



submitted to

**Postal and Telecom Department
/ Ministry of Transport and
Communications**

DRAFT

Universal Service Strategy

*Universal Service Strategy, Universal Service Fund Manual,
Implementation Procedures and
Design of Pilot Programs*

8 June 2017

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
1 INTRODUCTION	1
1.1 GENERAL INTRODUCTION	1
1.2 RATIONALE FOR A UNIVERSAL SERVICE STRATEGY	1
1.3 NATIONAL CONTEXT AND RELATION TO OTHER RELEVANT POLICIES	2
1.3.1 <i>Economic policy</i>	2
1.3.2 <i>Telecommunications Masterplan</i>	3
1.3.3 <i>e-Governance Master Plan 2016 to 2020</i>	3
1.4 HOW THIS STRATEGY HAS BEEN DEVELOPED	4
2 THE MYANMAR ICT MARKET AND REGULATORY CONTEXT	6
2.1 MARKET SIZE AND GROWTH	6
2.2 REGIONAL DISTRIBUTION OF THE MOBILE NETWORKS	6
2.3 MAIN INDUSTRY PLAYERS	8
2.3.1 <i>MPT, Telenor, Ooredoo and 4th NTL (MNTC/MyTel)</i>	8
2.4 THE BACKBONE AND PASSIVE INFRASTRUCTURE INDUSTRIES	9
2.4.1 <i>Major fibre-companies</i>	9
2.4.2 <i>The tower market</i>	10
2.5 OTHER LICENSEES	10
2.5.1 <i>Internet Service providers (ISPs)</i>	11
2.5.2 <i>4G/LTE service providers with 2600 MHz spectrum licences</i>	11
2.6 REGULATORY AND OTHER MEASURES THAT CAN IMPROVE UNIVERSAL SERVICE	12
2.6.1 <i>Competition and Infrastructure sharing</i>	12
2.6.2 <i>Frequencies</i>	12
3 OBJECTIVES AND TARGETS OF THE UNIVERSAL SERVICE STRATEGY	13
3.1 UNIVERSAL SERVICE - A DEFINITION	13
3.1.1 <i>General concept</i>	13
3.1.2 <i>What is basic communications</i>	13
3.1.3 <i>Universal access and universal service</i>	13
3.1.4 <i>Specific dimensions of universal service</i>	13
3.2 MYANMAR'S UNIVERSAL SERVICE TARGETS	14
3.2.1 <i>Availability of voice and broadband Internet services</i>	14
3.2.2 <i>Affordability of communications services</i>	15
3.2.3 <i>Accessibility regardless of gender, religion, ethnicity or ability</i>	17
3.2.4 <i>Awareness/ ability</i>	18
4 KEY PRINCIPLES OF THE UNIVERSAL SERVICE STRATEGY	20
4.1 MARKET EFFICIENCY AND TARGETED INTERVENTIONS	20
4.2 SMART SUBSIDIES AND SUSTAINABILITY	20
4.3 COMPETITIVE TENDERING FOR SMART SUBSIDIES	20
4.4 OPEN ACCESS	21
4.5 THE TRUE ACCESS GAP	21

4.6	CREATING MAXIMUM SOCIO-ECONOMIC IMPACT	21
4.7	TECHNOLOGY NEUTRAL	21
4.8	TRANSPARENCY AND STAKEHOLDER CONSULTATION	21
5	UNIVERSAL SERVICE PROGRAMS AND PROJECTS	22
5.1	OVERVIEW OF UNIVERSAL SERVICE PROGRAMS	22
5.1.1	<i>The importance of sequencing and focus</i>	22
5.2	PROGRAM 1 - INFRASTRUCTURE ROLL-OUT FOR VOICE & BROADBAND	22
5.2.1	<i>Introduction</i>	22
5.2.2	<i>Voice and Broadband coverage</i>	26
5.2.3	<i>The role of infrastructure sharing and backbone provision</i>	26
5.2.4	<i>Overall target</i>	27
5.2.5	<i>First Year (2017-2018) Project - Pilot Areas</i>	27
5.2.6	<i>The Overall Project Broadband Roll-out Program</i>	30
5.3	PROGRAM 2 - ICT CAPACITY BUILDING - ENABLING THE DIGITAL FUTURE	31
5.3.1	<i>Introduction</i>	31
5.3.2	<i>Internet access for high schools</i>	32
5.3.3	<i>Digital literacy projects and increasing ICT usage</i>	37
5.4	PROGRAM 3 - SPECIAL PROJECTS	39
5.4.1	<i>Introduction</i>	39
5.4.2	<i>Types of special projects</i>	39
5.4.3	<i>Fund allocation and implementation</i>	40
5.4.4	<i>Proposed first special project during pilot phase</i>	40
6	AVAILABLE USF FUNDING AND NEEDS	41
6.1	GENERAL	41
6.2	USF INCOME PROJECTION	41
6.3	REVIEW AND RECOMMENDATIONS	42
7	MONITORING AND EVALUATION	43
7.1	INTRODUCTION	43
7.2	MONITORING	43
7.3	EVALUATION	43
7.4	SUSTAINABILITY	44
7.5	PLANNING THE NEXT 5-YEAR UNIVERSAL SERVICE STRATEGY	44

Executive Summary

GENERAL INTRODUCTION

This document proposes a draft Universal Service strategy for the Republic of the Union of Myanmar (Myanmar). This is part of the government's objective to reform 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 Telecommunications Law from 2013 gives the MOTC the option to establish a Universal Service Fund (USF), and then instruct the Postal and Telecommunications Department (PTD) to develop programmes and projects for the construction of basic telecommunications infrastructure and to extend telecommunication services in the underserved areas of the country.

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.

Good policies and regulation have a huge effect on universal service, in terms of market expansion and lowering of prices. However, some areas cannot be reached by market forces alone.

The government's Universal Service strategy ensures that areas and communities that cannot be reached commercially by the industry players, will also be served. 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.

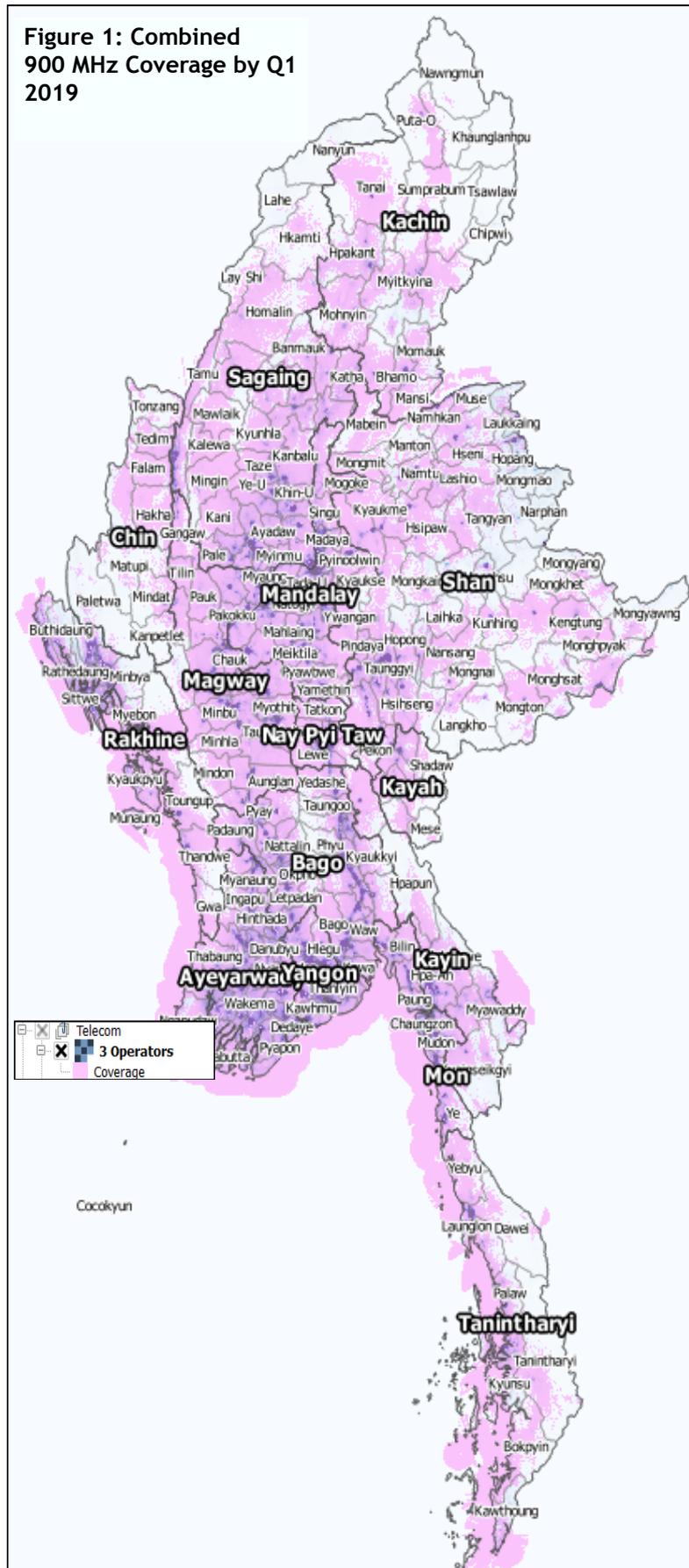
The Government has released an overarching 12 point economic policy at the end of July 2016. This Universal Service Strategy has been developed in line with this high-level economic policy, and is able to support and make small contributions to many of the national economic goals. Further, this universal strategy is taking account of the Telecommunications Masterplan and the e-Governance Master Plan 2016-2020.

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

- Data and evidence collection
- Independent and extensive ICT sector analysis
- Consultation with a wide range of industry and other key stakeholders
- Myanmar ICT projects experience and analysis of wider relevant context
- International experience and best practice

MOBILE COVERAGE FOR VOICE AND BROADBAND INTERNET

Total coverage to be achieved *by Q1 2019*, combining the coverage of all three operators for each state is shown in Figure 1, based on the detailed GIS analysis of each operators’s projected coverage.



The GIS analysis determined the minimum total coverage is rising to 94% by Q1 2019, but is expected to even reach 95% after incorporation of the latest (92%) revised licence commitments of Telenor and Ooredoo. Details by state and region can be seen in Table 1 below.

Table 1: Geographical Area and Population Covered by State						
State	% Geog. Area Covered	Total Population	Population covered	% Population covered	Total Townships	Townships with < 50% Population Coverage
Chin	40.1%	469,010	274,552	58.5%	9	4
Shan (North)	54.7%	2,534,984	1,742,998	68.8%	24	7
Shan (East)	46.5%	825,297	573,740	69.5%	10	2
Tanintharyi	43.8%	1,455,338	1,194,078	82.0%	10	0
Kachin	39.4%	1,624,896	1,359,311	83.7%	18	6
Shan (South)	52.7%	2,392,218	2,044,219	85.5%	21	4
Kayah	52.2%	287,555	262,134	91.2%	7	2
Kayin	56.9%	1,599,517	1,357,124	84.8%	7	0
Rakhine	63.3%	3,153,958	2,956,615	93.7%	17	0
Sagaing	68.2%	5,195,173	4,908,427	94.5%	37	4
Bago East	72.8%	2,920,445	2,824,462	96.7%	14	0
Mon	89.7%	2,090,384	2,066,876	98.9%	10	0
Bago West	86.8%	1,985,575	1,963,547	98.9%	14	0
Magway	91.0%	3,885,893	3,852,800	99.1%	25	0
Mandalay	95.2%	6,098,506	6,070,438	99.5%	28	0
Yangon	94.3%	7,562,429	7,535,160	99.6%	45	1
Nay Pyi Taw	91.1%	1,155,749	1,151,699	99.6%	8	0
Ayeyarwady	92.7%	6,254,480	6,238,964	99.8%	26	0
Total	62.1%	51,491,407	48,377,144	94.0%	330	30

Up to 3.1 million people will remain without service after Q1 2019 and need the intervention by the USF.

