



APT Expert Mission for Lao PDR in 2018 for National Broadband Plan 2021-2025

December 2018



Disclaimer

This report is based on information materials provided by the MPT and other local stakeholders throughout the technical assistance mission. The report is not based on detailed legal due diligence and does not constitute legal advice. Accordingly, no inference should be drawn as to the adequacy, accuracy or suitability of the policy recommendations, regarding legal or regulatory framework for broadband in Lao PDR.

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List of Abbreviations

ADB	Asian Development Bank
ADSL	Asymmetric Digital Subscriber Line
APST	Asia Pacific Satellite Technology Co., Ltd
ASEAN	Association of Southeast Asian Nations
ccTLD	Country Code Top Level Domain
CDMA	Code Division Multiple Access
CLMV	Cambodia, Laos, Myanmar and Vietnam
DPLC	Domestic Private Leased Circuit
EDGE	Enhanced Data rates for GSM Evolution
EDI	Electronic Data Interchange
EdL	Électricité du Laos
EFT	Electronic Funds Transfer
EHR	Electronic Health Record
ETL	Enterprise Telecom Lao
FTTH	Fiber to The Home
FTTx	Fiber to The x
GOL	Government of the Lao People's Democratic Republic
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
GTPA	Government Telecommunication Project Agency
HSPA	High Speed Packet Access
HSDPA	High Speed Downlink Packet Access
ICT	Information and Communication Technology
IoT	Internet of Things
IP	Internet Protocol
IPLC	International Private Leased Circuit
IPTV	Internet Protocol Television

ISP	Internet Service Provider
ITU	International Telecommunication Union
IXPs	Internet eXchange Points
LANIC	Lao National Internet Center
LAOSAT	Lao Asia Pacific Satellite Co., Ltd.
LSE	Lao Satellite State Enterprise Co., Ltd.
LTC	Lao Telecommunication Company
MOICT	Ministry of Information, Culture and Tourism
MOD	Ministry of Defense
MOF	Ministry of Finance
MOIC	Ministry of Industry and Commerce
MOPS	Ministry of Public Security
MOPW	Ministry of Public Works
MPT	Ministry of Posts and Telecommunications
MSMEs	Micro, Small and Medium sized Enterprises
NCDP	National Committee for Disabled Persons
RFID	Radio-Frequency Identification
SSTC	China Aerospace Science and Technology Co., Ltd
STL	Star Telecom Lao
USO	Universal Service Obligation
UXO	Unexploded Ordnance
VPN	Virtual Private Network
WB	The World Bank
WBCN	Wireless Broadband Communication Network
WHO	World Health Organization
Wi-Fi	Wireless Fidelity
WiMax	Worldwide Interoperability for Microwave Access

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Executive Summary

The Mission aims to provide technical assistance to help the GOL prepare Lao National Broadband Plan for the period of 2021-2025. The Mission mainly focuses on assisting in planning what actions Lao PDR could consider in order to promote broadband infrastructure and services at the national level. The Asia-Pacific Telecommunity (APT) in partnership with the National Information Society Agency (NIA) of Korea has been entrusted by the Ministry of Posts and Telecommunications (MPT) for the technical assistance as a part of APT Expert Mission 2018 for Lao PDR.

The purpose of this National Broadband Plan is to harmonize activities across the government and to provide a whole-of-government approach to broadband development in Laos with a view to achieving medium- and long-term strategic objectives.

The report for the National Broadband Plan 2021-2025 is comprised of the following six chapters:

Chapter 1. Introduction introduces the policy context in relation to the telecommunication sector in Lao PDR and the background of this Technical Assistance project;

Chapter 2. Current State of Broadband in Lao PDR gives an overview of the state of ICT/broadband and telecommunication market in Lao PDR, followed by the state of broadband ecosystem in terms of applications, devices, networks, adoption and take-up, and local content, with major laws and regulations for administering and regulating the telecommunications sector;

Chapter 3. Objectives sets out five strategic objectives of the National Broadband Plan 2021-2025 including objectives of promoting supply (broadband infrastructure) and stimulating demand (broadband services);

Chapter 4. Vision proposes several vision statements to accomplish for broadband in Lao PDR within the planning period from 2021 to 2025;

Chapter 5. Policy Goals and Programs set outs policy goals and programs for the National Broadband Plan 2021-2025 for achieving the goals of (1) More places connected, (2) More affordable prices (Affordability), (3) More people use (Take-up, Usage) and (4) more useful applications and local contents (Relevance);

And **Chapter 6. Implementation and Performance Indicators** describes the structure to expedite implementation of the Plan and the performance indicators for monitoring and measuring the progress of the plan.

The proposed National Broadband Plan ranging from 2021 to 2025 anticipates the development of an advanced broadband infrastructure by 2025 that will be universally accessible across the country with high quality at an affordable price.

1. Introduction

Historically, broadband has been commonly defined in terms of data transmission speed. Speed has been the key component when addressing broadband, even though there is no definitive bandwidth. However, broadband is not just about high-speed access to the Internet in terms of data transmission speed. Rather, it is an enabling platform for advanced services and applications for socio-economic development. In other words, the potential benefits of broadband are closely related to the services and applications enabled by broadband and their productivity gains. Although there are some direct effects from deployment of the broadband infrastructure, the indirect effects from broadband-enabled innovation, efficiency gains and enhanced competitiveness, as well as new products and services are far more substantial.¹ According to a World Bank study, low-income and middle-income countries experienced “about a 1.38% increase in GDP for each 10% increase in broadband penetration” between 2000 and 2006.²

Since broadband is an enabling platform that impacts not only the ICT sector but also other sectors of the economy, broadband infrastructure is broadly being recognized as a new social overhead capital in information society. In addition, broadband is often viewed as an ecosystem embracing interdependent supply and demand. Broadband ecosystem approach highlights interactions between supply (network platforms) and demand (services and applications). Thus, it is essential to create an environment for supply-side growth, but it is no less important to spur demand for and take-up of broadband. That is the main reason why broadband strategies in many countries evolve with markets and focus on building both the supply of and demand for broadband.

It is equally important to note that broadband is not an end itself, but rather an enabler for improving education, healthcare, the environment, energy efficiency, public safety, and the delivery of public services. In this context, the purpose of this National Broadband Plan is to harmonize activities across the government and to provide a whole-of-government approach to broadband development in Laos with a view to achieving medium- and long-term strategic objectives.

Although the market is the primary force determining supply and demand of broadband services, government has a significant role to play both in facilitating market driven broadband outcomes and promoting universal broadband access in underserved and unserved populations. There are serious impediments to Lao PDR realizing the full benefits of broadband – such as limited market size, lack of price competition, lack of affordable

1. OECD, Broadband and the Economy, DSTI/ICCP/IE(2007)3/FINAL, OECD Ministerial Meeting on The Future of the Internet Economy, p. 11 (June 17-18, 2008), available at <http://www.oecd.org/dataoecd/62/7/40781696.pdf>

2. Christine Zhen-Wei Qiang and Carlo M. Rossotto, IC4D: Extending Reach and Increasing Impact, Chapter 3: Economic Impacts of Broadband, GICT Dept. World Bank, p. 45 (2009)

broadband services, low take-up, lack of local content, and so on. To address these barriers, the Government of Lao People's Democratic Republic (GOL) needs to formulate a National Broadband Plan and should exert concerted efforts, based on the Plan, to promote sustainable environment and market operation through pro-competitive regulatory measures focusing on the deployment and take-up of broadband, in addition to encourage the extension of physical networks and the development of local content along with useful applications.

1.1 Policy Context in Lao PDR

Lao PDR, with an area of 236,800 square kilometers, is the only landlocked country in South East Asia. Lao PDR is situated in the center of the Indochina Peninsula. It is bordered by China to the north, Vietnam to the east, Cambodia to the south, Thailand to the west and Myanmar to the northwest. Some 70% of the country is composed of mountains and high plateaus.

Lao PDR has made number of changes to the structure of its telecommunication sector over the last decade. This includes the introduction of private investment through joint ventures, which contributed to the modernization of telecommunication infrastructure in the country. Despite the progress in telecommunication infrastructure, Lao PDR still faces many challenges in broadband³ supply and demand as follows. First, given the low level of income, the price of the equipment required to access the Internet is very high. Second, being land-locked, there is no direct access to submarine cable systems, leading to high costs of international bandwidth. In addition, small size of population in mountains and remote areas makes the rollout of infrastructure expensive. Even if connectivity was available, rural and remote areas make it difficult from a commercial perspective to provide services at affordable prices. Third, due to both commercial and cultural reasons, Laotian content is very limited. Fourth, because of relatively low levels of literacy and educational attainment, awareness of the Internet is not high among most of the population. Internet users amounted to only 25.5% of total population in 2017.

Lao PDR, compared to its neighboring countries, has a relatively small population base and limited domestic market. In this regard, broadband is rather expected to play a key role in providing access to global markets, in addition to enabling digital transformation of society. Indeed, broadband can have an important place in providing access to global markets. In a nutshell, Lao PDR is facing a unique combination of priorities, market structures, and geographies that affect its national broadband plan.

3. It is not appropriate to define broadband in terms of a specific transmission speed. However, for policy purposes, broadband is defined as 512 Kbps or higher in Lao PDR.

1.2 Background of the Project

The Mission aims to provide technical assistance to help the GOL prepare Lao National Broadband Plan for the period of 2021-2025. The Mission mainly focuses on assisting in planning what actions Lao PDR could consider in order to promote broadband infrastructure and services at the national level. The Asia-Pacific Telecommunity (APT) in partnership with the National Information Society Agency (NIA) of Korea has been entrusted by the Ministry of Posts and Telecommunications (MPT) for the technical assistance as a part of APT Expert Mission 2018 for Lao PDR.

The new National Broadband Plan ranging from 2021 to 2025 anticipates the development of an advanced broadband infrastructure by 2025 that will be universally accessible across the country with high quality at an affordable price. By 2025, broadband infrastructure in Lao PDR will meet the needs of its citizens, business and the public sector, while producing a wide range of converged applications and services required for effective economic and social development.

As noted earlier, broadband is often regarded as an ecosystem and the broadband ecosystem consisting of networks, services, applications, content and devices is expected to be fully integrated into the economic and social structure of Laos. Therefore, a right combination of these elements of broadband ecosystem will bring an enabling platform for sustainable economic growth, innovation, and good governance.

In addition to the examination of broadband ecosystem along with international assessment of broadband and ICT, the project also reviews and analyzes the previously formulated National Broadband Plan(draft) to check if it still stays relevant, together with the assessment of what worked and what did not. With rapidly changing technologies and changes in demand and the national ICT environment, the National Broadband Plan (draft) needs to be reviewed with a renewed focus. Based on the review, recommendations on strategic direction will be made to improve and strengthen a sustainable broadband ecosystem in Laos by ensuring the fulfilment of the national vision - more affordable broadband for all by 2025.

