory requirements prepare revised tariffs complying with any price caps and glide path requirements in line with MACRA determinations.

5.4 Strategic Priority Area 4:   International Network Capacity

High-capacity transport capacity within the country and for termination internationally and to the Internet is provided by a limited number of operators, over a limited range of links either via optical fibre as well as satellite. Due to other initiatives aim at increasing the broadband speed and internet/broadband penetration in Malawi, it is expected that traffic volume within the country and internationally will proportionally increase. To ensure the end-to-end quality of experience is achieved and also maintained at an acceptable level, it is essential to keep the international and national backbone capacity in harmony with the traffic growth. It is required that Malawi should ensure the local content which is specific to the needs of the people is developed and hosted locally to avoid the use of more costly international links to access content hosted in other countries**.**

5.4.1: Sufficient network availability

Action:

a) **MACRA should:**

(i) Monitor traffic and network performance

(ii) Consider licensing additional supplier if appropriate

b) The network providers should:
(i) Analyze and review network requirements and obtain more capacity
(ii) Provide the relevant KPIs concerning the traffic growth and performance.

5.4.2: Promote Local Hosting and Content

Action
a) Government should:
  (i) Ensure the implementation of ICT policies which will support the development of appropriate content in Malawi and its hosting locally.
  (ii) Implement initiatives in the education and health sectors as well as throughout all government departments to ensure that internet content is available which will improve the outcomes for all citizens of Malawi.
b) MACRA should:
(i) Cooperate with the Ministries to ensure the implementation of the ICT policy
(ii) Supports the development of appropriate local content and its hosting within Malawi.
(iii) Monitor the cost effectiveness of such initiatives including their impact on the overall demand for network resources.
c) Network operators should work in cooperation with local hosting companies to ensure resilient network access is provided and maintained to the hosting facilities.

c) Others institutions like;
(i) Local bodies such as trade organizations, healthcare providers and banks should develop content which is appropriate to the needs of the people of Malawi and will bring benefit both to individuals and the economy of Malawi.
(ii) The training institutions should promote use of local content through ICT skills training.

5.5 Strategic Priority Area 5: Availability of Broadband

Considering that currently broadband access penetration rate for the population is only 4.5% which is limited to urban areas, there is need to

provide ubiquitous quality broadband services to all citizens. Providing and extending a quality broadband network across the country will lead to improvement in the quality of life of citizens in the way they work, live and learn using broadband network.

5.5.1: Development of Government and tertiary education networks

Action

a) Government should:
(i) Promote the initiatives detailed in the Digital Malawi project especially Connectivity for Public Institutions and Connectivity for Higher Education.
(ii) Conclude financial and commercial arrangements with overseas providers to facilitate new network provision.

b) MACRA should
(i) Issue all relevant licenses to support the development of the government and tertiary education networks.
(ii) Make other required resources available including availability of appropriate spectrum.

c) Network operators should cooperate as appropriate to ensure timely deployment of networks.

d) New market entrants should work closely with established network operators to ensure the effective rollout of the networks.

5.5.2: Promote and fund Telecentres in rural areas

Action
a) Government should:
(i) Promote the use of shared access locations such as schools community centres.
(ii) Ensure that nomination and approval process of the USF Board members is expeditious.

b) MACRA, acting for the Universal Service Fund to be established should expeditiously to:
(i) Ensure the USF is adequately staffed to commence operations;

(ii) Develop an appropriate universal service strategy setting out specifically the subsidization of shared access models for segments of the population likely to remain un-served through individual access approaches (irrespective of expanded reach of networks or low-income user tariffs) and establishing subsidy strategies for shared access facilities (e.g. telecentres) on an ongoing basis and reflect this determination in appropriate budgetary allocations for telecentres;

(iii) Set out the most appropriate support and selection mechanisms for providing the necessary subsidies in a cost-effective manner such as through reverse auction for the provision of service;

(iv) Determine appropriate contribution levels and adjustment mechanisms to be set for the sector, including to strike the balance of industry viability to necessary subsidies for areas and populations unlikely to be economically viable and aligned with broader Malawi ICT policies and initiatives;

(v) Create an appropriate monitoring mechanism to document telecentre demand/use, so to create an empirical basis for evaluating support needs of telecentres (connectivity, equipment, training);

(vi) Provide training to telecentre staff, potentially in coordination with cross-sectoral ICT initiatives in e.g. education for example.

The Universal Service Fund, once fully established within MACRA, should continue these initiatives, including also periodic review mechanisms to best align available resources to demand as among un-served and excluded populations on a cost-efficient, shared access basis.

c) Operators should provide subsidised connectivity to rural telecentres as part of a Universal Service Obligation.

d) Other actors – supportive development of locally suitable and demanded applications to be available at telecentres.

5.5.3: Support development of 'Smart Hubs'

Action
a) MACRA should establish three types of hub
(i) **A student/technology businesses incubator** – establish an initial scheme, as a pilot and test-bed within the Campus of one of Malawi's main universities; then based on lessons learnt, establish one to two additional schemes in Malawi's other universities

(ii) **General telecentres**, - seek to establish 5-7 general telecentres in a variety of locations through:-
  - revitalising two to three existing urban telecentres
  - locating one within an operator's offices and
  - creating a new telecentre opportunistically utilising existing available office space in one of Malawi's urban centres

(iii)**More informal internet cafes/internet shops** – promote this as part of the voucher scheme with the aim of encouraging a significant number of entrepreneurs to purchase connectivity and set up internet cafes

b) Operators should:
  (i) Roll out infrastructure
  (ii) Support training of staff
  (iii)Subsidize access initially

c) Other Actors should:
  (i) Develop applications relevant to "Smart Hubs"
  (ii) Encourage the use of "Smart Hubs" by SMEs.

5.6 Strategic Focus Area 6: Affordability of Broadband

There are some challenges associated with accessibility and affordability of broadband services especially with respect to the terminal devices such as computers, smart-phones, set-up boxes amongst others. Affordability is one of the key obstacles to broaden access to broadband-enabled services and applications in Malawi. In order to mitigate this, the Strategy identifies the high upfront of handsets/terminals as a substantial barrier to access to broadband in Malawi. Some actions to reduce the price of terminals through regulatory action have already been taken, including tariff free imports (*Customs and Exercise (Tariffs) Order 2017, items 84.17 (handsets) and 84.71 (computers)).*

Further, measures to improve affordability to purchasers might therefore include creating micro-finance/cooperative purchase mechanisms for such terminals (public-private initiative),
Incentivizing operators to offer lower-cost handsets, and potentially subsidies, at least for shared access/ public users (e.g. telecentres, educational and other institutions.

The establishment of the Universal Service Fund opens new possibilities to provide shared access to segments of the population who would not otherwise be able to access broadband in Malawi. The mandates for the Universal Service Fund calls for identification of underserved and unserved areas and communities and provide the authority to subsidize services that might otherwise not be economically viable. Shred access venues like telecentres are necessary to permit digital inclusion of these population from time to time.

5.6.1: Improve affordability of terminals/connection devices
Actions:

a) **MACRA** should facilitate the provision of information on low-cost handsets and terminals and options (above) for lowering/spreading the cost of these.

b) **Operators** should be incentivized to import and offer to their customer's low-cost handsets.

c) **SME and cooperatives** should consider offering micro-lending/financing of such purchases to small businesses and entrepreneurs.

5.6.2: Introducing further levels of competition in the market
Actions:

a) **MACRA**, in coordination with the appropriate line ministries should:

(i) Enable implementation of the 2016 Act, including particularly with respect to cost models, annual market assessments, reference offers, facilities and network sharing and corresponding regulatory monitoring and enforcement/timely dispute resolution standards (see the corresponding separate initiatives);

(ii) Encouraging, in the context of these pro-competitive measures, the rollout of the third mobile operator, as well as other present or potential entrants across sub-markets, including in terms of a speedy and low-barrier licensing process;

(iii)Consider creating a market for resale services through MVNO licensing and access obligations on existing facilities-service operators;

(iv)Consider the introduction of number portability as a recognised way in which barriers to competition can be reduced by offering customers of existing networks to move to newly licensed operators without the need to change their telephone number;

(v) Allocating scarce resources, particularly to new market entrants to enable facilities-based competition (see corresponding specific initiative).

b) Operators should:
 (i) Enter into commercially appropriate MVNO agreements;
 (ii) Cooperate in the introduction of number portability;
 (iii)Reduce prices in response to increased competition.

c) Others, including potential investors should seek opportunities to enter the BB supply market in Malawi either through MVNO arrangements or deploying new networks.

5.6.3: Introduce targeted subsidies - Voucher schemes for businesses/SME users

Actions:

a) **Government** should encourage the uptake of ICTs through government initiatives and make money available to support SMEs

b) **MACRA should**;
 (i) With the use of the USF and in cooperation with SMEs, establish a national voucher scheme for a period of three years which subsidies up to 100% of connection costs (up to an agreed limit) and 50-75% of the annual tariff for the first year. Aim to target 1,000 connections, with a specific focus on aggregators:
   - entrepreneurs that purchase a connection and resell to a group of users, for example via an internet café, and
   - a number of customers clustered together e.g. a business park, join forces to aggregate their vouchers which will enable subsidy of a large connection cost

5.6.4: Closely Monitor and where necessary Regulate Retail Prices

Actions:

a) **MACRA** should;
 (i) in the process of developing appropriate implementing regulations called for under the Communications Act, 2016:
   - Develop standardized cost-models and regulations governing their application in cooperation with the overall competition regulator allowing for periodic application to the market to identify inefficiencies and unjustified price levels in submarkets; and
   - Develop and implement regulations for the imposition of price caps and their monitoring and enforcement under the authority of Art 78 of the Act, including with respect to data services specifically.

b) **The Competition and Fair-Trading Commission** should cooperate with and support MACRA in the above-listed actions.

c) **Operators should** implementation of the above regulatory requirements prepare revised tariffs complying with any price caps and glide path requirements in line with MACRA determinations.

5.6.5: Review impact of taxation levels on broadband services on the industry and user take-up

Actions:

a) **Government (MoF and the revenue authorities)** should:

(i) Consider the impact of import duties on communications network equipment for both existing as well as new entrant operators against the expectation of an increase in the availability of broadband services in existing locations and currently unserved areas and a desire to see additional competition and more affordable prices in the market;

(ii) Conduct studies in cooperation with MACRA to consider the impact of taxation of broadband services on price and take-up levels as among both, consumers and businesses; and

(iii)Consider the effect of elimination, reduction or restructured taxation of broadband services in terms of both government revenue and projected changes in affordability/take-up of such services. Scenarios should include recapture of operator profits at the corporate income tax level.

b) **MACRA** should provide data and expert analysis to the Ministry of Finance in this context and in light of its knowledge of the Malawi industry; and

c) **Operators** should provide revenue and related data and feedback to this inquiry and analysis.

5.7 Strategic Focus Area 7: Promote Demand

Promoting demand for broadband services is vital to increase usage, socio-economic benefits, and sufficient revenue for operators and government to continue investment in infrastructure roll-out. Focusing on supply side and broadband infrastructure deployment alone will not drive broadband to scale up. There are a number of issues which include relatively low levels of digital awareness and skills, limited numbers of IT teachers, in schools/ colleges and limited IT user skills which need to be improved at all levels, but particularly starting with the young, at school and

college. In order to stimulate broadband demand, this Strategy considers some actions to be undertaken by different stakeholders which include government, network operators as well as NGOs. Capacity building and awareness is therefore a strategic issue that will be addressed to accelerate broadband uptake and utilization.

