

**Ministry of Transport and
Communications**

**Posts and Telecommunications
Department**

**Universal Service Strategy for Myanmar
(2019 to 2023)**

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Acronyms / Abbreviations

2G	Second Generation Mobile Communications
3G	Third Generation Mobile Communications
A4AI	Alliance for Affordable Internet
ADB	Asian Development Bank
ASL	Application Service Licence
ARPU	Average Revenue Per User
BSC	Base Station Controller (in GSM networks)
BTS	Base Transceiver Station (in GSM networks)
CSO	Civil Society Organization
GIS	Geographic Information System
GOM	Government of Myanmar
GPS	Global Positioning System
GSM	Global System for Mobile Communications
ICT	Information and Communications Technologies
INGO	International Non-Government Organization
ISP	Internet Service Provider
LTE	Long-Term-Evolution (next generation GSM network)
MCF	Myanmar Computer Federation
MCRC	Myanmar Communications Regulatory Commission
MIMU	Myanmar Information Management Unit
MoE	Ministry of Education
MOTC	Ministry of Transport & Communications
MPT	Myanmar Post and Telecommunications
NFS-C	Network Facilities Licence - Class
NFS-I	Network Facilities Licence - Individual
NTL	Nationwide Telecommunications Licence
OPEX	Operating Expenditure
PTD	Posts and Telecommunications Department in MOTC
UA	Universal Access
US	Universal Service
USF	Universal Service Fund

1 Introduction

1.1 General introduction

This document is the Universal Service Strategy for the Republic of the Union of Myanmar (Myanmar). This is part of the government's objective of the reform of the telecommunications sector, which the Ministry of Transport and Communications (MOTC) is pursuing.

Universal Service is a policy goal to ensure that all people in a country have access to and are able to use telecommunications services. This focuses in particular on people living in rural and remote parts of the country, as well as poorer households country-wide, and persons with disabilities. A universal service policy defines a minimum set of telecom services, both for voice services and broadband Internet, which all people should be able to use. This also means that these defined telecom services must be affordable.

The main objective for the telecommunications sector of the Government of Myanmar (Government) is to increase access to telecommunications, make services affordable and develop a communications infrastructure that will foster inclusive socio-economic growth and poverty reduction.

The 2013 Telecommunications Law gives the MOTC the option to establish a Universal Service Fund (USF). For this, the licences of all four operators with a Nationwide Telecommunications Licence – Ooredoo, Telenor and MPT, as well as the fourth entrant Telecom International Myanmar Limited (MyTel) – are required to pay a USF levy. The USF levy is 2% of relevant revenue on an annual basis.

The MOTC can then instruct the Posts and Telecommunications Department (PTD) to develop programmes and projects for the construction of basic telecommunications infrastructure and to extend telecommunication services in the unserved and underserved areas of the country. The MOTC can further set additional Universal Service goals, as per international best practice.

The MOTC has established a USF for Myanmar. A USF is both a legal and institutional structure, as well as a financing instrument. A USF would be largely responsible for the implementation of the Universal Service Strategy and its individual programs, and projects. Thus, the terms Universal Service Strategy, USF and USF programs are used in this document.

For the development of this document, extensive consultations have taken place among government, industry and civil society stakeholders. This included at least three major workshops, the publication of a Draft Universal Service Strategy on the Ministry's website in January 2018, and receiving written comments and input, which have been considered and incorporated, as appropriate.

1.2 Rationale for a Universal Service Strategy

Communication has become increasingly important for societies. In the digital information age, communications services – whether they are voice communications or broadband Internet – have become indispensable for modern life. They are crucial for governments, business and individuals alike, both for economic growth and social development, as well as for the functioning of a democracy.

Further, with the advent of broadband Internet and the infinite possibilities it offers for information, content, applications and services, the individual capacity to harness and benefit from these opportunities has become critical. As such, the expansion of the broadband network, and capacity building, has become important and urgent.

Sector reform and effective sector regulation are the best mechanism to accomplish the government's goals of improved access, affordable services and increased communication network coverage throughout the country.

The MOTC has already accomplished major sector reform goals such as the promulgation of the Telecommunications Law 2013, the liberalization of the market and the development of key regulatory rules on interconnection, frequencies, competition, licensing and numbering. Additional milestones achieved are the licensing of the fourth Nationwide Telecom Licensee; Telecom International Myanmar Limited (MyTel), and the auction of frequencies in the 2.6 GHz, and 1.8 GHz bands with assignment. Further important tasks ahead are the establishment of an independent telecommunications sector regulator, improved enforcement of existing regulations and ensuring a level playing field among industry players.

Even though commercial operators have a long-term interest in serving all parts of the country, and competition and good regulation drives network expansion, there will be areas that the commercial operators will not serve or at least it will take a long time.

For areas and communities beyond the market reach, the Law provides MOTC the ability to establish various mechanisms to fulfill Universal Service obligations, including the establishment of a Universal Service Fund (USF).

Therefore, the government's Universal Service Strategy ensures that these areas and population groups will also be served. Universal Service ultimately benefits economic and social cohesion, integration and a country's socio-economic growth.

Universal service policies and USFs are internationally wide-spread practices and there are over 90 USFs world-wide. Myanmar's strategy is building on this international experience, while still tailoring its own Universal Service Strategy to local circumstances and needs.

1.3 National context and relation to other relevant policies

This Universal Service strategy is embedded in a set of existing and required policies. It should be aligned with overall government policies, such as the country's economic policy. Many countries have a National Digital strategy, National Broadband policy and/ or a Telecommunications/ ICT Masterplan, which is a higher-level, comprehensive policy document addressing ICT, digital technologies and services on a national level. Further, countries then have a set of regulatory policies which regulate the ICT sector, such as pricing policies, consumer policies, competition policies, numbering, interconnection, and so on. Universal service is a sub-set of the Telecommunications Masterplan (or National Broadband or Digital strategy) as well as a regulatory policy that ensures that the telecom sector also reaches the difficult and remote areas and lower-income households.

1.3.1 Myanmar Sustainable Development Plan

In August 2018, the Government released the “Myanmar Sustainable Development Plan (2018 – 2030)”. The purpose of the Myanmar Sustainable Development Plan (MSDP) is to provide a single national strategy that provides a framework and guide for all other strategies, allowing an overall coherent and harmonized approach. Existing strategies are required to be executed consistent with macro-level national development priorities contained in the MSDP, with a special focus on sustainability and co-ordination.

This Universal Service Strategy is strategically aligned with the MSDP. This covers key principles and approaches; the following are a few examples only:

- The implementation of USF projects takes place in partnership with the private ICT industry and other stakeholders. This is in line with Pillar 2 of the MSDP: “Prosperity and Partnership”, which emphasizes private sector-led growth. One of MSDP’s strategies is to increase broad-based access to financial services. Better telecom coverage in rural and remote areas will support this goal, by enabling mobile-based financial services.
- The Universal Service Strategy is focused on telecommunications infrastructure which is a critical and enabling infrastructure. This is in line with the MSDP that prioritises basic infrastructure to enable sustainable economic growth and diversification.
- Pillar 3 of the MSDP: “People and Planet” has a focus on the invaluable asset of Myanmar’s people and education for the 21st Century; while not specifically mentioned, digital literacy and skills which is covered in Program 2 of this Universal Service strategy, is clearly part of preparing students and others for the participation in the digital society and economy.
- The Government also wants to enhance safety and security for the people, and focuses on reducing the urban-rural divide by enabling soft and hard connectivity. This allows access to markets, information, technology, finance, education, basic services etc. This Universal Service strategy is a vital instrument to reduce the urban-rural divide by ensuring that also rural areas have the same key telecommunications services.

In conclusion, this Universal Service Strategy aligns itself with the MSDP and plays a part in supporting key objectives of the MSDP.

1.3.2 Economic policy

The Government released an overarching 12-point economic policy at the end of July 2016. This Universal Service Strategy has been developed in line with this high-level economic policy, and is able to support and make small contributions to many of the national economic goals, for example:

- By aiming to provide more equitable and universal access to communications infrastructure across regions and states, the Universal Service Strategy supports national reconciliation and the rapid development of fundamental economic infrastructure;
- By using market-oriented mechanism to achieve universal service, this strategy supports competition and a vibrant private sector as well as public financial management and work on fiscal prudence;
- As universal service usually has a strong focus on rural areas, it often benefits the agriculture and livestock sectors;

- Communications can assist with job searches and employment, and infrastructure development projects, particularly in rural areas; as well as reduction of poverty and inequality;
- The Internet is one avenue for acquiring knowledge and learning, and ICT skills themselves become more and more important. Universal service not only expands broadband Internet networks, it also assists with human capital development and developing a skilled workforce; and
- The development of the financial sector is enhanced by access to mobile financial services, and communications available universally helps with financial inclusion.

1.3.3 Telecommunications Masterplan

The Myanmar Telecommunications Masterplan¹ includes several references to universal service and the USF. Key connectivity targets for 2020 are as follows:

- 1) Over 90% of Myanmar population covered by a telecommunications network;
- 2) Over 85% of Myanmar population covered by a network that provides internet access;
- 3) Over 50% of Myanmar population with access to a high-speed internet connection.

The first target may be exceeded sooner, since the population coverage to be met by both Telenor and Ooredoo will be 92% of population covered. The combined coverage of all operators, including MPT, as shown in the national GIS map (see Section 4.2), should exceed 94% and most likely reach 95% by early 2019. Further, since the majority of the networks are already 3G capable, current broadband Internet coverage exceeds 80% of the population, and will expand rapidly going forward.

The Masterplan is thus generally aligned with universal service targets and focuses on making telecommunications more accessible and affordable to the poor and to those in remote areas. It mentions that a particular aspiration of the MOTC is that broadband Internet access expenditure for typical usage should not exceed 5% of Myanmar citizens' income. This is discussed in more detail in Section 2.2.2 on affordability. The Masterplan further mentions the importance of finding innovative solutions for people with disabilities that allows them to access telecommunications services.

The Masterplan also urges that the funds collected by the USF should be allocated transparently and effectively, based on international best practice. Further, it urges that such funding needs to be defined clearly, so as not to distort the market or distract operators from fulfilling commercially-supported roll out plans.

The Masterplan places itself in a technology neutral position as to solutions. It states that the way forward for universal service should be based on an "informed assessment of the needs, options and potential obstacles and risks, to develop a strategic framework and practical solutions to the above challenges. This strategy will be prepared along with expert and public consultations on the matter, since there is widespread interest and knowledge on this subject."

Myanmar's government established the Digital Economy Development Committee (DEDC) with Vice President U Henry Van Thio as patron. The Digital Economy

¹ Final Draft August 2015; as of July 2017 it has not yet been formally adopted.

Development Committee is setting up goals to be achieved by 2020 - 2025. Its purpose is to support the digital economy in the country, develop other economic sectors based on the digital economy, improves social affairs, education, health and economy by the use of digital technology, and creating Myanmar as a digital hub of the ASEAN region by an enabling economic environment and use of digital technology. The Universal Service Strategy will follow progress to co-ordinate and complement efforts within its scope.

1.3.4 e-Governance Master Plan 2016 to 2020

Myanmar's e-Governance Master Plan (2016-2020) is another important framework to be considered to ensure there is no duplication or conflict, and if possible to create synergies. An important prerequisite for e-Government is that all inhabitants are connected and can afford and use communications services; thus, universal service supports e-Governance.

Relevant parts in the e-Governance Masterplan are those relating to communications network infrastructure; it highlights key concepts such as, wherever feasible, using existing infrastructure like fibre-networks, sharing networks and working with the private sector for security and cost-effectiveness.