2. Current State of Broadband in Lao PDR

2.1 State of ICT/broadband from international perspective

☐ Telecommunication & Broadband

- In 2016, Lao PDR has the value of 0.91, making it part of the bottom 10% for Internet and telephony competition index (level of competition index for internet services, international long-distance services, and mobile telephone services on a 0–2 (best) scale)

- Mobile network coverage rate: 101st (96%)
- International Internet bandwidth per Internet user: 129th (2.8Kbps)



Source: WB, TCData360

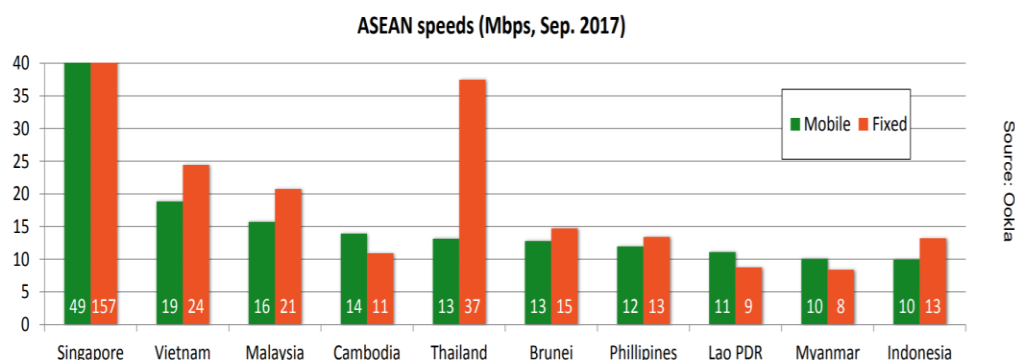
- Fixed broadband Internet tariffs (Monthly subscription charges for fixed broadband Internet service (PPP \$): 88th (\$42.39/Month)
- Average cost of broadband (per Month in USD): \$229.43 (192nd out of 196 countries)

Rank	Country code	Name	Continental region	Packages measured	Average package cost per month (local currency)	Currency	Average cost of broadband (Per month in USD)	Average cost of broadband (Per month in currency of your choice) – Use drop-down list in the cell above this one
1	IR	Iran	ASIA (EX. NEAR EAST)	34	189,350.10	IRR	\$4.34	3.34
2	UA	Ukraine	CIS (FORMER USSR)	17	146.31	UAH	\$5.57	4.28
3	RU	Russian Federation	CIS (FORMER USSR)	29	587.54	RUB	\$9.27	7.13
4	MD	Moldova	CIS (FORMER USSR)	12	188.92	MDL	\$11.34	8.71
5	SY	Syria	NEAR EAST	41	6,254.88	SYR	\$12.13	9.33
6	EG	Egypt	NORTHERN AFRICA	37	219.31	EGP	\$12.24	9.41
7	BY	Belarus	CIS (FORMER USSR)	24	25.00	BYR	\$12.50	9.61
8	KZ	Kazakhstan	CIS (FORMER USSR)	32	4,530.37	KZT	\$13.16	10.11
9	RO	Romania	EASTERN EUROPE	23	53.31	RON	\$13.30	10.22
10	NP	Nepal	ASIA (EX. NEAR EAST)	34	1,968.98	NPR	\$17.97	13.81
11	TJ	Tajikistan	CIS (FORMER USSR)	21	170.10	TJS	\$18.11	13.92

Rank	Country code	Name	Continental region	Packages measured	Average package cost per month (local currency)	Currency	Average cost of broadband (Per month in USD)	Average cost of broadband (Per month in currency of your choice) – Use drop-down list in the cell above this one
185	OM	Oman	NEAR EAST	13	56.92	OMR	\$147.87	113.64
186	QA	Qatar	NEAR EAST	14	544.00	QAR	\$149.40	114.82
187	VU	Vanuatu	OCEANIA	10	16,860.00	VUV	\$151.74	116.61
188	AG	Antigua and Barbuda	CARIBBEAN	10	415.19	XCD	\$153.63	118.07
189	AE	United Arab Emirates	NEAR EAST	7	569.92	AED	\$155.15	119.24
190	ML	Mali	SUB-SAHARAN AFRICA	7	91,333.33	XOF	\$162.13	124.60
191	ZW	Zimbabwe	SUB-SAHARAN AFRICA	8	170.00	USD	\$170.00	130.65
192	CK	Cook Islands	OCEANIA	4	253.00	NZD	\$170.74	131.22
193	KY	Cayman Islands	CARIBBEAN	14	143.72	KYD	\$172.87	132.86
194	HT	Haiti	CARIBBEAN	8	224.19	USD	\$224.19	172.30
195	LA	Lao People's Democratic Republic	ASIA (EX. NEAR EAST)	39	1,928,478.63	LAK	\$229.43	176.32
196	BN	Brunei Darussalam	ASIA (EX. NEAR EAST)	7	362.64	BND	\$332.63	255.63
197	NA	Namibia	SUB-SAHARAN AFRICA	12	6,170.44	NAD	\$465.52	357.76
198	PG	Papua New Guinea	OCEANIA	18	1,917.20	PGK	\$583.87	448.71
199	BF	Burkina Faso	SUB-SAHARAN AFRICA	8	537,158.63	XOF	\$953.56	732.83

Source: Broadband Pricing League Table

- Internet speed among ASEAN countries: mobile 8th, fixed 9th out of 10 ASEAN countries

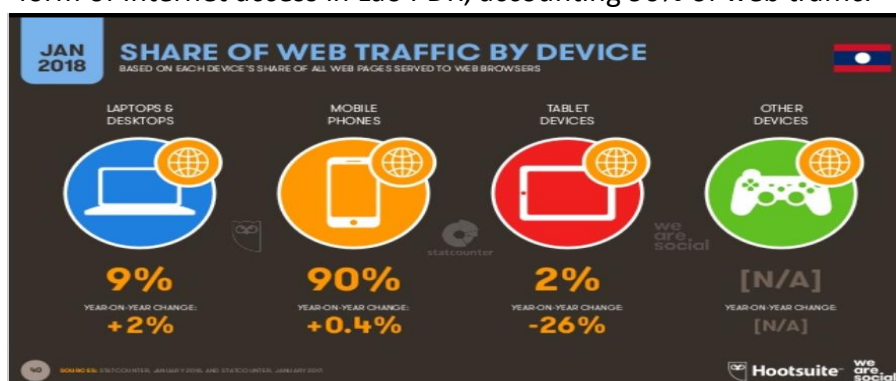


- Most popular websites for Laotians: Youtube is the most popular website among Laotians, followed by Google and Facebook.⁴



(Google.la has Lao and English language options.)

- Share of Web traffic by device: Mobile phone has become the most preferred form of Internet access in Lao PDR, accounting 90% of web traffic.



☐ Lao PDR ICT Profile

ICT statistics	%
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4. Alexa's Traffic Ranking is based on the traffic data provided by users in Alexa's global data panel over 3 months period. A site's ranking is based on a combined measure of Unique Visitors and Pageviews. Unique Visitors are determined by the number of unique Alexa users who visit a site on a given day. Pageviews are the total number of Alexa user URL requests for a site.

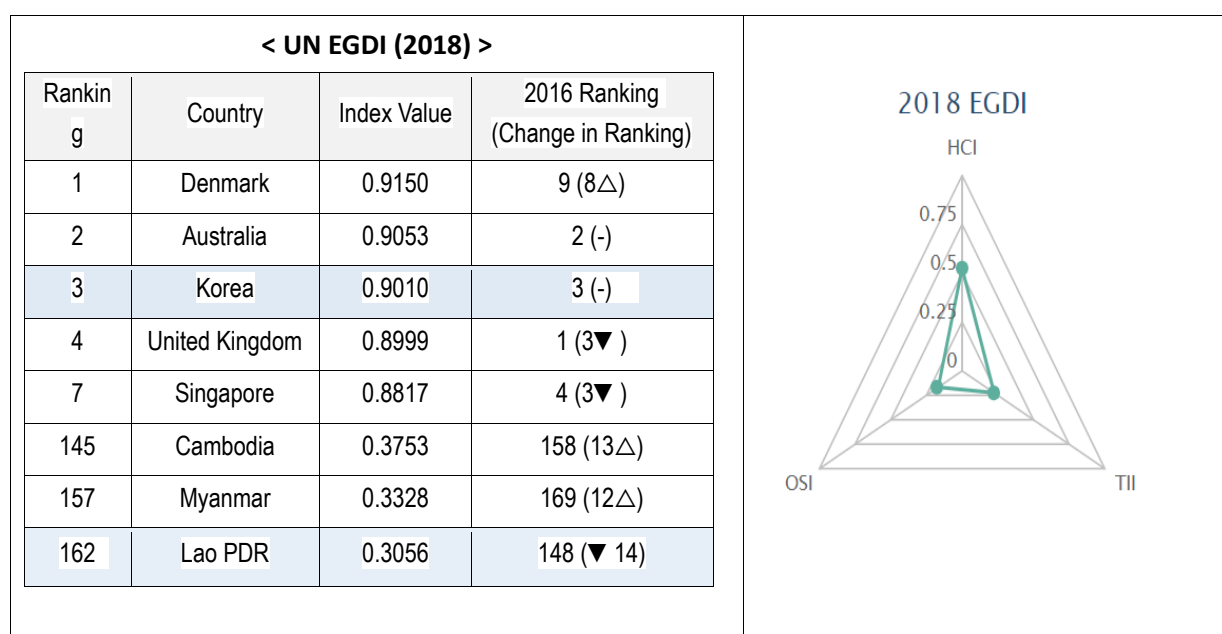
Fixed-telephone subscriptions per 100 inhabitants	16.4
Mobile-cellular subscriptions per 100 inhabitants	54.1
Fixed (wired)-broadband subscriptions per 100 inhabitants	0.2
Mobile-broadband subscriptions per 100 inhabitants	40
Households with a computer (%)	13.2
Households with Internet access at home (%)	24.5
Individuals using the Internet (%)	25.5

Source: ITU, ICT-EYE (Latest data available: 2018)

□ UN e-Government Survey 2018: 162nd out of 193 countries

- All of the three areas of the Online Service Index (0.1667), the Telecommunications Infrastructure Index (0.2246), and the Human Capital Index (0.5254) are very low.

(Region leader in Asia: Korea (0.9010) / Sub-region leader in Southeast Asia: Singapore (0.8817))



Source: UN e-Government Survey 2018

UN E-Government Development Index Ranking for Lao PDR: 2003-2018

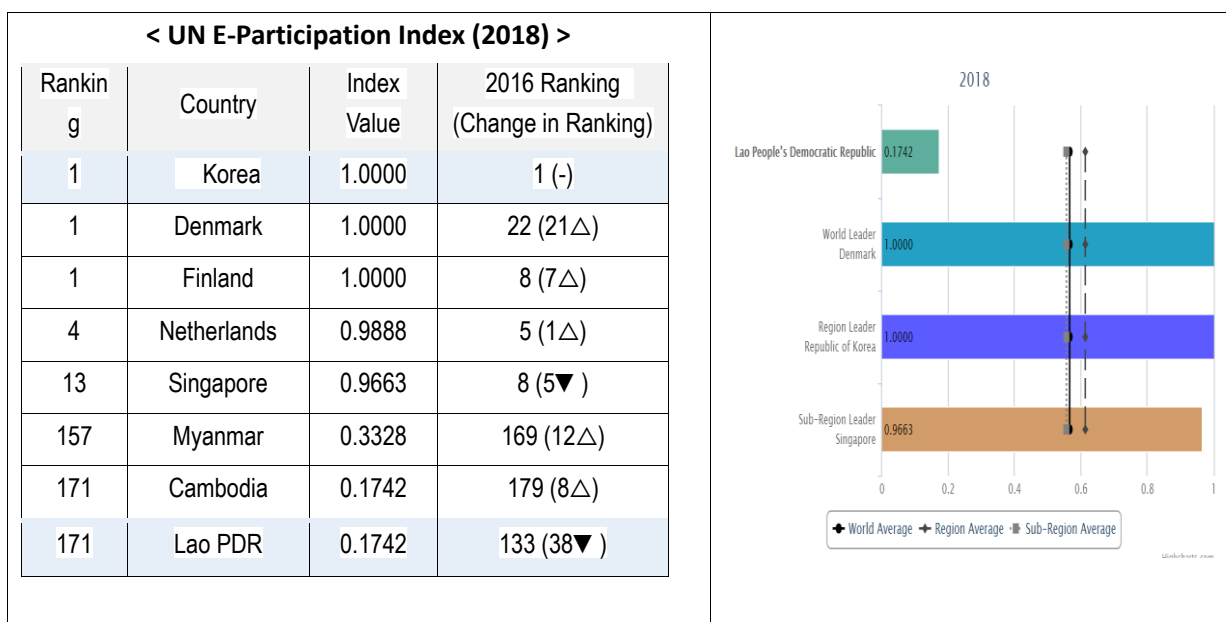
Year	2003	2004	2005	2008	2010	2012	2014	2016	2018
EGDI Ranking	149	114	147	156	151	153	152	148	162