5.7.1: Develop IT skills for teachers, technical professionals and IT Users

Actions:

a) **Government** should Increase the number of IT/digital technology teachers in schools and colleges, and establish a schools' digital connectivity network
b) **Operators** should be required to provide training to teachers (on how to connect to the internet, or how to use it once on)
c) **ICT suppliers should** provide training/guidance on hardware and software
d) **Education bodies and NGOs should;** promote use of relevant applications and training in schools, colleges, telecentres and "Smart Hubs".

5.7.2: Promote Government Usage

Actions:

a) **Government should;**
(i) establish a Government/ public service network
(ii) Improve digital technology awareness and skills of Government/ public service employees
(iii) Procure sufficient IT devices, software and services for staff to use
(iv) Establish and e-Government strategy, delivery plan and processes

5.7.3: Encourage businesses and SMEs to work together

Actions

a) MACRA should establish a business networking and collaboration online portal/ website, initially targeting uses of the Smart Hubs, Telecentres and Internet Cafes, but targeting a wide SME audience

6.0 SWOT ANALYSIS

The Strategy includes a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of the current situation in the telecommunications sector in Malawi with direct relevance to Broadband services in the country. The SWOT analysis has been used to identify the key areas where actions are required and include both network and service provision as well as user support and demand stimulation. Further, the SWOT analysis has been used to develop the Initiatives and Actions grouped under the seven Key Areas that make up the National Broadband Strategy for Malawi. The outcomes of the SWOT analysis are presented below.

SWOT ANALYSIS

Strength, Weaknesses, Opportunities and Threats Analysis

STRATEGIC FOCUS AREA	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
1. Increase access speeds and capacity of existing network infrastructure	• ICT Policy has been developed along with ICT Masterplan and Wireless Broadband Access Masterplan • Licensing regime and functioning NRA are in place • Cost modelling study has recently been completed and wholesale prices will move to be more in line with costs • Regulatory Review and market assessment is being undertaken, conclusion of which should enable MACRA to put in place pro-competitive asymmetric regulations on dominant entities • Radio spectrum plan is in place • Incentive pricing of spectrum for access including microwave links e.g. in rural areas	• Transition towards implementing the new Communications Act and associated implementing regulations takes time and focus from MACRA • High taxation levels • Inadequate infrastructure backbone and access • Poor business opportunity for Fixed Wireless Access operators (FWA) • Spectrum release roadmap to further broadband is not yet available	• Mandate infrastructure sharing especially towers in rural areas and new ducts • Widespread deployment of connectivity specifically aimed at providing Broadband to "shared access" centres /locations	• Failure of widespread deployment of technologies e.g. fixed wireless access • Obsolescence of technology –network and terminal • Difficulty in management of and lack of cooperation between stakeholders •
2 Increase access network coverage into underserved (unserved) areas	• Regulatory Review and market assessment is being undertaken, conclusion of which should enable MACRA to put in place pro-competitive asymmetric regulations on dominant entities • Incentive pricing of spectrum for access including microwave links e.g. in rural areas	• Low GDP and low penetration • Lack of electricity and low dependability of power grid where there is access • Lack of local content • Shortage of ICT	• Increase power availability in rural areas including using renewable energy • Develop strategic plan for USF including prioritization of highest increase in access connectivity at least cost	• Telecoms is seen as a major source of tax revenue by the Government • Difficulty in serving the rural population due to high cost of service access to low-density, poor populations • No clear prospect for GDP growth

#	Area	Strengths	Weaknesses	Opportunities	Threats
			• skills and training • Low literacy rates • Telecentres in rural areas are not cost effective or self-supporting	• Increase power availability in rural areas including using renewable energy • Change license fee structures to make market entry attractive and lower risk • Development of higher education network to give more POPs for telecentres and community access points and ongoing education	supporting significant investment • Impact of wider digital divide
3.	National Backbone Network capacity	• Entrance of the third backbone operator has introduced competition and is driving prices down	• Lack of BB satellite usage • High cost of capital • Lack of sufficient investment • Quality of Service by network operators • High cost of capital	• Mandate infrastructure sharing especially towers in rural areas and new ducts • Development of partnerships to grow networks (including VSAT providers) • Change license fee structures to make market entry attractive and lower risk	• Difficulty in management of and lack of cooperation between stakeholders • Economic and political change/instabilities
4	International Network capacity	• High capacity international connectivity in place	• High cost of bandwidth – international and national-landlocked country despite introduction of third fibre backbone provider • High cost of capital	• Cooperation with international organization e.g. Google, Facebook, Microsoft etc. to develop applications and network infrastructure	• Economic and political change/instabilities • Malawi is competing in a global market for investment • Unstable exchange rates and lack of access to investment finance • Obsolescence of technology –network and terminal

#	Issue	Current Status	Challenges	Recommendations	Threats
					• Malawi is competing in a global market for investment • Operators not investing, in both current and new technologies or not meeting their investment promises
5.	Availability of broadband	• Licensing regime and functioning NRA are in place	• Lack of competition- only 2 mobile operators • High taxation levels • Lack of sufficient investment • Lack of electricity and low dependability of power grid where there is access • Quality of Service by network operators	• Incentivize use of Broadband services through tax changes • Increase power availability in rural areas including using renewable energy	• Difficulty in serving the rural population due to high cost of service access to low-density, poor populations • No clear prospect for GDP growth supporting significant investment
6	Affordability of broadband	• Incentive pricing of spectrum for access including microwave links e.g. in rural areas • There is a desire to develop and learn from others • Cost modelling study has recently been completed and wholesale prices will move to be more in line with costs	• High cost of capital • High taxation levels • Low GDP and low penetration	• Incentivize use of Broadband services through tax changes • Stronger cooperation amongst operators and vendors to provide cheaper devices/terminals	• Economic and political change/instabilities • Unstable exchange rates and lack of access to investment finance • Obsolescence of technology –network and terminal • Ongoing dominance of the 2 mobile operators
7	Promote demand	• Cost modelling study has recently been completed and wholesale prices will move to be more in line with costs	• Lack of local content • Shortage of ICT skills and	• Stronger cooperation amongst operators and vendors to provide cheaper	• Impact of wider digital divide

devices/terminals • Incentivize use of Broadband services through tax changes
training • High taxation levels • Low literacy rates

The implementation of the National Broadband Strategy for Malawi will be key to the ongoing successes in the broadband development in Malawi. Responsibility for the individual strategic focus area has been identified. However the coordination of the initiatives and the stakeholders involved in each initiative will need to be carried out over the five year period of the plan and beyond. It is therefore recommended that a Broadband Coordination Function is set up as part of the Universal Service Department within MACRA. This department will work with all relevant parties to ensure that the various initiatives are undertaken within the identified time periods. It will also identify specific KPIs for each initiative and monitor progress.

Responsibility for the successful ongoing development of broadband services in Malawi rests with a range of organizations including Government, MACRA, existing and new network operators and service providers, international organizations and users The structure of such a Broadband Coordination Function could be as shown below:

7.1   Roles and Responsibilities
The section below describes the roles and responsibilities of key actors involved in the implementation of the strategy:

7.1.1 Ministry of Information
The Ministry of Information will be responsible for creating a conducive legal and regulatory environment for the broadband deployment, adoption and smooth functioning of the ICT sector of Malawi.

7.1.2 Malawi Communications Regulatory Authority (MACRA)
Under MACRA, Universal Service Department will play a critical role in the implementation of this National Broadband Strategy.

7.1.3 The Academia

The Academia in Malawi will play a key role in the nation's efforts in developing capacity and expertise in promoting digital literacy which is relevant for broadband adoption and usage.

7.1.4 Civil Society

The Civil Society will work with other stakeholders to promote effective engagement, promote transparency and accountability of the public and private sector institutions, and strengthen knowledge and awareness of cyber security related issues across Malawi.

7.1.5 Private Sector

The Private Sector will be responsible for deployment of broadband technologies and all other infrastructure required for the population to access broadband services.

7.1.6 Citizens

The citizens will be expected to take appropriate steps in order to ensure that they embrace the opportunities brought by the advances in technology which includes broadband services.

8.1 NATIONAL BROADBAND STRATEGY IMPLEMENTATION COST (BUDGET)

Implementation Costs

Building on the SWOT analysis and the demand forecast, user and technology mapping and so forth described above, a series of Initiatives has been developed which set out the proposed strategies comprising the National Broadband Plan for Malawi. These are grouped under seven high level descriptors and deal with the supply of services by network operators and service providers, as well as the demand for services and the activities of users at small-institutional, SME and individual level. The total cost for implementing the Broadband Strategy arises from the implementation of the 25 initiative whose total cost is MWK558 billion spread over a period of five yea

1 INCREASE ACCESS SPEEDS AND CAPACITY OF EXISTING NETWORK INFRASTRUCTURE

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred MWK(000,000)	Implementation KPI
1.1	**Roll out 3G and 4G to all existing towers (based on plans of network operators)** **Duration 1-5 years (3G)** **Duration 1-5 years (4G)**	**MACRA**	Review and revise license conditions as necessary.	• Internal consultations – review of the licence conditions • Meetings/negotiations with Telcos on licence review • Submit the reviewed licences to DOX • Submit the reviewed licences to the Board for approval • Gazetting • Implementation	30	• Operator plans developed and shared • Number of base station sites upgraded • BB speed increases experienced by customers
			Ensure appropriate and relevant spectrum is available.	• Re-farming the spectrum • Stakeholders' consultation meetings • Submit to DOX • Submit to Board	10	
			Offer incentive spectrum pricing for rural areas	• Review current spectrum pricing • Stakeholders' consultations meetings • Submit to DOX • Submit to Board	40	
			Consider use of USF for hard to reach areas.	• Conduct Gap analysis study • Identify potential operators to roll out services in the underserved areas • Advertise • Evaluate • Contract negotiation • Award Contract/License • Offer the US fund to the winning bidder • Implement • M&E	500,000	
			Ensure operators' plans are submitted.	• Write operators to submit information • Follow up to ensure submission is done	5	
			Monitor performance of operators.	• Carry out technical audits (GSM audit)	10	

No.	Activity	Responsibility	Actions		Target	Indicators
		Operators	• Ensure appropriate plan is in place.	• Ensure licence conditions include submission of appropriate plans • Enforce licence conditions	10	
1.2	**Migrate FWA from WiMAX to LTE** **Duration 1-3 years**	**MACRA**	• MACRA to encourage the migration. • Review and revise license conditions as necessary -	Engage the operators Issue roll out targets for LTE	20,000	• Number of operators migrating to new technologies • BB speed increases experienced by customers
			• Ensure appropriate and relevant spectrum is available.	As above	10	
			• Offer incentive spectrum pricing	As above	40	
			• Consider use of USF for hard to reach areas	As above	30,000	
			• Ensure plans are submitted.	As above	5	
			• Monitor performance of operators.	As above	30	
		Operators	• FWA operators may need to upgrade technology	Engage operators	900	
			• Market driven actions	Encourage competition – license more operators	20	
1.3	**Release more spectrum** **Duration 1-3 years**	**MACRA**	• Ensure sufficient relevant spectrum is available. • Publish plan to show when new spectrum will be available.	• Re-farm the spectrum as above As above	20	• Spectrum review completed • Revised licenses issued
			• Develop incentive based pricing strategy especially for rural	• Review licensing framework to target rural areas pricing • Engage operators	20	• New spectrum pricing