Regardless of whether the government procures network capacity as a service, or builds in parts its own network, there should be a separation between e-Governance and universal service. The USF can be used to subsidize networks that are built by telecom licensees in areas which are not commercially viable.

1.4 How this strategy has been developed

Methodology

This Universal Service Strategy was developed using a combination of the following main methodologies:

- Independent and extensive ICT data and sector analysis;
- Consultation with a wide range of industry, government, civil society and other key stakeholders;
- Two rural field visits interviewing villagers, government officials, school headmaster and hospital doctors in November 2016 in Chin state and Kachin state;
- Myanmar ICT projects experience and analysis of wider relevant context;
- Review and discussion of international experience on universal service, USFs and best practice elements;
- Detailed GIS analysis of the combined telecom service coverage of major operators;
- Four workshops on Universal Service:
 - 08 September 2016: PTD Industry workshop with NFS-I and NFS-C licensees;
 - 18 November 2016: Workshop on Universal Service with A4AI members and civil society organizations (CSOs);
 - 16 February 2017: PTD consultative workshop with industry and CSO stakeholders, Novotel Hotel Yangon;
 - 21 July 2017: Industry roundtable hosted by PTD in Yangon;

- Final public consultation: publishing the Draft Universal Service Strategy and inviting written comments, after which the Strategy has been finalized.

Technology neutral

It is important to note that this Universal Service Strategy adheres in general to the principle of being technology-neutral. That means that it does not favour or prescribe any particular technology. Operators and service providers will make their own choices on which technology is best suited and most cost-efficient to meet specific universal service targets. However, on the other hand, the Universal Service Strategy does not exist in a technology vacuum. There are the following aspects which have to be seen in context to existing technology and future technology trends:

- The gap or needs analysis – this is based on, and describes specifically which technologies are used, which frequencies etc. and what is planned to be rolled out in the future;
- The analysis of how universal service should be defined – this is based on what services the large majority already enjoys, for example the feature that the overwhelming majority enjoys telecom service that are mobile;
- The service specifications for universal service targets; for example this may include certain download speeds or Quality of Service requirements, which can limit the options for technologies;
- The regulatory analysis and future technology trends: a Universal Service Strategy needs to look towards upcoming technologies that offer cost-savings and/or service improvements; also regulatory aspects influence this, for example the availability of spectrum in the 700 MHz band has the potential to lower the costs of serving rural areas with advanced broadband Internet at very high download speeds.

1.5 Beyond this Universal Service Strategy

It is important to note that this Universal Service strategy is intended for a period of five years, from 2019 to 2023. Its focus is a plan of action for these five years. While including definitions, objectives and key principles, it is not a policy document. A policy document would be longer-term, more comprehensive and including all possible aspects and measures of universal service. This Universal Service Strategy instead, after laying a foundation of both definitions, principles and analysis, is focused on addressing the most prominent identified universal service needs for the next five years. These are captured in the three main programs.

It is important to allow for flexibility in terms of what universal service programs can be financed and implemented. This is required because the universal service needs and the telecom environment are often changing rapidly. Further, Myanmar is a member of ASEAN, and key trends and guidelines for Universal Service from ASEAN are important elements to consider. Article 9 (f) of the Notification to establish the USF allows for that flexibility, as it refers to the key dimensions of Universal Service: Availability, Accessibility, Affordability and Ability.

It is equally important though that there is clarity of the scope of Universal Service, and that only programs are financed which clearly have the purpose to support the achievement of Universal Service goals. Planned USF programs and projects therefore need to clearly indicate how they support Universal Service achievement. Further, proper data analysis and research, as well as stakeholder consultation, is required, to establish that proposed USF programs and projects are truly needed and feasible. And lastly,

detailed project design needs to ensure their likely success, their benefits and also include performance indicators to measure benefits.

2 Objectives and targets of the Universal Service Strategy

2.1 Universal Service – a definition

There are several elements to universal service, as follows:

- The general concept
- The specific definition of what should be considered part of universal service in a particular country
- The difference between universal access and universal service, and
- The specific dimensions of universal service

2.1.1 General Concept

Universal service to communications services means that every inhabitant of a country should have access to a minimum set of communication services, regardless of where they live, their gender, ethnicity or religion, and their income and ability. This set of communications service are considered as essential for any person to take part in social and economic life, and be included in society. The lack of these universal services would mean the person is at a severe disadvantage, and would struggle to participate in society.

2.1.2 What is considered universal service in Myanmar

Each country typically defines and regularly reviews what communications services they consider to be universal service. This is typically based on the status of telecommunications service in the country, as well as international trends and regional benchmarks. Many Organisation for Economic Co-operation and Development (OECD) countries with a prevalent fixed telephone networked included the fixed phone within their definition of universal services. Emerging markets and developing countries leapfrogged the fixed network for the majority of retail users, and thus the mobile phone has been considered as universal service.

The vast majority of countries, nowadays also consider broadband Internet as part of universal service. However, they differ in determining the minimum download speed, depending on their market, cost and feasibility of targets and the typical usage patterns. As markets develop and end-users demand change, the minimum broadband download speeds need to be regularly reviewed and updated.

For Myanmar, mobile voice and broadband data services are defined as universal services. In 2016, 83% of households had a mobile phone, and 78% of mobile phone owners have a smartphone, allowing broadband Internet services to be used on mobile devices. Clearly, the large majority of the population enjoys these services, therefore these universal services also need to be made available for the minority that do not have these services today.

2.1.3 Universal access and universal service

In the past, there was a further distinction between universal access and universal service. Universal service means household or individual access to a service, while universal access could include access at a public place like a public phone or public Internet café. However, the long-term goal is universal service. And with the high mobile phone penetration and increasing proliferation of smartphones within Myanmar, this strategy should focus largely on universal service for Myanmar.

2.1.4 Specific dimensions of universal service

The following table shows and explains the four key dimensions of universal service:

Issue	Basic meaning	Specification
Availability	All inhabitants have service available	Coverage of inhabited geographic territory <ul style="list-style-type: none"> • Region /area • Locality size (e.g., towns, villages, settlements with varying number of inhabitants)
Accessibility	All inhabitants can access the service	<ul style="list-style-type: none"> • Gender • Ethnicity, religion • Ability /disability
Affordability	All inhabitants can afford to pay	<ul style="list-style-type: none"> • Access device (e.g., mobile phone) • Cost of calls & services • Minimum “basket” below a certain national limit (e.g., 3% of family income)
Ability (Capacity)	All inhabitants have the basic ability to use telecom services	With increasing focus on the broadband Internet, user capabilities become important <ul style="list-style-type: none"> • Awareness of services and their benefits • Ability to use computers & devices • Ability to navigate the Internet & use ICT services

Source: Intelcon

2.2 Myanmar's universal service targets

Myanmar's universal service targets have been organized and framed by the four key dimensions of universal service described above.

2.2.1 Availability of voice and broadband Internet services

Voice services

The target for universal service in the next five years is to reach 99% of the population to be covered by a mobile signal and having basic mobile voice services available. In addition, any significant voice and data gaps of a specific set of 29 major national highways and roads, shall be covered.

Based on the GIS mobile coverage analysis, it was determined that due to operator obligations, mobile signal coverage based on 900MHz will reach 94-95% of the population by March 2019. This is the date when Ooredoo and Telenor will have to fulfill their licence coverage obligations. MPT will have to meet its licence obligations a year later. Thus, to reach beyond the 95%, the universal service program is needed; availability of mobile service for 99% of the population is also a feasible target.

Another important aspect is that key national highways and roads should have continuous voice and data coverage. The purpose is foremost to ensure safety, enabling travellers to call police or ambulance services. In addition, it is also important for economic reasons. A set of 29 major national highways and roads have been identified. It will be studied if and where major coverage gaps exist, and then these gaps will be included into Program 1 for infrastructure roll-out.

However, due to problems in some contested areas, operators may struggle to fulfil their obligations in those contested areas. Nevertheless, the existing licence obligations and market forces will ensure services reach the vast majority of the population.

Very few countries achieve 100% of population coverage, and this is also not recommended as a target. The costs for the last 1-2% of the population are often prohibitively high and providing a service is not sustainable, as it would be permanently loss-making due to high operating costs. This is what is called the 'true access gap'.

Broadband Internet services

The target for universal service in regards to broadband Internet availability in the next five years is to ensure that 95% of the population are covered by a mobile broadband service. Currently around 80% of the population are covered. The minimum download speed is proposed to be increasingly improved as per the suggested table below, from 2 Mbps at the end of 2019 to 5 Mbps at the end of 2023 as the capacity of mobile base stations and the reach of the fibre backbone increase. As comparison, average download speeds in the first six month of 2017 were at least 4.35 Mbps.²

Table 2-2

Average download speed	2019	2020	2021	2022	2023
Mbps	2	2	3	3	5

The above recommendation for a download speed of 2 Mbps on average (not guaranteed³) starting in 2019 is based on a combination of the current situation and the following factors:

- Myanmar's average download speed in 2017 was 4.35 Mbps, which is likely to include many higher paying business customers – targeting 2 Mbps a year later for end-users as a minimum universal service target is therefore feasible;
- The vast majority of broadband Internet is, and will continue to be, provided by mobile and wireless service and for most non-urban areas by 3G. Any proposed minimum speed needs to take that into account.⁴
- Urban areas are likely to have higher average download speeds as more advanced 4G/LTE equipment is provided there first. It will take longer to also serve the semi-urban and rural areas. However, the lower customer density in

² See: Average download speed 4.35 Mbps (first 6 months 2017)

<https://www.broadbandspeedchecker.co.uk/isp-directory/Myanmar.html>

Other sources show higher average download speeds, e.g., 7.6 Mbps download average speed (3 Aug 2017)

<http://testmy.net/country/mm>, and 9.8 Mbps (May 2017)

<http://www.dospeedtest.com/speedtest-result/country-statistics/Myanmar/>

³ Guaranteed broadband download speed is technically not really feasible for the average mobile data user, as the capacity of a BTS is shared and only special fixed installations could allow guaranteed service.

⁴ 3G broadband speed capability can vary significantly based on number of users, equipment, backhaul capacity, etc.

rural areas enables higher data speeds from 3G than typical in dense urban areas;

- It is expected that new frequencies will have been released in the years prior to 2020, which will allow 4G/LTE deployment also in rural areas, so the universal service download minimum speed for users on average can be raised from 2 to 3 and 5 Mbps respectively.

2.2.2 Affordability of communications services

Affordability of communications services is very important for people, and a key element of universal service. It means that services are reasonably priced, and even low-income people can afford to use a minimum amount of services. It is widely recognized, that effective competition among several operators is the best guarantor for fair pricing, combined with a regulatory authority ensuring a level-playing field. Analysis shows that Myanmar has roughly met the "1 for 2" broadband affordability target – 1GB of mobile data is priced at 2% or less of average monthly income. This "1 for 2" broadband affordability target is designed to ensure that even the 20% of the population with the lowest income can afford some amount of broadband services. They may not think it is cheap, but they can afford it, especially when needed for specific purpose. Very few developing countries have met this target so far. As a fourth national operator has been licensed, and more broadband frequencies for ISPs been issued, it is expected that prices will continue to be under intense pressure. Further, the Myanmar population benefits from low-cost smartphones and has a high mobile ownership. Therefore, at this time, no special measure in this area is proposed. However, the USF will, on an ongoing basis, monitor and if required, investigate affordability issues for the lowest income groups.

Affordability targets internationally

Affordability can best be measured as the cost of broadband service in terms of the percentage of people's income. If the percentage cost is low enough, people can afford the service. Different targets have been proposed; a challenge is to obtain reliable income data, especially disaggregated by income groups and regions. Universal service is about affordability of telecom services for poorer populations. What is affordable to the top 10% of the population will be unlikely to be affordable for the lowest 20% of the population who may be largely rural dwellers.