Current coverage today is likely around 85% of the population based on all three operators. This applies for both voice coverage and broadband Internet (3G). This is due to the modern networks deployed and roll-out strategies: Ooredoo uses UMTS 900MHz technology in semi-urban and rural areas to enable a full range of voice and data services over a wider geographic radius from its towers; this means that their network is providing at least 3G broadband Internet everywhere, and higher capacities in cities. While Telenor has used the 900 MHz band initially only for 2G coverage outside cities, all its BTS's are equipped for 3G also, and can be switched to 3G operation provided the voice and data demands can be balanced. In summary there is very little difference between the reach of the existing networks for voice coverage and broadband Internet 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. MPT has operated a GSM network in Myanmar for over 10 years, and also uses 900MHz, but may need to upgrade at least some of its base-stations to ensure 3G capability.

Both operators have committed under their updated licence agreements to roll-out their network to cover 92% of the population by Q1, 2019, reaching a combined coverage of between 94% to 95%, based on the GIS analysis. In conclusion, there will be little difference between the reach of the voice network and the 3G broadband Internet network reach and little cost difference between deploying their voice and broadband Internet networks. Also, with thin-route IP networks, there are no higher backbone related operating costs due to offering broadband Internet, especially considering the lower usage density in rural areas. The only higher cost-issue will be in areas where the BTS needs to be connected via satellite trunking, as satellite bandwidth is still very expensive.

UNIVERSAL SERVICE OBJECTIVES FOR MYANMAR

The analysis to determine the gaps and needs in terms of universal service and what programs and projects are required to close them were guided by the following four key dimensions of universal service:

Table 1		
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 • Race, tribe, 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	<p>With increasing focus on the broadband Internet, user capabilities become important</p> <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

The objectives for this universal service strategy are also framed according to the above four key dimensions of universal service:

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 thus having basic mobile voice services available to them.

Broadband Internet - 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 mobile broadband services. The minimum download targets will be increasingly improving, from 1.5 MBps at the end of 2017 to 5 MBps at the end of 2021 as the capacity of mobile base stations and the reach of the fibre backbone increase.

A major program on infrastructure investment and supply is therefore a key part of this Universal service strategy.

Affordability of communications services

Analysis shows that Myanmar has roughly met the “1 for 2” broadband affordability target - 1GB of mobile data priced at 2% or less of average monthly income. Further, the Myanmar population benefits from low-cost smartphones. Therefore, no special measures in this area are proposed, though the USF shall have a major role in monitoring price developments.

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 shall monitor key communications use categories according to gender, religion, ethnicity and disability for the next two years. If the gap is not closing, special additional measures shall be taken.

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, and to do so safely and protected. The strategy has therefore a major program focussed on capacity building and enabling digital skills. Currently only 22% of mobile internet users state that they have the required skills to use the Internet; this shall reach at least 50% within the next 5 years.

OVERVIEW OF UNIVERSAL SERVICE PROGRAMS

Combining the universal service overall strategic goals and the identified gaps and needs in regards of universal service in Myanmar, the universal service strategy shall focus on three program streams:

1. Program 1 - Infrastructure deployment for basic voice and broadband services
2. Program 2 - ICT Capacity building - Enabling the digital future
3. Program 3 - Special Projects incl. content, applications, pilots, disability

Program 1 will be the main investment stream and ensure the supply of infrastructure so that all regions of the country and all identifiable population centres have access to national telecommunications infrastructure services.

Program 2 is centred on the development of digital skills and literacy, integration of ICT in education, and will also stimulate demand as a result.

Program 3 is to focus on special projects, in addition to the two main streams of infrastructure supply and capacity building. These special projects will be smaller in size, but nevertheless promote important aspects of universal service, such as promoting relevant local content and applications, 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 these sectors.

PROGRAM 1 - INFRASTRUCTURE DEPLOYMENT FOR BASIC VOICE AND BROADBAND SERVICES

Overall target

The realistic 5 Year target of the USF Strategy is to reach 99% of population, assuming that problems currently causing security risks and hindrance to network deployment (in Shan, Kayin and Rakhine States) can be resolved. Over half of the uncovered populations (up to 1.8 million) are in Townships with security risks. 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 and thus provide no payback on CAPEX investment. It is usual for the last 1-1.5% of population to be unreachable except through OPEX subsidies. Costs are prohibitive and thus should only be re-considered once the 99% target has been achieved.

Overall infrastructure program costs

The final subsidy cost for all gap areas to reach up to 99% of the population has been estimated at USD 25.4 million. However, to allow for contingencies, especially the need to reach some communities by satellite trunking, the absolute maximum is set at USD 35 million.

Piloting

For piloting the following 20 townships in the regions of Kachin (4), Kayah (1), Chin (6), Sagaing (5), Magway (1) and Tanintharyi (3) are considered, combining the most needy areas and range of financial viability. The final selections will be decided in discussion with PTD and the operators. The list is provided in Table 3.

Table 3: Interim Pilot Selections					
State	Township	Township total population	Uncovered population	% Uncovered	No. of BTSs
		1,500,597	940,339		229
Kachin	Myitkyina	307,377	255,123	83	9
Kachin	Waingmaw	119,876	99,497	83	6
Kachin	Chipwi	19,153	766	4	12
Kachin	Momauk	79,132	56,184	71	4
Kayah	Hpasawng	25,589	19,704	77	2
Chin	Thantlang	49,096	27,985	57	5
Chin	Tonzang	31,497	13,544	43	9
Chin	Mindat	41,793	30,091	72	6
Chin	Matupi	50,619	15,692	31	14
Chin	Kanpetlet	21,104	10,341	49	6
Chin	Paletwa	95,558	16,245	17	21
Sagaing	Pinlebu	107,792	88,389	82	3
Sagaing	Hkamti	45,495	21,383	47	13
Sagaing	Lay Shi	15,648	5,477	35	6
Sagaing	Lahe	46,236	2,774	6	11
Sagaing	Nanyun	48,998	980	2	19
Tanintharyi	Dawei	152,225	123,302	81	15
Tanintharyi	Tanintharyi	111,672	64,770	58	21
Tanintharyi	Bokpyin	84,588	61,749	73	7
Magway	Sidoktaya	47,149	26,403	56	6

The total maximum subsidy for the 20 proposed pilots is approximately USD 12.4 million. This may be slightly reduced before the project is tendered. In any case, the final amount of subsidy awards is expected to be less than USD 10 million after completion of the tender due to the competitive factors.

The Overall Project Broadband Roll-out Program

Table 4 shows the categories of infrastructure projects to be implemented, starting from the pilot program through to Year 2022. The projects target the least covered townships in Year 2, and target progressively lower percentage gap areas in following years.

Table 6-5: Program 1 Projects and Targets							
Project Type	Target approx. no. townships	Main targeted regions	Provisional Annual Targets				
			Year 1 2018	Year 2 2019	Year 3 2020	Year 4 2021	Year 5 2022
Approx. subsidy per unserved inhabitant (US\$)			\$13.20	\$17.70	\$9.30	\$16.30	\$7.00
New population coverage			1.8%	1.0%	0.5%	0.4%	0.3%
Final year-end population coverage			96.8%	97.8%	98.3%	98.7%	99.0%
Approx. US\$ Subsidy targets (US\$ M)			10.0	10.0	8.0	7.0	0.4
Pilot project selection of townships	22	Kachin, Chin, Sagaing, Tanintharyi					
Townships with less than 50% coverage	26	Kachin, Kayin, Kayah, Shan,					
Townships with 50-75% coverage	22	Shan, Kayin					
Townships with 76-90% coverage	40	Tanintharyi Sagaing					
Townships above 90% coverage	40	Rakhine, Bago East					
	150						

PROGRAM 2 - ICT CAPACITY BUILDING - ENABLING THE DIGITAL FUTURE

This major USF program will be two-pronged and will have two different sub-programs, as follows:

1. **Broadband Internet connectivity for high schools** under the Department of Basic Education; and
2. **Digital literacy projects** with organizations that have an existing track record, and including public access for broadband Internet.

Human capital development is a major component of most countries ICT plans, an example for the region is the ASEAN ICT Masterplan 2015 and 2020.¹ 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

¹ See the Strategic thrust number 5.

faster and easier than adults, and the school is already a place of knowledge and learning.

The USF will focus on:

- Providing broadband Internet connectivity to schools selected by the Department of Basic Education (DBE)/UNESCO and supported by them through their joint initiative, providing all the additional equipment and required training; if still required, the USF shall also consider providing broadband connectivity to the 25 teacher training colleges.
- This will include a pass-word protected WiFi network for the school. In the planned pilot program it shall be explored if and how this WiFi network can be made available for the general public after school hours.

School connectivity ecosystem & funding focus

It is important to realize that school 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.

The Department of Basic Education has an existing partnership with UNESCO to equip high schools with broadband Internet, and more importantly, the end-user devices and capacity to take advantage of it. It is a comprehensive and holistic approach that covers all required elements to make a school connectivity project successful.

The USF is not responsible for creating the ecosystem, but it shall play an important role to accelerate ICT in high schools, in collaboration with the Department of Basic Education and the UNESCO program.

For USF support, it will be important that high schools are “Internet-ready”. Thus, the program will be rolled out in increments over several years, and the focus will be in each year on the schools that have become Internet ready.

How it will be funded and implemented

- The broadband Internet connectivity will be supplied by the telecom industry and 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;
- For at least 5 years, the USF shall partially subsidize the monthly cost of the broadband Internet connectivity to the schools that are part of the joint DBE/ UNESCO program.
- In order to make this sustainable in the long-run and create ownership of the schools, schools / the DBE are to contribute to the cost of monthly broadband connectivity, even if only nominally and a small amount. If feasible, the own contribution of schools shall slowly increase over the next 5 years.

Pilot and costing

The pilot project shall connect 30 to maximum 50 high schools, selected jointly by DBE and UNESCO, and supported by the joint capacity building program and supply of tablets etc. They shall be in same townships and regions as the current supported 31 high schools: Mandalay region, Bago region, and Mon state and/ or in close by states or regions to ensure there is sufficient capacity to regularly visit and support the schools, conduct joint trainings and similar activities.

As a rough guide and based on recent broadband connectivity projects, costs vary from USD 5,000 to USD 15,000; this includes the set-up (in most cases existing wireless connectivity), 5 years monthly subscription costs and a WiFi network. So the pilot project for broadband Internet connectivity including around 50 schools would cost USD 500,000, assuming average costs of USD 10,000 per school.

PROGRAM 3 - SPECIAL PROJECTS

The purpose 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.