No.	Objective	Responsible	Tasks	M&E	Weight	KPI
			areas.	• Submit to DOX • Submit to Board • Gazette • Implement • M&E		implemented
			• Ensure roll out obligations are included in licenses, especially "use it or lose it requirements".	• M&E exercise	20	
			• Monitor spectrum use to ensure hoarding does not take place, especially with incentive priced spectrum.	• M&E	10	
		Operators	• Prepare realistic spectrum plans. • Follow license obligations	• Enforcement	10	
1.4	**Promote use of renewable energy sources** **Duration 1-5 years**	**Governmen t/MoI**	• Develop policies to promote rollout and use of renewable energy sources.	• Review ICT policy to include renewable energy aspects • Stakeholders' consultations • Final Policy	40	• Number of existing sites upgraded to renewable energy sources • Number of new sites deployed using renewable energy
			• Consider subsidies and incentives, including reduced import duties, for such equipment.	• Engage Parliamentary committee on communications • Lobby government	30	
		MACRA	• Conduct cost benefit analysis of using renewable power sources	• Conduct the analysis to establish the cost of investment for several scenarios • Engage operators • Publish report and recommendations	40	

	Objective	Responsible	Activity	Action	Budget	Outcome
						sources
		Operators	Consider use of USF to promote use of renewable energy sources	Include as a condition in the bidding document to ensure winning bidder adopts renewable energy	200	
			Deploy renewable energy sources for RAN where possible.	Implement	300	
		Energy Utility companies	Energy companies to invest in infrastructure and rollout and develop range of pricing models based on Govt policy	Govt to lobby with energy utility companies; Govt introduce incentives to invest in infrastructure and rollout and develop range of pricing models based on Govt policy	200	
1.5	Increase Network Reliability, Redundancy and Diversity Duration 1-5 years	Government/MoI	Identify appropriate policies to support MACRA in this initiative	Develop applicable polices; Consult key stakeholders; Adopt Policies	30	NRRD plans developed and submitted to MACRA
		MACRA	Develop ICT network Redundancy, Reliability and Diversity (NRRD) Framework	Develop the Framework; Consult stakeholders; Submission to DOX/Board for approval; Implement; Enforce		
			Conduct cost-benefit analysis input to government policy initiatives	Conduct the analysis; Engage stakeholders; Implement		
			Consider use of USF to support initiatives	To include in the USF Operational Manual – to encourage network redundancy		
		Operators	Develop individual NRRD plans	Include in the license condition for operators		

	• Provide appropriate performance metrics to MACRA	• MACRA to develop metrics for operators • Include the metrics in the license condition for operators	
	• Review NRRD on an ongoing basis and update as required	• MACRA to amend licenses to include NRRD review on an ongoing basis • Include the requirement in the license condition for operators	10
TOTAL COST FOR STRATEGIC PRIORITY AREA 1			**552,040**
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 1			**110,408**

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred (MWK 000 000	KPI
2.1	**Deploy new infrastructure – Mobile, FWA and use of broadband satellite** **Duration 1-5 years**	**MACRA**	• Ensure sufficient relevant spectrum is available	As above	100	• Operator plans developed and shared • Number of new base station sites deployed • Amount of additional coverage provided (number of additional customer subscriptions)
			• Revise coverage obligations in licenses.	• Review operators licenses • Engage operators • Include the obligations in the reviewed licenses	15	
			• Offer targeted prices for spectrum.	As above – Review pricing structure	30	
			• facilitate use of appropriate technologies such as satellite through licensing processes	• Carryout cost benefit analysis of satellite versus other technologies • Engage the operators • Implement	30	
			• consider use of USF to support deployment	As above	200	
			• Monitor progress of network deployment	As above	25	
		Operators	• Meet new license coverage obligations.	• MACRA to include new license coverage obligations in the licenses • Engage operators • Enforce	5	
			• Invest in new network infrastructure	• MACRA to include coverage obligations in the license • Engage • Enforce	5	
		Others	• Bring new technologies into the market e.g. satellite	Engage and encourage such stakeholders during international forums	30	
2.2	**Release more spectrum for wider coverage** **Duration 1-3 years**	**MACRA**	• Ensure sufficient relevant spectrum is available.	• As above – • Re-farming; • Publish plan to show when new spectrum will be available	15	• Spectrum review completed • Revised licenses issued • New spectrum pricing implemented • Amount of spectrum licensed

#	Objective	Responsible	Action	Notes	Target
			• Develop incentive based pricing strategy especially for rural areas.	• Review spectrum pricing structure • Engage • Implement	15
			Release sub-1GHz spectrum for wider coverage	• Finalize channelization of sub 1GH spectrum • Publish plan to show when new spectrum will be available • Implement	30
			• Ensure roll out obligations are included in licenses, especially "use it or lose it requirements".	As above	5
			• Monitor spectrum use to ensure hoarding does not take place, especially with priced incentive spectrum.	As above	20
		Operators	• Prepare realistic spectrum plans	As above	20
			.Follow license obligations	As above	20
2.3	**Incentivizes the use of suitable spectrum for backhaul connectivity** **Duration 1-3 years**	**MACRA**	• Ensure sufficient relevant spectrum licensed at an appropriately low price (even at an admin cost level) for new links.	• ***As above Review pricing structure***	10
			• Maintain existing pricing for existing links, even when upgraded	*– offer as an incentive*	5
		Operators	• Deploy new high speed links to new sites	***MACRA to encourage operators to deploy high speed links.***	150

2.4	Promote infrastructure and network sharing through regulatory Incentives	Govt/MoI.	Ensure legislation in place to enable new towers to be built easily	• Lobby Govt for new legislation to be developed • Engage relevant stakeholders • Implement	30	• National roaming requirement implemented • Number of agreements to share infrastructures/ network (sites) • USF-supported shared tower sites deployed • Policy review of planning/siting requirements completed including recommendations
	Duration 1-5 years	• **MACRA**	• Apply obligations to SMP operators • Define guidelines for Infrastructure Sharing • Consider use USF to build new towers that are then shared • Encourage networks sharing or mandate national roaming on new tower infrastructure built in rural areas	• Include in license for operators • Develop the Guidelines • Engage the stakeholders • Implement the US Fund Rules on IS • Implement license conditions on national Roaming	35	
		Operators	• Enter into infrastructure sharing agreements with each other	• Submit to the Authority IS Agreements	15	
			• Undertake national roaming agreements with other network parties	Submit to the Authority the National roaming Agreements	5	
TOTAL COST FOR STRATEGIC PRIORITY AREA 2						817
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 2						164

3 NATIONAL BACKBONE NETWORK CAPACITY

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred	KPI
3.1	Policy to ensure new or reconstructed civil works include telecoms duct available to operators **Duration 1-5 years**	Govt/MoI	Inter departmental as well as local /regional/national cooperation needed to develop and implement policy.	• MACRA to lobby Govt to develop applicable policy • Stakeholders consultation • Adopt Policy • Implement	10	• Development of a national policy and plan to integrate ducting into the road construction/reconstruction undertakings, construction standards and so Forth. • Development of a cross-sectorial leasing and
		MACRA	• Managing agency to be set up either within MACRA or independently.	• Policy to include Councils as managing agency • Maintaining records and allocating capacity to be done by operators	20	access policy for ducting across transport and electric (and other) Rights-of-way owner/operators. • Location/length of conduit actually deployed in the rights of way
		Operators	• Willingness to make use of shared infrastructure	• Encourage operators to make use of the ducts through IS	10	• Conduits successfully leased to operators in which active fibre is deployed and utilized
		Others	• Collaboration with other bodies required with MACRA	• Develop Agreements with relevant stakeholders • Engage • Implement	10	
3.2	Require Reference Wholesale Offers from Network Service Licensees **Duration 1-3 years**	MACRA	• Use SMP Determinations to set obligations on dominant suppliers.	• Develop Competition Rules and Guidelines for determining dominant market player • Assessing markets • Enforce	20	• Dominant carrier regulatory framework promulgated/effective • Annual market analyses and dominance determinations carried out • Reference offers approved • Take-up of reference offer terms by other operators
		MACRA	• Identify other regulatory remedies to mandate RIOs	• Benchmark on best practices • Enforce	15	
				• Approve Reference Offers.	5	
				• Encourage non SMP operators to publish RIOs to ensure consistency across the sector.	5	
				• Resolve disputes in a timely manner if they arise.	5	
				• Prepare Reference Offers	5	
				• Determine prices for regulated services	5	
				Enter into interconnect agreements		
3.3	Undertake	MACRA	Undertake tariff	• MACRA to do market analysis	15	• Completion of regulations for cost

periodic review of wholesale tariffs based on cost models to ensure prices are cost-based **Duration 1-2 years**		review and determine regulated tariffs.		modelling and market analyses, application of price caps
			• Implement in a timely manner • Enforce	15
	Operators	Cooperate fully to provide data for costing activities	MACRA to enforce license conditions and Regulations	15

Right column notes:

• Annual market analyses and dominance determinations carried out;
• Periodic updating of cost models and review of findings
• Application of price caps/glide paths to wholesale products
• Declines in tariffed prices for wholesale products

155

TOTAL COST FOR STRATEGIC PRIORITY AREA 3 **155**

AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 3 **31**

4 INTERNATIONAL NETWORK CAPACITY

Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred (MWK 000,000)	KPI
4.1 **Ensure sufficient network availability for needs** Duration 1-5 years	**MACRA**	• Monitor traffic and network performance • Consider licensing additional suppliers if appropriate	• Monitor traffic and network performance • Enforce license conditions and Regulations • License additional international bandwidth operators	50 30	• Amount of additional international bandwidth installed/equipped • Amount of additional international bandwidth used
	Operators	• Analyse and review network requirements and obtain more capacity when necessary	• Meetings with telcos	50	
4.2 **Promote local content and hosting to minimize costs** Duration 1-5 years	**Govt/MoI**	• Implementation of ICT policies through coordination between bodies.	• Lobby Govt to develop policies to encourage local content development and hosting • Stakeholders engagement • Adopt policies • Implement	30	• Number of local applications developed • Number and capacity of local hosting sites
		• Implement initiatives across education, health and agriculture sectors and develop information sites	• Lobby Govt to engage education and health and agriculture sectors to develop local content	150	
	• **MACRA**	• Cooperation with Ministries to ensure implementation of ICT policy.	Meetings with relevant Ministries	30	
		• Monitor cost effectiveness of local applications	• Do a cost benefit analysis • Publish results • Implement	35	
	Others	• Local bodies (trades, health organisations, banks) to develop local content and e-commerce sites.	• MACRA to collaborate with relevant stakeholders	100	
		• Education of users to promote use of local content.	• Hold awareness meetings and sensitization meetings	90	
TOTAL COST FOR STRATEGIC PRIORITY AREA 4				565	
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 4				113	

5 AVAILABILITY OF BROADBAND

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred	KPIs
5.1	**Development of government and education networks** **Duration 1-5 years**	**Government**	· Promote initiatives through Digital Malawi program. · **Conclude financial and commercial arrangements** with overseas providers to facilitate new network provision.	· MACRA to lobby Govt to implement Digital Malawi Projects · Encourage investors to provide new network	100	Number of connected sites per year Speed of connections Rate of growth in user numbers
		MACRA	· Issue necessary licenses. · Make other required resources available including spectrum	· Evaluation · Negotiate · Issue licenses · Gazette As above	20	
		Operators	· Cooperate as appropriate to ensure timely deployment of networks.	MACRA to conduct roll out audit	20	
		Others	· Market entrants such as ESCOM should work with established network operators.	· MACRA to facilitate new entrants to work with established network operators	20	
5.2	**Promote and fund Telecentres in rural areas** **Duration 1-5 years**	**Government**	· Promote use of telecentres across sectors in rural areas including education and health.	· MACRA to lobby Govt to provide the list of targeted sites	400	· USF fully established, board in place and institutional staffing accomplished · Universal Service policy appropriately prioritizing support to telecentres/shared access · Sufficient funds are raised through an appropriate level of industry contributions and allocated to telecentre support · Number of telecentres supported and monitored to ensure uninterrupted connectivity is provided, user demand in the location is given/developed.
		MACRA	Fund Telecentres through USF – include in USF planning and	· Implement US Fund Action Plan · Awareness on telecentre use · Identify training needs	200	