The latest "1 for 2" proposal from A4Ai⁵ for an affordability measure of broadband data is to use the cost of 1GB to be equivalent to 2% of national average income, rather than the earlier 500 MB and 5% of income per capita⁶. It is argued that this revised lower target would also ensure that the lower income groups, including the bottom 20%, can afford at least a basic level of broadband service. This target thus accounts for the unequal distribution of income typical in many countries.

Affordability analysis for Myanmar

The four main operators are all offering quite affordable data broadband packages; typically 1GB costs MMK 3,000 in 2017. Latest offers in 2019 even showed 1GB for MMK 1,000. The table 2-3 below shows:

- A top down analysis using macro-economic data to estimate income and the cost of broadband as percentage of income; and

⁵ See <http://a4ai.org/1for2-affordability-target/>

⁶ UN Broadband Commission

- A bottom-up analysis using household survey data from the nationally representative ICT study by LirneAsia/MIDO in 2016.

Table 2-3 Affordability analysis

Top-down estimate

National GDP per capita (World Bank 2016) in USD	1,300
Above GDP per capita in MMK (based on exchange rate May 2017)	1,756.710
2% of per capita income in MMK per month	2,928

LirneAsia/MIDO 2016 Nationally representative ICT study

Average monthly HH income in MMK	265,620
Average monthly HH income – URBAN – in MMK	352,941
Average monthly HH income – RURAL – in MMK	228,017
Average monthly HH income - MEDIAN (excl. outliers)- MMK	200,000
2% of household income from MEDIAN – in MMK	4,000

As can be seen, based on the macro-economic analysis, the broadband price of MMK 3,000 in Myanmar is very close to 2% of GDP per capita (MMK 2,928). At the household level, data shows that useable income is lower, but that based on *household income*, people can afford 1GB broadband data, based on the 2% rule (MMK 4,000).

Affordability of end-user devices

In 2016, 83% of *households* have a mobile phone. There is a clear trend of people wanting to have their *own personal phone*: individual mobile phone ownership increased from 39% in 2015 to 61% in 2016. Biggest increase in regards of owning their own phone is noticeable in rural areas, the percentage of rural phone owners increased from 26% to 53% over the year.

A national ICT study⁷ showed that on average people spent MMK 105,198 (USD ~85) in 2016 on a mobile phone. New smartphones cost around MMK 110,000 and most people prefer to save until they can afford a smartphone. 78% of mobile owners have a smart phone, this is up from 66% in 2015. In rural areas people are not far behind: 74% have now a smart phone.

Considering these increasing phone ownership trends, this Universal Service Strategy does not include special measures regarding end-user devices. However, this needs to be monitored and explored further to determine whether some measures are necessary in the future.

Only 6% of households in the LirneAsia/ MIDO ICT study from 2016 have a computing device (laptop, notebook, tablet or desk-top computer) and virtually all of these are in

⁷ LirneAsia/ MIDO ICT household surveys in Myanmar 2015 and 2016

urban areas. Public access to computing devices and digital skills capacity building are therefore important and are addressed in this strategy through Program stream 2.

2.2.3 Accessibility regardless of gender, religion, ethnicity or ability

All programs in this strategy need to specially assess how they ensure the same accessibility in the above categories. This strategy includes measures to close the gap in regards to access, as follows:

- *The USF infrastructure program will bring improved communications especially to the mountainous regions where ethnic and religious minorities live.*
- *The digital skills program will include a focus on women to ensure their digital capabilities improve.*
- *The special program includes a program to provide tools for persons with disabilities to better use communications services.*

The USF will monitor key communications use categories according to gender, religion, ethnicity and disability. If the gap is not closing, special additional measures shall be taken.

The universal service dimension of accessibility is to minimize differences among the population in regards to their access to basic communications services. This means both men and women should have equal access, and no discrimination due to religious belief or ethnicity. The Universal Service Strategy also identifies measures that will help people with disability to use communication services.

ICT data comparing men and women

The LirneAsia/MIDO ICT study from 2016 showed that while 72% of men owned a mobile phone, this was only 52% among women. The field visit in Chin and Kachin state also provided anecdotal evidence that when a household only has one mobile phone, it stays with the male, and is not accessible for the woman when the man takes it to work or travels.

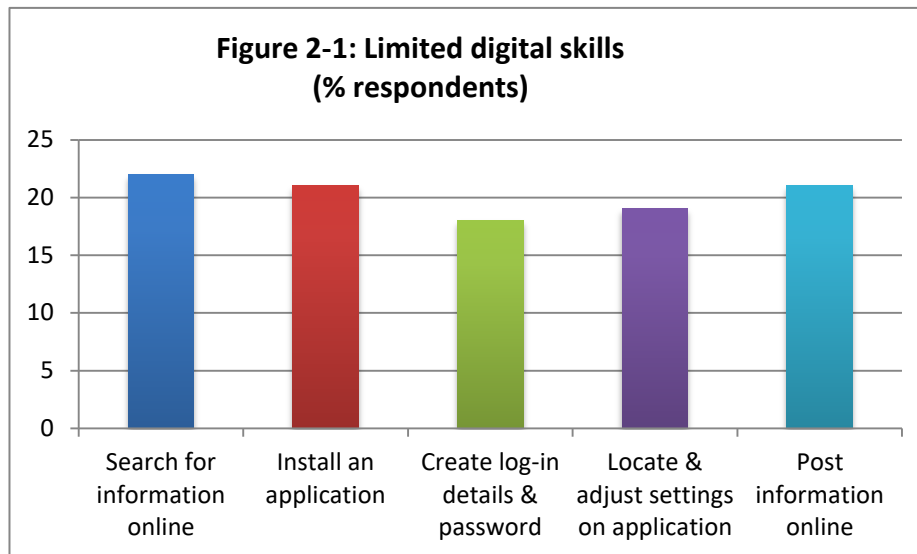
On the other hand, among smartphone owners, men and women are very close, with 78% men and 77% women. Also in terms of mobile data usage, men and women are fairly close with 51% among men and 47% of female phone owners using mobile data.

The main difference between men and women appears to be in regards to digital skills. Data shows that women's skills are consistently lower than those of men. This will be addressed in Program 2.

2.2.4 Awareness/ ability

The analysis has identified that there is a major gap between the ownership of data-capable mobile phones and the awareness and ability to take full advantage of Internet information and services. For example, currently only 22% of mobile Internet users states that they have the required skills to use the Internet. In addition, the penetration of computing devices (laptop, notebook, tablet or desk-top computer) is very low with

only 6% of households having a computing device.⁸ Further, awareness is low on how to protect privacy and sensitive data, while using the Internet, leading to risks for consumers. The strategy has therefore included a major program focused on capacity building and enabling digital skills.



Source: LirneAsia/MIDO ICT study 2016

The future of a nation is closely linked to mastering the tools of the digital era. This includes the economy, digital innovation and e-government, but also online safety, personal data protection and personal digital skills to benefit from online information, services and applications. In order to achieve these digital skills goals, the Government of Myanmar has key national policies such as the ICT Masterplan and the Education reform. However, they are not yet at the implementation stage. The role of the Universal Service Strategy is to accelerate and assist this process of building ICT capacity. The aim should be to initiate vanguard projects that highlight the benefits of broadband connectivity, for example in the education or health sector, and to support especially youth, rural and lower-income groups in acquiring digital skills.

There are three key factors that are a reason for needing a major Universal Service program focusing on digital skills:

- The lack of any existing substantial digital skills program and computerization or Internet access in Myanmar's schools; though there are plans for the future.
- The finding that digital skills are low among mobile phone owners, at 22% or below, for simple but key tasks such as searching for information on the Internet.
- The fact that several CSR and NGO initiatives have also perceived this gap, and have started successful programs, but all still lack scale and reach.

Thus, the Universal Service Strategy has, as its second major program, a focus on providing broadband connectivity for digital learning centres and supporting ICT capacity building and training initiatives.

⁸ Data from LirneAsia/MIDO National ICT study, 2016

3 Key principles of the Universal Service Strategy

3.1 Market efficiency and targeted interventions

The Universal Service Strategy is implemented within a multi-player, commercial marketplace, in accordance with the broader policy objectives of the Government. The Government of Myanmar is committed to foster efficient market operation, a fair competitive environment and overall sector expansion, and to remove any regulatory or other barriers to the operation of an efficient market.

Targeted interventions and financial aid from the USF will be used as a means to provide support in areas and for user groups where efficient market forces alone cannot provide the desired services. The Fund is to develop market-oriented programs, and subsidise projects that will be mostly implemented by operators and service providers. This also means that USF funding will not be used in an environment where a lack of sector reform still is responsible for very costly services. Key reform measures need to be implemented first before substantial USF funding can be used.

3.2 Smart subsidies and sustainability

The USF shall use the smart subsidy approach as much as possible. Smart subsidies refer to subsidies for rural and high cost areas, low-income population groups, capacity building efforts and service targets which will not be reached by the market alone, even in an efficient market, or at least not for a long time to come. Targeted financial intervention is required beyond normal regulatory measures and incentives to provide services to these population groups and areas.

This smart subsidy is designed to not distort the market, and encourages cost minimization and growth of the market. It typically is only a part of required capital for the project, ranging typically from 30-70%, and helps to "kick start" a project or service, and leverages additional operator and service provider investment. The ultimate objective of giving a smart subsidy is that the project becomes commercially viable. Without the subsidy operators and service providers might have been reluctant to invest. Using the smart subsidy approach, services will thus be sustainable in the medium term without further, ongoing, financial support.

3.3 Competitive tendering for smart subsidies

The mechanism to select an operator, service provider or an organization for capacity building to receive a smart subsidy is usually that of a public, transparent and competitive tender.

The USF should use a competitive tendering approach to identify the lowest subsidy requested by qualified bidders for service provision and project implementation to specific technical standards. This is typically a two-stage process whereby a sealed technical proposal and a sealed financial proposal are submitted separately. The technical proposal is opened first. Only bidders qualified on technical grounds will have their separately and sealed financial proposal opened. Among these qualified bidders, the bidder with the lowest request for subsidy is awarded the project.

Winning bidders will sign a time-bound service agreement, often three to five years, agreeing to a one-off financial subsidy that will be disbursed over time as they meet their

build-out requirements and/or service provision obligations. Any networks deployed for providing the services remain owned by the operators.

3.4 Open access

While competitive tendering will be used, especially for major network expansion and broadband capacity upgrades, this should not lead to exclusivity for the winning operator or service provider. Any service provider that receives subsidies from the USF for a particular network expansion project shall be required to provide open access to its network according to existing commercial terms within the industry.

3.5 The true access gap

The true access gap comprises areas or communications targets that are beyond any commercial viability, even in instances where initial smart subsidies are given. Commercial sector operators or service providers serving these areas would need ongoing financial support, possibly in the form of operating subsidies. It is a political decision and depends on available financial resources, as to if, and to what extent, the state should subsidise ongoing service provision to areas, institutions such as schools, or population groups that are beyond the limits of the smart subsidy zone. Since these projects will require ongoing subsidies, the USF should carefully decide if assistance should be given, and if so, what, to bridge elements of the “true access gap”.

3.6 Creating maximum socio-economic impact

The USF must aim to design and implement projects with a high socio-economic impact and value, especially in the area of capacity development. This includes considerations of how many people can be impacted, and the quality and lasting effects of that impact. The USF should aim to maximise its resources to provide high quality impact and benefits to as many underserved people as possible.