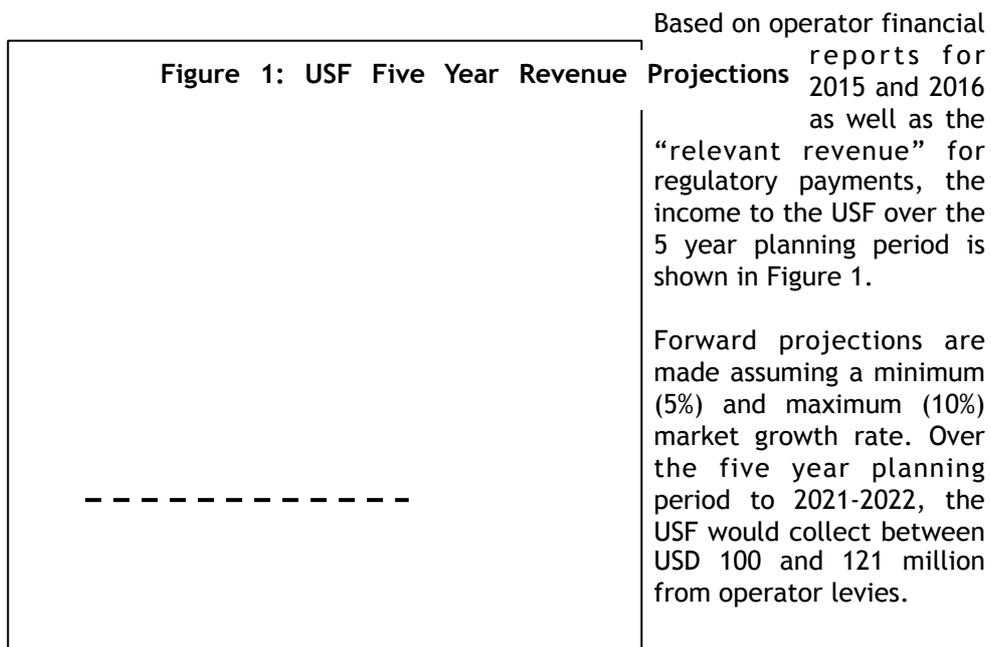
Special projects include the following types:

- ICT content, services or application development for rural users and/or lower income groups;
- Improved access and usability of various ICT services for disabled people;
- Small pilot projects to support ICT access and subsidised broadband connectivity in certain additional sectors (e.g., health) to highlight benefits of ICT for socio-economic development; and
- Other pilot projects.

The USF will allocate not more than 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.

USF INCOME PROJECTION

The licences require all four NTL operators - Ooredoo Myanmar Telenor and MPT, as well as the fourth entrant MNTC/MyTel - to pay a USF levy starting from their initial licence date, after a minimum of three years exemption. The USF levy is 2% of relevant revenue on an annual basis, which is the same amount as their regulatory fee.



The graph indicates that the amount of funds required for the main expenditure program (Program 1 - Voice and Broadband Infrastructure Services) will be collected within the first two years.

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 few high schools ready and only smaller scale digital literacy projects today - has a low absorptive capacity for funds at this initial stage; and thus it would be risky to invest large amounts in these initial years; and
- Program 3, while important, requires a high degree of administrative capacity, which USF's usually don't have in their initial years.

In conclusion, the immediate and ongoing collection of 2% of relevant revenues will create a serious imbalance of income versus expenditure, i.e., the USF will collect too much with little capacity to distribute the funds. USF's that collect too much and then cannot distribute the funds in a reasonable and beneficial manner are the main reason why USFs sometimes are considered inefficient and just an additional taxation on the sector. Collecting too much risks to lose the credibility of the universal service program and the USF.

It is therefore recommended that the MOTC should consider the following in order to ensure sound USF planning and execution:

- 1) Suspend or *reduce* collections after two years, or in the first year where subsidy distributions fall below 50% of collections.
- 2) Delay the commencement of collections until 2018 - 2019, to coincide with the first needs of the Strategic Plan following the Year 1 pilot program;
- 3) Execute a conceptual change in the licence obligation to enable PTD to collect "up to 2%" of relevant revenues, fixing the actual collection at 1% for the initial few years² and having the flexibility to collect according to actual needs of the USF; and

MONITORING AND EVALUATION

The USF and its universal service strategy needs a monitoring and evaluation system for the following key 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. It needs to commence with an effective acceptance testing program and baseline survey to ensure that future monitoring and evaluation can be rooted against conditions existing at commencement of the program.

² The measure to reduce the collection percentage could be accompanied by a regulation to collect the universal service levy from all licenced operators above a stipulated level of turnover.

1. Introduction

1.1. General introduction

This document proposes a draft 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 purpose 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 new Telecommunications Law from 2013 gives the MOTC the option to establish a Universal Service Fund (USF), and then instruct the Postal and Telecommunications Department (PTD) to develop programmes and projects for the construction of basic telecommunications infrastructure and to extend telecommunication services in the underserved areas of the country.

This document has been prepared by the consultants for MOTC on the project entitled “**Universal Service Strategy, Universal Service Fund Manual, Implementation Procedures and Design of Pilot Programs**”. The Postal and Telecommunications Department (PTD) within the MOTC is managing the project and Intelcon Research & Consultancy Ltd. (Intelcon) is assisting the MOTC. A separate Guide on establishing the USF is also prepared. Thus, both the terms universal service strategy and USF programs are used.

The purpose of this document is to present a comprehensive and coherent Draft Universal Service strategy for Myanmar, for further consideration and discussion with the MOTC, as well as with key stakeholders within government, industry and civil society.

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 Telecommunications Law 2013, the liberalization of the market and the development of key regulatory rules on interconnection, frequencies, competition, licensing and access. Additional milestones achieved are the licensing of the fourth National Telecom Licensee (NTL) MyTel, and the auction of frequency licences in the 2600GHz band. Further important tasks ahead are the establishment of the Myanmar Communications Regulatory Commission (MCRC), 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

1.3.1. Economic policy

The Government has 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 states and regions, the Universal Service strategy supports national reconciliation and infrastructure development;
- 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 is focused to rural areas, it benefits often 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 money, and communications available universally helps with financial inclusion.

1.3.2. Telecommunications Masterplan

The Myanmar Telecommunications Masterplan (Final Draft August 2015) also 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 will be exceeded sooner, before the end of 2018, since the latest agreed population coverage proposals to be met by both Telenor and Ooredoo will be 92% of population covered. Their combined coverage of all operators as shown in the national GIS map, as described in Section 5, will 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 target is currently being exceeded as can be seen in the analysis of Section 3.2.2 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 emphasizes that the MOTC is aware of the considerable international experience, best practice lessons and risks associated with USFs that exist. In this context the Masterplan also urges that the funds collected by the USF should be allocated transparently and effectively. 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 should be 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."

1.3.3. e-Governance Master Plan 2016 to 2020

Myanmar's e-Governance Master Plan (2016-2020) is another important factor to be considered. In particular, 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. The following highlights some of its key elements:

- Government will use, as far as possible, existing infrastructure such as the fibre-networks along roads and railway (1.3.7 a);
- Government is looking at shared networks and infrastructure for e-Governance purposes (1.18.3 b); but it does not preclude that some infrastructure may need to be built (1.29.4);
- Implementation tasks include creating shared infrastructure such as a high-speed e-Governance network, for which the MOTC is responsible (40,41,77);
- Review of international practice concludes that working with the private sector is advisable for security and cost-effectiveness (48 a);
- The e-Governance plan promotes readily accessible and extendable infrastructure (which includes all sorts such as data servers, storage, but also communication networks) and promotes cloud computing services such as Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) (92);
- The Masterplan mentions an e-Governance backbone (99).

The word infrastructure in the e-Governance Masterplan is all-encompassing, and means all hardware needed for e-Governance implementation (such as computing devices, servers, data storage, and also communication networks). The Universal Service strategy uses a more narrow meaning and infrastructure only refers to communications network infrastructure.

It is assumed that in the e-Governance plan priority will be given to using existing communication and backbone networks. Government will work with the private sector as much as possible, where feasible and advisable. In practice this would mean that the government shall purchase bulk network capacity from service provider rather than building a separate network.

In either case, whether the government procures network capacity as a service, or builds its own network, there will be a separation between e-Governance and universal service. While the USF can be used to subsidize networks that are built by the licensed operator in areas which are not commercially viable, the USF cannot be used to fund separate government-owned e-Governance networks.

1.4. How this strategy has been developed

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

- Data and evidence collection
- Independent and extensive ICT sector analysis
- Consultation with a wide range of industry and other key stakeholders
- Myanmar ICT projects experience and analysis of wider relevant context
- International experience and best practice

A Universal Service Scoping Report was produced as a preparatory analysis for the development of this Universal Service strategy. In order to create a stand-alone document, parts of the analysis from that report have been included. However, this has been balanced with the requirement for a succinct strategy. Interested parties may find some more detailed analysis in the Universal Service Scoping Report.

Further, key elements on which this Draft Universal Service strategy is based, include the following:

- Extensive review of relevant data and documents;
- Review and discussion of international experience on universal service, USFs and best practice elements;
- Detailed GIS analysis of the combined coverage of Telenor, Ooredoo and MPT;
- Three 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;
- Two rural field visits interviewing villagers, government officials, school headmaster and hospital doctors in November 2016 in Chin state and Kachin state; and
- Numerous meetings with industry, government and CSO stakeholders.

This Draft Universal Service strategy will be subject to a public round of consultations before its approval and finalization.

2. The Myanmar ICT market and regulatory context

2.1. Market size and growth

The number of subscribers on the three main mobile operators' networks stood at 50.3 million, based on official operator submissions to PTD in November 2016. This was 10.7% above the figure recorded in July 2016. It represents a penetration of approximately 97% of population, though actual population penetration is of course lower due to multiple SIM ownership of a fairly large part of subscribers.

Following the earlier growth of 100%+ from 2014 to 2015, total subscriber growth grew at over 50% from Q2 2015 to Q2 2016. It was one of the fastest growing markets in Asia-Pacific. Table 2-1 shows the normal slow-down in growth rate, though it is still very vibrant at around 6.8% over the most recent two quarters.

Table 2-1: Market Quarterly Growth Rates³

Period	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3/Q4 2016
Quarterly growth	17.1%	15.2%	15.1%	10.8%	8.5%	6.8%

Source: Operators quarterly reports and November 2016

Market Revenues and ARPU: Mobile service revenues were approximately MKK 2,587,000 Million over the twelve months to Q3 2016 (approximately USD 2 billion), based on latest quarterly reports received by PTD.

Over the same period, the Average Revenues per User (ARPU) have moved from over MKK 6,000 per month to under MKK 5,000. This is a normal trend in all markets as higher subscriber penetration is achieved, including more lower income users.

2.2. Regional distribution of the mobile networks

Total population coverage of the telecommunications mobile infrastructure in July 2016 was over 80%, but was concentrated in central and southern regions. Both coverage and subscriber penetration in Western, Eastern and Northern states were lagging.

The licence commitments made by operators to increase their population coverage to specific targeted levels (92% by February 2019) are already taking shape even in the most recent available operator statistics (December 2016). Those show marked changes in subscriber numbers and penetration, especially in Chin, Rakhine, Kayin, Shan, Kayah, Sagaing and Kachin. The changes shown in Figure 2-1 are due in large part to major increases achieved by MPT and Telenor between July and December of 2016.

Source: Operator reports to PTD

³ Quarterly statistics of the three operators have been harmonised and summed together.