No.	Strategy	Actor	Activities	Actions	Cost	Indicators
			budgeting. Monitor activities at telecentres to encourage increasing activities. Provide training to telecentre staff.	Identify training institute, Conduct training		
		Operators	Provide subsidised connectivity to rural telecentres as part of a USO.	Encourage operators to provide subsidized connectivity to rural telecentres	100	
		Others	Develop applications and provide training on use of IT and telecentres.	Hold meetings with relevant stakeholders to develop applications and provide training on use of IT and telecentres	400	
5.3	Support development of "Smart Hubs" Duration 1-3 years	MACRA	Encourage creation of "Smart Hubs" in urban areas.	Lobby Govt to create conducive environment for Smart hubs; Meetings with relevant stakeholders to create smart hubs; Implement Digital Malawi Project; Identify suitable places to become "Smart Hubs"; Provide funding for equipment and training from USF; Consider usage of voucher scheme; Monitor usage		• Number of centres of each type established per year • Rate of growth in user numbers
		Operators	Rollout infrastructure; Support training of staff; Subsidise access initially	MACRA to encourage operators to support the initiative	200	
		Others	Develop applications relevant to "Smart Hubs"; Encourage the use of "Smart Hubs" by SMEs	Implement Innovation Awards; Conduct awareness on Smart Hubs	300	
TOTAL COST FOR STRATEGIC PRIORITY AREA 5					1760	
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 5					352	

6 AFFORDABILITY OF BROADBAND

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Cost to be incurred	KPIs
6.1	**Improve Affordability of terminals/connection devices** **Duration 1-3 years**	**Government**	• Introduce lower (or remove) tariffs on imported devices. • Consider promotion of subsidised computers through schools. • Consider promotion of subsidised computers to SMEs positive	• Lobby Ministry of Information to liaise with Ministry of finance to remove or lower import tariffs • Lobby Ministry of Information to liaise with Ministry of finance to remove or lower import tariffs • Lobby Ministry of Information to liaise with Ministry of finance to remove or lower import tariffs	50	• Broadened tax exemptions/investment rules lower the price of ownership of smartphone and analogous devices • Micro-finance including or focusing on acquisitions of smartphone and devices are operating in Malawi • Telecentres are provided with USF-supported terminals for shared access • Smartphone/terminal ownership increases, particularly in lower-income populations
		MACRA	Facilitate the provision of information on making cost effective choices for consumers on website or other material	• Encourage operators to publish tariffs on website and print media but also distributing leaflets on tariffs • Awareness meetings/campaign with consumers	30	
		Operators	Continue to offer a range of handsets at different price ranges, including low cost smartphones	• MACRA to encourage operators to enter into agreements with manufacturers so that they can offer handsets at affordable prices	150	
		Others	SME groups consider pooling access to computers, potentially through "Smart Hubs"	MACRA to encourage and support SMEs to pool resources through smart hubs	100	
6.2	**Introduce further levels of competition in the market** **Duration 1-5 years**	**Government**	Facilitate deployment of new networks through the Digital Malawi project, government networks, education networks and energy networks.	• MACRA to lobby Govt to create conducive environment for investors to invest in new networks	50	• Public sector spending on ICT initiatives, including infrastructure and services like training, awareness etc. having a positive effect on domestic demand for broadband service

No.	Title	Responsible Party	Activities	Actions	No.	Indicators
						- Implementation and enforcement of competition-relevant regulatory standards and imposition of effective remedies - Streamlining of licensing process and resale-based licensing options - Implementation of number portability - Entry and operational status of new/previously inactive operators - Take-up of reference offer terms by other operators
		MACRA	- Effective application of existing and new regulations to encourage 3rd operator to roll out services (regulated prices, infrastructure sharing, open access) - Consider MVNO access obligations on existing operators (though the MVNO market is currently more likely to focus on voice rather than BB). - Review the need for the introduction of number portability.	- Review CLF - Review spectrum pricing - Incentivise new entrants in the market - Operationalize Regulations on Infrastructure Sharing - Encourage existing operators to apply for MVNO licence - Operationalize Numbering Regulations	55	
		Operators	- Enter into commercially appropriate MVNO agreements. - Reduce prices in response to competition.	MACRA to encourage operators to enter into commercial MVNO agreements and to offer competitive pricing	20	
		Others	Seek opportunities to enter the BB supply market either through MVNO arrangements or deploying new networks	MACRA to encourage vendors to partner with potential investors	20	
6.3	Introduce targeted subsidies - Voucher schemes for businesses/SME users	Government	- Encourage uptake of ICTs through government initiatives. - Make money available from national government to support businesses/SMEs - Identify suitable body to draw up rules and administer scheme	- Lobby Govt to create an environment that will increase ICT uptake - Lobby Govt/MoI to set aside some budget allocation to support businesses/SMES	50	- Public launch of voucher - Number of vouchers issued

Ref		Actions		Outputs
Duration 1-3 years		• MoI to hold meetings with relevant stakeholders		
	MACRA	• Publicise and administer Voucher Scheme (if required by government) • Assess impact of scheme after 1, 2 and 3 years.	• Carry out awareness campaign on voucher scheme and implement the voucher scheme • Carry out a baseline study of the voucher scheme • Conduct Periodic monitoring of the voucher scheme • Carry out an evaluation study	30
	Operators	Accept vouchers as payment for services	MACRA to encourage operators to accept voucher payments	20
	Others	Publicise availability of Vouchers Scheme through SME groups	• Make awareness to SME groups on the availability of voucher schemes	20
6.4 **Closely Monitor and where necessary Regulate Retail Prices**	**MACRA**	• Ensure that all actions taken are in line with the powers granted under the Act. • Ensure market definitions are appropriate for market analysis.	• Enforce the Act and Tariff Regulations • Conduct market assessment	20	• Completion of regulations for cost modelling and market analyses, application of price caps • Annual market analyses and dominance determinations carried out; • Periodic updating of cost models and review of findings • Application of price caps/glide paths to retail products • Declines in tariffed prices for retail products
Duration 1-2 years	**Operators**	Follow Tariff Regulations adopted	MACRA to enforce Tariff Regulations	20	
Review impact of	**Governmen**	• Cooperation with MACRA to	Lobby Govt for	30	• Broadband taxation study

6.5	t			
taxation levels on broadband services, on the industry and user take-up **Duration 1-5 years**		determine impact of taxation of broadband network operators (including import duties on network equipment) and broadband services on take-up by both individual and business users. • Consideration of impact of lower levels of taxation on total government revenues.	MACRA to through Digital Malawi to carry out Consultancy service on Taxation of Broadband/Telecommunication Services • Carry out a study on impact of lowering taxation on Govt revenues	• conducted recommendations developed and • Reductions in import duties on communications network equipment
	MACRA	• Work with Govt ministries to reduce the level of import duties on communications network equipment Work with Govt ministries (Treasury) to determine impact of taxation	• Lobby Govt to lower import duties on electronic communication equipment	20
	Operators	Provide data to support analysis of revenues within the sector	Cooperate on studies/consultancies being done	20
TOTAL COST FOR STRATEGIC PRIORITY AREA 6				705
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 6				141

7 PROMOTE DEMAND

	Initiative	Responsible Party	Activity	Programs, projects and /or actions to be undertaken	Costs to be incurred (MWK 000,000)	KPIs
7.1	Develop IT skills for teachers, technical professionals and IT users	Government	• Effective Implementation of ICT policies. • Implement ICT education into the education curriculum. • Support training in ICT as part of life-long learning opportunities. • Implement computer and internet access penetration into schools and telecentres (following ICT policies)	• MoI to put up procedures of to support ICT education in the curriculum • NACIT to develop a curriculum for all relevant sectors	70	• Number of teachers trained per year • Number of IT professionals trained per year
	Duration 1-5 years	MACRA	• Inter-governmental cooperation to implement ICT policies • Facilitate deployment of education networks.	• MACRA to implement policies related with digital literacy • Consider issuing licence fee exempt to education networks • Issue applicable licences • Make scares resources available as required.	200	
		Operators	• Cooperate with MACRA and education networks to provide capacity	MACRA to enforce	25	
		Others	• Education bodies and NGOs assist with the use of relevant applications and training in schools, colleges, telecentres and "Smart Hubs" to provide training, including training of trainers. Consider opportunities for alternative service providers e.g. satellite BB	MACRA to facilitate the development of application for training by other stakeholders – such meeting stakeholders	150	
7.2	Promote government usage Duration 1-5 years	Government	• Promote use of broadband in Government offices, and train staff on using computers and the internet	• E-Govt to facilitate deployment of networks in Govt offices and train Govt employees annually	200	• Number of sites connected per year • Number of new network users added per year
		MACRA	• Facilitate deployment of government networks.	• Issue licenses as required. • Make scares resources available	200	

				Indicators
				as required.
	Operators	Provide network infrastructure to Government buildings	500	
	Others	Consider opportunities for alternative service providers	300	
7.3 Encourage businesses and SMEs to work together Duration 1-3 years	**Operators**	• Provide connectivity to "Smart Hubs".	150	• Number of connected SMEs • Increase in value of business resulting from on-line activities
	Others	• Businesses and SMEs develop "internet user groups" to lobby and review network rollout progress • Support and use "Smart Hubs"	400	
7.4 Improve Affordability of terminals/connection devices		• Introduce lower (or remove) duty on smart terminal devices. • Lobby Ministry of Information to liaise with Ministry of finance to remove or lower import duty on terminal devices	70	
TOTAL COST FOR STRATEGIC PRIORITY AREA 7			**2265**	
AVERAGE ANNUAL COST FOR STRATEGIC PRIORITY AREA 7			**453**	

Implementation Road Map
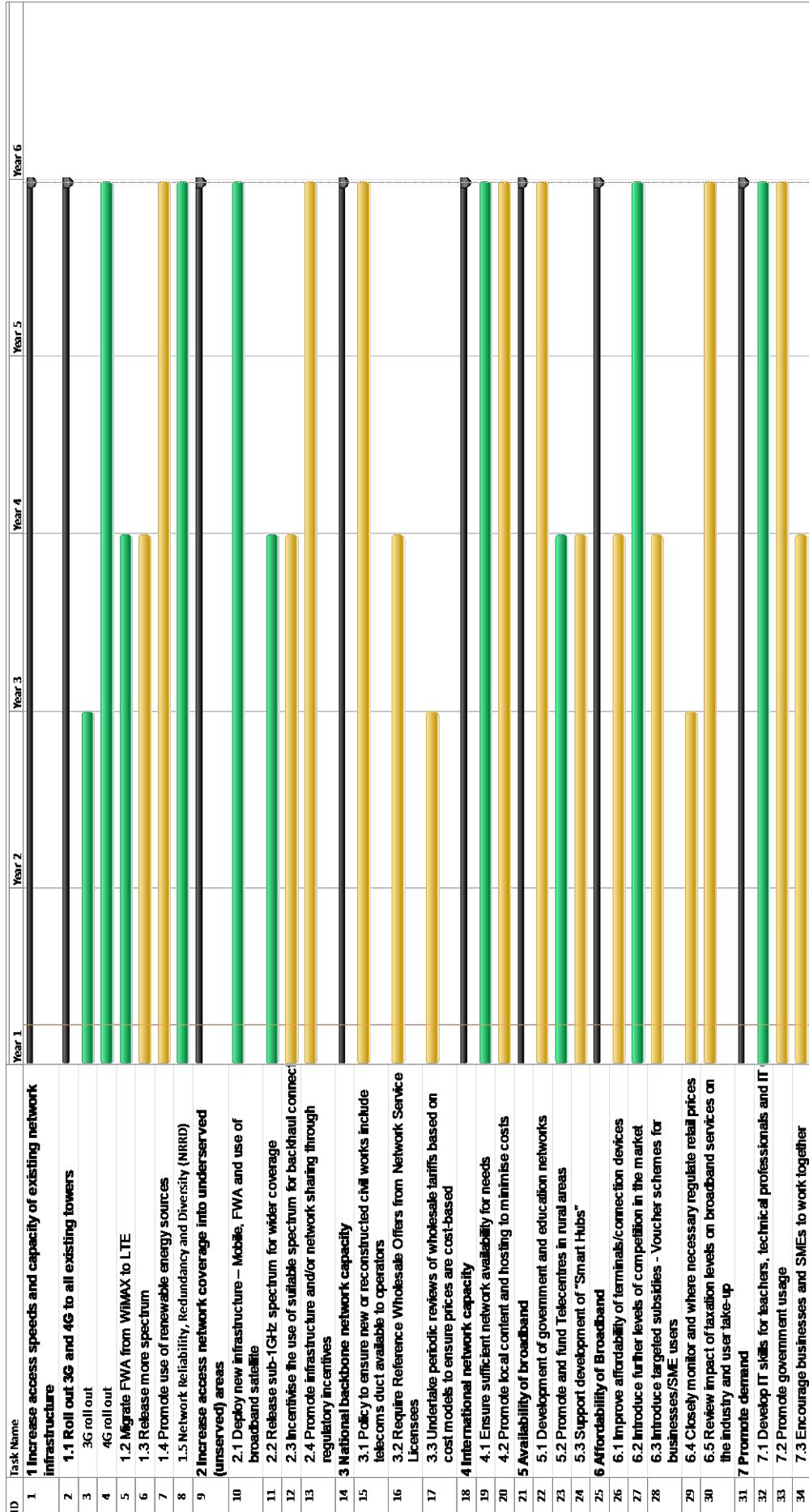
Many of the initiatives will be ongoing over the five year period of the National Broadband Strategy. The timing of some of them though is important in the short term in order to provide the necessary network infrastructure as well as skills which will be imperative in promoting the demand for Broadband services in the years ahead. The road map for the initiatives is shown in the chart below:

ID	Task Name	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1	1 Increase access speeds and capacity of existing network infrastructure						
2	1.1 Roll out 3G and 4G to all existing towers						
3	3G roll out						
4	4G roll out						
5	1.2 Migrate FWA from WiMAX to LTE						
6	1.3 Release more spectrum						
7	1.4 Promote use of renewable energy sources						
8	1.5 Network Reliability, Redundancy and Diversity (NRRD)						
9	2 Increase access network coverage into underserved (unserved) areas						
10	2.1 Deploy new infrastructure – Mobile, FWA and use of broadband satellite						
11	2.2 Release sub-1GHz spectrum for wider coverage						
12	2.3 Incentivise the use of suitable spectrum for backhaul connecti						
13	2.4 Promote infrastructure and/or network sharing through regulatory incentives						
14	3 National backbone network capacity						
15	3.1 Policy to ensure new or reconstructed civil works include telecoms duct available to operators						
16	3.2 Require Reference Wholesale Offers from Network Service Licenses						
17	3.3 Undertake periodic reviews of wholesale tariffs based on cost models to ensure prices are cost-based						
18	4 International network capacity						
19	4.1 Ensure sufficient network availability for needs						
20	4.2 Promote local content and hosting to minimise costs						
21	5 Availability of broadband						
22	5.1 Development of government and education networks						
23	5.2 Promote and fund Telecentres in rural areas						
24	5.3 Support development of "Smart Hubs"						
25	6 Affordability of Broadband						
26	6.1 Improve affordability of terminals/connection devices						
27	6.2 Introduce further levels of competition in the market						
28	6.3 Introduce targeted subsidies - Voucher schemes for businesses/SME users						
29	6.4 Closely monitor and where necessary regulate retail prices						
30	6.5 Review impact of taxation levels on broadband services on the industry and user take-up						
31	7 Promote demand						
32	7.1 Develop IT skills for teachers, technical professionals and IT						
33	7.2 Promote government usage						
34	7.3 Encourage businesses and SMEs to work together						

Each of the initiatives has been assessed against three further criteria. These represent impact, ease of implementation and broad costs. The assessments are shown graphically in the following Gant charts. The following key is used:

Colour	Impact	Ease of Implementation	Broad Cost
Green	High	Easy	Low
Orange	Medium	Medium	Medium
Red	Low	Difficult	High

8.1.1Impact

ID	Task Name	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1	1 Increase access speeds and capacity of existing network infrastructure						
2	1.1 Roll out 3G and 4G to all existing towers						
3	3G roll out						
4	4G roll out						
5	1.2 Migrate FWA from WiMAX to LTE						
6	1.3 Release more spectrum						
7	1.4 Promote use of renewable energy sources						
8	1.5 Network Reliability, Redundancy and Diversity (NRRD)						
9	2 Increase access network coverage into underserved (unserved) areas						
10	2.1 Deploy new infrastructure – Mobile, FWA and use of broadband satellite						
11	2.2 Release sub-1GHz spectrum for wider coverage						
12	2.3 Incentivise the use of suitable spectrum for backhaul connect						
13	2.4 Promote infrastructure and/or network sharing through regulatory incentives						
14	3 National backbone network capacity						
15	3.1 Policy to ensure new or reconstructed civil works include telecoms duct available to operators						
16	3.2 Require Reference Wholesale Offers from Network Service Licensees						
17	3.3 Undertake periodic reviews of wholesale tariffs based on cost models to ensure prices are cost-based						
18	4 International network capacity						
19	4.1 Ensure sufficient network availability for needs						
20	4.2 Promote local content and hosting to minimise costs						
21	5 Availability of broadband						
22	5.1 Development of government and education networks						
23	5.2 Promote and fund Telecentres in rural areas						
24	5.3 Support development of "Smart Hubs"						
25	6 Affordability of Broadband						
26	6.1 Improve affordability of terminals/connection devices						
27	6.2 Introduce further levels of competition in the market						
28	6.3 Introduce targeted subsidies - Voucher schemes for businesses/SME users						
29	6.4 Closely monitor and where necessary regulate retail prices						
30	6.5 Review impact of taxation levels on broadband services on the industry and user take-up						
31	7 Promote demand						
32	7.1 Develop IT skills for teachers, technical professionals and IT						
33	7.2 Promote government usage						
34	7.3 Encourage businesses and SMEs to work together						

8.1.2 Ease of Implementation

ID	Task Name	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1	1 Increase access speeds and capacity of existing network infrastructure						
2	1.1 Roll out 3G and 4G to all existing towers						
3	3G roll out						
4	4G roll out						
5	1.2 Migrate FWA from WiMAX to LTE						
6	1.3 Release more spectrum						
7	1.4 Promote use of renewable energy sources						
8	1.5 Network Reliability, Redundancy and Diversity (NRRD)						
9	2 Increase access network coverage into underserved (unserved) areas						
10	2.1 Deploy new infrastructure – Mobile, FWA and use of broadband satellite						
11	2.2 Release sub-1GHz spectrum for wider coverage						
12	2.3 Incentivise the use of suitable spectrum for backhaul connection						
13	2.4 Promote infrastructure and/or network sharing through regulatory incentives						
14	3 National backbone network capacity						
15	3.1 Policy to ensure new or reconstructed civil works include telecoms duct available to operators						
16	3.2 Require Reference Wholesale Offers from Network Service Licensees						
17	3.3 Undertake periodic reviews of wholesale tariffs based on cost models to ensure prices are cost-based						
18	4 International network capacity						
19	4.1 Ensure sufficient network availability for needs						
20	4.2 Promote local content and hosting to minimise costs						
21	5 Availability of broadband						
22	5.1 Development of government and education networks						
23	5.2 Promote and fund Telecentres in rural areas						
24	5.3 Support development of "Smart Hubs"						
25	6 Affordability of Broadband						
26	6.1 Improve affordability of terminals/connection devices						
27	6.2 Introduce further levels of competition in the market						
28	6.3 Introduce targeted subsidies - Voucher schemes for businesses/SME users						
29	6.4 Closely monitor and where necessary regulate retail prices						
30	6.5 Review impact of taxation levels on broadband services on the industry and user take-up						
31	7 Promote demand						
32	7.1 Develop IT skills for teachers, technical professionals and IT						
33	7.2 Promote government usage						
34	7.3 Encourage businesses and SMEs to work together						

8.1.3 Broad Costs

9.0 SCHEDULE 2:

9.1 MONITORING AND EVALUATION FRAMEWORK

MONITORING AND EVALUATION FRAMEWORK FOR THE NATIONAL BROADBAND STRATEGY (NBS)

The National Broadband Strategy (NBS) Monitoring and Evaluation Framework provides a detailed layout for the assessment of progress during the implementation of the strategy, as well as the assessment of the long-term impact and outcomes of the strategy based on periodic reviews. The Monitoring and Evaluation Framework aims to provide mechanisms or tools for data collection, analysis and reporting, and further information on the roles and responsibilities of stakeholders as well as frequency of reports.

The successful implementation of the NBS will require a Monitoring and Evaluation Framework that aim to:

- Support the attainment of the NBS Vision and Strategic Goals; and
- Enable accurate reporting on progress and identification of lessons learned and challenges encountered for informed decision making and effective planning in subsequent years.

This can be used to elaborate new measures as well as amend and tailor existing initiatives under the strategy. This section of the Strategy details the proposed systematic approach to monitoring and evaluating progress as an integral part in implementing

the NBS in Malawi. The monitoring is scheduled to be periodic in order to track the progress of implementation of the NBS. The monitoring will, therefore, focus on periodic and objective assessment of progress towards the attainment of the set objectives.

The key objectives of the monitoring and evaluation approach are:

- Establishment of performance targets for various governmental institutions and other key relevant stakeholders responsible for implementing specific activities of the NBS.
- Development of performance plans to establish a shared understanding of the expected end results, the approach to achieving these end results and identify the resources necessary to ensure a successful implementation of the strategy. The plans will be based on the KPIs, Performance Targets and Deadlines provided in the Implementation Logical Framework
- Monitoring and reporting performance as well as progress in achieving expected end results by identifying and promptly reporting observed or likely deviations.
- Periodically evaluating key stakeholders' or individual institution performance against established performance targets.

9.1.1 Monitoring

Implementation of this Strategy will be through annual work plans and budgets. The tasks detailed in the NBS implementation plan will form the basis for preparing annual work plans and budgets. In this regard, the Ministry of Information (MoI) and MACRA together with all relevant stakeholders will ensure that annual work plans and budgets are prepared within the framework of the Strategy.

Activities of this strategy will be continuously monitored and monthly performance reports will be prepared by all implementing agencies and submitted to the Principal Secretary of MoI through the Director General of MACRA. The Ministry will in turn submit to the National Steering Committee quarterly performance reports highlighting the progress made towards the achievement of key performance indicators (KPIs) in general and quarterly targets. Furthermore, quarterly monitoring exercises will be conducted. Lastly, a comprehensive annual progress report will be produced highlighting the progress made towards achievement of the KPIs in general and annual targets. The purpose of periodic reporting is to account for the resources utilized and output/results.

9.1.2 Joint Annual Reviews

The MoI in conjunction with MACRA and all key stakeholders identified in the Strategy shall set the Terms of Reference for the Joint Annual Reviews (JARs). The JARs will start at organizational level, sector and national level in order to allow for wider participation and analysis of implementation bottlenecks. Participation at national level will include representatives from all key stakeholders in the promotion of broadband in the country, who will discuss developments, interventions and policy recommendations as well as the achievement of Annual Implementation Plan milestones. Emphasis will be placed on challenges being experienced in the achievement of the targets and how these can best be addressed.