3.7 Technology neutral

The USF mechanism is to enable the most effective, efficient and appropriate technologies to be implemented to provide universal service. By ensuring a technology neutral approach in the competitive tendering process, the USF will allow the operators to choose the most cost-effective and appropriate technology to provide communications services.

3.8 Transparency and stakeholder consultation

The USF should operate in an open and transparent manner by

- a) inviting key stakeholders to input into strategy, program and project development;
- b) distributing the funds of the USF in an open, fair and transparent manner; and
- c) publishing as a minimum, annual reports that provide details of funds collected, funds disbursed, to which operator or service provider projects are awarded, how much funds they have received, key terms and conditions of their service agreement, status and achievements of project implementation and service provision, successes and problems encountered.

4 Universal Service Programs and projects

4.1 Overview of Universal Service programs

Combining the universal service overall strategic goals and the identified gaps and needs with regard to universal service in Myanmar - discussed in detail in Section 2 - the Universal Service Strategy shall focus on three program streams, which are the following:

Program 1 - Infrastructure deployment for voice and broadband services

Program 2 - Broadband connectivity and ICT training - Enabling the digital future

Program 3 - Special Projects incl. content, applications, pilots, disability

Program 1 will be the main priority and investment stream. Program 1 will focus on the supply of infrastructure to all regions of the country, and ensuring all identifiable villages have access to national telecommunications infrastructure services. This will also cover a specific set of identified major national highways/ express ways and roads, and close any significant coverage gaps along them.

Program 2 is centred on the development of digital skills and literacy, and will provide broadband connectivity to a range of digital learning centres, and other community and public institutions. By enabling more people to use broadband Internet services, it will stimulate demand and increase ICT usage as a result. That is also beneficial for the industry, and the country as a whole.

Program 3 is to focus on special projects. These special projects will be smaller in size, but nevertheless promote important aspects of universal service, such as promoting relevant local content and applications, especially for ethnic and language minorities, rural and poorer population; catering for the needs of persons with disabilities; and some projects such as connecting rural hospitals to broadband Internet that have the purpose of illustrating the benefits of ICT in key public sectors.

4.1.1 The importance of sequencing and focus

A common feature of successful universal service strategies and USF's is that they see the achievement of universal service as a sequence of several main steps and that they focus on the most important next step. This means that they focus on up to three main priorities for a certain period of time; and then re-evaluate needs and focus on the next top one to three priorities. For example the Rural Communications Development Fund (RCDF) of Uganda focused in its first period mainly on infrastructure development and public access. In its next strategic plan, it puts more focus on enabling usage through content and capacity building. Its third RCDF policy is geared strongly towards broadband coverage and usability. Other examples of countries with successively revised plans include Chile and Colombia.

Without focus and a small number of identified priorities, USFs have struggled to implement their programs in a timely fashion, especially when they are newly established. Thus, Myanmar's Universal Service Strategy should focus on the above three main program streams.

4.2 Program 1 - Infrastructure roll-out for voice & broadband

4.2.1 Introduction

Program 1 is the first priority of this Universal Service Strategy as the biggest need is that of people with no communications services at all today. Over the five year period the target is to bring mobile voice communications services to 99% of the population, and to bring broadband Internet services with a specified minimum download speed to 95% of the population. Furthermore, Program 1 intends to ensure that key national highways and main roads have seamless mobile voice and data coverage.

4.2.2 Population coverage by mobile services – GIS analysis results

The projects in this Program are informed and guided by the GIS analysis of existing and projected mobile service coverage, combined with detailed cost and financial modelling that determines whether an unserved area needs financial support from the USF or not. This is used to demonstrate the gaps that will remain in Q1 2019 and their costs for USF subsidy investment. The GIS analysis is based on the following data:

- World Population Grid 2015 for Myanmar, certified by MIMU as accurately showing all town and village track population concentrations, within the 330-township boundaries in 100m² square grids;
- 900 MHz GSM Signal Prediction Maps of all four operators for -100dBm (outdoor) signal level. The maps are combined electronically into a single coverage map. This shows the national coverage by March 2019.
- An accurate topographic map layer produced by the USA's Shuttle Radar Topography Mission (SRTM) providing elevations as well as a visual indication of hilly and mountainous terrain. This was used to determine the limits of signal coverage due to hilly and mountainous areas. Terrain factors for each township were developed indicating the level of difficulty and coverage radius likely in new project deployment.

The combined 900 MHz mobile signal coverage map includes the revised coverage of Telenor and Ooredoo for the end of year 5 in their licence (Q1 2019) based on their commitments to reach each at least 92% of population, plus the latest MPT coverage existing to 2019. The geographic roll-out plan of MyTel for 2018 has also been analysed. MyTel's coverage will not exceed the 3 operators' combined map described above in any area. Furthermore, the GIS analysis using MIMU and World Population Grid data has been harmonised with official census populations at the Township and State levels.

The results of the analysis are summarised in Table 4-1. This indicates minimum total population coverage rising to 94.8% by Q1 2019 after incorporation of these latest updates.

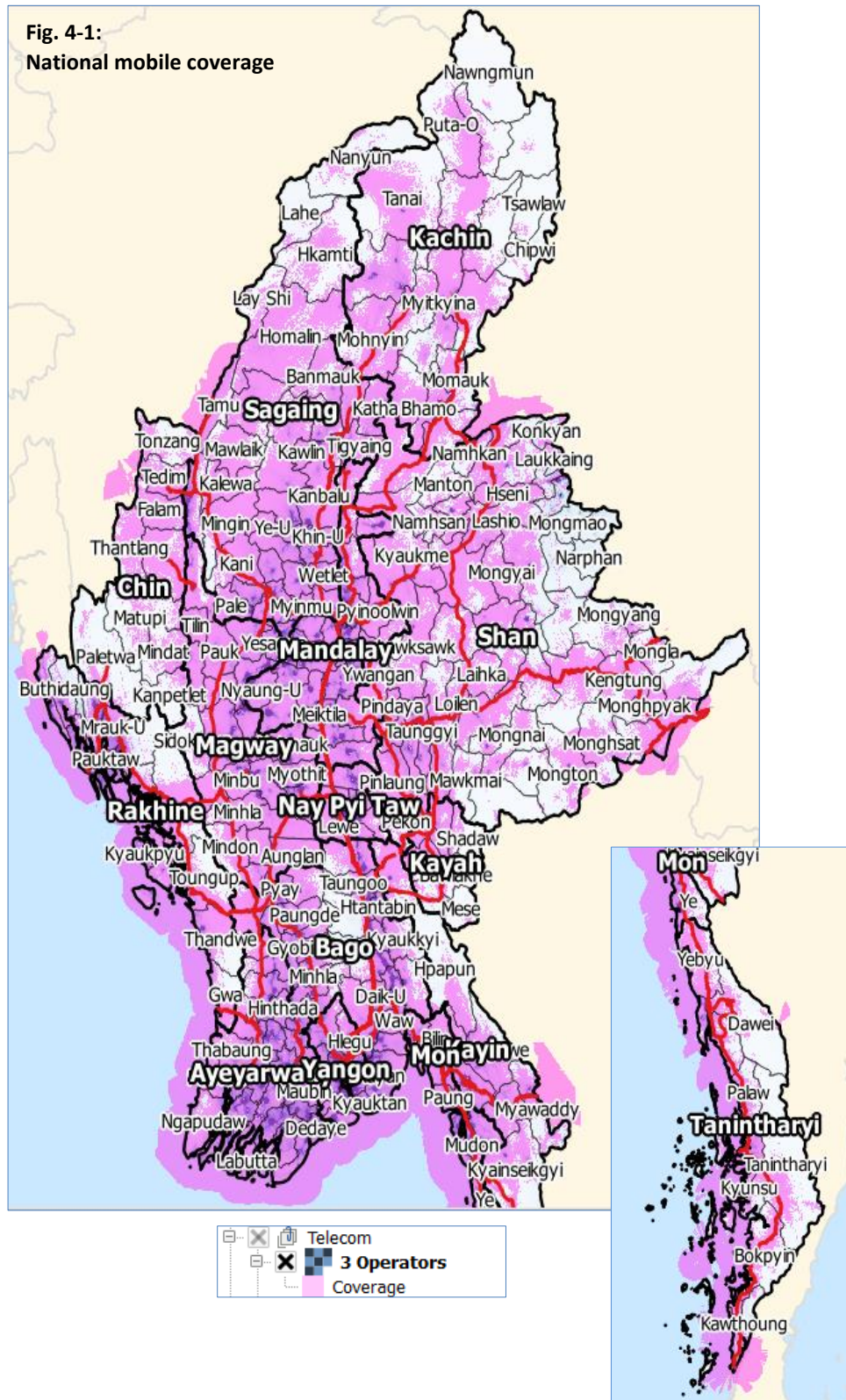
Table 4-1: Geographical Area and Population Covered by Region and State						
State	% Geog. Area Covered	Total Population	Population covered	% Population uncovered	Total Townships	Townships with < 50% Population Coverage
Chin	48.0%	478,801	317,976	33.6%	9	2
Shan (North)	59.2%	2,520,258	1,792,718	28.9%	24	7
Shan (East)	50.0%	898,191	632,777	29.5%	10	2
Shan (South)	63.5%	2,405,983	2,192,373	8.9%	21	0
Tanintharyi	44.5%	1,408,401	1,176,288	16.5%	10	0
Kachin	45.0%	1,642,841	1,419,786	13.6%	18	4
Kayin	60.3%	1,504,326	1,327,803	11.7%	7	1
Kayah	51.8%	286,627	258,419	9.8%	7	1
Rakhine	63.8%	2,098,807	1,978,993	5.7%	17	0
Sagaing	73.9%	5,325,347	5,101,269	4.2%	37	2
Bago East	71.6%	2,894,140	2,788,891	3.6%	14	0
Bago West	87.3%	1,973,233	1,953,012	1.0%	14	0
Mon	89.9%	2,054,393	2,033,077	1.0%	10	0
Magway	91.7%	3,917,055	3,888,057	0.7%	25	0
Mandalay	95.8%	6,165,723	6,141,393	0.4%	28	0
Yangon	94.3%	7,360,703	7,331,684	0.4%	45	1
Nay Pyi Taw	94.2%	1,160,242	1,156,827	0.3%	8	0
Ayeyarwady	92.9%	6,184,829	6,172,582	0.2%	26	0
Total	65.9%	50,279,900	47,663,925	5.2%	330	20

(Remark: Population based on 2014 Census Data)

The lowest projected population coverage is for Chin state with 66.4% (33.6% uncovered). Also, two (2) out of Chin's nine (9) townships will have less than 50% population coverage. Shan (North) has the most townships with less than 50% coverage, at seven (7).

Up to 2.6 million people (5.2% of total official population) will remain without service after Q1 2019 and will need the intervention by the USF.

Figure 4-1 illustrates the geographical coverage achieved by the combination of all operators including current or projected coverage to Q1 2019. The map also shows all of the National and ASEAN highways with a red line.



4.2.3 Voice and Broadband coverage

The coverage and costs for 2G and 3G broadband service are basically equivalent for the case where 3G service is provided to rural areas using 900MHz. This requires sufficient 900MHz spectrum to be available for this purpose and is also based on scenarios where

backhaul is provided by terrestrial means (fibre and broadband IP Microwave). *PTD released 900 MHz frequencies available in the E-GSM band to enhance the potential for 3G broadband to be used by the operators.* Thus, future coverage projections for rural areas are for broadband.