Source: UN e-Government Readiness Survey 2003-2018



□ UN E-Participation Index: 171st out of 193 countries

(Region leader in Asia: Korea (1.0) / Sub-region leader in Southeast Asia: Singapore (0.9663))



Source: UN e-Government Readiness Survey 2018

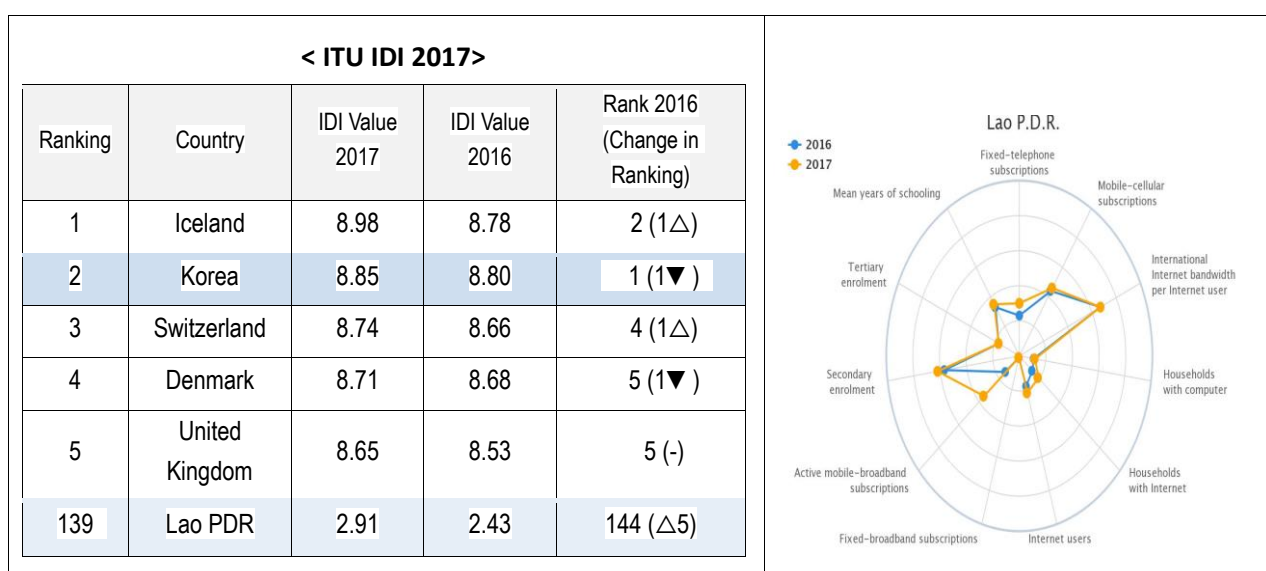
UN E-Participation Index Ranking for Lao PDR: 2008-2018

Year	2008	2010	2012	2014	2016	2018
E-Participation Ranking	170	86	161	137	133	171

Source: UN e-Government Readiness Survey 2008-2018

□ ITU ICT Development Index: 139th out of 176 countries in 2017

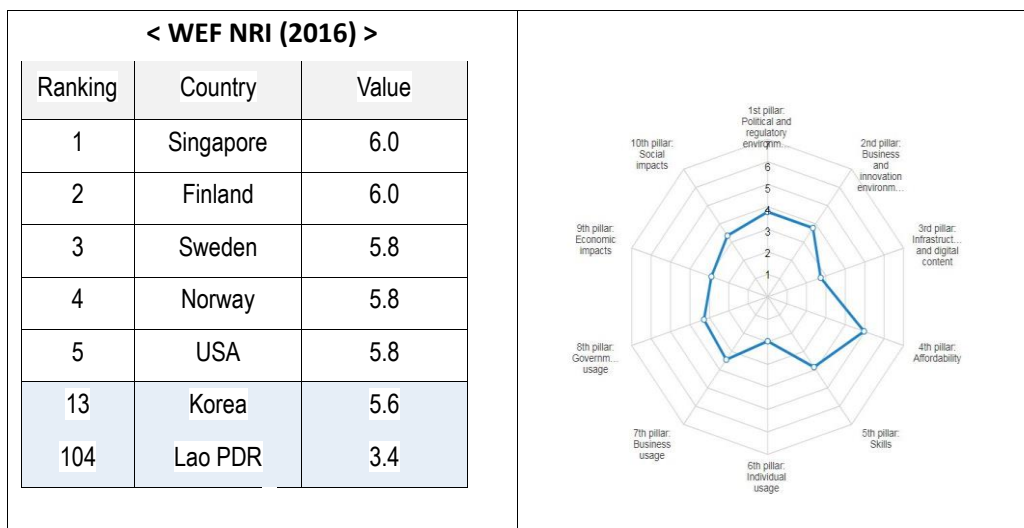
- Lao PDR ranked 139th out of 176 countries in ICT Development Index 2017 by ITU (up five places), which rose from 144th to 139th in the global rankings and from 29th to 27th in the regional rankings.
- Lao PDR made one of the most significant improvements among LDCs within IDI 2017 (up 0.47 points).



Source: ITU IDI 2017

□ Networked Readiness Index by World Economic Forum: 104th out of 139 countries in 2016

- The four sub-indices of Environment (3.8), Readiness (3.9), Usage (2.9), Impact (3.1) are very low. Among them, individual usage (2.0) is the lowest.



Source: WEF GITR 2016

2.2 Telecommunication Market

Lao PDR has adopted a distinctive model of private and state combined ownership to extend telecommunication access and network infrastructure. For mobile services, there are four mobile operators (LTC, ETL, UNITEL, and Beeline⁵, all with a mixture of private ownership and government shareholding. They all have full service licenses and are also involved in the fixed telephone and broadband market. Star Telecom (UNITEL) is a joint venture between a government-owned company (51%) and Vietnam's VITETTEL group (49%). Lao Telecom (LTC) is 51% owned by the Government and 49% by Shennington (Thailand). Enterprise of Telecommunications Lao (ETL), the state-owned incumbent, was partially privatized in 2016 when 51% was sold to a Chinese group (JIAFU). Until recently, 78% of Vimpelcom (Beeline) was owned by Veon, a group that includes one of the largest telecom operators in Russia. Because of its decision to withdraw its business in the region, the government acquired full ownership of the telecom operator, Vimpelcom Lao Co., Ltd. with USD \$22 million in 2017. The Sky Telecom, 10% owned by the GOL, was established in 2011. The state company as the operator of government fiber optic backbone is authorized for full license for telecommunication service, but now provides only Internet service.

Accordingly, Beeline and Sky Telecom are fully owned by the government, while three remaining telecommunication companies are partly owned by the government. The strategy of government-foreign investor joint ventures has resulted in a relatively high level of mobile access for Lao PDR. In fact, Lao PDR allowed more telecom companies to set up business since 2001, aiming to provide quality service with modernized networks. Under the circumstance that ICT has been recognized as a priority field in the country's development, the rationale behind the introduction of new joint

5. The government has assumed ownership of the telecom operator Vimpelcom Lao Co., Ltd. in a US\$22 million deal to purchase a 78% stake from a Russian investor.

ventures was that greater competition leads to more investment in telecommunication infrastructure and to lower prices. So far, it seems that more competition has contributed to upgrading the country's network infrastructure, but greater competition has not led to a positive impact on prices yet. In summary, it is fair to say that Lao PDR has been extending its mobile phone coverage rapidly under tight regulations that ensure profitability for telecommunication operators.

<Table 1> Telecom Operators in Laos

Name of Operator	Year licensed	Ownership	Wire Connectivity	Wireless Connectivity	Voice Service	Data Service
LTC	1996	Lao Gov.: 51% Shennington (Thailand): 49%	ADSL Fiber	3.5G 4G	Landline Mobile	ADSL Leased line Dial-up DPLC
ETL	2000	Lao Gov.: 49% Jiaifu Hold. (China): 51%	ADSL Fiber	3.5G 4G planned	Landline Mobile	ADSL Leased line Dial-up VPN
Star Telecom (UNITEL)	2008	Lao Gov.: 51% Viettel (Vietnam): 49%	ADSL Fiber	3.5G 4G	Landline Mobile	ADSL Leased line Dial-up
Vimpelcom Lao Co., Ltd. (Beeline)	2003	Lao Gov.: 100%	Fiber	3.5G	Mobile	-
Sky Telecom	2011	Lao Gov.: 100%	ADSL Fiber	-	Landline	ADSL Leased line DPLC, IPLC

Source: MPT, 2018

For mobile coverage, 2G is widely available with 86% coverage of Laotian households in 2015.⁶ 2G network covers 94% of total population, whereas 3G and 4G cover 78% and 43%, respectively. Mobile broadband was launched in 2008 with the deployment of the first 3G network. Following 3G network, Lao Telecom and UNITEL launched LTE service in 2013 and 2015, respectively. Taking advantage of the large-scale deployment of 4G services by LTC and UNITEL, the mobile broadband market has grown fast as the mobile operators offer faster speeds. However, the country's mobile sector in overall is having a difficult time. Mobile subscription rate had picked up to some extent in 2011, the market had gone backwards afterwards due to the enforcement of SIM card registration in 2011.

For fixed services, the mobile operators also participate in the fixed-line telephone market via copper wire and fiber connections. In 2015, ADSL accounted for 58% of subscriptions while FTTx accounted for 36% (at speeds of up to 60 Mbps). Fixed

6. 95% in urban areas, 83% in rural areas with roads, and 69% in rural areas without roads

broadband penetration has not increased significantly over the last five years, with penetration increasing from a very small base from 0.1% in 2012 to 0.2% in 2017.⁷ Fixed broadband is limited largely to urban areas. Regional variations in access to broadband are huge, mainly concentrating in big cities by reflecting the pattern of income levels and population densities.