9.1.3 Evaluation

Performance evaluation is very important as it helps in objective comparison of actual against expected results and the resultant impact. In a changing environment, some of the key assumptions in the strategy may dramatically change and affect implementation of the set outcome targets. It is in the course of evaluation that the effects of such changes will be determined, and appropriate corrective action taken. The evaluations, therefore, will assess the relevance of the strategic goals and objectives, efficiency and effectiveness of the strategies, assumptions, the strengths and weaknesses in the implementation of the NBS.

A mid-term and full review will be conducted. As such, an independent stakeholder will be commissioned to undertake the mid-term and long-term reviews of the strategy to determine the short, medium and long-term impact and outcomes of the strategy based on annual reviews, and if necessary, effect remedial actions following the mid-term review to keep implementation on track. The mid-term review will be undertaken from the end of third quarter of Year 3 of the Strategy and the long-term review at the end of the fifth year.

Monitoring and Evaluation framework for the implementation of the National Broadband Strategy

Strategic goals	Strategies/Actions	Key Performance Indicators	Baseline (2019)	Target/ Outputs (2024)	Means of verification	Time Frame /Frequency	Data Collection Instrument/ Strategy	Lead Implementing Agency and Support
Strategic Priority Area – 1: Increase access speeds and capacity of existing network infrastructure								
Strategic goal – 1.1: Roll out 3G and 4G to all existing towers (based on plans of network operators)	Review and revise license conditions	Number/proportion of 3G sites rolled out (Bts)	0	20	Roll out reports	Annually (1-2 years)	Administrative	MACRA
	Increase access speeds and capacity for existing networks	Number/proportion of 4G sites rolled out (Bts)	0	20	Roll out reports	Annually (1-3 years)	Administrative	Operators
	Offer incentive spectrum pricing	Number of FWA operators migrating from WIMAX to LTE	2	4	License evaluation reports	Annually (1-5 years)	Administrative	MACRA
	Ensure spectrum availability	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
	Using USF to reach hard to get areas	Proportion of projects in hard to reach areas	0	100	Rural Projects rollout reports	Annually (1-5 years)	Administrative	MACRA
	Ensure operators plans are submitted	Number of plans submitted	0	2	Commercial plans	Annually (1-2 years)	Administrative	MACRA
	Monitor performance of operators	Number of projects implemented	0	20	Performance assessment report	Annually (1-2 years)	Field visits, meetings.	MACRA
	Devise a robust plan containing commercial and financial planning	Number of plans submitted	0	2	Commercial plans	Annually (1-2 years)	Operators' business plan reviews	Operators
	Share the plan with MACRA	Number of Plans shared with MACRA	0	2	Published plan	Annually (1-2 years)	Administrative	Operators
	Report to MACRA on a regular basis	Progress report schedule	0	4	Progress Report	Annually (1-5 years)	Report writing sessions	Operator

Activity	Indicator	Baseline	Target	Means of Verification	Frequency	Monitoring	Responsible
Provide KPIs in alignment with broadband targets	KPIS targets with broadband targets	0	1	KPIs framework developed	Annually (1-5 years)	Working session on the KPIs targets	MACRA
Strategic goal 1.2: Migrate to Newer Technologies (3GPP Based) — Ensure that all relevant licenses are issued to support the migration plan	Number of licenses issued	0	4	License evaluation/Board reports	Annually (1-5 years)	Administrative	MACRA
Review and revise license conditions to support the migration plan	Reviewed license conditions	0	1	Reviewed license report	Annually (1-5 years)	Administrative	MACRA
Ensure migration plans are submitted	Number of migration plans	0	4	Migration plan reports	Annually (1-5 years)	Administrative	MACRA
Ensure the availability of appropriate spectrum bands for access	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
Offer incentive pricing for spectrum for access and transport network	Administrative Incentive Pricing (AIP) reviewed	1	1			Administrative	
Monitor the progress of the migration plan by establishing mutually agreed KPIs	Established KPIs on Migration plan	0	4	Reports available of migration plan	Annually (1-5 years)	Administrative	Network operators MACRA
Upgrading technology FWA operators	Number of operators migrating to new technologies	0	2	Technical reports	Annually (1-5 years)	Operators technical quarterly reports	Network operators

Strategic goal / Objective	Activity	Indicator	Baseline	Target	Means of verification	Frequency	Type	Responsible
Strategic goal 1.3: Release more spectrum	Ensure sufficient relevant spectrum is available	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
	Publish plan to show when new spectrum will be available	Number of published spectrum plan	0	1	Published spectrum plan	Annually (1-3 years)	Administrative	MACRA
	Develop incentive-based pricing strategy especially for rural areas	Administrative Incentive Pricing (AIP) reviewed	1	1	AIP review report	Annually (1 year)	Administrative	MACRA
	Ensure roll out obligations are included in licenses, especially "use it or lose it requirements"	Number of licenses reviewed with regards to rollout obligations	0	4	CLF annual reports	Annually (1years)	Administrative	MACRA
	Monitor spectrum use to ensure hoarding does not take place, especially with incentive priced spectrum	Number Spectrum availability reports	0	5	Spectrum availability reports	Annually (1-5 years)	Administrative	MACRA
	Prepare realistic spectrum plan	Number of spectrum requirement plans	0	1	Spectrum requirement plans	Annually (1-5 years)	Operators technical annually reports	Network operators
Strategic goal 1.4: Promote use of renewable energy sources	Develop policy to promote rollout and use of renewable energy sources	Number of policies developed	0	1	Policy developed	Annual (by 3rd year)	Meeting and working sessions	GoM – MoICECT & MoE&EA

Activity	Indicator	Baseline	Target	Means of verification	Timeframe	Type	Responsible
Develop a strategy on subsidies and incentives, including reduced import duties, for such equipment	Number of strategies developed	0	1	Strategy developed	Annual (by 3rd year)	Meeting and working sessions	MACRA
Conduct cost benefit analysis of using renewable power sources	CBA study	0	1	CBA study report	Annual (by 2nd year)	Meetings Analysis and report writing sessions	MACRA
Consider use of USF to promote use of renewable energy sources	Proportion of sites using renewable energy sources	0	20%	Annual reports	Annually (1-5 years)	Administrative	MACRA Operators
Deploy renewable energy sources for RAN where possible	Proportion of sites with renewable energy sources	0	20%	Annual reports	Annually (1-5 years)	Administrative	– Others renewable energy companies
Facilitate investment by energy companies in infrastructure and rollout and develop range of pricing models based on government policy	Proportion of energy companies rolling out	0	20%	Annual reports	Annually (1-5 years)	Administrative	– Others renewable energy companies
Strategic goal 5: Increase Network Reliability, Redundancy and Diversity — Identification of appropriate policies to support MACRA in this initiative	Number of policies identified to support the initiative	0	1	ICT Policy Review Report	Annually (1 year)	Working sessions and meetings	- GoM MoICECT
Develop ICT network	Number of	0	1	NRRD	Annually (by	Working	MACRA

Redundancy, Reliability and Diversity (NRRD) Framework	NRRD framework			framework		sessions and meetings	
	Conduct cost-benefit analysis	CBA study	0	1	CBA study report	Annual (by 2nd year)	Meetings Analysis and report writing sessions	MACRA
	Develop individual NRRD plans	Number of operators' NRRD plans	0	4	Operators' NRRD plan	Annually (by 3rd year)	Working sessions and meetings	Network Operators
	Provide appropriate performance metrics to MACRA	Schedule of performance metrics agreed	0	1	Agreed schedule of KPIs	Annual (by 3rd year)	Working sessions and meetings	Network Operators
	Review NRRD on an ongoing basis and update as required	Number of operators' NRRD plans reviewed	0	4	Operators' NRRD plan review reports	Annually (from 4th year)	Working sessions and meetings	Network operators

Strategic Priority Area – 2: Increase access network coverage into underserved (unserved) areas

Strategic goal 2.1: Deploy new infrastructure – Mobile, FWA and use of broadband satellite	Ensure sufficient relevant spectrum is available	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
	Revise coverage obligations in licenses	Number of revised licenses	0	4	Revised license templates	Annually (1-5 years)	Administrative	MACRA
	Offer targeted prices for spectrum	Number of offers for targeted price for spectrum	0	4	Revised spectrum prices	Annually (1-5 years)	Administrative	MACRA

Strategic goal / Activity	Indicator	Baseline	Target	Output	Frequency	Method	Responsible
Facilitate use of appropriate technologies such as satellite through licensing processes	Number of reviewed licenses	0	4	Reviewed license documents	Annually (1-5 years)	Administrative	MACRA
Consider use of USF to support deployment	Number of project support for deployment using USF	0	4	Financial and Projects reports	Annually (1-5 years)	Administrative	MACRA Network operator
Monitor progress of network deployment	Number of monitoring exercises	0	20	Monitoring reports	Quarterly (for each year)	Field visits, surveys and meetings	MACRA, Network operators
Implement new license coverage obligations	Number of revised licenses	0	4	Revised license templates	Annually (1-5 years)	Administrative meetings with MACRA & operators	Network operators
Ensure adoption of new technologies into the market e.g. satellite	Number of adopted new technologies into the market	0	1	Progress Reports on new technologies adopted	Annually (1-5 years)	Working sessions, meetings, field visits, awareness meetings on new technologies	Others
Strategic goal 2.2: Release sub-1GHz spectrum for wider coverage — Ensure sufficient relevant spectrum is available	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
Publish plan on new spectrum availability	Number of spectrum availability plan	0	1	Spectrum availability plan	Annually (1-5 years)	Administrative	MACRA

Activity	Indicator	Baseline	Target	Means of verification	Frequency	Type	Responsibility
Develop incentive-based pricing strategy especially for rural areas	Administrative Incentive Pricing (AIP) reviewed	1	1	AIP review report	Annually (1 year)	Administrative	MACRA Operators
Ensure roll out obligations are included in licenses, especially "use it or lose it requirements"	Number of licenses reviewed with regards to rollout obligations	0	4	CLF annual reports	Annually (1 year)	Administrative	MACRA Network Operators
Monitor spectrum use to ensure hoarding does not take place hoarding e especially with incentive priced spectrum	Number of spectrum monitoring reports	0	5	Spectrum monitoring reports	Quarterly (for each year 1-5)	Administrative	MCARA
Prepare realistic spectrum plans	Number of spectrum requirement plans	0	1	Spectrum requirement plans	Annually (1-5 years)	Operators technical annually reports	Operators
Follow license obligations	Number of monitoring reports on license obligation	0	4	Monitoring reports	Quarterly (for each year 1-5)	Administrative	Network operators
Strategic goal 2.3: Release sub-1GHz spectrum for wider coverage	Ensure sufficient relevant spectrum licensed at an appropriately price for new links	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA
Maintain existing pricing for existing	Administrative Incentive Pricing	1	1	AIP review report	Annually (1 year)	Administrative	Operators

	Activity	Indicator	Baseline	Target	Output	Timeframe	Means	Responsible
	links even when upgraded through AIP	(AIP) reviewed						
Strategic goal 2.4: Promote infrastructure and network sharing through regulatory Incentives	Ensure legislation in place to enable new towers to be built easily	New proposed policy/strategy infrastructure development	0	1	Infrastructure development policy/strategy	Annual (by 3rd year)	Working sessions and meetings	GoM MoICECT -
	Apply obligations to SMP operators	SMP determination guidelines developed	0	1	SMP determination guidelines	Annual (1st year)	Working sessions and meetings	MACRA
	Define guidelines for Infrastructure Sharing	Infrastructure sharing regulations developed	0	1	Infrastructure sharing regulations	Annual (1st year)	Working sessions and meetings	MACRA
	Consider use USF to build new towers that are then shared	Number of new towers built that are shared	0	5	Infrastructure sharing reports	Annually (3rd year to 5th year)	MOU agreements, Implementation meetings, monitoring visits, Commissioning.	GoM MoICECT Operators MACRA
	Encourage networks sharing or mandate national roaming on new tower infrastructure built in rural areas	Number of infrastructure agreements/mandated national roaming	0	5	Infrastructure agreements / mandated national roaming copies	Annually (1-5 years)	Administrative	MACRA Operators