In small and remote communities that can only economically be reached by VSAT trunked to the BTS sites, the recurrent cost of providing full 3G based broadband Internet access could be high. These costs have been factored into subsidy estimates, though ultimately operators need to make their own business analysis during the bidding phase. However, development such as High-Throughput- Myanmar Set 2 Satellite (Totally capacity in 864 MHz for C band and Ku band) will allow improved and faster connectivity across the country, including in remote areas, where there are no fibre links or microwave links yet. It would also allow communications to be established quickly.

4.2.4 Overall target for mobile coverage of the population

The 5 Year target of the USF Strategy is to reach 99% of population with voice services and 95% for broadband Internet services. This assumes that problems in currently contested areas (for example in Shan, Kayin and Rakhine States) can be resolved. Over half of the uncovered populations (up to 1.8 million) are in townships that belong to contested areas. Most unserved communities beyond the 99% level of coverage are in remote, small population centres for which the potential revenues might not be sufficient to cover OPEX costs. It is usual for the last 1-1.5% of population to be almost unreachable except through OPEX subsidies. This is not recommended as it is not sustainable and costs are prohibitive.

Townships with the lowest population coverage to date, especially those which can be reached by terrestrial transmission systems, should be targeted as the highest priorities. Table 4-2 provides guidance on how many townships are in each coverage category and the maximum subsidies projected are based on a methodology, described in detail in a separate report, which takes population density and mountainous terrain factors into consideration. The subsidy cost for all gap areas to reach up to 99% of the population has been estimated at USD 61.6 million. However, this figure is subject to change and refinement based on pilot and first year implementation results.

Population coverage	No. of Townships	No. of towers required	Total subsidies for voice and 3G data service (USD)
Less than 50%	20	232	
50 to 75%	32	220	
75 to 90%	39	181	
Above 90%	123	175	
100%	116	-	
Total	330	808	61,600,000

The subsidy offered by the USF of USD 61.6 million is needed for areas that can be reached with smart subsidies. This assumes that the operators winning the subsidy will invest additional own resources. A smart subsidy provides a partial amount of the finance required (the gap between revenues and costs), and with this additional funding for the operators, service provision becomes viable.

A further subsidy of USD 36.4 million (i.e., total USD 98 million) would be needed to reach every gap area to 100% of population. However, the last 1% of population would definitely not be sustainable beyond the 5 year subsidy period and would require indefinite OPEX subsidisation. Therefore, it is only recommended to reach to 99% of the population.

The costs are expected to cover conversion to 3G broadband as needed (and to 4G when appropriate).

4.2.5 Major national highways and roads

In addition to covering population centres with mobile communication services, a further goal is to ensure there is voice and data service available along a specified set of major national highways and roads. The key purpose is to ensure the safety of motorists and travellers, and ensure they can call emergency services, such as police, ambulance or fire department. In addition, this will also have positive impact on the tourism sector, and businesses and the economy as a whole, as important economic trade corridors are covered with service,.

The major national highways and roads identified are the following:

ASEAN Roads (4925.37 km)

1. Tamu-Mandalay-Meikhtila-Yangon-Bago-Phayakyi-Thaton-Myawaddy road (1649.916 km)
2. Meikhtila-Loilin-Kyaington-Tarchilate road (804.27 km)
3. Minelar-Kyaington road (90.123km)
4. Mandalay-Thipaw-Muse road (455.445 km)
5. Thipaw-Loilin road (240.195 km)
6. Thaton-Mawlamying-Thaphyuzayut-Ye-Dawei-Laynyar-Khamaukkyi-Kauthaung+Laynyar-Khalonloi road (1544.604 km)
7. Dawei-Myitta(Hteekhee)-MinthameeTaungKyar road (140.817km))

Expressways Roads (586.08 km)

- Yangon-Nay Pyi Taw-Mandalay Road

Highways Roads (695 km)

- Yangon-Taungoo- Meiktila-Mandalay Road

Main National Roads (4826.34 km)

1. Mandalay-Takaung-Bamaw-Myitkyinar road (280.64 km)
2. Haka-Gantgaw road (112.64 km)
3. TwinNge-Moemait road (73.6 km)
4. Ngathinechaung-Gwa road (78.72 km)
5. Tarlay-Parchoe-Kyinglat road(56 km)
6. Shwebo-Myitkyinar road (462.4 km)
7. Mandalay-Lashio-Bamaw-Myitkyinar road (763.84 km)
8. Aungpan-Pinloun-Moebyae-Loikaw road (146.24 km)
9. Taungnu-Mawchi-Loikaw road (293.44 km)
10. Taungnu-Laiktho-Yardo-Loikaw-Hopone road (332.8 km)
11. Thanphyuzayut-Phyathonesu road(101.12 km)
12. Thinenin-Teetain road(40.64 km)
13. Kyuktaw-Palatwa road(53.6 km)
14. Minbu-An road (189.6 km)
15. Yangon-Pyay-Mandalay road (781.92 km)
16. Pathein-Monywa road(392.16 km)
17. Hanmyintmo-Moytkyi-Ywarngan-Aungpan road(126.56 km)
18. Yangon-Sittwe road(318.88 km)
19. Pantaung-Taungkote road(163.52 km)
20. Kyeinpinsee-Satkawt-Danuphyu-Zalon road (58.56 km)

A GIS analysis has been undertaken to review each of these roads and any significant coverage gaps. Overall, there are only few gaps, and those have been included into this Program 1 for Infrastructure roll-out.

4.2.6 How this will be implemented

International best practice for USFs is to use public competitive tender processes for selecting service providers, and offer a smart subsidy for the provision of specified universal services. The smart subsidy approach and principle is described in Section 3.

In general, the Myanmar USF will use a competitive tendering approach to ensure that the least amount of subsidy is used for providing universal service from qualified bidders. This bidding process involves a technical proposal and a financial proposal. The technical proposal needs to be responsive to the request for proposal (RFP) document which requires a range of qualifications for corporate, financial, management, technical, business and service specifications:

1. The technical proposal is evaluated against the required technical and other specifications published in the RFP, a simple pass or fail evaluation takes place. Only bidders that pass the technical evaluation are considered capable and qualified. Bids that fail to meet the technical and other requirements are not considered further, their financial proposal is not admissible.
2. Only the qualified bidders have their financial proposal evaluated. Among these qualified bidders, the bidder with the lowest request for subsidy is awarded the project.

Further, the RFP will contain a maximum allowable subsidy so as to clarify expectations for the industry and increase cost minimization efforts and innovative use of technology. However, according to the requirement, to expedite the roll out a maximum allowable subsidy may be reconsidered, if all of the proposed Bids are higher than the maximum allowable subsidy.

Nevertheless, the Universal Service Strategy remains open to explore alternative approaches jointly with the industry and service providers. Alternative options may be chosen if they:

- Are in one or more ways superior to the competitive tender approach (for example: more cost-efficient, more transparent, etc.);
- Still ensure a level-playing field among bidders and encourage competition from all eligible service providers;
- Still result in cost-minimization for the USF;
- Still are fair and transparent for all eligible bidders;
- Reduce the amount of time and effort to administer the selection process; and
- Result in superior outcomes for the beneficiaries.

Furthermore, the USF is generally open to explore innovative approaches that can assist in reducing costs and making the implementation attractive to the eligible bidders. Examples are national roaming (or roaming agreements in USF areas) and Radio Access Network (RAN) sharing. However, any innovative approaches to be used by the USF need to show clear benefits and be favoured among potential bidders.

For Program 1, only the four operators possessing a Nationwide Telecom Licence are eligible to participate in the program since they are the only providers that are licensed to provide mobile services. However, they are not allowed to use any USF subsidies to fulfill the coverage obligations in their licence. Service providers also need to adhere to strict standards in the areas of labour conditions and law, environmental standards as well as health and safety standards.

4.2.7 First Year (2019-2020) Project – Pilot Areas

The objective of the pilot project is to test and demonstrate USF project development and competitive tendering under conditions expected to pertain in the remainder of the program. Further, pilots should generate some “quick wins” to encourage collaboration among licensees and successful program development. In selecting areas for the USF piloting, a combination of factors was considered, namely:

- **Coverage** – include some townships with less than 50% population coverage, and
- **Viability** – the most attractive cases for an initial pilot will have viability ratios between 25% and 75%, i.e., the commercial revenues *prior to USF subsidies* are between 25% and 75% of the amount needed to provide operators with a marginal 5 Year payback. These are shown in Table 4-3 below as Categories 3 and 4. Above 75%, i.e. Categories 1 and 2, the areas are either commercial or “almost commercial” and may be covered by the operators without subsidy. Below 25% (Category 5), areas may be unviable even with a USF subsidy because the revenues are so far below the payback target and may not even cover operating costs. Most difficult cases are not generally recommended for an initial pilot. However, a range of cases were selected for consideration in order to test all of the access gap model assumptions.

Table 4-3: Description of Viability Factor Expectations		
Category	Viability Factor	Project Description and Priority Implication
Category 1	>100%	Definitely commercially viable and will be served by existing service providers soon; no subsidy required.
Category 2	75-100%	Project is close to viable. Not yet specifically targeted by existing service providers, but could be targeted commercially soon without financial incentive. Predicted subsidy less than 25% of overall investment. USF Program could accelerate investment, but there is a risk that it will be served soon anyway.
Category 3	50-75%	Commercially unviable without a subsidy in the range of 25-50% of overall investment. Good target for USF.
Category 4	25-50%	Unviable and very unlikely to be served without subsidy in the range 50-75% of overall investment. Should also be targeted for USF Program subsidy
Category 5	0-25%	Definitely unviable without major subsidy, e.g., requiring more than 75% of overall investment. Also may require an ongoing operating cost subsidy. Could only be targeted later when market has expanded, or possibly part of true access gap that cannot be reached in a sustainable manner.

A list of townships has to be selected as representing the best possibilities for piloting. These include very needy areas and a range of situations and financial viability levels that would provide useful experience under pilot conditions.

Based on Table 4.2 and Table 4.3, only 116 townships have 100% coverage and other townships have to achieve voice and broadband coverage by using USF. PTD has also

shared the list with the four mobile operators for comment in order to assist with the final recommendation to select the pilot townships.

4.2.8 The Overall Broadband Roll-out Program

It is important to note that the following overall costs for the planned broadband roll-out program are rough estimates made during the Strategy development. The purpose of these figures is to give an approximate ballpark figure. These figures are likely to change somewhat, based on pilot outcomes, more detailed project design and, as time goes on, cost and other changes to relevant parameters.

The subsidy cost for all gap areas to reach up to 99% of the population has been estimated at USD 61.6 million. For the Pilot Project, about 20 townships shall be selected for the Year 1.

4.2.9 The role of tower infrastructure sharing and backbone provision

The status of backbone and passive infrastructure providers and their role in the main USF infrastructure subsidy program has been considered. Specifically, it has been considered whether they could be direct USF subsidy recipients or are better as sub-contractors providing leased services to the Nationwide Telecommunications Licence holders.

Tower companies

Myanmar's market is characterised by the strong presence of several independent tower companies. Tower companies have contracts for building and operating sites for the Nationwide Telecommunications Licence holders. These tower sites are typically shared by two or more service providers. This passive infrastructure sharing reduces costs significantly.

In rural areas with smaller populations and less revenue, the focus of the USF program, passive tower sharing can become less feasible. This is because possibly only one or two operators have interest in these remote small rural areas. The business model of tower companies though requires multiple tenants.

Further creative infrastructure sharing models include active Radio Access Network (RAN) sharing, or domestic roaming for the most challenging low population areas. The USF subsidy calculation model assumes that tower companies' full costs must be met, regardless of how many operators are tenants.

Thus the most remote rural areas need the leading operator to optimise total revenues as well as OPEX coverage, potentially through RAN sharing or roaming to become economic.