The national fibre-optic backbone is over 75,000 kilometers long and runs along main roads across 18 Provinces and 149 Districts. There is also a metropolitan ring in Vientiane. For Lao PDR, being a landlocked country, connections to neighboring countries with a coastline is critical. Lao PDR accesses submarine cables via cross-border terrestrial links to Thailand, Viet Nam, Myanmar, Cambodia, and China. The LANIC is a default route for international transit because the government centralized all internet traffic through the Lao National Internet Center (LANIC).⁸

For satellite communication, the LAOSAT-1 Satellite was successfully launched into its scheduled orbit on December 2015 from Xichang Satellite Launch Centre, China. LAOSAT⁹ is a joint venture established by the GOL, including Lao Satellite State Enterprise Co., Ltd. (LSE), China Rocket Co, Ltd. and China Aerospace Science and Technology Co., Ltd (SSTC) as well as the Asia Pacific Satellite Technology Co., Ltd (APSTD) from Hong Kong. The satellite is providing telecommunication services to Lao government agencies such as the air traffic management of the Ministry of Public Works (MOPW) and Ministry of Public Security (MOPS), Laos-China railway construction, telecom operators and television stations. Also, LAOSAT plans to provide Wireless Broadband Communication Network (WBCN) service (4G wireless broadband internet services) to the public and government agencies particularly those concentrated in the most populated provinces of Vientiane, Luang Prabang, Champassak, and Savannakhet. It is now under review for licensing.

2.3 State of Broadband Ecosystem in Lao PDR

2.3.1 Applications

Demand for more and higher-quality video and other content will be a major factor in driving the demand for higher-capacity broadband access. In addition, applications are

7. Broadband Internet seems to make a very slow progress mainly due to the high cost of infrastructure in a mountainous and sparsely populated country.

8. The Lao National Internet Committee was formed in 1998 to regulate and establish Internet policy for the nation, based on an Internet Decree issued by the Prime Minister. The Lao National Internet Center was established as the IXP in 2010 under the MPT. Besides IXP, LANIC is also responsible for implementing National Data Center and managing Country Code Top Level Domain(ccTLD).

9. Lao Asia Pacific Satellite Co., Ltd. (LAOSAT) was incorporated on February, 2016. As the only satellite operator in the Lao PDR, LAOSAT is fully responsible for the commercial operation of LAOSAT-1 Satellite, mainly engaging in satellite telecommunications, satellite television and WBCN services.

also increasingly driving broadband use and development. Applications consist of function-specific software that delivers content to users or allows them to perform certain tasks.¹⁰

Users benefit directly from the applications and content they use through broadband networks. Applications enable people to buy and sell products, interact with government entities and find information of their interests. Households with Internet access at home have increased to nearly 19%.¹¹ But Laotians have difficulties finding useful local applications and local content online. There are not many local language web sites nor are there significant efforts for the development of application and local content.

Broadband applications can help businesses improve productivity and competitiveness. These productivity gains and enhanced competitiveness would benefit the whole economy. Both Laotian consumers and businesses are increasingly turning to applications and content that utilize Youtube, Facebook, and other social media. YouTube and Facebook take a large portion of the total traffic over mobile broadband connections. Indeed, social networking applications are driving mobile broadband use in Lao PDR.

The GOL, as an anchor tenant, established National Data Center to link its systems with other concerned organizations. The government provides e-Government services to its citizens and businesses, including national portal, e-Tax, e-Health, e-Customs, e-Education, and e-Map. Instead of providing integrated online services, the national portal seems to provide information on line and links to other government organizations. National University of Laos has established e-Learning programs in various subjects. Also, e-Transport has been established by linking through a computer network to facilitate data access such as vehicle registration, issuing driving license, driving license testing on line and so on. Despite the progress made in e-Government, the government seems to have been slow in promoting e-Government applications and the citizens make little use of them.

e-Commerce was also launched to meet the needs of Laotians such as buying and selling products on line. Also, in a bid to promote small and medium sized enterprises (SMEs), the Ministry of Industry and Commerce (MOIC) and the ADB launched the website plaosme.com in August 2017, which is an e-commerce platform for all SMEs to access the domestic and international markets. Notwithstanding the efforts for the development of the online market, Lao businesses do not feel confident about online transactions. For domestic e-Commerce, legal framework for taxation, classification for business registration, and consumer protection is not in place yet. Furthermore, Lao PDR faces a barrier related to addresses in implementing e-Commerce. Lao addresses

10. The World Bank Group, Broadband Strategies Toolkit, 2014, p.35

11. ITU, ICT-EYE

are confusing because property is usually numbered twice. To add to the confusion, no one seems to use any of them. To avoid confusion, numbers are often omitted from addresses, and locations are described using landmarks instead.

2.3.2 Devices

Devices continue to grow in number and variety as more computers and mobile phones connect to the Internet. New devices have constantly revolutionized the personal computer (PC) market in the past three decades. At present, about 13% of households own a personal computer in Laos. In terms of PC penetration, Lao PDR is lagging its neighboring countries except Cambodia. This is mainly due to the high tariff rates for ICT products, thereby resulting in low computer penetration and preventing the country from the potential benefits of ICT use. Currently PCs and other ICT products are subjected to 20% tariff. In addition to the tariff duty of 20%, PC related products are subjected to a Value Added Tax (VAT) of 10%.

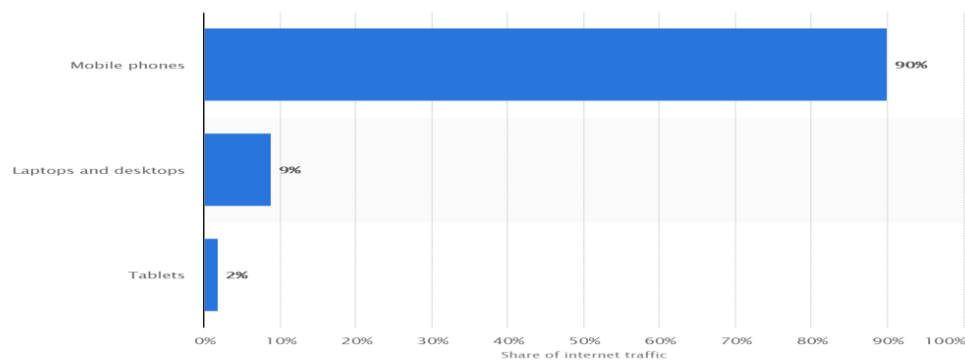
<Table 2> PC penetration in Lao PDR and its neighboring countries

Country	Lao PDR	Thailand	Vietnam	Myanmar	Cambodia
PC penetration (%)	13.2	24.8	25.2	16.6	12.5

Source: ITU

On the other hand, there are more than half of the population using a mobile phone. The statistics below illustrate the distribution of internet traffic by device in Lao PDR as of January 2018. As of this date, around 90% of internet traffic in Lao PDR was accessed with mobile phones. It shows that mobile is the preferred channel of interaction as in many other countries.

<Figure 1> Distribution of internet traffic in Laos 2018 by device



Source: <https://www.statista.com/statistics/>

Although the adoption of new technologies such as radio-frequency identification (RFID) and Internet of Things (IoT) is at an early stage in Lao PDR, these emerging technologies will enable millions of objects to connect each other, machines, and humans. Internet of Things, for instance, will create whole new classes of devices and the number of IoT devices will increase exponentially. Thus, IoT involves extending Internet connectivity beyond standard devices, such as PCs and smartphones. IoT has fundamentally different requirements on the broadband networks. With more devices going online as a result of the IoT, Lao PDR is advised to prepare network deployment and reliable power supply for efficient transmission and exchange of data/information in advance.

2.3.3 Networks

The basic elements of supply in the broadband infrastructure consist of at least three levels¹²: 1) international connectivity; 2) domestic backbones; and 3) local connectivity. For international connectivity, Lao PDR is connected by more than dozens of international links after passing through the centralized LANIC's Internet Exchange Point to deliver Internet traffic to international transit systems. According to Article 7 (Connection of Internet Network) of Decree on the Management and Use of Internet, and Domain Name of Lao PDR (2012), the National Internet Center is the sole connecting point of the internet network within the country and abroad. Each of the ISPs has its own international connection to the neighboring countries. Internet service fees in Laos are higher than those in most ASEAN member nations due to high cost of international bandwidth from neighboring countries. The price of international bandwidth per Mbps was around USD 100 at the end of 2012. Although the price keeps falling, it is still expensive for Lao PDR, compared to its neighboring countries.

<Table 3> International connection bandwidth by neighboring country

Country	No. of connection point	Bandwidth	Total Bandwidth
China	3		6.41 Gbps
Myanmar	2		
Thailand	6		17.421 Gbps
Vietnam	5		13.089 Gbps
Cambodia	2		

Source: MPT, 2018

12. In general, the basic elements consist of at least four levels: 1) international connectivity; 2) domestic backbones; 3) backhaul or metropolitan connectivity, and 4) local connectivity. However, in the Lao PDR, most fiber-optic backbone networks run along with roads. Towns and villages have traditionally been clustered around roads. Thus, backhaul or metropolitan network for connection between the backbone and local networks or cell site is not needed except a few big cities such as Vientiane under the ring topology.

For domestic backbones, constructing a backbone network covering the entire country is a top priority for Lao PDR. The total length of fiber optic cable reached 75,289 kilometers at the end of 2017. The operators continue to rollout fiber optic cables.

<Table 4> Length of fiber optic cable

Year	Aerial OFC (Km)	Burial OFC (Km)	Total Length (Km)
2015			67,351
2016			70,948
2017		6,610	75,289

Source: MPT, 2018

A nationwide project to install an underground fiber optic network was completed in 2014. The state-funded project, developed by the Ministry of Defense (MOD), was set to provide advanced telecommunication services in Lao PDR. The underground fiber optic network, the first ever in Laos, has better assurances in providing stable services unlike above ground fiber optic networks which are exposed to risks of being damaged or interrupted by storms or other unforeseen events.

The first phase to install the underground network from Lao PDR's southernmost to northernmost regions began in 2009 and completed in 2010, with underground cables also to be rolled out from certain points of the easternmost to westernmost regions. In late 2012, the project began its second phase to spread the network to provinces across the country. Now Sky telecom is utilizing the underground fiber optic network for providing Internet service to its subscribers.

The Type I operators - Lao Telecom, ETL, UNITEL, Beeline and Sky Telecom - provide Internet services with dial-up, leased line, DSL, FTTx, CDMA, WiFi, WiMax and GPRS/EDGE/3G, 3.5G, HSPA or HSDPA for GSM and 4G.¹³ Mobile network coverage, as % of the population, reached at 96% in 2017. The telecom operators except Sky Telecom offer mobile phone services on the GSM, 3G, and 4G systems.¹⁴ The operators will continue to upgrade and expand 4G network, including ETL who has a plan to rollout 4G soon.

All five telecom operators are partly or wholly owned by the GOL. Furthermore, Internet fees by data rates are a lot alike. Within agreed criteria in accordance with Decision on Determination of Telephone and Internet Fees and Principles of Sales

13. Refer to Table 1 for the services each operator offers.

14. Until now, LTC and UNITEL only provides 4G services.

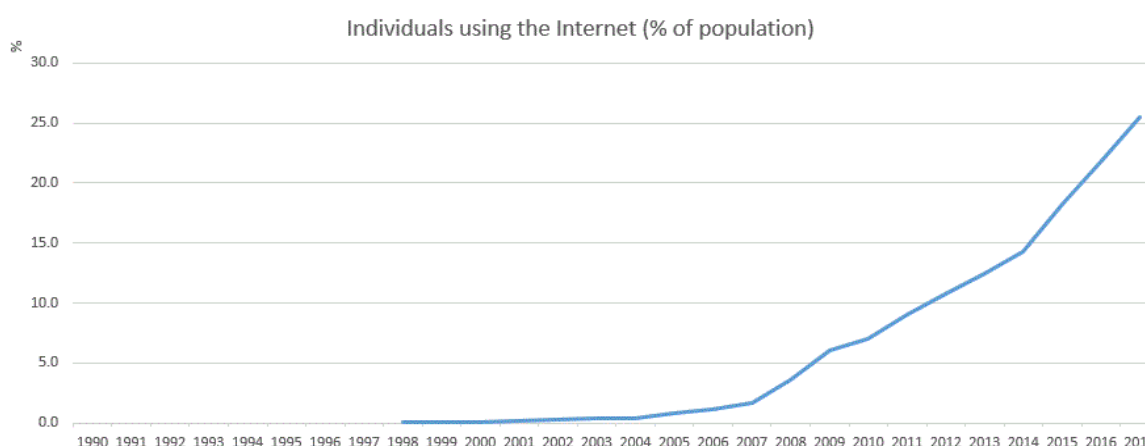
Promotions (2016), the GOL seems to allow equitable revenue share between the telecom operators. The operators are now operating in an environment where the regulator is keeping a tight hold on pricing and open competition is in effect discouraged.