**Figure 2-1: Total penetration per 100:
July compared to Dec 2016**

Figure 2-2: Operator Coverage Commitments

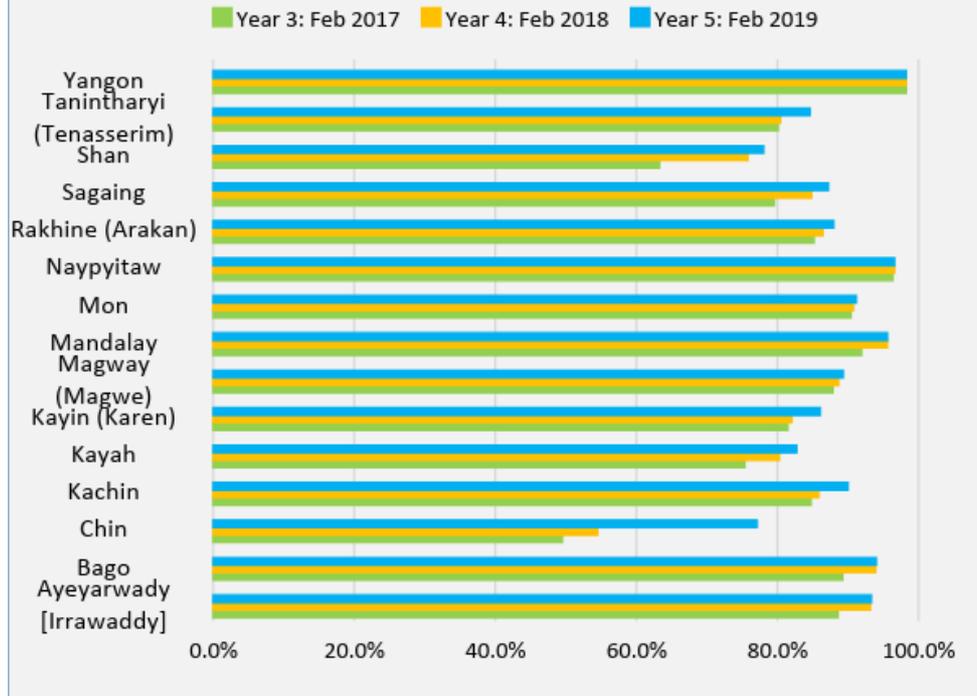


Figure 2-2 indicates the population coverage commitments which the operators made to PTD in their license negotiations, prior to a latest agreement made by Telenor and Ooredoo, each to marginally increase their Q1 2019 total coverage from 91% to 92%.

Source: Operator reports to PTD

2.3. Main Industry players

The Myanmar telecommunications market is characterised by a highly complementary combination of mobile retail and wholesale infrastructure service providers.

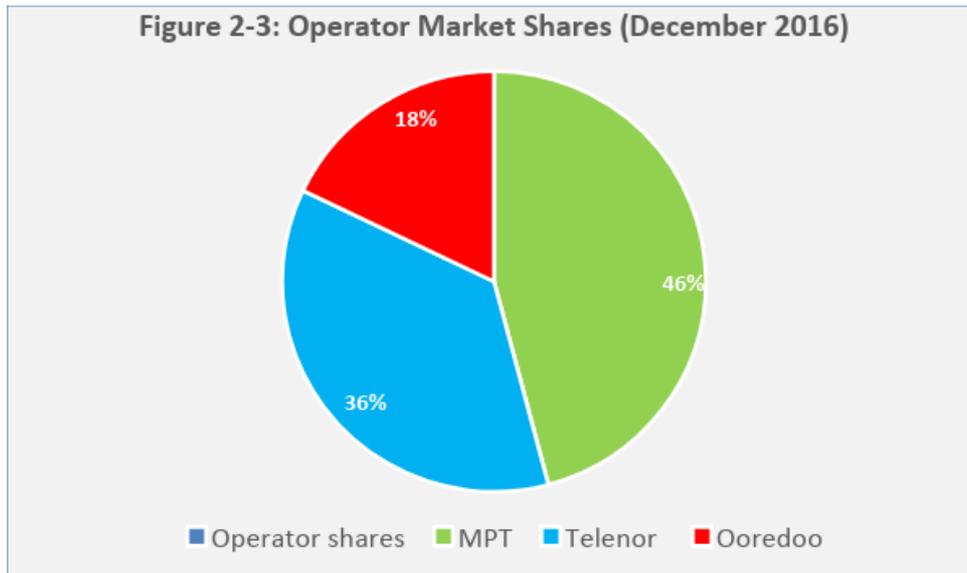
2.3.1. MPT, Telenor, Ooredoo and 4th NTL (MNTC/MyTel)

The current market structure in terms of existing shares possessed by the three current operators (based on number of subscribers) is shown in Figure 2-3. Although both MPT and Telenor have expanded into previously poorly served states, it is noteworthy that Telenor’s subscribers declined in Nay Pyi Taw, Yangon, Mandalay and Mon. Telenor’s market share thus declined from 38% to 36% between July and December 2016, while MPT’s share increased by 2% to 46%. Ooredoo remained stable at 18%.

Source: December 2016 operator reports to PTD

Telenor and Ooredoo have to date pursued quite different roll-out strategies as illustrated by their use of differing frequency bands for basic voice and broadband services. Telenor has used the 900 MHz band solely for 2G coverage and marketed basic voice services aggressively (even though all its BTS’s are equipped for 3G also). Telenor is utilising only 2.1 GHz for 3G data services to date. Ooredoo sought to differentiate itself as a leading data service provider,

Figure 2-3: Operator Market Shares (December 2016)



utilizing UMTS 900MHz technology in rural areas to enable a full range of voice and data services over a wider geographic radius from its towers than possible with 2.1 GHz. In major urban areas with dense populations (Yangon and Mandalay) Ooredoo's data services also utilise 2.1 GHz and it was also the first to roll out 4G/LTE services.

In the coming two years, both Telenor and Ooredoo are expected to pursue further geographical expansion, as per their licence commitments. Telenor is expected to utilise the 900MHz band for 3G in rural areas and has already secured an additional 2.5 MHz of 900 MHz spectrum for that purpose in the E-GSM band.

Both companies will be offering basic voice as well as advanced broadband services on an approximately equivalent geographical basis as they fulfill their five year strategies (to 2019). Both companies foresee an increase in passive infrastructure sharing via the fibre and tower companies in the immediate years ahead.

The country's fourth nationwide telecommunications licence (NTL) was formally issued to the consortium Myanmar National Tele & Communications (MNTC) in January 2017. It will operate under the brand name MyTel. Ownership is held by a 49% share for Viettel, operated by Vietnam's military, and 23% by a Myanmar consortium of 11 local companies called Myanmar National Telecom Holding Public, and domestic firm Star High with 28%.

The new provider has been allocated the 900 MHz and 2100 MHz bands and expects to become operational in 2018, and announced investments of more than USD 2 billion in equipment, services and infrastructure. Licence conditions are reportedly similar to that of the other operators.

MyTel is reportedly targeting the rural market as a key part of its growth strategy, and said it intends to provide coverage to at least 95% of Myanmar's population and attract 5 million subscribers by 2020. It also announced that it wants to boost Internet speeds for mobile handset users to 3 Mbps, which is double the present rate.

Since 2014 mobile Internet usage has swelled from just 2 million registered subscribers to nearly 40 million in 2016, according to estimates from PTD.

2.4. The backbone and passive infrastructure industries

A main reason the national licenced mobile operators in Myanmar have been able to achieve rapid growth and projected expansion into less economic regions is because of the thriving passive infrastructure wholesale industry.

2.4.1. Major fibre-companies

Two optical fibre companies with Network Facilities Service (Class) licenses and a number of smaller companies have laid or are building a total of 30,000 Km of fibre. These companies are providing major infrastructure services: national backbone facilities that are internationally connected. They enable expansion of the main retail operators' services into an ever-increasing broadband regional presence. The leading companies are:

- **Myanmar Fiber Optic Communications Network Company (MFOCN)** is the larger company and has laid around 13,500 Km of fibre stretching throughout the country linking borders, metro and regional areas. Its plans to extend total route distances to over 20,000 Km;
- **Eager Communications Group Limited (Eager)** has currently around 4,500 Km existing or fibre-network under construction. It is working aggressively on a phased plan that commenced with metro areas, then linking international borders and seeking to establish a high quality nationally integrated network. It plans to have 10,000 Km of national network with route diversity (redundancy that secures continued operations in case one fibre-route is temporarily down), reaching every state over the next 12-18 months.

The combination of the above and other smaller players, present mainly in urban areas, are providing the retail companies with a variety of broadband infrastructure options for public services as well as special networks to link government institutions, health and educational (university and school) establishments.

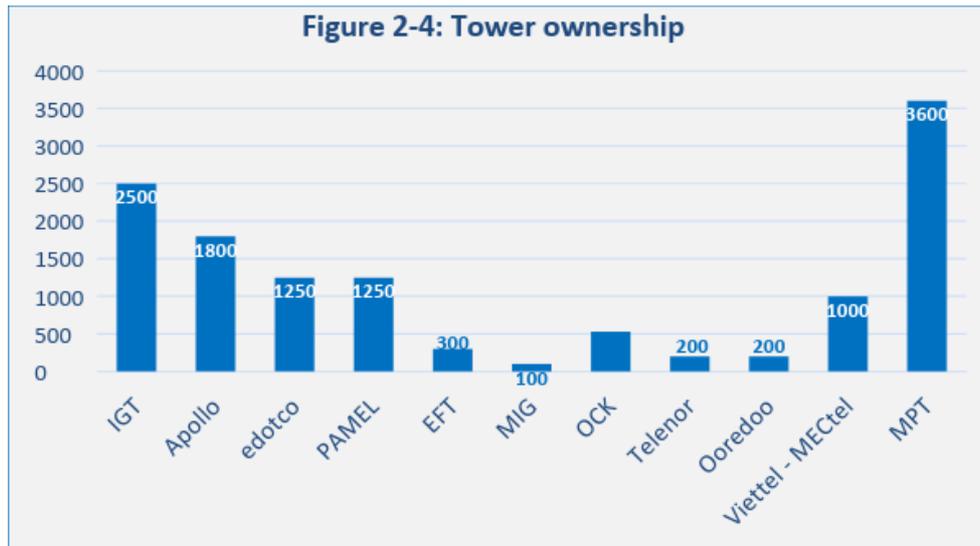
2.4.2. The tower market

At least seven tower companies have constructed over 7,500 towers, an increasing percentage of which will have multiple tenants. Including towers constructed and owned by MPT, the total number of towers in Myanmar is currently over 13,000. In addition to the above, MPT has 2,600 of its own towers and around 1,000 have been built by MECtel, which will become assets of the fourth mobile operator.

The tower companies are expected to construct more over the next two years as the main operators roll out their commitments and the fourth operator MyTel also enters the market.

The presence of so many competing companies has enabled the mobile operators to negotiate attractive tower lease rates. This is made possible by the tower companies' expectations for multiple tenancy as the mobile operators increasingly mirror one another's geographical presence.

Figure 2-4 summarises the latest status of Myanmar's existing towers as reported by TowerXchange in January 2017. The graph includes the towers owned both by the independent towercos and those self-owned by the operators, in particular MPT and Viettel-MECtel.



Source: TowerXchange January 2017

2.5. Other licensees

There are many other licensees in addition to the major players described above. Table 2-2 shows the five licence types and associated numbers of licence holders, both local and foreign. A few companies hold several licences.

Table 2-2: Existing Licensees			
Type of Licence	Local	Foreign	Total
Nationwide Telecommunication Licence (NTL)	1	2	3
Network Facilities Services Licence (Individual)	27	8	35
Network Service Licence	12	7	19
Network Facilities Services Licence (Class)	24	16	40
Application Service Licence	16	6	22
	80	39	119

Source: PTD September 2016

Not all of the licence holders are operational yet. As well, many of the licence holders do not provide services that are relevant to universal service (e.g., companies focussed on providing corporate communication solutions, international gateway services). Some of the licence holders also do not intend to serve rural areas.

2.5.1. Internet Service providers (ISPs)

A wide range of licence holders provide Internet Service. In addition to the mobile service operators, approximately 15-20 ISPs are actively advertising fixed Internet services to home or business users. At least six of these (including MPT) offer satellite based VSAT services, and a few offer fibre to the home (FTTH), Wi-Fi and WiMAX wireless services.

In most cases, the non-mobile ISPs are not significant players in the universal service areas except for the following situations:

- VSAT services are already being offered in some areas where the mobile signal is weak and also re-sold locally as telecentre or Wi-Fi hotspot service;
- Some ISPs may in future have interest in providing wireless (e.g., Wi-Fi) services in small community locations around fibre-route access points which do not have a mobile BTS nearby.