The USF will therefore tender to the Telecom licensees (i.e., the service retailers) as their network economics are a greater incentive to minimize costs, and they are a better guarantor for service provision. For example, the USF could hold a competition for towers to be built, but this would fail if operators were not willing to use them and provide a service. Also, operators are considered best able to find least cost coverage solutions through negotiation of tower provision contracts.

Fibre routes

The cost of fibre routes is generally high, yet fibre is a very important and active part of the backbone infrastructure sharing ecosystem. The licensed companies constructing fibre routes between main traffic nodes, including in rural areas, are very aggressive and creative in rolling out backbones for the retail service providers. A review of the existing and planned fibre routes with the main companies has led to the conclusion that the USF needs to consider subsidies for fibre routes for the rural areas. The fibre companies bring their national infrastructures into place that will allow virtually any areas to be served by the licensees through a combination of leased fibre backbones and owned “last hop” broadband IP microwave links.

4.3 Program 2 – Broadband connectivity and ICT training - Enabling the digital future

4.3.1 Introduction

Many countries invest heavily in broadband connectivity and it is widely considered important for socio-economic development as well as poverty alleviation. Recent analysis⁹ though points out that broadband connectivity alone does not provide necessarily the expected benefits, but that it requires a set of skills for people to take advantage of the Internet. Therefore, research shows that a complementary investment in ICT capacity building is required. Human capital development is also a major component of most countries' ICT plans. An example for the region is the ASEAN ICT Masterplan 2015 and 2020.¹⁰ It is further recognized that ICT capacity programs are also benefitting the industry, as they increase the demand and usage for broadband data services.

For this reason, Program 2 will focus on capacity building, ICT training and digital skills development, and where required, connect educational institutions to broadband Internet.

It is important to note though that the USF is not a general education fund. There are other institutions, other ministries and other policies responsible for overall education, including on ICT. The USF is typically used to assist in this, accelerate the process and fill a short-term gap. For example the USF can assist with schools connectivity and ICT training, but the Ministry of Education is ultimately responsible for this. The USF can assist where commercial providers for the required ICT training either do not exist, or are too expensive for poorer people, or difficult to access for people living in rural areas.

So the Universal Service strategy needs to carefully identify where its assistance is truly needed and has a real impact.

Based on the analysis and consultation undertaken, the Program 2 of the Universal Service Strategy has two sub-components:

- 1. Broadband Internet connectivity and ICT training in schools**
- 2. Digital literacy training in various alternative learning centres and other community institutions, including broadband connectivity where required**

⁹ See Connected for Development? Theory and evidence about the impact of Internet technologies on poverty alleviation, H. Galperin and M.F. Viécens, in Development Policy Review, 2017

¹⁰ See the Strategic thrust number 5.

4.3.2 Broadband Internet connectivity and ICT training in schools

Introduction and approach

ICT capacity building in schools has potentially the biggest and longest-term impact on broadband development and the country as a whole. Children typically learn faster and easier than adults, and the school is already a place of knowledge and learning. Organizations such as the ITU therefore strongly promote school broadband Internet connectivity.¹¹ Many national ICT plans, broadband policies and universal service strategies promote and implement school connectivity projects.¹²

The school system in Myanmar is not yet quite ready for any major investment in broadband connectivity for schools. Therefore this Universal Service Strategy will use a cautious, step by step approach to support ICT training in schools. Wherever possible, the USF will support existing efforts and initiatives that have a success track record such as the UNESCO Connect to Learn initiative. This initiative has a comprehensive and holistic approach that covers all required elements to make a school connectivity project successful. Details are described in Box 4-1. This will avoid duplication and re-inventing the wheel, and instead build on lessons learned, increase the impact and chances for success.

BOX 4-1: DBE & UNESCO - Connect to Learn

Lead by UNESCO, with other funding partners

Purpose: Enable students to experience a 21st century education

- 31 Basic Education High Schools (BEHS); rural /semi-urban places
- 17 in Mandalay region, 6 in Bago region, and 8 in Mon state
- Total of 21,000 students

Each school receives the following equipment

- Access to the Internet
- 6 laptops for specific teachers
- 100 tablets @ USD 350/400 (movable computer lab)
- Computer server, projector
- in some cases power solutions

Teaching/ training component for teachers & 25 staff from the Department of Basic Education – this includes ongoing training, support and approved teaching content

- Basic ICT skills
- How to use ICT for learning
- More tools/advanced use for teachers incl. education portal
- Teaching English and Life skills (content already on tablets)
- Plans to train teachers at the 25 teacher colleges

Lessons learned/ challenges

- Teachers generally require substantial support
- Schools struggle to support maintenance costs
- Sufficient and reliable power supply is an issue

¹¹ See for example: ITU, Updated Module 1: Policies and Regulation to Promote School Connectivity

¹² Recent examples include Kenya, Botswana, South Korea, Malaysia and Thailand.

Background: current situation of ICT in the education sector

The Ministry of Education (MOE) launched a Comprehensive Education Sector Review (CESR) process, in partnership with development partners and a wide range of education stakeholders, to develop a new National Educational Strategic Plan (NESP) for the period 2016-21. The NESP has mainstreamed the use of ICTs at all levels of the national education system. ICTs will be piloted and where proven to work, expanded nationally.

Currently, there are only a small number of secondary schools across the country that have established computer laboratories to teach basic ICT knowledge and skills. *Notably, in the majority of cases these facilities are significantly underutilised* and they have failed to make measurable improvements in student learning. This is because ICT education is not a core subject in the secondary education curriculum. Logically the focus of teachers and students (as well as parents) are on core curriculum subjects that will be assessed in the end of high school completion examinations, called matriculation.

The required pre-conditions are not yet in place in Myanmar's formal education sector for a major support program by the USF. It is important to realize that school Internet connectivity requires an ecosystem to be in place in order to deliver real and lasting benefits. This includes such important elements as teachers being trained to use ICT, a school curriculum that includes teaching ICT as well as integrating ICT into teaching other subjects, sufficient numbers of computers and/ or tablets, electricity and so forth. This ecosystem has not been established yet, and as of now, it is beyond the scope of the USF.

Under the NESP the basic education system will expand from 11 years to 12 years, and a formal review and updating of the secondary curriculum is starting in 2017. Until the curriculum is approved, major USF support for broadband connectivity in schools is premature in the first few years, but shall be planned in the near future. Well-designed pilot projects shall be implemented to accelerate and assist the process of implementing ICT in schools.

Box 4-2: Current situation of high schools

While comprehensive data are missing, interviews with the Department for Basic Education (DBE), the Myanmar UNESCO project and the field visit undertaken by the consultants and PTD, have provided insight into the situation of schools in regards to ICT. During the field visit in November 2016, a total of five high schools were visited and detailed qualitative interviews were conducted with the head administrators; two high schools in Chin state in the district centres of Mindat and Matupi; and three in Putao, Kachin States (one in the district centre and two in surrounding villages). Findings confirm the assessment that schools are not yet ready to benefit from the provisions of broadband Internet connectivity to facilitate ICT teaching. Some of the key findings include the following:

- Schools mostly had only 1-2 computers, limited to administrative tasks only;
- In one case there were more computers for classes, but the lack of sufficient electric power resulted in them not being used at all, as additional generator power was too costly; several schools struggled with reliable power supply;
- The majority of teachers, often including the head teacher, were not computer literate themselves; most schools had just one or two persons with some computer skills, but no capacity for technical repair or maintenance; and
- However, almost all teachers had mobile phones and used data services such as Facebook and Viber, as well as some news sites.

What is to be funded

The main focus will be on high schools, as primary schools are likely less ready. For USF support, it will be important that high schools are either Internet ready or have a partner or other resources to become "Internet-ready" (see explanation below). As very few schools are Internet-ready today, it is important therefore that they have a partner and/or credible plans to become Internet ready. Further, the program will be rolled out in increments over several years, and the focus will be in each year on the schools that are most Internet ready.

The Universal Service Strategy is focusing on providing the assistance and finance for establishing the broadband Internet connectivity, as well as a partial subsidy for the monthly subscription. Funding for additional needs such as end-user devices (e.g., tablets, computers) is possible and will be considered if needed. However, overall, this should generally be the responsibility of partners and the respective Ministry.

Internet-ready schools

International experience has shown that schools need to be "Internet-ready" *before* the Internet connectivity is provided. Otherwise costly Internet service is provided without the schools being able to benefit from it. Typical criteria for an Internet-ready school are:

- Sufficient number of up-to-date computers or tablets to teach a class
- Safe/secure and suitable room to store computers or tablets
- Sufficient power supply and back-up if required
- Suitable and up-to-date installed software, including special learning and educational software or approved online sources (content)
- Existing ICT curriculum or ICT topics that are to be taught
- Guidelines or plans of how to integrate ICT into teaching various subjects such as mathematics, geography, sciences, art, etc.

- Trained ICT teacher
- Trained or sensitized other teachers who know how to integrate ICT into their subjects, or improve their teaching through own research for course material

WiFi school coverage, proposed download speed

Each school shall be served with a pass-word protected WiFi network with an intelligent data management router that covers the school compound, administrative and teacher quarters. This will ensure that the teachers and schools administrators have access to the Internet as well. For teachers this will mostly allow access to additional educational material and teaching resources, and for administrators improved communication, as well as data exchange and management tools. Most importantly, this will enhance the uptake and acceptance of computers and Internet connectivity among the head teachers and senior school administrative personnel. Their sensitization and empowerment in regards to ICT will assist in their support of the school connectivity program.

Broadband download speed targets are used as guides for schools at the beginning of the program. They shall be updated or modified, based on an evaluation of actual usage in the schools of any pilot project. As of now, 5Mbps is a reasonable starting point for download speed, assuming that 30 children are online browsing at the same time, allowing at least 160 kbps.

4.3.3 ICT capacity building in digital learning centres

The Universal Service Strategy will also support alternative digital learning centres, which provide access to ICT and digital literacy to a wider audience. This will provide ICT access and training outside of schools, that will benefit students but also other non-formal learners and the wider public.

This wider audience will include:

- School students with an interest in ICT, demand driven whereby students choose to gain new knowledge and skills in ICT;
- Out of school children and youth;
- Non-formal education students; and
- The general public.

Currently, there is significant demand among students both in formal basic education schools, as well as out of school children and youth, to access 21st Century digital literacy knowledge and skills.

Digital learning centres would need to be institutions that have existing infrastructure, especially in terms of an existing suitable building for training activities, as well as existing training staff. This could include, but not be limited to:

- Public libraries,
- Monastic schools,
- Existing computer training schools,
- Certain government institutions, and
- Non-government organizations.

The overall aim of digital learning centres will be to provide school students, out of school children and youth and adults with a range of practical 21st Century ICT knowledge and skills, focusing on entry-level digital literacy. More technical ICT training, for example, for students interested in working as ICT officers in small and medium businesses, may be offered as well, but cannot be funded by the USF.

Digital learning centres will provide opportunities for students (both formal and non-formal), youth and adults to access ICT knowledge and skills courses, and access broadband internet for informal individual or group-based learning activities, such as homework assignments.

In this way, digital learning centres will serve all neighbouring schools and non-formal education centres within the township where they are located.

Stakeholder partnership and co-ordination

In order to ensure that school students make use of the digital learning centres, it is important to create a good partnership and co-ordination between the USF, the digital learning centres and the Department of Basic Education.

This is facilitated by an agreement among parties. The USF will seek to develop a Memorandum of Understanding (MoU) with both the DBE and the digital learning centres organization, outlining respective duties and obligations.