Concerning the operation of networks, an important part of telecommunication system is its power supply system. The reliable operation of telecommunications hinges on the electricity access and quality of the power supply. Due to a lack of electricity in Lao PDR, solar energy or diesel/gasoline generators supply electricity for parts of the backbone but in some places, the solar storage units are losing capacity and the generators cause problems such as battery failure, running out of fuel, and failure to start. Thus, the telecom operators send their maintenance staff regularly to check or refuel the power sources.

2.3.4 Adoption and Take-up

As shown in the Figure 2 below, Internet users (as % of population) who have used the Internet in the last three months for any location have rapidly increased since 2008. In 2017, individuals using the Internet reached 25.5% of population, recording a 3.65% increase from 2015.

<Figure 2> Internet penetration rate

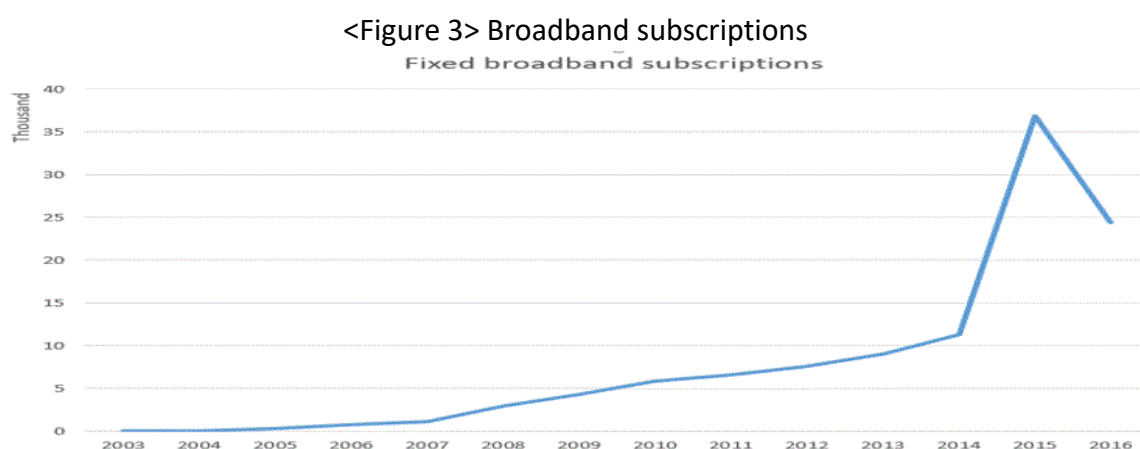


Source: The World Bank, World Development Indicators

In contrast, the growth of fixed internet users has been very sluggish. Fixed-line broadband market penetration¹⁵ has not grown significantly over the last thirteen

15. Fixed broadband penetration here refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s.

years. Subscription to fixed broadband is available mainly to urban areas with high population density. The latest value for fixed broadband subscriptions in Lao PDR was 24,426 as of 2016. Over the past 13 years, the value for fixed broadband subscription has fluctuated between 36,839 in 2015 and 25 in 2003. Fixed broadband subscription peaked at 36,839 in 2015 and decreased by 34.9% year-on-year. In fact, as shown in the Figure 3 below, fixed broadband penetration has been falling due to mobile subscriber substitution since the large-scale launching of 4G service by UNITEL in 2015. Although fixed broadband penetration is expected to grow steadily by replacing ADSL with FTTH, overall market penetration will remain relatively low comparing to wireless broadband.¹⁶



Source: The World Bank, World Development Indicators

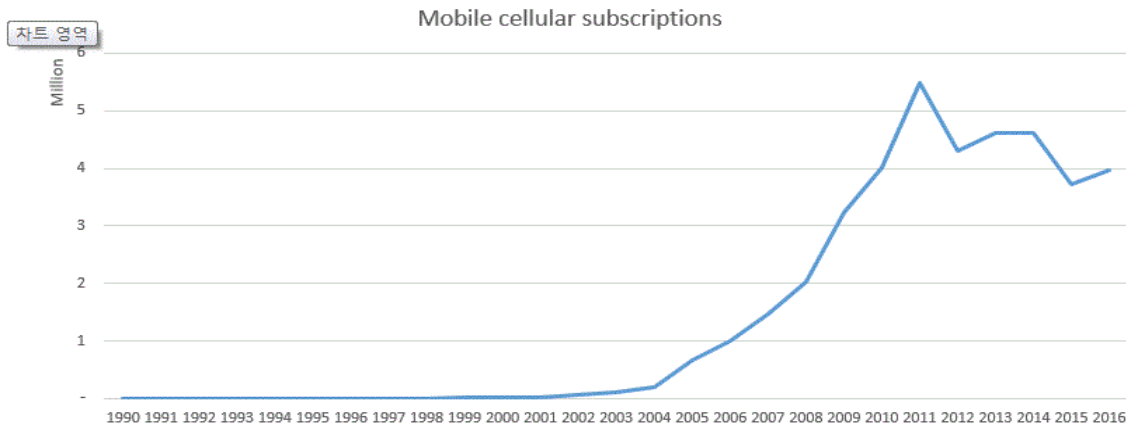
As mentioned earlier, the country's mobile sector has undergone a difficult period. The market ran into Beeline problem that resulted in a major setback not just to Beeline but to the overall market.¹⁷ As seen in the Figure 4, the market seems to be struggling to regain the momentum.¹⁸

16. Low penetration rate in fixed broadband could be significant because wireless networks are not fully substitutable for fixed networks, either in usage or in performance.

17. The three telecom operators (LTC, ETL, and UNITEL) temporarily cut their connection with Beeline from noon October 15, 2011, after Beeline broke an agreement regarding telecom regulations. The three operators decided to cut both mobile and fixed line links with Beeline after it was found to be offering special promotions which infringe regulations agreed upon about a week ago. All four telecom operators had agreed on October 6 to stop offering special promotions such as free call credit and messaging services. All four operators had agreed among themselves to cut the connection if an operator broke the regulation. The disconnection had a serious impact on all mobile phone users, who have been unable to reach Beeline subscribers.

18. In 2015, the official figure was 53.1% subscription rate, a sharp decrease from 84% in 2011. This seems due to both the inaccuracy of the statistics before 2011 (number of active SIM cards for the last three months should be counted for mobile subscription) and a result of government enforcement of the registration of SIM cards.

<Figure 4> Mobile cellular subscriptions



Source: The World Bank, World Development Indicators

By contrast, there has been a rapid expansion of mobile broadband internet services on the back of the large-scale launch of 4G services by the two mobile operators, LTC and UNITEL. Lao PDR has seen a strong increase in mobile broadband penetration over the past five years. The mobile broadband market in Lao PDR, however, is still at an early stage of development and penetration remains relatively low compared to other ASEAN member countries. About 40% of Laotians have adopted mobile broadband. Nevertheless, it is expected that the mobile broadband market will be driven by new applications and increasingly faster speeds offered by the mobile operators as they newly roll out or expand their 4G networks. The adoption of mobile broadband will continue to increase across different demographic groups and regions. Also, broadband adoption among businesses is growing, but no reliable statistics are available.

2.3.5 Local content

What motivates people to use broadband services is that they believe broadband will enrich their lives, offer convenience, provide entertainment and improve their businesses, which is all related to application and content.¹⁹ In this respect, broadband take-up and the availability of compelling content are closely related. The development, availability and use of local digital content will lead to increased take-up of broadband services, creation of cultural content, development of sectoral applications, and new business opportunities for industry.

Laos and Thailand are really close in language and culture. Lao script is slightly different from Thai script, but people would be able to read each other's language

19. The World Bank Group, Broadband Strategies Toolkit, 2014, p.40

with minimal effort. As a result, Thai movies, soap operas, talk and game shows are very popular in Lao PDR, whereas Lao local content is very limited. Thus, more resources and policy support should be directed to foster the development of appropriate local content and to support the Laos content industry. Contents have high upfront development cost, but the marginal cost of additional use is relatively low.

Table 5 shows the top 10 highest traffic-generating Lao websites, giving a snapshot of what the average Lao internet user is spending their time on the Internet. The largest state-owned bank website takes the top spot, followed by news site and job portal.²⁰

<Table 5> Top 10 Lao Websites (As of January 2017)

Ranking	Website	Organization
1	BCEL.COM.LA	<i>Banque Pour Le Commerce Extérieur Lao</i> (The largest state-owned bank)
2	LAOPOST.COM	Lao Post (online news website)
3	108JOB.LA	108-1009 Group Company (recruitment site)
4	MYDELIVERY.LA	Kiwi Company (online delivery website)
5	VIENTIANETIMES.ORG.LA	Vientiane Times (English daily newspaper)
6	THOLAKHONG.COM	Citizen journalism website driven almost exclusively by social media, particularly Facebook
7	KIDORK.COM	Victory Future Tech Sole Company (online publication site)
8	BOL.GOV.LA	The Bank of the Lao PDR.
9	LAOTIANTIMES.COM	Laotian Times (private online English news site)
10	SOKVIEK.COM	A joint venture partnership between Pakaad and TNK Media (job portal)

Source: Laotian Times, 2017

In addition, IPTV service is provided by the five operators (LTC, ETL, Beeline, UNITEL, and Sky Telecom) in conjunction with Internet packages.²¹ As fast and reliable connections is made available, the operators launched IPTV services. High-capacity broadband networks that can transmit content on a real time basis are required for

20. Laotian Times, January 3, 2017

21. TV station licensing in Lao PDR, including IPTV, is the responsibility of the Ministry of Information, Culture and Tourism (MOICT) by Law on the Media No. 01/NA, 2008.

IPTV services. The number of IPTV subscribers is increasing, but the exact number of IPTV subscribers is not available.

2.4 Policy and Regulation

The Ministry of Posts and Telecommunications (MPT), as the regulator, oversees and regulates the telecommunication sector based on the Law on Telecommunications 2011. But the pace of regulatory reform has been lagging rapid industry development, including the WTO recommendation on the separation of regulatory agency. Since ICT has been recognized as an important cross-cutting sector in the 8th Five-Year National Socio-Economic Development Plan (2016–2020), the MPT focused on priority activities, including ensuring Internet coverage across the country and establishing the national policy on broadband.²²

In addition to Law on Telecommunications 2011 that gives a basic framework for administering and regulating the telecommunications sector, the government put various Presidential decrees and decisions into effect.