2.5.2.4G/LTE service providers with 2600 MHz spectrum licences

Four companies, already holding telecom licences and active as ISPs, won 20 MHz spectrum allocations in the 2600 MHz band through auctions held by PTD in October 2016. These companies had previously been restricted to fibre and Wi-Fi for their last-mile distribution but won licences to roll out wireless service in the new band on a regional basis. Their allocations and obligations are according to the schedule and minimum service standard shown in Table 2-3.

	Region	Company	Coverage Year 5	Min. service
1	Naypyitaw, Magway, Bago, Mon, Kayin, Tanintharyi	Fortune International	30%	5 Mbps
		Global Technology		
2	Yangon, Ayeyawaddy, Rakhine	Amara Communications	50%	5 Mbps
		Yatanarpon Teleporrt		
3	Mandalay, Sagaing, Chin, Shan, Kachin, Kayah	Amara Communications	35%	5 Mbps
		Yatanarpon Teleport		

It is expected that these operators will concentrate mostly on the urban areas in their spectrum licence territories since the signal range at 2600 MHz is limited. However, it is possible that they might provide competitive service in township centres in the future.

2.6. 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. Currently public consultation is underway on a draft law. 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.

2.6.1. 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 many operators have chosen to be passive infrastructure providers (e.g., tower and fibre companies). The majority of retail operators 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.

2.6.2. Frequencies

Frequencies are obviously extremely important for telecommunications, but 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. Thus the timely assignment of sufficient spectrum in the 900 MHz, 850 and 700 MHz bands is important for universal service. The PTD is in the process of assigning 1800 MHz which will spur LTE development, including in more semi-urban and some rural areas, though the range is more limited.

700MHz has good prospects of becoming a very good ecosystem for LTE in the long run, with many end-user devices available and on the market. It is the most harmonized band in the region and the ecosystem will speed up once India is able to auction it. Releasing this band soon will be important due to its suitability and cost-efficiency for rural LTE.

3. Objectives and targets of the Universal Service strategy

3.1. Universal service - a definition

There are several elements to universal service, as follows:

- The general concept
- The definition of basic communication
- The difference between universal access and universal service, and
- The specific dimensions of universal service

3.1.1. General concept

Universal service to (tele-)communications services means that every inhabitant of a country has access to basic communication services, regardless of where they live, their gender, race or religion, and their income and ability.

3.1.2. What is basic communications

Each country typically reviews and defines what they consider basic communications services in their country's context, while at the same time looking at international trends. Many OECD country with a prevalent fixed telephone networked included the fixed phone within their definition of basic 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 a basic service. *At least*, basic service must be defined in technology-neutral terms between fixed and mobile.

Most 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.

3.1.3. Universal access and universal service

In the past, there was further a distinction between universal access and universal service. Universal service means household or individual access to a service, while universal access means 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 high proliferation of smartphones within Myanmar, which will further increase, this strategy must focus largely on universal service.

3.1.4. Specific dimensions of universal service

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

Table 3-1		
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 • Race, tribe, 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

3.2. 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.

3.2.1. 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 thus having basic mobile voice services available to them.

In Section 2, 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.

However, due to ongoing security concerns and civil unrest, operators may struggle to cover certain obligated areas as planned. Nevertheless, the existing licence obligations and market forces have and will reach the vast majority of the population.

Very few countries achieve 100% of population coverage, and this is also not necessarily recommended. The costs for the last 1-2% of the population quickly become prohibitively high and providing service is not sustainable. It would be permanently loss-making due to high operating costs. This is what is called the true access gap and is an unsustainable target.

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 services. Currently around 80% of the population are covered. The minimum download speed is proposed to be increasingly improving as per the suggested table below, from 1.5 MBps at the end of 2017 to 5 MBps at the end of 2021 as the capacity of mobile base stations and the reach of the fibre backbone increase.

Table 3-3

Average download speed	2017	2018	2019	2020	2021
MBps	1.5	2	2	3	5

The recommended download speed of 2 Mbps on average (not guaranteed⁴) starting in 2018 is based on a combination of the current situation and factors, as follows:

- according to industry sources⁵, Myanmar’s average download speed in 2015 was 2.8 Mbps, which is likely to include many higher paying business customers - targeting 2 Mbps three years 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; 3G broadband speed capability can vary significantly based on number of users, equipment, backhaul capacity, etc.
- urban areas are likely to have higher average download speeds as more advanced 4G/LTE equipment is provided there first, but it will take longer to also serve the semi-urban and rural areas. However, the lower customer density in rural areas enables higher data speeds from 3G than typical in dense urban areas;
- starting from 2020 it is expected that new frequencies will have been released in the previous years, which will allow 4G/LTE deployment also in rural areas, so the universal service download minimum speed users on average can be raised from 2 to 3 and 5 MBps respectively.

3.2.2. Affordability of communications services

Analysis shows that Myanmar has roughly met the “1 for 2” broadband affordability target - 1GB of mobile data priced at 2% or less of average monthly income. Further, the Myanmar population benefits from low-cost smartphones. Therefore, no special measures in this area are proposed, though the USF shall have a major role in monitoring price developments.

⁴ 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.

⁵ See <https://www.fastmetrics.com/internet-connection-speed-by-country.php>

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 typically having reliable income data, especially disaggregated by income groups and regions. What is affordable to the top 10% of the population, is likely not affordable for the lowest 20% of the population who may be largely rural dwellers. Universal service is about affordability of telecom services for the poorer part of the population.

The latest "1 for 2" proposal⁶ 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 capita⁷. 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 three main operators are all offering quite affordable data broadband packages -typically 1GB costs MMK 3,000. The two tables below show a

- top down analysis using macro-economic data to estimate income and the cost of broadband as percentage of income; and a
- bottom-up analysis using household survey data from the nationally representative ICT study by LirneAsia/MIDO in 2016.

Top-down estimate

National GDP Per capita (World Bank 2016) in USD	1.300
Exchange rate May 2017 USD to MMK	1.756.710
2% of per capita income in MMK	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 current 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

⁶ See <http://a4ai.org/1for2-affordability-target/>

⁷ UN Broadband Commission

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.

The ICT study⁸ showed that on average people spent MMK 105,198 (USD 90) 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 smartphone, 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 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.

3.2.3. 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 shall 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 communications services.

⁸ LirneAsia/ MIDO ICT household surveys in Myanmar 2015 and 2016

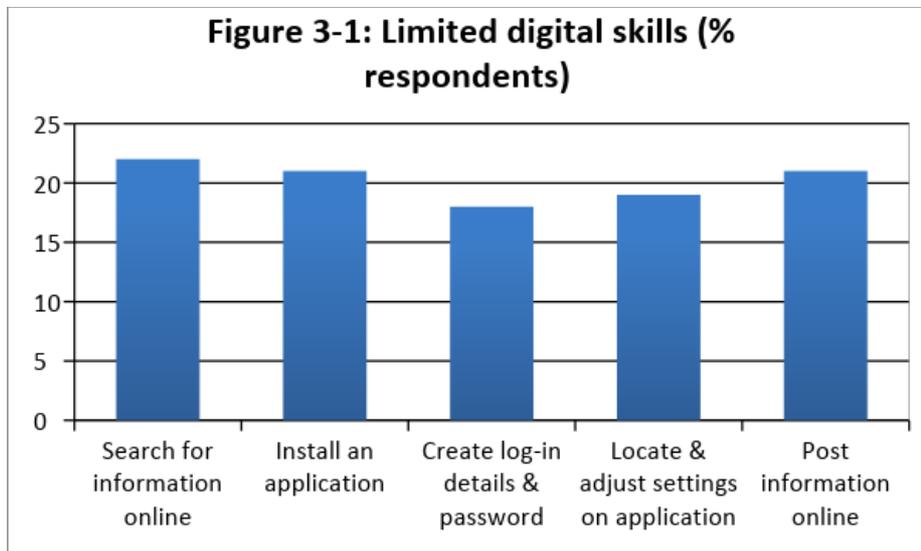
ICT data comparing men and women

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

3.2.4. 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, and to do so safely and protected. The strategy has therefore a major program focussed on capacity building and enabling digital skills. Currently only 22% of mobile internet users state that they have the required skills to use the Internet; this shall reach at least 50% within the next 5 years.



Source: LirneAsia/MIDO ICT study 2016

The future of a nation is closely linked to mastering 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 at an advanced state for implementation. The role of the universal service strategy is thus to

accelerate this process, and to initiate vanguard projects that highlight the benefits of digital skills, for example in the education sector, and to support rural and lower-income groups in acquiring digital skills. The USF shall not replace major efforts that must be undertaken by the Education department. It shall assist and complement those efforts, focussing on providing broadband Internet connectivity to schools that are made ready to benefit from Internet access.

There are three key factors that are a reason for needing a major USF program focussing 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 connecting schools and capacity building.

4. Key principles of the universal service strategy

4.1. 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 only 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.

4.2. 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, whereas 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.

In cases where commercial viability is not possible or appropriate, e.g., in regards to capacity building, the USF will consider and ensure long-term project sustainability.

4.3. 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 is to use a competitive tendering approach for the least amount of subsidy requested for service provision and project implementation from qualified bidders. This is typically a two-stage process where a sealed technical proposal and a sealed financial proposal get submitted separately. The technical proposal gets opened first and bidders have to qualify. Only qualified bidders 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 once-only 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.

4.4. Open access

While competitive tendering will be used, especially for major network expansion and broadband capacity upgrades, this shall 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.

4.5. 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 one of available financial resources, if and to what extent to subsidise ongoing service provision to areas, institutions such as schools, and population groups that are beyond the limits of the smart subsidy zone. The USF is to carefully decide if and what assistance can be given for the “true access gap” - considering that these projects will require ongoing subsidies.

4.6. 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 shall aim to maximise its resources to provide high quality impact and benefits to as many underserved people as possible.

4.7. Technology neutral

The USF mechanisms is to enable the most effective, efficient and appropriate technologies to be implemented for 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.

4.8. Transparency and stakeholder consultation

The USF will be operating in an open and transparent manner by

- a) inviting key stakeholders input into strategy, program and project development;
- b) publishing, as a minimum, annual reports that provide details of funds collected, funds disbursed, to which operator or service provider projects are awarded and how much funds they receive, key terms and conditions of their service agreement, status and achievements of

project implementation and service provision, successes and problems encountered; and

- c) distributing the funds of the USF in an open, fair and transparent manner.

5. Universal Service Programs and projects

5.1. Overview of Universal Service programs

Combining the universal service overall strategic goals and the identified gaps and needs in regards of universal service in Myanmar, discussed in detail in Section 3, the universal service strategy shall focus on three program streams, which are the following:

- 4. Program 1 - Infrastructure deployment for basic voice and broadband services**
- 5. Program 2 - ICT Capacity building - Enabling the digital future**
- 6. Program 3 - Special Projects incl. content, applications, pilots, disability**

Program 1 will be the main investment stream and ensure the supply of infrastructure so that all regions of the country and all identifiable population centres have access to national telecommunications infrastructure services.

Program 2 is centred on the development of digital skills and literacy, integration of ICT in education, and will also stimulate demand as a result.

Program 3 is to focus on special projects, in addition to the two main streams. 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 the 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 these sectors.

5.1.1. The importance of sequencing and focus

Successful universal service strategies and USF's have in common 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 1 to 3 main priorities for a certain period of time; and then re-evaluate needs and priorities and focus on the next top 1-3 priorities. For example the Rural Communications Development Fund (RCDF) of Uganda focussed in its first period of 5 years mainly on infrastructure development and public access, while focusing in its next strategic plan stronger on enabling usage through content and capacity building. Its third RCDF policy is geared strongly on broadband coverage and usability. Other examples with several rounds of plans include Chile and Colombia.