Among many other topics, the agreement between the USF, DBE and organization managing the digital learning centres would cover the following:

- Joint awareness creation of the ICT training possibilities;
- Plans to manage the online protection of the schoolchildren,
- Commitment and mechanisms to resolve any differences of opinion, and
- Detailed monitoring and evaluation approach.

Public access

With the high data-capable phone penetration and relatively affordable broadband Internet costs in Myanmar, providing public access to broadband Internet is a less immediate priority for the USF. Further, many existing digital literacy initiatives in Myanmar started out as public access. Lessons learned from these initiatives include that public access is less in demand, and not sufficient on its own, which is why most of the initiatives have started to focus more on digital literacy. Nevertheless, there are people without their own device, and it is relatively easy to include public access into the digital literacy program of the Universal Service Strategy. *The USF program will therefore include public access, though not as a stand-alone element, but rather as a complement to the digital learning centres. Further, the USF will monitor the situation regarding the need and demand for public access to broadband Internet services, and take steps in the future if needed.*

4.3.4 Digital literacy training and increasing ICT usage

As outlined in more detail in Section 2.2.4, the large majority of current mobile (smart) phone owners do *not* know how to use the available online content, data services and Internet applications, and how to protect their data and privacy. Thus, the Universal Service Strategy will support digital literacy and ICT training projects. These can take place in the digital learning centres, but can also be offered by other organizations separately. This will not only benefit the users of ICT services, but the ICT sector as a whole, as these measures will also increase the demand and usage of all sorts of data products and services; it is thus a measure to also stimulate ICT demand.

What is to be funded

The USF will fund a range of digital literacy projects, both as part of the digital learning centres and in other institutions as appropriate. These projects may have a range of target groups, such as:

- The general public, including a focus on people in rural and remote areas and/or poorer household segments, as well as ethnic minorities;
- Youth, especially to help with skills upgrade for employment; also a focus on digital skills for girls and women;
- Persons with disabilities; and
- Any otherwise disadvantaged or vulnerable groups.

In terms of digital literacy training, this will focus on basic ICT skills that allow people to use mainstream Internet services, content and online applications, and to do so safely and securely. Digital literacy training also extends to awareness raising initiatives. Examples of potential digital literacy topics include:

- What is the Internet and how to search the Internet for relevant information
- How to ensure children surf the Internet protected
- How to use mobile money services safely
- How to identify fake news
- How to search for relevant applications, install and use them
- Online safety, data and privacy protection
- Options for posting own content, opinions, blogging, commenting etc.

Eligibility for USF funding digital literacy projects

USF funding will be available under specific rules and conditions to ensure that the finance is given to a) responsible and capable recipients, and b) to qualified initiatives. These eligibility criteria and conditions will be developed in detail and refined through the pilot program, and will include, but not be limited to, the following:

- Eligible organizations need to have an existing track record in Myanmar in digital skills training and providing public access to broadband Internet. This will be further specified (for example: trained at least a 1,000 people in Myanmar, have at least 20 existing public access locations);
- Eligible organizations without an existing track record may also receive funding assuming they demonstrate they are qualified; however, since this is a higher risk for the USF, the USF contribution may be smaller, e.g., limited to maximum of 50% of total funds;
- Only locally-based NGO's or local companies are eligible;
- All organizations to receive USF funding need to contribute at least 20% of their own financial resources;
- In order to merit the administrative resources to evaluate a specific proposal, the applicants need to make a proposal for digital training above a certain size (e.g., training more than 5,000 persons, offering more than 10 locations for training); this is to be specified.

4.3.5 How it will be funded and implemented

Program 2 will be implemented in two stages:

1. First stage: During an annual application process eligible organizations make proposals to request funding: this can be for both, broadband connectivity and digital training activities, or just for digital training activities; and

2. Second stage: After the conclusion of the evaluation for the first stage, a list will be prepared with all the locations of the winning applicants where broadband Internet connectivity is requested. This will then be divided in several bidding lots and a competitive tender will decide which operators and service providers will be selected to supply broadband Internet. The winning service providers will bid for these lots to receive a subsidy.

Annual application process to select eligible organizations

The USF will use an annual application process to solicit eligible proposals for USF subsidy for digital literacy and training projects, and if required funding for broadband connectivity. This will be open to eligible organizations.

The USF will publish a detailed application form that assists applicant organizations to supply the required data, information and qualitative rationale for the digital literacy project and/or broadband connectivity to be funded. Further, relevant cost data for the project that can be checked, and clear evaluation criteria and guidelines will be published that shall be used to select proposals for funding. This will also set-out clear accountability and monitoring processes that ensure funding is used for the intended purposes and target groups.

The best proposals will be selected. Applicant organisations need to demonstrate that they are addressing a gap; and that there are few or no other options to receive this training that is affordable. Their proposal needs to include their existing digital literacy training curriculum (e.g., the detailed topics, training material, etc.).

Competitive bidding approach for broadband Internet connectivity

The broadband Internet connectivity will be supplied by the telecom industry. Service providers will be selected via competitive tenders. They will receive a subsidy from the USF for providing the service that will cover their costs. This is similar to Program 1, but more than the four NTL operators will be eligible to participate.

For between 3 to 5 years, the USF shall partially subsidize the monthly cost of the broadband Internet connectivity to the selected schools and digital learning centres. After that, it shall be evaluated if it is necessary to continue the subsidization. The evaluation will focus on a) whether the goal been achieved to teach basic digital literacy or whether there still is need and demand for basic digital literacy training; And b) if yes, if a subsidy is still needed or if the digital learning centres or schools can pay for broadband Internet themselves (e.g., users are willing to make small payment for training and/or internet access; Ministry of Education provides budget for Internet).

In order to make this sustainable in the long-run and create ownership, schools and digital learning centres will need to contribute to the cost of monthly broadband connectivity. This could start with a small nominal amount, but should increase over time as percentage of the monthly cost.

Technical support

International experience with USF-funded broadband connectivity highlights the importance of proper technical support. Many problems can occur when there is a lack of proper and timely technical support. This includes outside technical support for major issues regarding the Internet connectivity but also in-house support for typical day-to-day problems such as viruses, required software upgrades, computer/tablet maintenance, dealing with SPAM, trouble-shooting and so on. Outside support shall be resolved through technical maintenance and support agreements with the suppliers. The USF and

its partners shall monitor the methods and approaches to ensure internal technical support for the digital learning centres.

4.3.6 First step: Pilot project

The *pilot project will connect 30 to maximum 50 digital learning centres*, selected through an application process and competitive tender. This will include both components, the digital training initiative and broadband connectivity.

Costs for institutional connectivity can vary widely depending on the location, the prevailing broadband prices, international bandwidth and connectivity, most feasible technology, etc. As a rough guide and based on recent broadband connectivity projects, costs vary from USD 5,000 to USD 15,000 per centre; this includes the set-up (in most cases existing wireless connectivity), 5 years monthly subscription costs and a WiFi network. A pilot project for broadband Internet connectivity including around 50 digital learning centres would therefore cost USD 500,000, assuming average costs of USD 10,000 per centre.

In order not to delay the pilot project, the USF will also offer some funding for any tablets as an option, in case that is required. This will be further discussed and specified during the detailed Pilot Design phase.

A pilot project for the universal service program on connecting digital learning centres is particularly important. It is needed to establish more accurate costing for the program, and fine tune the required download speed to actual centre needs; if it is too low, it may limit the usefulness and success, if it is too high, the USF overpays.

4.3.7 Other broadband connectivity projects

Program 2 is further open to supporting other broadband Internet connectivity projects, as long as they are:

- within the scope of universal service, providing basic communications services to underserved areas, underserved populations groups and key public institutions;
- tendered transparently and competitively; and
- assessed properly to ensure that the required conditions (e.g., reliable power supply, required ICT literacy, etc.) are present, so that intended target group can indeed benefit from the broadband Internet connectivity.

However, each different type of broadband connectivity project will have its own:

- Needs analysis;
- Detailed project design, and possibly a pilot project first;
- Procurement and public tendering process;
- Evaluation process;
- Baseline study;
- Monitoring and evaluation system.

4.4 Program 3 - Special projects

4.4.1 Introduction

The purposes of this third universal service program stream are two-fold:

- there are many other aspects of universal service which cannot be included into the other two main programs; this program allows them to be integrated; and

- the USF can implement pilot projects on universal service themes to explore new approaches which could become main stream programs in the next Universal Service Strategy.

The USF will undertake special projects that merit financing and are consistent with the overall objectives of universal service, but which do not fall into the USF two mainstream programs. Special projects may expand into major mainstream programs in future years if they prove to be successful, demonstrate benefits, and are in demand by the target population.

The USF will solicit ideas, inputs, and requests from a range of stakeholders, and may prepare tentative project plans for public comment and additional input and ideas.

4.4.2 Types of special projects

Special projects include the following types:

- 1) **ICT content, services or application development for rural users, ethnic minorities and lower income groups:** The USF will consider supporting projects that focus on development of content and applications of value to *regional or rural and underserved communities, as well as lower-income parts of the population*. These could include web sites, mobile apps, online educational and training materials, interactive and multimedia applications for users, and other targeted ICT content.
- 2) **Improved access and usability of various ICT services for disabled people:** the USF will work with notable representative disability groups to identify specific barriers and requirements from persons with disabilities in regards to using ICT services; initial indications are that there are already, for example, several helpful applications for both blind and deaf people but that they only exist in English and need to be converted into the Burmese language.
- 3) **Small pilot projects to support ICT access and subsidised broadband connectivity in certain sectors to highlight benefits of ICT for socio-economic development** – e.g., broadband Internet access for rural hospitals. These will be identified through a needs and capacity analysis, as well as through dialogue with other government agencies. Such projects must be related to ICT network access and avoid using USF funds to finance another sector's internal hardware and system development programs that should be financed from that sector's own budget. Also, these projects will be put to competitive auction.
- 4) **Other pilot projects:** These may be initiated from time to time, in order to establish or refine the USF's and/or partner's knowledge or methodology to be employed in the main program. A simple competitive bidding or application process will be used.

4.4.3 Fund allocation, implementation and pilot project

The USF will allocate about 5% of its annual spending for special projects. Implementation can vary depending on the requirements of each special project and either use an open competitive process or an open application process.

As a first pilot project, funding may be provided to translate specialised software from English to Burmese to help disabled people to use ICT.

4.5 Regulatory and other measures that can improve universal service

Good policies and regulation have a huge effect on universal service, in terms of market expansion and lowering of prices. In particular, the following areas are important:

- Competition policies
- Spectrum policies and frequency allocation
- Infrastructure sharing

One of the biggest tasks ahead for Myanmar is the establishment of an effective and independent regulatory authority; Myanmar Communications Commission (MCC). Currently, the public consultations have been held and the draft law of the Myanmar Communications Commission is sent to Parliament for the approval. Also important are developing and implementing a broadband policy, and sensible ICT taxation, such as taxes on end-user devices and VAT on retail prices, which increase affordability and usage.

4.5.1 Competition and Infrastructure sharing

Myanmar has made tremendous strides in opening its market and introducing competition. In future, the focus will be on effective competition regulation, ensuring there is a level playing field among all players, and no unfair advantages for any one operator.

Also, Myanmar is very advanced in regards to infrastructure sharing as licensing has created wholesale and retail categories, and the telecom licensees have chosen to be passive infrastructure providers (e.g., tower and fibre companies). The majority of retail telecom service providers largely rely on using and sharing existing infrastructure, rather than building their own. Again, this should be monitored and supported, when required, with effective regulation.