- Law on Telecommunications (2011)
- Law on Electronic Transactions (2012)
- On the Promulgation of the Amended Land Law (2003)
- Decision of the Minister to the Prime Minister's Office, Head of the National Authority of Post and Telecommunications on the Reduction of Fees for Radio Frequency Application (2010)
- Decree on the Management and Use of Internet and Domain Name of the Lao PDR (2012)
- Decision on Approval of Internet Service Business Operation (2015)
- Decision on Telecommunication Business Operating License (2015)
- Decision on Telecommunication Competition (2015)
- Decision on Numbering Management (2015)
- Decision on Communication via Satellite (2016)
- Decision on Determination of Telephone and Internet Fees and Principles of Sales Promotions (2016)
- Decision on The Installation of Mobile Network Base Stations (2016)
- Decision on Interconnection of Telecommunication Network (2016)
- Decision on International Mobile Telecommunication (2016)

22. As a part of building broadband infrastructure, the MPT established the first National Broadband Plan(draft) with the assistance by the ITU and the Korean government in 2011. Unfortunately, the first plan was not officially adopted by the GOL.

- Decision on the Safety of Radio Frequencies Propagation (2016)
- Law on Radio Frequency (2017)

Also, the MPT formulates new policies and reviews existing policies, making the required recommendations on legislation and decrees for the development of telecommunication industry. The ministry is also responsible for making a strategic plan over the long term for the industry as well as crafting 5-year plans and annual plans. The vision of the MPT is to realize further development of telecommunication to create better connections and to ensure wider coverage in the country by 2023.²³ The MPT emphasizes that broadband has a very important role to play in transforming Laos from a land-locked to a land-linked country through ICT.

Approaches to broadband adopted by each country often include strategies that lead to the formulation of policies and regulations. These strategies tend to evolve with markets, paying attention to changes in both supply and demand. They create the base for policy implementation in the initial stage by making the strategic framework for executing policies and regulations. Policies and programs for broadband market development can be split into three components that somewhat overlap. But they follow a logical sequence: promotion, oversight, and universalization.²⁴ Lao PDR implemented broadband development strategies by means of policies, laws, decrees and regulations. In this context, a benchmark approach is applied to compare the policy actions taken by Lao PDR with the policymaking model recommended by the World Bank for developing the broadband ecosystem. The result is shown in Table 6.

<Table 6> Result of Comparison between Lao PDR and the WB Recommendation

23. MPT, Vision towards 2030, 10-year Development Strategy (2016-2025) and 2nd 5-year Development Plan of Post and Telecommunications Sector

24. Yongsoo Kim, Tim Kelly and Siddhartha Raja, Building Broadband: Strategies and Policies for the Developing World, GICT Dept. World Bank (Jan.2010), available at http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building_broadband.pdf.

	Early stage: Promote	Mass market: Oversee	Universal service: Universalize
Goal	Focus on promotional policies as a pump-primer to spread broadband networks	Facilitate competition through consistent, facilitating regulation	Universalize broadband service as the market grows Networks
Networks	<p>▽ Develop an enabling environment through policies and regulation that promote investment and market entry (Draft National Broadband Plan)</p> <p>▽ Reduce administrative burdens and provide incentives and subsidies for R&D, pilots, and network rollout (Decision of the Prime Minister on the Reduction of Fees for Radio Frequency Application, 2010)</p> <p><input checked="" type="checkbox"/> Allocate and assign spectrum for wireless broadband services (4G bands for LTC in 2013 and UNITEL in 2015)</p>	<p>▽ Consider infrastructure sharing, including local loop unbundling (Decision on the Installation of Mobile Network Base Stations, 2016) (Sharing of EdL's poles) (Fiber optic cable swap and lease among the operators) (Articles 19~21, Law on Telecommunication, 2011: Network Interconnection and Use of Telecommunication Infrastructure)</p> <p><input type="checkbox"/> Reallocate spectrum to expand available bandwidth</p>	<p><input type="checkbox"/> Undertake deployment of open access to broadband networks in rural or remote areas, using public/private partnerships, as appropriate</p> <p><input checked="" type="checkbox"/> Coordinate access to rights-of-way Services (Decree of President on Land Law, Chapter VI, 2003)</p>
Services	<p>▽ Provide broadband networks to schools, government agencies, etc. government as an anchor tenant</p> <p><input type="checkbox"/> Standardize and monitor service quality</p>	<p><input type="checkbox"/> Create an enabling environment for intra- and intermodal competition (Decision on Telecommunication Competition, 2015)</p> <p><input type="checkbox"/> Ensure non-discriminatory access for service, application, and content providers</p>	<p><input type="checkbox"/> Consider expanding universal service obligation to include broadband</p>
Applications	<p><input type="checkbox"/> Promote government-led demand aggregation</p> <p><input type="checkbox"/> Government agencies as early adopters and innovators</p> <p>▽ Provide e-Government and e-learning applications</p> <p><input type="checkbox"/> Promote creation of digital content</p> <p><input type="checkbox"/> Develop local content and hardware sector</p>	<p>▽ Support secure, private, reliable e-commerce transactions (Law on Electronic Transactions, 2012²⁵)</p> <p><input checked="" type="checkbox"/> Introduce intellectual property protections (Law on Intellectual Property No. 38/NA, 2017²⁶)</p>	<p><input type="checkbox"/> Develop advanced e-Government programs</p> <p><input type="checkbox"/> Offer grants to community champions and broadband demand aggregators</p>

25. Article 4 of the Law: The State pays attention to the importance of the use of electronic transactions by promoting and supporting electronic commerce and services, public administration and other electronic transactions to develop the economy and serve the society.

26. This new IP Law replaces the Law on Intellectual Property No. 01/NA, 2011.

Users	<input type="checkbox"/> Provide low-cost computers and other user devices, such as in education <input type="checkbox"/> Deliver digital literacy programs	<input type="checkbox"/> Promote ethics on information use	<input type="checkbox"/> Expand universal service programs to underserved communities ²⁷ <input type="checkbox"/> Construct community access centers <input type="checkbox"/> Provide subsidies for poor households to buy user devices (such as computers)

Source: Adapted from Yongsoo Kim, Tim Kelly and Siddhartha Raja (2010)

Note: ☒ fully adopted and implemented

☐ partially adopted or implemented

☐ never implemented or under review

() Specific actions taken for the corresponding item above

3. Objectives

The National Broadband Plan 2021-2025 sets out a strategic vision for broadband in Lao PDR and establishes national goals regarding broadband while elaborating specific policy actions to accomplish the goals to be mandated by the 9th National Five-Year Socio-Economic Development Plan.

Various studies have revealed that broadband is increasingly important as an enabling technology for economic growth. As introduced in the beginning, the World Bank has found that in low- and middle-income countries, every 10% increase in broadband penetration accelerates economic growth by 1.38 percentage points.²⁸ In a similar study, McKinsey estimates that a 10% increase in broadband household penetration delivers a boost to a country's GDP, ranging from 0.1% to 1.4%.²⁹ Booz also found that 10% higher broadband penetration in a specific year is correlated to 1.5% greater labor productivity growth over the following five years. In addition, Booz suggests that countries in the top tier of broadband penetration have exhibited 2% higher GDP growth than countries in the bottom tier.³⁰

27. Article 27 of Law on Telecommunications of 2011 stipulates the obligation of securing the availability of universal services with good quality, convenience, fast and fairness, which has never been enforced. In addition, Articles 30 through 32 of the same law stipulates the establishment of Telecommunication Fund to develop the telecommunication network to cover all rural remote areas throughout Lao PDR. But the Fund has never been organized and operated.

28. World Bank, Information and Communication for Development: Extending reach and increasing impact, 2009

29 . McKinsey & Company, Mobile broadband for the masses, 2009, available at http://www.mckinsey.com/client/service/telecommunications/mobile_broadband.asp

30. Booz & Company, Digital Highways: The Role of Government In 21st-Century Infrastructure, 2009

In the context of socio-economic development, recognizing the significant positive spill-over effects of broadband, the MPT of GOL establishes strategic objectives of broadband plan as follows.

- (i) To promote adequate supply in terms of broadband infrastructure to support socio-economic development (To extend broadband infrastructure to underserved and unserved population)
- (ii) To make broadband services more affordable
- (iii) To stimulate demand to ensure sustainable level of take-up of broadband services
- (iv) To foster local content and support local e-commerce
- (v) To create an enabling environment conducive to attract new investments in the broadband ecosystem

4. Vision

Vision is a description of what Lao PDR would like to achieve or accomplish for broadband within the planning period. It serves as a clear guide for choosing future courses of action for broadband, inspiring members of the government and society towards accomplishing the future desired state of broadband. More importantly, the vision should be closely aligned with national development strategy. As a rule of thumb, effective visions contain up to 22 words, making them easy to communicate and remember. If the vision is too long, it would be hard to remember and understand.

There are several ways to establish a vision. The process of visioning is usually an interactive participatory process that is open to all stakeholders. Steps in making a vision include:

- (i) Identifying and consulting stakeholders
- (ii) Inviting stakeholders to present or explain their own vision for e-Government
- (iii) Drafting a common vision based on stakeholders' visions
- (iv) Aligning vision with more general national development needs and opportunities
- (v) Consolidating and agreeing on final vision

A consensus does not exist on the characteristics of a 'good' or 'bad' vision statement. Commonly accepted traits of powerful visions include:

- (i) Conciseness: able to be easily understood and remembered
- (ii) Clarity: directly point a prime goal
- (iii) Future orientation: describes where the government is going rather than the current state
- (iv) Stability: offers a long-term perspective and is unlikely to be affected by technology changes

- (v) Challenging: not something that can be easily achieved and discarded
- (vi) Inspiring: motivates members of society and is something that the members view as desirable

When working on the vision for broadband, it is advised to incorporate core values of broadband such as universal availability, affordability, contribution to socio-economic development, and milestone into the vision. Several examples are provided below, which might be a useful starting point for exploring the vision for broadband.

- Example 1: To transform the country into digital society, the GOL makes broadband infrastructure and services available to all Laotians at affordable prices by 2025 (23 words)
- Example 2: Robust and affordable broadband for all Laotians by 2025
- Example 3: To become a leader in ASEAN in the availability and productive use of broadband for socio-economic development by 2025 (19 words)
- Example 4: By 2025, 90% of Laotians will have access to broadband services at 5% or less of the average monthly income (22 words)
- Example 5: To develop sustainable broadband ecosystem by 2025 that supports affordable use by all Laotians to promote socio-economic development (18 words)
- Example 6: Better lives through better broadband
- Example 7: Affordable broadband for ALL by 2025

5. Policy Goals and Programs

The objective of the National Broadband Plan 2021-2025 is to establish policy goals and programs and to coordinate across the government with a whole-of-government approach to broadband development in Lao PDR. For the successful accomplishment of the policy goals and programs articulated in the National Broadband Plan, collaboration and coordination among the government ministries, operators, and other stakeholders should be secured. Also, for efficient and effective provision of broadband infrastructure and services, different elements of the broadband ecosystem - networks, devices, affordability, and digital literacy, applications and local contents - should be balanced.

Policy goals and programs encompass both supply- and demand-side issues. Supply-side issues are mainly related to encouraging investment and competition for broadband infrastructure, lowering costs of network rollout, extending broadband infrastructure into underserved and unserved areas. On the other hand, demand-side issues add new

challenges of improving affordability and relevance of broadband services to users. As the availability of broadband increases, the focus of policy tends to shift from solving supply-side challenges to addressing demand-side dilemmas.³¹

5.1 More places connected

According to the information provided by the MPT, currently a ## % out of a total of 8,500 villages can access to broadband wired and/or wireless. **By 2025, ## % of ##### villages will access to broadband.** Increased accessibility and availability of broadband will contribute to inclusive growth and good governance. Increased connectivity to broadband in underserved and unserved areas will provide new opportunities for local development and stimulate the formation of networks for social, agricultural, educational and other purposes.