Without focus and key priorities USF's have struggled to implement their programs in a timely fashion, especially when they are newly established. Thus, Myanmar's universal service strategy focuses on the above three main program streams.

5.2. Program 1 - Infrastructure roll-out for voice & broadband

5.2.1. Introduction

The projects in this Program are informed and guided by the GIS analysis of existing and projected mobile service coverage, combined with financial modelling that is fully described in the USF Scoping report dated 9th March 2017.

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 use of 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 three operators for -100dBm (outdoor) signal level. The maps are combined electronically into a single coverage map. This shows the national coverage by March 2019, based on Telenor and Ooredoo roll-out commitments made to the Government under their licence.
- 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 MPT coverage map was limited to existing 2016 coverage, while Telenor and Ooredoo provided maps for the end of year 5 in their licence (Q1 2019) based on their commitments to PTD to reach at least 91% of population. These commitments have been subsequently increased to 92%, however the GIS mapping is sufficient for project planning purposes. An up-to-date GIS analysis will be undertaken for the tendering of individual USF projects. Total coverage to be achieved by Q1 2019, combining the coverage of all three operators for each state is shown in Table 5-1. This indicates minimum total coverage rising to 94% but is expected to reach 95% after incorporation of the latest (92%) commitments of Telenor and Ooredoo.

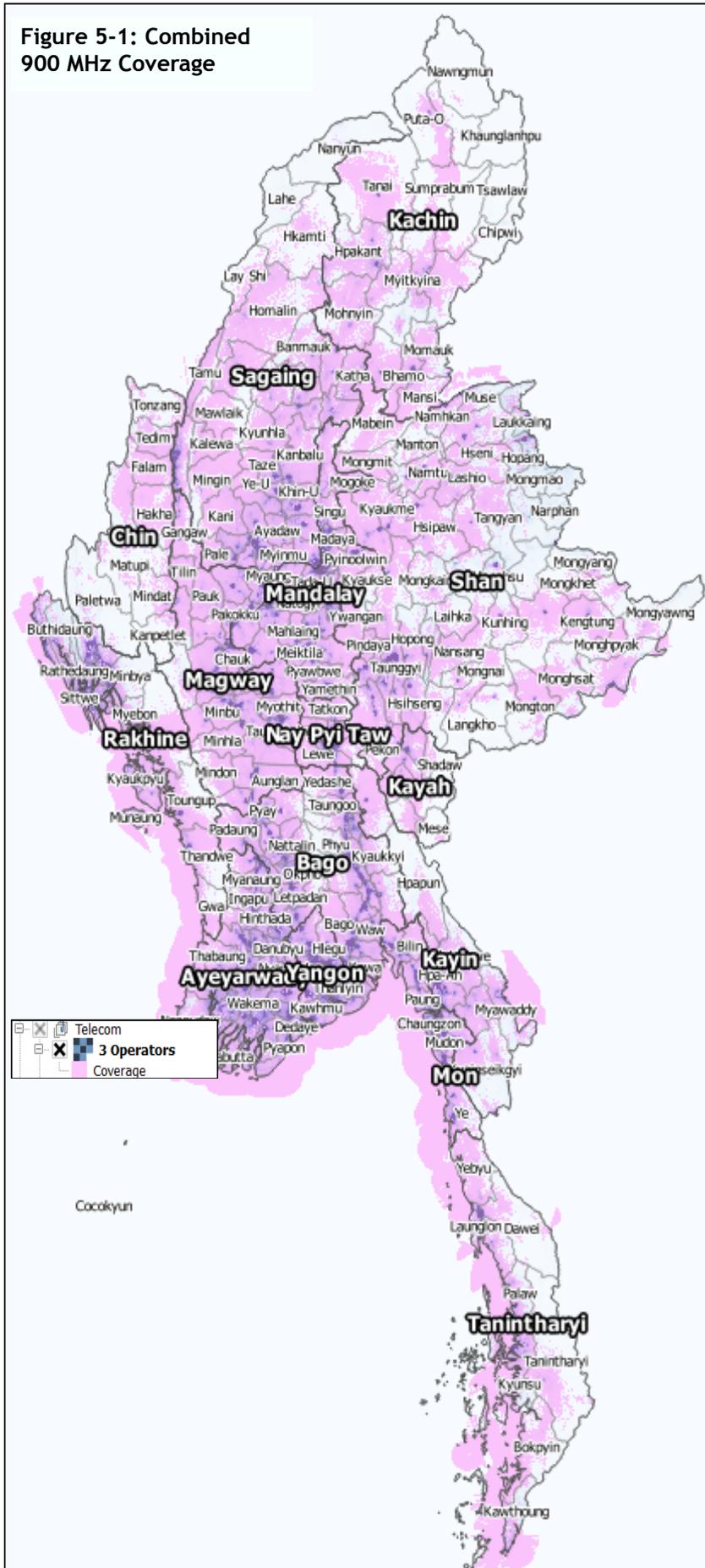
State	% Geog. Area Covered	Total Population	Population covered	% Population covered	Total Townships	Townships with < 50% Population Coverage
Chin	40.1%	469,010	274,552	58.5%	9	4
Shan (North)	54.7%	2,534,984	1,742,998	68.8%	24	7
Shan (East)	46.5%	825,297	573,740	69.5%	10	2
Tanintharyi	43.8%	1,455,338	1,194,078	82.0%	10	0
Kachin	39.4%	1,624,896	1,359,311	83.7%	18	6
Shan (South)	52.7%	2,392,218	2,044,219	85.5%	21	4
Kayah	52.2%	287,555	262,134	91.2%	7	2
Kayin	56.9%	1,599,517	1,357,124	84.8%	7	0
Rakhine	63.3%	3,153,958	2,956,615	93.7%	17	0

Sagaing	68.2%	5,195,173	4,908,427	94.5%	37	4
Bago East	72.8%	2,920,445	2,824,462	96.7%	14	0
Mon	89.7%	2,090,384	2,066,876	98.9%	10	0
Bago West	86.8%	1,985,575	1,963,547	98.9%	14	0
Magway	91.0%	3,885,893	3,852,800	99.1%	25	0
Mandalay	95.2%	6,098,506	6,070,438	99.5%	28	0
Yangon	94.3%	7,562,429	7,535,160	99.6%	45	1
Nay Pyi Taw	91.1%	1,155,749	1,151,699	99.6%	8	0
Ayeyarwady	92.7%	6,254,480	6,238,964	99.8%	26	0
Total	62.1%	51,491,407	48,377,144	94.0%	330	30

The lowest projected population coverage is for Chin state with 58.5%. Also, four (4) out of Chin's nine (9) townships will have less than 50% population coverage. Shan (North) has the most number of Townships with less than 50% coverage at seven (7).

Up to 3.1 million people will remain without service after Q1 2019 and need the intervention by the USF. Figure 5-1 illustrates the geographical coverage achieved by the combination of all three operators. Separate State / Region-level Maps are provided in Annex A.

**Figure 5-1: Combined
900 MHz Coverage**



5.2.2. 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 has recently released half of the 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.

Only 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 prohibitive. Costs would also be beyond the capacity of USF to finance as these sites would be on-going loss-making. As a result, a small percentage of the population will have Internet access with a slower speed than available to areas whose backbone is provided terrestrially by means of fibre or IP radio microwave hops.

5.2.3. Overall target

The realistic 5 Year target of the USF Strategy is to reach 99% of population, assuming that problems currently causing security risks (in Shan, Kayin and Rakhine States) can be resolved. Over half of the uncovered populations (up to 1.8 million) are in Townships with security risks. 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 and thus provide no payback on CAPEX investment. It is usual for the last 1-1.5% of population to be 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 territorial transmission systems, should therefore be targeted as the highest priorities. Table 5-2 provides guidance on how many townships are in each coverage category and the maximum subsidies projected are based on a methodology, described in Annex B, which takes population density and mountainous terrain factors into consideration. The final subsidy cost for all gap areas to reach up to 99% of the population has been estimated at USD 25.4 million.

Population coverage	No of Townships	No. of towers required	Total subsidies for voice and 3G data service (USD)
Less than 50%	30	331	
50 to 75%	27	183	
75 to 90%	41	205	
Above 90%	93	131	
100%	139	-	
Total	330	850	25,400,000

The costs are expected to cover conversion to 3G broadband as needed but further dialogue with the operators is required to assess the cost of providing service to small and most remote localities that will require satellite / VSAT trunking to micro-sized base stations.

5.2.4. First Year (2017-2018) Project - Pilot Areas

The objective of the pilot project is to 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 were 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 5-3 below as Categories 3 and 4. Above this, in 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.

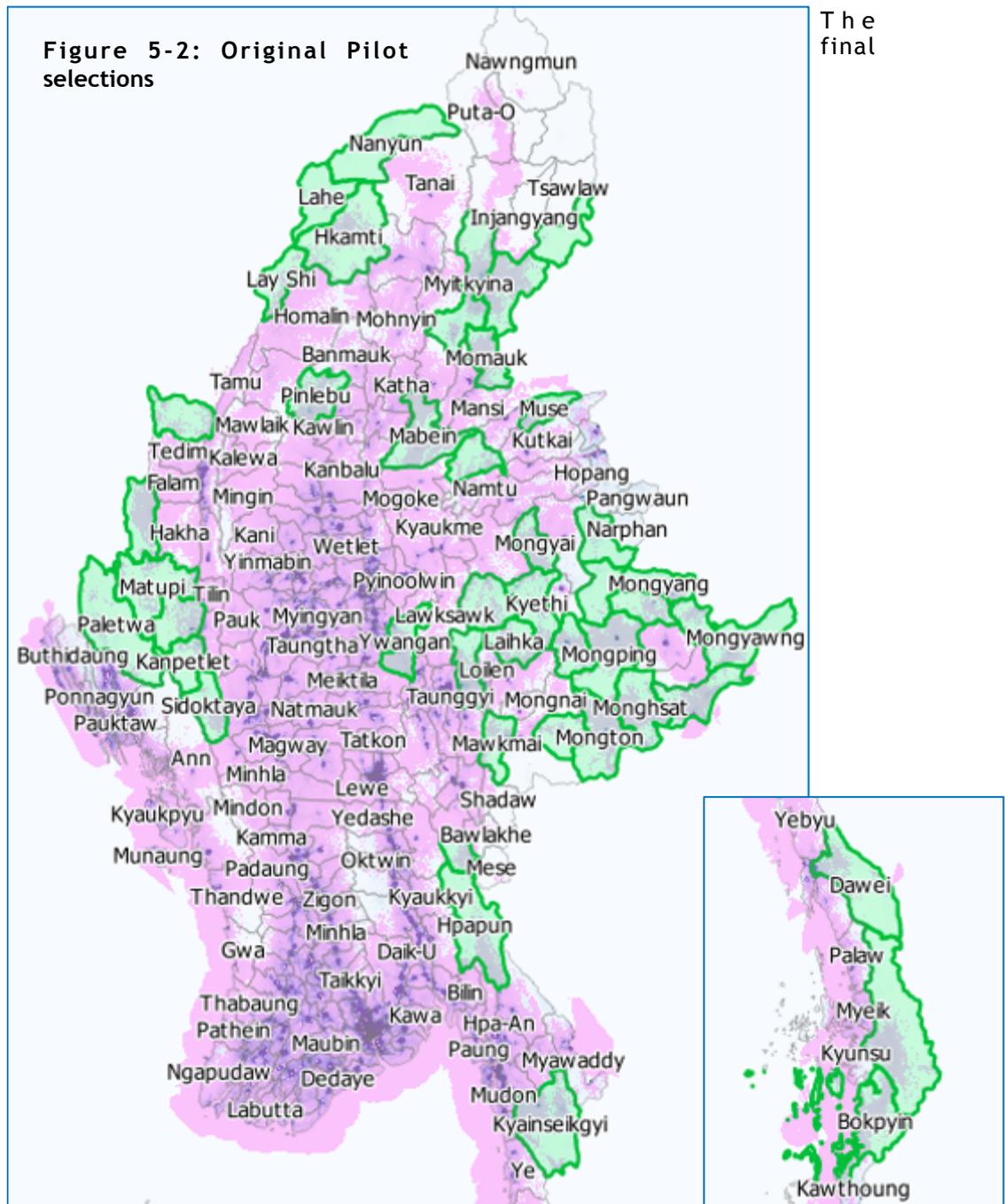
Table 5-3: Description of Viability Factor Expectations		
Category	Viability Factor	Project Description and Priority Implication
Category 1	>100%	Definitely commercially viable and will be served by existing service providers soon, no subsidy required.
Category 2	75-100%	Project is close to viable. Not yet specifically targeted by existing service providers, but could be targeted commercially soon without financial incentive. Predicted subsidy less than 25% of Capex. 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. Should be targeted later when market has expanded.