Activity	Indicator	Baseline	Target	Means of verification	Timeline	Type	Responsible
Enter into infrastructure sharing agreements with each other, or third parties (tower owners)	Number of infrastructure agreements	0	5	Infrastructure agreements copies	Annually (1-5 years)	Administrative	MACRA Network operators
Undertake national roaming agreements with other network parties	Number of national roaming agreements	0	1	National roaming agreements copies	Annually (1-5 years)	Administrative	MACRA Network operators
Potential opportunity for third party companies to build new infrastructure and lease it to network operators (tower companies)	Number of new tower companies licensed	1	3	Infrastructure license	Annual	Administrative	Other companies

Strategic Priority Area – 3: National Backbone Network capacity

Activity	Indicator	Baseline	Target	Means of verification	Timeline	Type	Responsible
Strategic goal 3.1: Policy to ensure new or reconstructed civil works include duct to telecoms available to operators	Inter departmental as well as local /regional/national cooperation needed to develop and implement policy	Number of collaborative meetings	0	10	Meeting reports	Annually (from year 1-5)	Working sessions and meetings	GoM – MoICECT & MoLGRD
	Managing agency to be set up either within MACRA or independently	Unit established under MACRA	0	1	Operation structure reviewed	Annual (by 3rd year)	Working sessions and meetings	MACRA
	Cooperation with other bodies required	Number of MOUs signed	0	10	Signed MOUs	Annually (from year 1-5)	Working sessions and meetings	Other institutions/ MACRA

Activity	Indicator	Baseline	Target	Means of verification	Frequency	Method	Responsible
Maintaining records and allocating capacity to operators	Number of records submitted	0	4	Operator record submission	Annually (from year 1-5)	Administrative	MACRA
Willingness to make use of shared infrastructure	Quarterly performance reports in shared infrastructure	0	4	Infrastructure sharing performance reports	Quarterly (from year 1-5)	Administrative	Network operators
Cooperation of other bodies required with MACRA	Number of MOUs signed	0	10	Signed MOUs	Annually (from year 1-5)	Working sessions and meetings	Other institutions/ MACRA
Set up new conduit/ dark fiber seller/provider	New conduit for dark fiber set	0	1	Licensed fiber operator	Annual (once off by 3rd year)	License application, evaluation, board approval and negotiation reports	MACRA/ new operator
Strategic goal 3.2: Require Reference Wholesale Offers from Network Service Licensees — Use SMP Determinations to set obligations on dominant suppliers	SMP determination guidelines developed	0	1	SMP determination guidelines	Annual (1st year)	Working sessions and meetings	MACRA
Identify other regulatory remedies to mandate RIOs	Number remedies identified to mandate RIOs	0	1	Signed MOUs	Annually (from year 1-5)	Working sessions and meetings	Other institutions/ MACRA
Prepare and publish Guidelines for Reference Interconnection Offers	Guidelines for RIO prepared and published	0	1	Published guidelines for RIOs	Annual (by 3rd year)	Working sessions and meetings	MACRA

Activity	Indicator	Baseline	Target	Means of verification	Timeframe	Type	Responsible
Approve Reference Offers	Number of RIOs submitted/year	0	4	RIOs prepared	Annually (from 1-5 years)	Administrative	Network operators
Encourage non SMP operators to publish RIOs to ensure consistency across the sector	Number of published RIOs	0	4	RIOs prepared	Annually (from 1-5 years)	Administrative	Network operators
Resolve disputes in a timely manner	Proportion of disputes resolved	0%	100%	Dispute resolutions report	Quarterly (from year 1-5)	Administrative	
Prepare Reference Interconnect Offers	Number of RIOs submitted/year	0	4	RIOs prepared	Annually (from 1-5 years)	Administrative	Network operators
Encourage operator to enter into RIO agreements	Number of RIO agreements per year	0	1	RIO agreements	Annually (from 1-5 years)	Administrative	MACRA
Strategic goal 3.3: Undertake periodic review of wholesale tariffs based on cost models to ensure prices are cost-based — Undertake tariff review and determine regulated tariffs	Number of tariff structure reviewed per year	0	1	Wholesale tariff structure	Annually (from 1-5 years)	Technical meetings and administrative	MACRA
Implement in a timely manner	Number of licensees under tariff review	0	4	Progress Reports	(from years) 1-5	Quarterly meetings to determine progress	MACRA
Provision of data for costing activities	Request for information (RFI) template	0	1	Performance analysis reports	Quarterly (from year 1-5)	Administrative	Network operator

Activity	Indicator	Baseline	Target	Means of verification	Timeframe	Type	Responsible
Publish and Implement regulated tariffs	Number of tariff reports/year	0	4	Tariff analysis reports	Quarterly (from year 1-5)	Administrative	Network operator
Strategic Priority Area – 4: International Network capacity							
Strategic goal 4.1: Ensure sufficient network availability for needs — Monitor traffic and network performance	Request for information (RFI) template	0	1	Performance analysis reports	Quarterly (from year 1-5)	Administrative	MACRA
Consider licensing additional suppliers if appropriate	Number of additional suppliers licensed	0	2	License evaluation reports	Annually (1-5 years)	Administrative	MACRA
Analyze and review network requirements and obtain more capacity when necessary	Business plan submissions/year	0	1	Business plans evaluation reports	Annually (from 1-5 years)	Technical meetings and administrative	Network operators
Strategic goal 4.2: Promote local content and hosting to minimize costs — Implementation of ICT policies through coordination between bodies	Reviewed national ICT policy	0	1	ICT policy review report	Annual (by 3rd year)	Working sessions and meetings	MoICECT
Implement initiatives across education and health sectors and develop information sites	Number of initiatives (education & health) and information sites developed	0	2	Reports on establishment of information sites	Annually (from 2-5 years)	Field visits, working sessions and meetings	MACRA and Other institutions
Cooperation with Ministries to ensure implementation of ICT policy	ICT policy Implementation plan	0	1	Approved implementation plan document	Annually (by 2nd year)	Field visits, working sessions and meetings	MACRA

Activity	Indicator	Baseline	Target	Means of Verification	Frequency	Method	Responsible
Cooperation with local hosting companies	Number of cooperation agreements	0	4	Cooperation agreements documents	Annually (1-5 years)	Administrative	Network operators
Local bodies (trades, health organizations, banks) to develop local content and e-commerce sites	Number of local content & e-commerce sites			Local content and e-commerce site development	Annually (1-5 years)	Working sessions and meetings	Others
Enhance capacity building for users to promote use of local content	Number of training initiatives	0	20	Training reports	Annually (1-5 years)	Training sessions and meetings	Other institutions/MACRA

Strategic Priority Area – 5: Availability of broadband

Activity	Indicator	Baseline	Target	Means of Verification	Frequency	Method	Responsible
Strategic goal 5.1: Development of government and education networks — Promote initiatives through Digital Malawi program	Number of initiatives implemented under Digital Malawi	0	1	Digital Malawi annual progress report	Annually (1-5 years)	Administrative	GoM – MoICECT
Conclude financial and commercial arrangements with overseas providers to facilitate new network provision	Financial and commercial agreements with overseas providers	0	3	Signed MOUs	Annually (from year 1-5)	Working sessions and meetings	Other institutions/MACRA
Issue necessary licenses	Number of licenses issued	0	3	License evaluation reports	Annually (1-5 years)	Administrative	MACRA
Make other required resources available including spectrum	Proportion of spectrum blocks released	0	100% of the demanded blocks	Spectrum management reports	Annually (1-5 years)	Administrative	MACRA

Activity	Indicator	Baseline	Target	Means of verification	Frequency	Administrative	Responsible
Cooperate as appropriate to ensure timely deployment of networks	Number of operator agreements signed	0	5	Agreement documents	Annually (1-5 years)	Administrative	Network operators
Strategic goal 5.2: Promote and fund Telecentres in rural areas — Promote use of Public Internet Access Centers across sectors in rural areas including education and health	Deliberate strategy on telecentre use developed	0	1	Deliberate strategy on telecentre usage document	Annually (from 2nd year)	Working sessions and meetings	MoICECT MACRA MOEST
Fund Public Internet Access Centers through USF – include in USF planning and budgeting	Number of Public Internet Access Centers established (continuous)	0	200	Establishment reports (construction, setting up & operational)	Annually (1-5 years)	Site visits, local committee meetings, contractor reports	MACRA
Monitor activities at Public Internet Access Centers to encourage increasing activities	Number of monitoring visits to the Public Internet Access Centers	0	5	Field Reports	Quarterly (from year 3-5)	Field visits	MACRA
Provide training to Public Internet Access Centers staff	Number of staff trained	0	28	Training reports	Annually (from year 1-5)	Training and practical sessions	Training institutions MACRA
Provide subsidized connectivity to rural telecentres as part of a USO	Number of Public Internet Access Centers that are subsided	0	200	Wi-Fi connectivity reports	Quarterly (from year 1-5)	Technical and administrative	Network operators
Develop applications and provide training on use of IT in Public	Develop Application content manual	0	1	Application developers' reports	Annually (from year 1-5)	Technical and administrative	Others

	Activity	Indicator	Baseline	Target	Means of verification	Frequency	Type	Responsibility
Internet Access Centers								
Strategic goal 5.3: Support development of "Smart Hubs"	Encourage creation of "Smart Hubs" in urban areas	Deliberate strategy "Smart Hubs" developed	0	1	Deliberate strategy document	Annual (by 3rd year)	Working sessions and meetings	MoICECT
	Identify suitable places to become "Smart Hubs"	"Smart Hub" locations identity schedule	0	5	"Smart Hub" locations schedule/document	Annually (from year 1-5)	Planning/working sessions and meetings	MACRA
	Provide funding for equipment and training from USF	Number of budgets for equipment and training	0	5	Budget documents	Annually (from year 1-5)	Planning/working sessions and meetings	MACRA Smarts Hubs
	Consider usage of voucher scheme	Proportion of usage voucher scheme	0	50%	Voucher scheme usage analysis reports	Annually (from year 1-5)	Administrative	MACRA Network operators
	Monitor usage	Request for information	0	1	Usage report	Annually (Quarterly 1-5years)	Administrative	MACRA Network operation
	Rollout infrastructure for Smart Hubs	Number of rollout plans by operators	0	5	Operators' rollout plans submissions	Annually (from year 1-5)	Operator applications	Network operators
	Support training of staff of Smart Hubs	Number of staff trained	0	25	Training reports	Annually (from year 1-5)	Training and practical sessions	MACRA Smart Hubs
	Subsidize the initial	Number of	0	5	Subsidized	Annually(fro	Technical and	MACRA

Activity	Indicator	Baseline	Target	Means of verification	Timeframe	Resources	Responsibility
access for "Smart Hubs"	subsidized initial access Smart hubs			Smart hubs reports		administrative	Others
Develop applications relevant to "Smart Hubs"	Develop Application for "Smart Hub" manual	0	1	"Smart Hub" Application developers' reports	Annually (from year 1-5)	Technical and administrative	
Encourage the use of "Smart Hubs" by SMEs	Number of programs to encourage "Smart Hubs"	0	5	"Smart Hubs" applications and approved made	Annually (from the 3rd year)	Sensitization meetings TV and Radios Documentaries, brochures, newspaper adverts.	MACRA Smart Hubs