5.1.1 Introduce incentives to the operators investing in the unserved and underserved areas

The rationale behind providing access to broadband to the unserved and underserved areas has never been in doubt. The challenge is how to overcome an uneconomical cost-benefit equation where high infrastructure investments and operating costs are spread over very small number of users.

An uneconomical cost-benefit equation also applies to broadband infrastructure deployment for underserved and unserved areas in Lao PDR. Most of the unserved and underserved areas have a high cost topography with high mountains and remote areas. The costs of building broadband infrastructure will be very expensive for those areas while returns on investment are low. As is typical of such geographical areas, basic infrastructure such as roads and electricity grids is not in place, which makes it difficult and highly expensive to install broadband infrastructure.

When deploying broadband infrastructure for the underserved and unserved areas, financially viable and sustainable investment decisions should be made. But if commercially sound sustainable investment and service operation do not hold, in other words, market failure occurs, then the government should play an active role in assisting the unserved and underserved areas, not to leave them behind. Thus, although the market is the key factor for broadband investment, the government needs to intervene in facilitating broadband connectivity in areas where a market failure occurs. For the unserved and underserved areas where the operators do not provide services voluntarily, government action should be warranted to expand

31. World Bank, Digital Dividends, 2016

broadband infrastructure for the coverage of those areas, including policy measures to provide specific assistance and to lower the costs of deployment. To put it another way, the government should finance networks for unserved and underserved areas and establish incentives when the market alone is not able to serve. Justification is based on socioeconomic cost-benefit analysis, presenting that benefits accrued to local and national levels outweigh costs associated with providing broadband services.

In the same context, the GOL will leverage Telecommunication Development Fund to further expand broadband to the unserved and underserved communities. The government will operate Telecommunication Development Fund and establish related regulations and policies by the end of 2021.³² The MPT will start the operation of Fund from 2022. It is about time the MPT implements the Telecommunication Development Fund stipulated in the Law on Telecommunications (2011), along with the establishment of policies that will govern, manage and guarantee the fair, open and transparent use. The Telecommunication Development Fund will be utilized for subsidizing roll-out of networks for the unserved and underserved areas. In addition, tax incentives such as tax reduction for the investment in the unserved and underserved areas will be considered for introduction in 2022 in close consultation with the Ministry of Finance and relevant stakeholders for this National Broadband Plan to materialize.

5.1.2 Establish a comprehensive timeline for rolling out broadband infrastructure for the unserved and underserved areas

MPT and the operators will jointly establish a comprehensive timeline for unserved and unserved areas to roll out broadband infrastructure by 2021. The unserved and underserved areas specified in the Wired & Wireless Survey Data (collected during this study) are considered in the identification of backbone routes and access networks. Higher priority is given to high population density areas where access to broadband is very limited or not provided. If the operators are not willing to invest in the areas on a voluntary basis, financial assistance from Telecommunication Development Fund will be considered. In Lao PDR, the Électricité du Laos (EdL) has poles that should be shared for the deployment of new broadband infrastructure. Since the more infrastructure is reused, the more people could be covered by broadband services, planned utility infrastructure should be factored in for the plans of new broadband infrastructure for the unserved and underserved areas in close cooperation with EdL.

Expanding broadband networks to the unserved and underserved areas only addresses the supply-side of broadband. Even with accessible networks in place, there

32. According to the presentation by MPT, the establishment of Telecommunication Development Fund and related regulations and policies was completed in 2016. If that be the case, the MPT will bring forward the operation of Fund.

are likely to be lack of demand in the areas. Thus, it is important for MPT to focus its attention on developing policies that not only facilitate and encourage the building of broadband networks, but ensure that as many people as possible can and do use them through various measures such as ICT training, development of local content, discount of telecommunication charges for the rural areas, and etc.

5.1.3 Reduce the costs of delivering broadband services by establishing additional IXPs

Any opportunities that contribute to reduce the costs of broadband services should be identified along with updated requirements for efficient and cost-effective delivery of broadband services, including establishing additional Internet eXchange points (IXPs).

At present, there is a single centralized IXP managed by Lao National Internet Center (LANIC), causing inefficiencies, latencies, and the waste of bandwidth. To avoid the need for data from northern and southern regions to travel around the IXP in Vientiane, at least two IXP facilities of the LANIC should be established.³³ The IXP model in Lao PDR is that statutory government agency, the LANIC - a department of the MPT - provides financial support for establishing and operating the IXP.

The second IXP in the northern region will be inaugurated in 2022 and the deployment of the third IXP in the southern region will start in the same year. IXPs commonly are spread across a country to allow local networks to efficiently exchange information. IXPs route local Internet traffic locally. As Lao PDR establishes additional IXPs, local Internet traffic is exchanged more efficiently and routed locally, thereby reducing costs and network delays, while increasing content upload speeds.³⁴ In summary, additional IXPs would greatly help Internet data reach end users more efficiently and cost-effectively. Additional IXPs are also expected to provide significant benefits of lowering Internet-access costs for end users by decreasing operating costs of ISPs.³⁵ When establishing additional IXPs, the location and management of IXPs should be as neutral as possible.

5.1.4 Encourage the ISPs to increase caching capacity to save international bandwidth

For many users around the world, bandwidth is still scarce and expensive. So is in Lao PDR. Most Internet traffic generated by Laotian users tends to be international, resulting in large capital outflows to the Internet providers of the neighboring countries. Caches across the network can help ISPs to offer popular content on the

33. An IXP is simply a physical location where different IP networks meet to exchange local traffic with each other via a switch. The IXP saves on transit fees for ISPs, reducing the flow of local data that transits externally.

34. Internet Society, <https://www.internetsociety.org/policybriefs/ixps/>

35. Operating costs will be reduced by maintaining the regional Internet traffic to the same region.

network by storing web content and serving it from local network, thereby saving bandwidth while delivering faster web access to end users.

The MPT will encourage the ISPs to strengthen caching for popular Thai contents, storing a cached version of Thai contents in multiple locations. Real-time entertainment services on the Internet, including video traffic is a large and continually increasing part of international Internet traffic in Lao PDR. Video streaming traffic is overflowing networks, leading to the saturation of peering links between networks and then to a degradation of the quality of experience perceived by end users.³⁶

5.1.5 Enforce universal service obligation of the operators when extending the term of telecommunication service operations

Universal service obligation (USO) is stipulated in Article 27 of Law on Telecommunications (2011), but no details have been published so far. In fact, USO was enforced once. In 2013, the MPT assigned some number and location of the rural villages to each operator as obligation to provide the connectivity. In accordance with Article 27 of the Law, the operators have obligations to secure the availability of universal services with good quality, convenience, fast and fairness. From 2023, by activating universal service obligation of Article 27 of the Law, the MPT will request universal service objectives when reviewing the Type 1 licensees' revalidation application for service operation to safeguard the provision of a minimum set of telecommunications services in Lao PDR.³⁷

In addition to activating the existing USO, the MPT will be considering the introduction of USO for broadband in 2025. When demand is low, promoting broadband supply would not be easy. But the new USO including broadband is expected to act as a country-wide measure to deliver broadband connections to the hardest to reach in Lao PDR. It is also intended to fill the digital divide existing in Lao PDR with regard to access to broadband. The USO will provide a legal right to request a broadband connection of at least 512 Kbps download speed. The policy objective of ensuring that everyone in the country has access to broadband is straightforward to articulate but is likely to prove difficult to achieve. Achieving this objective in a cost-effective way with the minimum market distortion will be very challenging. Despite its difficulties, the MPT should be ready for the new USO to make the country more equitable and inclusive.

36. G. Maier, A. Feldmann, V. Paxson, and M. Allman, "On dominant characteristics of residential broadband Internet traffic," 2009

37. Type I is valid for 15 years in accordance with Article 23.

5.1.6 Leverage the use of wireless and emerging technologies

Given the geographic feature of the country, wireless technologies such as satellite and TV White Space³⁸ technologies will be actively utilized to provide broadband access in the mountainous and remote areas. In line with the migration to the digital television broadcast, the MPT shall reserve the freed-up or the digital dividend frequencies in favor of the government.

Besides, free Wi-Fi will be considered for public places around Vientiane and Luang Prabang. Public places around the two cities attract tourists, small businesses, and residents. Free Wi-Fi is an outstanding means to empower visitors and residents to learn more about what is happening and available locally. With a free Wi-Fi program, communities are increasingly willing to provide local content and information to keep visitors stay in the cities. Free Wi-Fi can contribute to increase tourism and business growth.

5.1.7 Reinforce collaboration for infrastructure sharing

Broadband service providers can share the cost of installing and maintaining infrastructure in ways that promote competition, operating efficiency and universal service. Due to economy of scale in telecom industry, sharing of infrastructure among telecom service providers is becoming the requirement and process of business where competitors are becoming partners to lower their increasing investments. Infrastructure sharing contributes to avoid or minimize duplication and to gear investment toward unserved and underserved areas. Particularly in rural areas, sharing infrastructure is an alternative that can lower the cost of network deployment. The problem for rural and remote areas is the high cost of network infrastructure, which leads to high prices.³⁹ Infrastructure sharing has advantages for both wireline and wireless network operators.

Not only to avoid redundant and overlapping investment in network infrastructure but to further promote sharing of broadband infrastructure, the MPT will launch a coordination framework for all relevant ministries and operators to share resources and harmonize plans before embarking on telecommunications infrastructure capital projects. This coordination framework will include the centralization of information

38. White spaces refer to frequencies allocated to a broadcasting service but not used locally. Digital television systems allow the transmission of several standard digital television channels in the radio-frequency spectrum previously used by a single analogue channel. Typically, there are four or five terrestrial analogue services in a given region, so their digitization into a single digital television channel will considerably reduce the overall use of spectrum.

39. In many countries, infrastructure sharing has been instituted in areas where it was concluded that competing physical infrastructures were not economically viable (such as in rural or remote areas) or where the construction of competing infrastructures could prove unacceptable for social or political reasons (too much civil works disruption or too many wireless towers at prime locations).

about passive and active infrastructure and map of telecommunications infrastructure by building Information System on Broadband Infrastructure by 2024. Detailed information will be presented in the form of tables, charts and maps at the district level, which will help the operators easily identify opportunities for infrastructure sharing. Based on the data from the system, statistics on broadband infrastructure in Lao PDR is published, which will also serve as an input for future broadband plan.

5.2 More affordable prices (Affordability)

Affordability has been one of the key factors hindering growth of broadband services in Lao PDR. One of the main reasons for not using broadband services, where services are available, is related to affordability. The MPT regulates both wireless and wired Internet fees and little variation is found in the market prices by the operators.