A list of **44 townships** were initially selected as representing the best possibilities for piloting. These included very needy areas and a range of situations and financial viability levels that would provide useful experience

under pilot conditions. However, at least half of the townships selected fall within security risky areas, as described below.

Figure 5-2 indicates these gap area townships proposed as being broadly representative cases for a pilot competition. A detailed list of these areas showing the expected number of new towers is provided in Annex C. The list was submitted to the three mobile operators for comment in order to assist with the final recommendation on how many of the 44 townships should be piloted.

Two (2) townships in Kayin and all twenty-two (22) in Shan were not included in the final list because of security risks not being conducive to pilot conditions and expectations.



selections - these are expected to total around 20 townships in the regions of Kachin (4), Kayah (1), Chin (6), Sagaing (5), Magway (1) and Taninthayi (3) - will be finalised in discussion with PTD and the operators. The list is provided in Table 5.4.

Table 5-4: Interim Pilot Selections					
State	Township	Township total population	Uncovered population	% Uncovered	No. of BTSs
Kachin	Myitkyina	307,377	255,123	83	9
Kachin	Waingmaw	119,876	99,497	83	6
Kachin	Chipwi	19,153	766	4	12
Kachin	Momauk	79,132	56,184	71	4
Kayah	Hpasawng	25,589	19,704	77	2
Chin	Thantlang	49,096	27,985	57	5
Chin	Tonzang	31,497	13,544	43	9
Chin	Mindat	41,793	30,091	72	6
Chin	Matupi	50,619	15,692	31	14
Chin	Kanpetlet	21,104	10,341	49	6
Chin	Paletwa	95,558	16,245	17	21
Sagaing	Pinlebu	107,792	88,389	82	3
Sagaing	Hkamti	45,495	21,383	47	13
Sagaing	Lay Shi	15,648	5,477	35	6
Sagaing	Lahe	46,236	2,774	6	11
Sagaing	Nanyun	48,998	980	2	19
Tanintharyi	Dawei	152,225	123,302	81	15
Tanintharyi	Tanintharyi	111,672	64,770	58	21
Tanintharyi	Bokpyin	84,588	61,749	73	7
Magway	Sidoktaya	47,149	26,403	56	6
	TOTAL	1,500,597	940,339		229

The Pilot is expected to provide service for up to approximately 940,000 population, which is 1.8% of total country population.

The total maximum subsidy for the 20 proposed pilots is approximately USD 12.4 million. This may be slightly reduced before the project is tendered. In any case, the final amount of subsidy awards is expected to be less than USD 10 million after completion of the tender due to the competitive factors.

5.2.5. The Overall Project Broadband Roll-out Program

Table 5-5 shows the categories of infrastructure projects to be implemented, starting from the pilot program through to Year 2022. The projects target the least covered townships in Year 2, and target progressively lower percentage gap areas in following years.

The approximate subsidy cost per unserved inhabitant, the additional population coverage achievable each year, and the main regions to be targeted in each coverage category are indicated. Since many prime priority target areas in Shan

State and Kayin States currently have security risks, final project scheduling must be made as the plan is adopted.

Subsidy costs per unserved inhabitant

The overall cost of the USF program to reach unserved inhabitants who will not be served commercially is US\$14.65. Throughout the course of the roll-out program, the subsidy costs per unserved inhabitant encompass the following range of case examples:

- US\$ 13.23 in Year 1 for the pilot project (potentially reducing to US\$ 10.63 due to competition after the subsidies are awarded);
- US\$ 17.04 in Year 2 for the townships with less than 50% coverage today; and
- US\$ 7.02 in Year 5 for townships whose current coverage is above 90% - typically flat countryside where filling in gaps is less costly.

Project Type	Target approx. no. townships	Main targeted regions	Provisional Annual Targets				
			Year 1 2018	Year 2 2019	Year 3 2020	Year 4 2021	Year 5 2022
Approx. subsidy per unserved inhabitant (US\$)			\$13.20	\$17.70	\$9.30	\$16.30	\$7.00
New population coverage			1.8%	1.0%	0.5%	0.4%	0.3%
Final year-end population coverage			96.8%	97.8%	98.3%	98.7%	99.0%
Approx. USF Subsidy targets (US\$ M)			10.0	10.0	8.0	7.0	0.4
Pilot project selection of townships	22	Kachin, Chin, Sagaing, Tanintharyi					
Townships with less than 50% coverage	26	Kachin, Kayin, Kayah, Shan,					
Townships with 50-75% coverage	22	Shan, Kayin					
Townships with 76-90% coverage	40	Tanintharyi Sagaing					
Townships above 90% coverage	40	Rakhine, Bago East					
	150						

Final program cost allowing for contingencies and learning

The projected costs in Table 5.5 represent the absolute maximum. In order to avoid the possibility of under-estimating required subsidies, the program includes the full USD 25.4 million estimates for the USF program cost *plus* the World Bank financed Pilot Project at USD 10 million. This allows for inclusion of additional high satellite costs for broadband roll-out in remote areas, as well as for the possibility that the pilot identifies the need for generally higher cost estimates due to under-estimation in the number of new BTSs required to complete coverage. In the end, economies may be reached such that the full estimated costs are not required.

5.2.6. The role of 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, in regards whether they are best sub-contractors providing leased services to the National Telecommunications Licences or as subsidy recipients.

Tower companies

Since Myanmar's market is characterised by the strong presence of independent tower companies, passive infrastructure sharing can play a key role in making rural BTS sites economic and thus reduce the subsidies required. However, tower companies' are essentially contracting sites for the National Telecommunications Licence holders. Their role is important to USF objectives but their business model (requiring multiple tenancy) becomes less feasible in small population rural areas, which will be the focus of USF investment, unless more creative infrastructure sharing models are developed. This may 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 OPEX costs must be met from the full revenue potential of the market. Thus the most remote rural areas, including those needing satellite based VSAT trunking to micro BTS sites and small towers, 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 tender to the National Telecommunication 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 (the USF could have a competition for towers to be build, but no or few operators are willing to use them and provide service). Also, operators are considered best able to find least cost coverage solutions through negotiation of tower provision contracts. In some cases, broadband service subsidy competitions might also be opened to Network Facilities Services Licence (Individual) holders.

Fibre routes

The cost of fibre routes are 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 more aggressive and pro-creative in rolling out backbones for the retail service providers, than the tower companies. A review of the existing and planned fibre routes with the main companies has led to the conclusion that the USF does not need to consider direct subsidies for fibre routes, since the fibre companies bring their national infrastructures into place that will allow virtually any areas to be served by the licensed operators through a combination of leased fibre backbones and owned "last hop" broadband IP microwave links.

5.3. Program 2 - ICT Capacity building - Enabling the digital future

5.3.1. Introduction

This major USF program will be two-pronged and will have two different sub-programs, as follows:

3. **Broadband Internet connectivity for high schools** under the Department of Basic Education; and
4. **Digital literacy projects** with organizations that have an existing track record, and including public access for broadband Internet.

Human capital development is a major component of most countries ICT plans, an example for the region is the ASEAN ICT Masterplan 2015 and 2020.⁹ 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.¹⁰ Consequently, many national ICT plans, broadband policies and universal service strategies promote and implement school connectivity projects.¹¹ It is also recognized that ICT capacity programs are likely to result in more demand for data services in the long run.

The main focus should be on enabling youth by providing digital skills - and therefore the USF support will range from formal education to also include informal education and monastery schools, as well other digital literacy projects for the wider public.

5.3.2. Internet access for high schools

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.

Data from the DBE indicates that from a total of 1,970 listed high schools, 1,027 high schools have a multi-media room¹². Our understanding is that these multi-media rooms include computers but that this is from a program implemented over 10 years ago and as such these computers are not up to date and cannot be considered functional. Especially not as broadband Internet access networks or devices.

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 Mindat and Maputi, and three in Putao (one in the district centre and two in surrounding villages). Some of the key findings include the following:

- Schools mostly had only 1-2 computers, limited to administrative tasks only;

⁹ See the Strategic thrust number 5.

¹⁰ See for example: ITU, Updated Module 1: Policies and Regulation to Promote School Connectivity

¹¹ Recent examples include Kenya, Botswana, South Korea, Malaysia and Thailand.

¹² Source: Department of Basic Education, received January 2017

- 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 were not computer literate themselves, including often the head teacher; 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.

School connectivity ecosystem

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. The USF is not responsible for readying schools in all these areas, nor financing all the required measures; that is the responsibility and role of the Department of Basic Education, and the USF should not interfere. However, the USF can and shall play an important role to accelerate ICT in schools, in collaboration with the Department of Basic Education. The USF will focus on providing broadband Internet to schools that need it, ***but the USF will only implement this in schools that have a partner or program in place to develop the required ecosystem for school connectivity.***

What is to be funded

The main focus will be on high schools. For USF support, it will be important

BOX 5-1: 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

that high schools are “Internet-ready” (see text box further 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 have become Internet ready.

The Department of Basic Education has an existing partnership with UNESCO to equip high schools with broadband Internet, and more importantly, the end-user devices and capacity to take advantage of it. It is a comprehensive and holistic approach that covers all required elements to make a school connectivity project successful. Details are described in Box 5-1.

BOX 5-2: DBE & UNESCO - Connect to Learn

Lead by UNESCO and DBE, 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

Rather than “re-inventing” this good program or duplicating efforts, the USF shall support the existing program of the Department of Basic Education and UNESCO. This shall be agreed upon between the USF and the Department of Basic Education (DBE), and their UNESCO partners, under a Memorandum of Understanding.

The USF will focus on:

- Providing broadband Internet connectivity to schools selected by the DBE/ UNESCO and supported by them through their joint initiative, providing all the additional equipment and required training; if still required, the USF shall also consider providing broadband connectivity to the 25 teacher training colleges.
- This will include a pass-word protected WiFi network for the school. In the planned pilot program it shall be explored if and how this WiFi network can be made available for the general public after school hours.

WiFi school coverage, proposed download speed

Each school will be served with a pass-word protected WiFi network with an intelligent data management router that covers the school compound, administrative and teacher quarters. It will include filters with managed settings to ensure no inappropriate content can be accessed by school-students. This will also 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 the pilot project. 5MB is a reasonable starting point for download speed, assuming that a maximum of 30 children are online browsing at the same time, allowing at least 160 kbps.