Strategic Priority Area – 6: Affordability of broadband

Strategic goal	Activity	Indicator	Baseline	Target	Means of verification	Timeframe	Resources	Responsibility
Strategic goal 6.1: Improve Affordability of terminals/connection on devices	Introduce lower (or remove) tariffs on imported devices	Number of meetings	0	4	Meeting reports	Quarterly	Meetings with Ministry of Finance (Revenue Directorate)	GoM MoICECT –
	Promoting subsidized schools' laptop initiative	Number of schools provided with laptops	0	30	Procurement, Implementation/delivery reports	Annually (from 2nd year)	Needs assessments, procurement processes	MACRA MoEST
	Promoting subsidized laptops to SMEs	Number of SMEs provided with laptops	0	60	Procurement, Implementation/delivery reports	Annually (2-5 year)	Needs assessments, procurement processes	MACRA SMEs

Activity	Indicator	Baseline	Target	Means of verification	Frequency	Means	Responsible
Facilitate the provision of information on making cost effective choices for consumers on website or other material	Number of programs for consumer awareness on cost effectives choices	0	5	Website with information on cost effective choices for consumers	Annually (2-5 year)	Sensitization meetings TV and Radios Documentaries, brochures, newspaper adverts, website.	MACRA Network operators
Enhance provision of low-cost smartphones handsets	Number of low-cost smart phones/year	0	120	Procurement report/ delivery report	Annually (2-5 year)	Meetings, Needs assessments, procurement processes	MACRA/ Network operators
Encourage SME groups to be pooling access to computers through "Smart Hubs"	Number of SMEs that are pooling access to computers through "Smart Hubs"	0	60	"Smart Hubs" registry	Annually (1-5 years)	Submissions of "Smart Hubs" concepts, meetings	MACRA Smart Hubs SMEs
Strategic goal 6.2: Introduce further levels of competition in the market — Facilitate deployment of new networks through the Digital Malawi project, government, education and energy networks	Percentage completion of Digital Malawi initiatives	0	100	Digital Malawi project progress reports	Annual (1-5 years)	Meetings, mission reports, Administrative	MoICECT
Effective application of existing and new regulations to encourage 3rd operator to roll out services	New regulations developed for 3rd operator to roll out services	0	1	Regulations	Annual (from 2nd year)	Stakeholder consultations, MoJCA promulgation	MACRA MOJCA
Provide MVNO access obligations on	Infrastructure sharing,	0	3	Regulations	Annual (from 2nd year)	Stakeholder consultations,	MACRA MoJCA

existing operators	interconnection regulations					MoJCA promulgation	
Provide necessary new licenses	New licenses issued	0	3	Licensed operator	Annual (once off by 3rd year)	License application, evaluation, board approval and negotiation reports	MACRA
Make scarce resources available to new market entrants	Availability of scarce resources to new market entrants	0	100% of the demanded blocks	Resource availability Reports	Quarterly (1-5 years)	Data collection	MACRA
Conduct needs assessment for introduction of number portability	Number of needs assessment report	0	1	Needs assessment report	Annual (by 3rd year)	Data collection, analysis	MACRA
Resolve disputes in a timely manner	Percentage of disputes resolved/year	0	100%	Dispute resolution report	Quarterly (1-5 years)	Dispute submission management tool	MACRA
Enter into commercially appropriate MVNO agreements	Number of commercial MVNO agreements	0	5	Commercial MVNO agreements	Annual (1-5 years)	Contract negotiation reports	Network operators
Reduce prices in response to competition	Percentage reduction in average prices	0	5%	Tariff review reports	Annual (1-5 years)	Data collection, tariff analysis	MACRA
Enhance BB supply market either through MVNO arrangements or	Number of MVNO operators providing BB	0	5	MVNO licenses issued	Annual (from 3rd year)	License negotiations, report submission	Others

Strategic goal	Activity	Indicator	Baseline	Target	Output	Timeframe	Means of verification	Responsible
Strategic goal 6.3: Introduce targeted subsidies - Voucher schemes for businesses/SME users	deploying new networks Encourage take up through government initiatives	Proportion of Government initiatives	0	1	Subsidized voucher schemes for businesses/ SME users	Annual (from 2nd year)	Negotiations meeting on subsidized voucher schemes	MoICECT
	Facilitate Government resource mobilization towards support businesses/SMEs	Percentage allocation of resources in national budget through Public Sector Investment Program (PSIP)	0%	0.1%	Public Sector Investment Program (PSIP)	Annual (from 2nd year)	Budget discussion with Treasury	MoICECT MACRA
	Identify suitable body to draw up rules and administer scheme	Number of Body set up	0	1	Institutional set up of the Body	Annual (from 3rd year)	Functional reviews	MoICECT MACRA
	Publicize and administer Voucher Scheme (if required by government)	Number of public adverts	0	1	Request for proposals (RFPs) developed	Annual (from 3rd year)	Terms of references for RFPs	MACRA
	Assess impact of scheme after 1, 2 and 3 years	Number of evaluation exercises	0	3	Evaluation/ assessments reports	Annual (1, 2 and 3 years)	Data collection, evaluations	MACRA, operators
	Accept vouchers as payment for services	Voucher payment system in place	0	1	Voucher payment system report	Annual (from 3rd year)	Terms of reference for Voucher Payment system	Operators

Activity	Indicator	Baseline	Target	Means of verification	Frequency	Activities	Others
Publicize availability of Vouchers Scheme through SME groups	Voucher payment system in place	0	1	Voucher payment system report	Annual (from 3rd year)	Awareness campaigns, meetings, brochures, TV and Radio, documentaries	
Use to support "Smart Hubs"	Number of "Smart Hubs" developed/year	0	1	"Smart Hubs" approved and supported	Annually (from the 3rd year)	Stakeholder meetings	MACRA Other
Strategic goal 6.4: Closely Monitor and where necessary Regulate Retail Prices							
Ensure that all actions taken are in line with the powers granted under the Communications Act.	Compliance to Communications Act.	0	100% Fully compliant.	Laid down procedure for compliance	Annual (by 3rd year)	Data analysis	MACRA
Ensure market definitions are appropriate for market analysis	Number of market analysis done	0	1	Market analysis report	Annual (by 3rd year)	Data analysis, report writing	– GoM MoICECT/ MACRA
Follow tariff regulations imposed	Number of tariff remedies imposed (Compliance to tariff regulations	0	100% Fully compliant	Market analyses reports	Annual (after every 3 years)	Tariff registry	Operators
Strategic goal 5: Review impact of taxation levels on broadband services, on the industry and user	Coordinate with MACRA to determine impact of taxation of broadband network operators' operations	Number of impact analysis done	0	1	Impact of taxation on telecoms sector report	Annual (by 3rd year)	Data analysis, report writing	– GoM MoICECT/ MACRA

take-up							
Consideration of impact of lower levels of taxation on total government revenues	Percentage of lower levels of taxation on total government revenues	0	High level	Impact of lower levels of taxation on government revenues	Annual (by 3rd year)	Data analysis, report writing	MACRA
Work with Treasury reduction of import duties on communications network equipment	Number of impact analysis done	0	1	Impact of taxation on telecoms sector report	Annual (by 3rd year)	Data analysis, report writing	MACRA, Treasury
Work with Treasury to determine impact of taxation	Number of Impact analysis	0	1	Report on impact taxation	Annual (by 3rd year)	Working sessions	MACRA, Treasury
Provide data to support analysis of revenues within the sector	Number of support analysis of revenues within the sector	0	1	Analysis of revenues report	Annual (by 3rd year)	Data analysis, report writing	MACRA, Treasury
Strategic Priority Area – 7: Promote demand							
Strategic goal 1: Develop IT skills for teachers, technical professionals and IT users	Effective Implementation of ICT policies	Number of policies implemented	0	1	ICT policies implemented reports or Activity Reports	Annual (by 3rd year)	Meetings, working sessions, field visits	MoICECT
	Implement ICT education into the education curriculum	Reviewed education curriculum	0	1	Curriculum with incorporated ICT courses	Annual (by 3rd year)	Working sessions and meetings	MoICECT and MoEST
	Support training in	Number of ICT	0	100	Training	Annual (from	Telecentre/	Other training

				reports	2nd year	rural trainings	institutions MoICECT and MoEST
ICT for life-long learning opportunities	training initiatives to the youth/year						
Implement computer and internet access lessons in schools and telecentres (following ICT policies)	Reviewed education curriculum with computer and internet lessons	0	1	Curriculum with incorporated ICT courses	Annual (by 3rd year)	Working sessions and meetings	MoICECT and MoEST
Inter-governmental cooperation to implement ICT policies	Number of MDAs involved in Inter-Governmental Cooperation	0	2	State of ICT policies in MDAs report	Annual (from 3rd year)	Meetings, working sessions	MACRA
Facilitate deployment of education networks	Number of institutions on MAREN	0	10	MAREN annual reports	Annual (1-5 years)	Meetings, Administrative	MAREN
Issue licenses as required	Number of licenses issued	0	3	License evaluation reports	Annually (1-5 years)	Administrative	MACRA
Make scares resources available as required	Availability of scarce resources as required	0	100% of the demanded blocks	Resource availability Reports	Quarterly (1-5 years)	Data collection	MACRA
Providing deliberate training to teachers and users (businesses and SMEs) by operators	Number of trainees trained	0	56	Training reports	Annually (from year 1-5)	Training and practical sessions	Network operators/MACRA
Operators could be required to provide training to users,	Number of trainings conducted	0	100	Training reports	Annually (from year 1-5)	Training sessions	Operators

especially businesses and SMEs							
Provide network infrastructure to schools	Number of schools connected	0	30	Technical roll out reports	Annually (from year 1-5)	Technical and physical roll out installations	Operators ISPs MACRA
Enhance use of relevant applications and training in schools, colleges, telecentres and "Smart Hubs" to provide training (including TOTs) by education bodies and NGOs	Number of trainers trained	0	56	Training reports	Annually (from year 1-5)	Training sessions, materials	Others training institutions
Enhance opportunities for alternative service providers e.g. satellite BB	Number of service providers	0	3	Progress reports	Annually (1-5 years)	Administrative, funding proposals	Operators MACRA
Strategic goal 2: Promote government usage	Promote use of broadband in Government offices, and train staff on using computers and the internet	0	200	Status reports from e-Govt Dept.	Annually (1-5 years)	Administrative	MoICECT / e-Govt Dept.
	Roll out connectivity to government offices throughout the country	0	200	Status reports from e-Govt Dept.	Annually (1-5 years)	Administrative	MACRA ISPs Operators
	Issue licenses as	Number of	0	3	License	Annually (1-	Administrative	MACRA

required	licenses issued		evaluation reports	5 years		
Make scarce resources available as required	Availability of scarce resources as required	0	100% of the demanded blocks	Resource availability Reports	Quarterly (1-5 years)	Data collection	MACRA
Provide network infrastructure to Government buildings	Number of Government offices with Network infrastructure	0	200	Status report from e-Govt. Dept.	Annual (from 3rd year)	Meetings, working sessions, installation of infrastructure	Network operators
Facilitate opportunities for alternative service providers	Number of service providers	0	5	Progress reports	Annually (1-5 years)	Administrative, funding proposals	Others
Strategic goal 3: Encourage businesses and SMEs to work together — Provide connectivity to "Smart Hubs"	Number of "Smart Hubs" instituted	0	5	"Smart Hubs" registry	Annually (1-5 years)	Submissions of "Smart Hubs" concepts, meetings	Operators
Businesses and SMEs develop "internet user groups" to lobby and review network rollout progress	Number of Internet User Groups developed	0	28	SMEs and Business Internet User Groups registry	Annually (1-5 years)	Meetings, working sessions	Others
Support and use "Smart Hubs"	Number of "Smart Hubs" instituted	0	5	"Smart Hubs" registry	Annually (1-5 years)	Submissions of "Smart Hubs" concepts, meetings	Others MACRA