4.5.2 Frequencies

Frequencies are obviously extremely important for telecommunications, especially for rural communications and rural broadband Internet. Frequencies that have a long range (more than 10km) promise to allow lower cost deployment of broadband Internet, which is crucial in the less densely populated rural areas. PTD may look into further release of additional frequencies as appropriate and according to the Spectrum Roadmap.

4.5.3 Supporting the industry for rural roll-out

Industry players, such as tower or fibre companies, and the mobile operators and broadband service providers, report that they face a number of challenges when rolling out their network. Further, when rolling out network to the most rural, remote and challenging locations, like the mountains, other supporting infrastructure is less available.

In summary, key challenges in particular for rural and remote network roll-out, affecting tower companies, fibre network operators and mobile operators, include the following:

- Lack of established, accepted and timely dispute resolution mechanism with local communities, especially in regards to tower site contracts, generator noise, etc; ;

- Difficulties with contract enforcement, especially for tower sites and agreed payment schedules;
- Conditions of rural roads or lack of roads, especially during monsoon season;
- Lack of electricity grid;
- Financial/ tax requests from some ethnic areas in addition to standard government taxes and fees; and
- Landmines still pose a safety risk for construction workers for underground fibre-optic deployment and towers in more remote areas.

Overall, the above challenges result in higher costs and slower roll-out and delays. Also, the telecom industry shoulders some of the cost of problems in other sectors (e.g., road, power).

MOTC is already aware of these additional challenges and is working with the industry and liaise with relevant other Ministries and government entities to solve these problems.

5 Available USF Funding

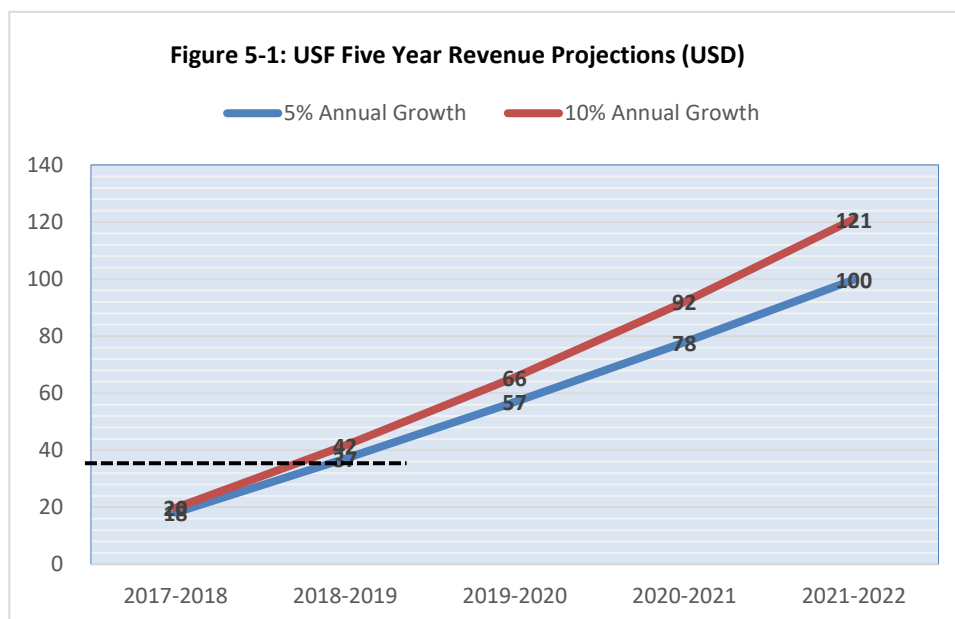
5.1 General

Chapter XV in the 2013 Telecommunications Law provides for MOTC to establish the USF and to instruct the PTD to develop its programs. NTL operators are required to contribute a USF levy of 2% of relevant revenue on an annual basis to the US Fund.

5.2 USF Resources

5.2.1 USF collection projection

The estimated collection to the USF over the 5 year planning period is shown in Figure 5-1. This is based on operator financial reports for 2015 and 2016 as well as their regulatory fee payments. Operators pay 2% of their relevant revenue as a regulatory fee, and will pay an additional 2% of relevant revenue as Universal Service fee.



Forward projections are made assuming a minimum (5%) and maximum (10%) market growth rate. Over the five year planning period to 2021-2022, the USF would collect between USD 100 and 121 million from operator levies. This is likely less at the beginning as the operator licences allow for a few years exemptions from the levy, depending on the fulfilment of their licence conditions, and different licence start years of their operating licence.

Programs 2 and 3 will be smaller than Program 1 for the following reasons

- Program 1 on Infrastructure is the main prerequisite and priority, and needs to be put in place first;
- Program 2 – with only smaller scale digital literacy projects existing today – has a lower absorptive capacity for funds at this initial stage; and thus it would be risky to invest very large amounts in these initial years; and
- Program 3, while important, requires a high degree of administrative capacity, which the USF’s still needs to build up over the coming years.

5.2.2 International experience

Comparative international best practice in universal service, collection and use of USF resources indicates the following:

- Myanmar will achieve a much higher mobile network coverage than many other developing countries through the existing licence roll-out obligations; thus less universal service funds are needed;
- Few funds collect more than 1.5% of revenue, and those that do are usually not able to disburse more than 1% of revenues on USF programs without risking misallocations; Successful fund disbursement requires careful needs analysis and project design in order to create true benefits for the people, and
- In most countries with a USF, all telecom licence holders (above a certain revenue level) have to pay a USF levy, not just the mobile operators. This allows a lower levy from all, rather than a higher levy from a few operators only.
- In Malaysia, 6% of the weighted net revenue is collected as Universal Service Provision (USP) and in India, 5% of the adjusted gross revenue is fixed to collect from all telecom service providers.

Based on international experience, it is important that the right balance of flexibility of the USF in terms of programs and projects to be financed, as well as a clear defined scope for the purposes of the USF.¹³ The concept of universal service evolves and changes as the telecom market develops. As a member of ASEAN, Myanmar will consider key trends and guidelines for Universal Service from other ASEAN members. Article 9 (f) of the Notification to establish the USF allows for that flexibility, as it refers to the key dimensions of Universal Service: Availability, Accessibility, Affordability and Ability.

Planned USF programs and projects need to clearly indicate how they support Universal Service achievement. Further, proper data analysis and research, as well as stakeholder consultation, is required, to establish that proposed USF programs and projects are truly needed and feasible. And lastly, detailed project design needs to ensure their likely success, their benefits and also include performance indicators to measure benefits.

5.2.3 Myanmar's USF approach

As can be seen from the international experience, a careful balance needs to be achieved between collecting sufficient funds for the needed USF programs. The USF is only there to fill in a gap that the market cannot fill; this is often a very small gap. Thus, for the USF to be successful and have true impact, this gap needs to be a) correctly identified, and b) targeted with the right and well-designed projects.

This Universal Service Strategy will therefore strive to achieve a balanced approach. For that purpose, it will monitor during the first few years of the USF, the following:

- Actual USF levy collections;
- USF fund disbursements;
- Program and project financial needs, as well as early impact; and
- Price development and financial health of the telecom sector.

Based on the monitoring results, the MOTC may consider, as part of the review of the USF Strategy itself, to adjust the USF collection in line with regional/ international practices, after the expiration of the current telecom Licences.

¹³ See Chapter 2 and 3 of the above ITU report for success factors and challenges of USF programs.

6 Program adaptation, monitoring and evaluation

6.1 Introduction

The USF and its Universal Service Strategy needs a monitoring and evaluation system for the following purposes:

- To assess if the intended objectives and benefits of the Universal Service Strategy are indeed achieved through the implementation of the strategy;
- To assess if the objectives and benefits are achieved efficiently in terms of costs and administrative efforts; and
- To be able to modify or implement corrective measures in the event that a program meets problems or underperforms.

Monitoring and evaluation is key to any strategy implementation, as it is for this Universal Service Strategy. However, monitoring and evaluation are separate concepts, as explained below.

In addition to monitoring and evaluation, it is also important to consider market development, changes in the regulatory regime, as well as technology and consumer trends. These can have an impact of the Universal Service program. For example new frequency release can impact rural coverage reach, as well as broadband capacity. The Universal Service Strategy therefore needs to take this development into account, and modify, update and adapt its program and projects, if necessary.

6.2 Monitoring

Monitoring has the objective to ascertain that the implementation goes to plan, and allows the monitor to detect if it does not. Monitoring will then help to devise and implement timely corrective measures. Monitoring is therefore done within shorter timeframes, more frequently and more or less as an ongoing activity.

In particular for the Universal Service Strategy, monitoring of the following is important:

- Do the service providers deliver the contracted service according to schedule and quality of service specifications?
- Are the beneficiaries of the programs indeed able to take advantage of the services provided or are there any impediments?

During the design phase of each project, the USF shall include a monitoring plan, which covers:

- What parameters are to be monitored;
- How frequently these parameters are monitored; and
- The combination of data and methods to be used for the monitoring.

6.3 Evaluation

Evaluation is a medium to long-term activity. Evaluations are typically conducted after 5 to 10 years. The purpose of an evaluation is focused on evaluating the intended impact, i.e., have the intended benefits of the program been realized? The evaluation builds on the factual information gathered during regular monitoring. It is often important to establish baseline data: what is the exact situation at the start in regards to certain key parameter the project plans to impact.

The USF will determine the earliest time to do a meaningful evaluation for each program stream. This could also be using a shorter timeframe as long as the expectations regarding the possible impact achieved are reasonable.

For each strategic program stream, the USF will also develop an evaluation plan, which covers:

- What are the main intended benefits of the program and how will their advancement been measured?
- Is a baseline study needed to determine the current situation on which to evaluate benefits later?
- In what timeframes will the specific impact been measured?
- What methods are to be used to evaluate the impact later?

This will ensure that the USF has a solid foundation of data and analysis that supports its rationale, implementation and socio-economic impact.

6.4 Program adaptation

Market and regulatory development, technology and consumer trends can have an impact on the Universal Service Program. Therefore, the implementation of the Universal Service Strategy is to use a mechanism and process to regularly

- review any key development;
- assess whether this would impact Strategy implementation; and
- modify and refine implementation plans accordingly.

This should cover, but not be limited to, at least the following:

- Network roll-out and coverage (using GIS);
- Type of network technology used and new emerging and cost-saving technologies, especially for rural areas;
- Development in power sector, green energy solutions for telecom, etc.
- Available and upcoming frequencies;
- Price and affordability development;
- Demand and consumer trends (e.g., handset types/ their penetration, ARPU, m-money, OTT content, m-applications);
- New policies/ strategies and regulation; and
- Financial standing of key operators.

6.5 Sustainability

A key aspect of the monitoring and evaluation activities is to ensure the sustainability of the various programs and individual projects, assuming they have indeed proven their beneficial impact.

Key questions in regard to the sustainability of projects include the following:

- Can the service provider or the organization selected for capacity building sustain the service provision based on the smart subsidy received for the contracted period of time?
- What happens after the USF support ends? Can the project sustain itself?

The USF will monitor the sustainability issue especially carefully and include key measures required in the next cycle of a 5-year Universal Service Strategy to ensure ongoing sustainability.

6.6 Planning the next 5-year Universal Service Strategy

One year before the end of this Universal Service Strategy, the next strategy would be developed. This would include the following:

- A fresh assessment of the universal service situation and needs in the country, covering the telecommunications and broadband Internet sector;
- A thorough analysis of the available monitoring data, overall experience of the current USF strategy and any evaluation study if already available;
- An updated review of international best practice and experience, lessons learned and successful similar programs; and
- A revised forecast of available funding, costing and financial feasibility of the future strategy.
- Strategy should be based on the regional and international practices.

The Strategy for next 5-year will go through a public consultation process before it is formally adopted.