How it will be funded and implemented

- The broadband Internet connectivity will be supplied by the telecom industry and 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;
- For at least 5 years, the USF shall partially subsidize the monthly cost of the broadband Internet connectivity to the schools that are part of the joint DBE/ UNESCO program. After that, it shall be evaluated if it is necessary to continue the subsidization. Ideally, the program provides a subsidy for 5 years to each selected school, but then moves to other schools so that all schools in the country receive the benefit of an Internet subsidy to kick-start ICT. Further, the USF expects that the government will provide resources for further computerization of all its school and their broadband connectivity, and that the program is not limited to UNESCO funds alone. The purpose is to accelerate government efforts to equip schools and teachers with ICT, not completely fund it through the USF.
- In order to make this sustainable in the long-run and create ownership, schools / the DBE are to contribute to the cost of monthly broadband connectivity, even if only nominally and a small amount. If feasible, the own contribution of schools shall slowly increase over the next 5 years.

Competitive bidding approach for Internet connectivity

The USF should use a competitive tendering approach for the least amount of subsidy requested for connecting schools and communities from qualified bidders. This is a two-stage bidding process where bidders need to provide a sealed technical proposal and a separately sealed 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. First the technical proposal gets opened. 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, and proceed to the second stage.
2. During the second stage, only the qualified bidders have their separately sealed financial proposal opened. 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.

Stakeholder partnership and co-ordination

It is imperative to have a good partnership and co-ordination between the USF and the Basic Department of Education, in order to have a successful school connectivity and ICT capacity building program. Both parties shall “own” the program and have a serious stake in its success.

This requires an agreement of what exactly gets done by whom, spelling out the respective roles, responsibilities, functions and expectations, as well as commitments regarding resources of funds, manpower and expertise that are at the disposal for this program. It is recommended that the USF develops a Memorandum of Understanding (MoU) with both the BDE and the UNESCO, outlining respective duties and obligations.

Among many other topics, the MoU between the USF, BDE and UNESCO should cover the following:

- BDE to gather and supply school-relevant data and information in a timely fashion,
- UNESCO to make available their DBE approved e-learning/educational software and content; DBE to start preparing a basic ICT curriculum for high schools;
- BDE’s responsibility for planning the budget for general software upgrades,
- Making sure that the schools themselves also have a voice and input into the program design and implementation as their local expertise and support is crucial for the success too;
- Plans to manage the online protection of the schoolchildren,
- Commitment and mechanism to resolve any differences of opinion,
- Sustainability plan - the USF funding is for five years, Internet service prices will likely further decrease; what portion of school connectivity, required upgrades, ICT teachers and associated costs can the DBE take over, which portion needs to be continued by the USF?
- Detailed monitoring and evaluation approach including both the USF, DBE and UNESCO.

Technical support

International experience with USF-funded school 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 schools.

First step: Pilot project

The pilot project shall connect 30 to maximum 50 high schools, selected jointly by DBE, PTD and UNESCO, and supported by the joint capacity building program and supply of tablets etc. They shall be in same townships and regions as the current supported 31 high schools: Mandalay region, Bago region, and Mon state and/ or in close by states or regions to ensure there is sufficient capacity to

regularly visit and support the schools, conduct joint trainings and similar activities.

Costs for school connectivity can vary widely depending on the location of the high school, 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 school; this includes the set-up (in most cases existing wireless connectivity), 5 years monthly subscription costs and a WiFi network. So a pilot project for broadband Internet connectivity including around 50 schools would cost USD 500,000, assuming average costs of USD 10,000 per school.

In order not to delay the pilot project, the USF will also offer some funding for the tablets as an option, in case that is required. This will be further discussed and specified during the detailed Pilot Design phase. This is an exception, and not part of the main program, and shall not exceed the cost of the broadband connectivity element.

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

5.3.3. Digital literacy projects and increasing ICT usage

As outlined in more detail in Section 3.4.1, 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. In addition to supporting building digital skills in schools, the universal service strategy will also support digital literacy and training projects outside of high schools. 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.

Public access

With the high data-capable phone penetration and low 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 literacy program. Further, the USF shall monitor the situation regards the need and demand for public access to broadband Internet services, and take steps in the future if needed.

What is to be funded

The USF shall fund a range of digital literacy projects, with a range of target groups and topics, including but not limited to the following target groups:

- The general public, but 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 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.

How it will be funded and implemented - Annual application process

The USF will use an annual application process to solicit eligible proposals for USF subsidy for digital literacy and training projects. This will be open to eligible organizations. The USF will set aside a specific amount each year for digital literacy projects, amounting to approximately 10-15% of annual USF spending, and not exceeding 15%.

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 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; 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.).

In case it is appropriate, the USF can issue a tender for competitive supply of broadband Internet connectivity for the selected digital literacy initiatives.

Eligibility for USF funding digital literacy projects

USF funding will be available under the following rules and conditions:

- Eligible organizations need to have an existing track record in Myanmar in digital skills training and providing public access to broadband Internet. This shall be further specified (e.g., trained at least a 1,000 people in Myanmar, have at least 20 existing public access locations);
- Eligible are only locally-based NGO's that are Not-for-Profit;
- Eligible organizations without an existing track record may also receive funding assuming they are qualified; however, since this is a higher risk for the USF, the USF contribution shall be smaller, e.g., limited to maximum of 30% of total funds;
- 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 10,000 persons, offering more than 10 locations for training); this is to be specified.

Pilot project

In order to include one pilot project for digital training during the first year, there will be a public Request for Proposal (RFP) from MOTC/PTD/USF. This will specify the maximum amount of funds available for the pilot project, and expected size and reach.

5.4. Program 3 - Special projects

5.4.1. Introduction

The purpose 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.

5.4.2. Types of special projects

Special projects include the following types:

- 1) **ICT content, services or application development for rural users and/ or lower income groups:** The USF shall 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 shall 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 shall 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 shall 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.

5.4.3. Fund allocation and implementation

The USF will allocate not more than 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.

5.4.4. Proposed first special project during pilot phase

One of the following two projects could be implemented for the pilot phase:

- Providing subsidised broadband access to rural/remote district hospitals in a certain region; or
- Providing funding to translate software from English to Burmese to help disabled people to use ICT.

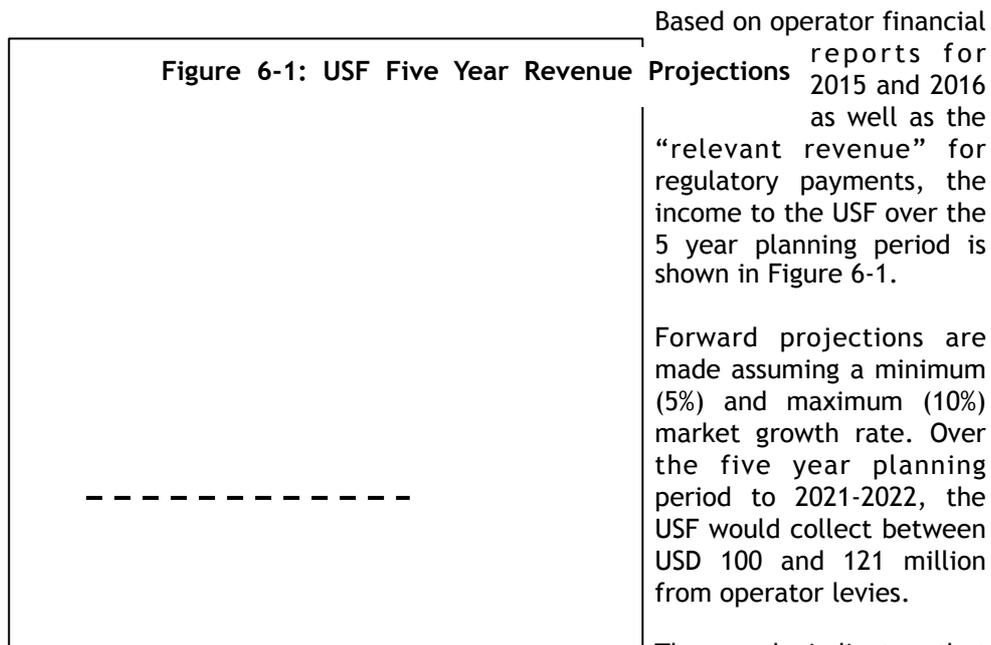
Both pilot projects could provide quick wins.

6. Available USF Funding and Needs

6.1. General

Chapter XV in the Telecommunications Law from 2013 provides for MOTC to instruct the PTD to establish the USF and to supervise its programs. For this, the licences of all four NTL operators - Ooredoo, Telenor and MPT, as well as the fourth entrant MNTC/MyTel - are required to pay a USF levy. The USF levy is 2% of relevant revenue on an annual basis, which is the same amount as their regulatory fee. They have a minimum of three years exemption to pay though, starting from their initial licence date.

6.2. USF Income Projection



The graph indicates that the amount of funds required for the main expenditure program (Program 1 - Voice and Broadband Infrastructure Services) will be collected within the first two years.

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 few high schools ready and only smaller scale digital literacy projects today - has a low absorptive capacity for funds at this initial stage; and thus it would be risky to invest large amounts in these initial years; and
- Program 3, while important, requires a high degree of administrative capacity, which USF's usually don't have in their initial years.

In conclusion, the immediate and ongoing collection of 2% of relevant revenues will create a serious imbalance of income versus expenditure, i.e., the USF will collect too much with little capacity to distribute the funds. USF's that collect too much and then cannot distribute the funds in a reasonable and beneficial manner are the main reason why USFs sometimes are considered inefficient. Collecting too much risks to lose the credibility of Myanmar's universal service program and the USF.

6.3. Review and recommendations

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

- Myanmar will achieve a much higher mobile network coverage than other developing countries through the existing licence obligations; thus less universal service funds are needed;
- Very few funds collect more than 1% of revenue, and those that do are usually not able to disburse more than 1% of market revenues on USF programs without risking misallocations;
- Collections of the magnitude indicated by the graph are likely to invite loss of confidence from stakeholders, since the fund will not be able to use the funds for purposes intended by the Telecommunications Law.

It is therefore recommended that the MOTC should consider the following in order to ensure sound USF planning and execution:

1. Suspend or *reduce* collections after two years, or in the first year where subsidy distributions fall below 50% of collections.
2. Delay the commencement of collections until 2018 - 2019, to coincide with the first needs of the Strategic Plan following the Year 1; this also helps operators to complete their licence roll-out obligations.
3. Execute a conceptual change in the licence obligation to enable PTD to collect “up to 2%” of relevant revenues, fixing the actual collection at 1% for the initial few years¹³ and having the flexibility to collect according to actual needs of the USF.

¹³ The measure to reduce the collection percentage could be accompanied by a regulation to collect the universal service levy from all licenced operators above a stipulated level of turnover.

7. Monitoring and evaluation

1. Introduction

The USF and its universal service strategy needs a monitoring and evaluation system for the following key 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.

2. Monitoring

Monitoring is done within shorter timeframes, more frequently and more or less an ongoing activity. It 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.

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.

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 focussed 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 in regards to certain key parameter the project plans to impact.

It is recommended that the USF determines for each program stream what the earliest time is to do a meaningful evaluation. This could be using a shorter timeframe as long as the expectations regarding the possible impact achieved are reasonable.

For each strategic program stream, the USF shall 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.

Note: Detailed monitoring and evaluation plans are part of this project and will be prepared by the consultants for PTD approval.

4. 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 regards 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?
- Will USF partners such as the Department for Basic Education provide the necessary budgetary resources to support the program adequately as agreed?

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.

5. Planning the next 5-year universal service strategy

One year before the end of this universal service strategy, the next strategy shall be developed. This will 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.