<Table 7> Minimum Fees for Wireless Internet

Type	Fees
Limited speed (Unlimited data)	
512Kbps	3,000 Kip/MB
1Mbps	5,000 Kip/MB
2Mbps	8,000 Kip/MB
3Mbps	4,000 Kip/Mbps/day

Source: Decision on Determination of Telephone and Internet Fees and Principles of Sales Promotions (2016)

<Table 8> Minimum Fees for Wired Internet

Type	Fees
512Kbps	130,000 Kip/month
1Mbps	200,000 Kip/month
2Mbps	350,000 Kip/month
3Mbps	120,000 Kip/Mbps/month

Source: Decision on Determination of Telephone and Internet Fees and Principles of Sales Promotions (2016)

<Table 9> ADSL Fee Schedule by LTC

Speed	Kips per Month
512 Kbps	260,000
1 Mbps	400,000
2 Mbps	800,000

Source: LTC, 2018

<Table 10> ADSL Fee Schedule by ETL

Speed	Kips per Month
ADSL Economic – prices per month, speed up to 1 Mbps	
512 Kbps	220,000
1 Mbps	350,000
ADSL Gold – speed up to 1.5 Mbps	
512 Kbps	600,000
1 Mbps	1,000,000

Source: ETL, 2018

<Table 11> ADSL Fee Schedule by UNITEL

Speed D/Up	Kips per Month
512 Kbps /256	220,000
1 Mbps /512	350,000
2 Mbps /1	680,000

Source: UNITEL, 2018

<Table 12> WiMax Fee Schedule by Beeline

Speed paid monthly	Kips per month
512 Kbps	500,000
1 Mbps	1,000,000
2 Mbps	2,300,000
3 Mbps	4,000,000

Source: Beeline, 2018

As shown in Broadband Pricing League Table previously, a study of broadband pricing in 196 countries reveals that Lao PDR ranks among Asia's highest at USD 231.76, second only to Brunei.⁴⁰ Iran offers the world's cheapest broadband, with an average cost of USD 5.37 per month. Iran is the cheapest in Asia as well as the cheapest globally, followed by Nepal (USD 18.85) and Sri Lanka (USD 20.17) – all three ranked among the cheapest in the world. The Maldives (USD 86.08), Laos (USD 231.76) and Brunei (UD 267.33) provide the most expensive package price per month in Asia.⁴¹

40. Data over 3,351 individual broadband packages was gathered by BDRC Continental and compiled and analyzed by Cable.co.uk during an 8-week period up to October 12, 2017. After identifying the primary fixed line telecoms providers for each country, data on the prices in local currencies were extracted, in most cases that meant the price of the most basic package at each speed level. All of these packages were then compiled to create the averages.

41. <https://www.cable.co.uk/broadband/deals/worldwide-price-comparison/>

Despite of the fact that many broadband packages are allowed to offer higher speeds with lower prices in many countries, the MPT regulates minimum prices for broadband services. While broadband charges vary across different connection types, speeds, and providers, even entry level broadband service is too high when taking account of monthly income per capita. Wired entry level broadband by ADSL comes with a monthly fee, ranging from 220,000 to 260,000 Kip (equivalent to USD 27 to 30), equivalent to around 13% of average monthly income.⁴² If calculated by 1 Mbps, the cost reaches almost a half of the average monthly income.

5.2.1 Establish sound regulatory environment by separating regulatory functions from the MPT

In principle, telecommunication sector regulation, including price regulation, should work primarily in favor of consumers - addressing market failure, fostering effective competition, protecting consumer interests, and increasing access to broadband services.⁴³ In particular, regulators should seek to ensure that the benefits from broadband, greater efficiency and reduced costs, are passed on to consumers rather than to higher profits for service providers. Regulatory agencies may be captured by commercial or governmental interests if they are not independent. In Lao PDR where the government still hold stakes in the operators, true regulatory independence seems to drift apart. The interests of operators coincide with the interest of government. Moreover, the government continues to play a dominant role in price regulation. The government eventually acts as both operator and regulator.

Lao PDR became the 158th WTO member in February 2013. The WTO Reference Paper requires the country to establish a regulator separate from the operator. Not only for fulfilling the obligations in the Reference Paper but also for making a transition to more effective regulation to promote broadband, the MPT will initiate a detailed study needed to establish a structurally independent regulator that separates the regulatory function of telecommunication market from the MPT. Providing a regulator with structural independence will contribute to reduce the possibility of political or industry capture. When a regulatory body bows to external pressure from operators or other government entities, it often lacks independence and its decisions could be neither objective nor transparent.⁴⁴

42. In 2017, GDP per capita amounted to USD 2,457 according to the World Bank, which gives an average monthly income of USD 204 ($27 \div 204 = 13.2(\%)$).

43. World Bank, Digital Dividends, 2016

44. International Bank for Reconstruction and Development/The World Bank, InfoDev, and The International Telecommunication Union (ITU), Telecommunications Regulation Handbook, 2011

5.2.2 Replace minimum price regulation by maximum price regulation (set maximum service rates for broadband services)

Price regulation in Lao PDR takes the form of minimum prices, setting below the market prices. A minimum price regulation in general leads to increase in supply, while decrease in demand by imposing higher prices for consumers. Minimum price regulation tends to increase the prices that operators receive in return for providing telecommunication services. The intent behind adopting minimum price regulation for telecommunication charges seems to stem from the policy direction to ensure a minimum level of revenue for the operators along with the desire to safeguard state revenue because the operators are owned by the government in part or as whole.⁴⁵ For the benefit of consumers, the GOL will change the price regulation structure by 2025, including the introduction of maximum price regulation.

Due to minimum price regulation, greater competition than before has not been beneficial for Laotians. Telecommunication charges has remained almost uniform across the operators. According to economic theory, prices of telecommunication services at large tend to decrease if the operators have been established for a long period of time and have got more subscribers. Profit margins are also likely to increase, allowing the prices to come down. In this context, even if the MPT is not able to change the price regulation structure, fixed broadband prices could be lowered through discussions with the operators. If that be the case, entry-level fixed broadband prices should be far lower than the current price offerings by the operators. Although lagging behind the recommendation by UN Broadband Commission for Digital Development, Lao PDR will achieve the price target by making entry-level fixed broadband services affordable (amounting to less than 5% of average monthly income by 2025).⁴⁶

5.2.3 Lower costs associated with broadband use

According to Broadband Strategies Toolkit by the World Bank, although broadband services are available, users must be able to afford all costs associated with the broadband service. The Toolkit points out two important factors for take-up of broadband: the ability to afford the hardware (e.g., personal computers, laptop/netbook computers, and smartphones) necessary to access the network, and

45. Article 1 of Law on Telecommunications emphasizes the role of telecommunication sector in the state budget, stating 'This Law determines the principles, regulations and measures regarding the organization, activities, management, monitoring, inspection of the operation of telecommunication businesses, telecommunication resources, technical standards, supply and usage of telecommunication services to ensure quality, accessibility for all, convenience, fairness, continuity of development and modernization aiming at ensuring national security and safety, as well as generating revenue to the State budget contributing to the protection and development of the nation.'

46. UN Broadband Commission for Digital Development

the ability to pay for network access (e.g., recurring monthly service charges). The issue is that some users simply cannot afford either the upfront costs of equipment or the ongoing costs of broadband access plans. In many developing countries, as well as among the low-income populations in developed nations, the costs associated with hardware and network access are often substantial relative to income levels. Since the issue of recurring monthly service charges was addressed in the previous section, the issue in this section is how to reduce the costs of equipment to use broadband.

The economic and social benefits of ICTs are well recognized in Lao PDR. But it is not well known that reducing taxes on PCs and ICT products is one of the surest ways to realize the benefits. A supportive tax regime on ICT products is needed in Lao PDR since taxes on PCs and ICT products are relatively high. Tax reductions for PCs would lead to lower retail prices, which, in turn, increase the demand for PCs and subsequently encourage broadband subscription. The increase in tax revenue increase from complementary markets such as broadband can offset the tax revenue loss due to the PC tax cuts.⁴⁷ Otherwise, high taxes can hold back the adoption of ICT products and broadband, which can inhibit economic growth and competitiveness. To promote the uptake of broadband and other ICT products, the MPT and the Ministry of Finance will jointly assess taxes and customs duties that can be reduced to improve affordability and determine the tax reduction targets by 2022. Tax reductions will be effective in the beginning of the year 2023.

5.2.4 Discount for disabled/disadvantaged groups

For people with disabilities, broadband is a flexible and adaptable tool that is being used to deliver convenient and effective services, and that enables a range of social, economic, and health-related benefits.⁴⁸ Thus, ensuring the availability and affordability of broadband is critical to people with disabilities. However, despite increasing availability, many people with disabilities remain offline simply because they cannot afford broadband services.

According to the World Health Organization (WHO), roughly 15% of the total population has a disability, amounting to more than 1 million in Lao PDR.⁴⁹ It is estimated that approximately half of them are mine/unexploded ordnance (UXO) victims.⁵⁰ Many disabled people in Lao PDR, as elsewhere, live in poverty with limited

47. In Colombia, the government eliminated the value-added tax (VAT) on most PCs in 2007. The tax reduction led to a 110% surge in PC sales as well as increased sales of complementary technologies, resulting in an 83% tax revenue benefit in the first two years alone.

48. US Chamber of Commerce, *The Impact of Broadband on People with Disabilities*, 2009

49. USAID, *Lao PDR General Disability Overview*, 2012

50. Except for people disabled because of UXO explosions, there is no reliable information on the number of people with disabilities in Lao PDR.

opportunities for accessing education, health, housing and labor market. Taking account of the interests of those with disabilities, the MPT will take specific measures to ensure that end-users with disabilities can also take advantage of broadband services. A certain percentage discount on the price of telecommunication charges, including broadband services will be considered in close consultation with the National Committee for Disabled Persons (NCDP) and the Ministry of Finance.

5.3 More people use (Take-up, usage)

To boost up demand for broadband, consumers should find the relevance and attractiveness of it. Hence, relevance and attractiveness issue must be addressed for broadband to be adequately adopted. Attractiveness is associated with services, applications and content consumers perceive. Many people simply do not see a need for broadband connectivity because of unattractiveness, although broadband is made available.

To increase the use of broadband, policy measures generally target at encouraging government, businesses, and individuals to produce and consume content, services, and applications. In this regard, broadband services should be made available in government offices, schools, health care centers and other places of public access. Facilitating the use of ICT by businesses such as e-Commerce, creating digital content accessible to local populations, and promoting digital entrepreneurship can all increase demand for broadband services.

5.3.1 Aggregate demand for the public sector

The GOL has not made much progress in introducing broadband to local institutions such as schools and health institutions. Extending broadband use cannot be addressed by the MPT policy makers alone. Broader structural issues must be addressed with the help of all relevant stakeholders. Above all, a significant role for all levels of government is the procurement of broadband services to deliver enhanced outcomes in health, education and other government services.

A lack of coordination of demand aggregation can create significant commercial risk for suppliers or does not allow users to negotiate with providers on favorable terms. On the contrary, aggregating demand can improve the responsiveness of broadband supply to the needs of user groups. This can lead to swift investment in infrastructure and to improve the pricing of broadband services. Services such as health, education and government services will be key anchor tenants for demand aggregation strategies. Through the investment supported by these anchor tenants, improved connectivity could be achieved for the wider community. To fully take advantage of demand aggregation, the MPT will develop government-wide coordination arrangements to enable government ministries and agencies to increase and

aggregate their demand, thereby making them to serve as broadband anchor tenants where practical.

5.3.2 Strengthen ICT training

People need ICT training to become digitally literate and to engage in e-services over the Internet. Digital literacy is essential skills in a broadband environment to effectively utilize and communicate using various digital platforms. Digital literacy enables people to set up online businesses, or to use broadband services, such as social networking sites, to enhance their ongoing livelihood and economic activity as well. Thus, digital literacy focuses on the end user experience and skills required to live in an increasingly digital society.

Digital literacy is a key factor to increase broadband adoption. The government, businesses and individuals need the skills and capabilities to enjoy the benefits of broadband access. The skills gap in basic competences, as well as in digital literacy, prevents many from participating fully in the digital economy. Not to leave anyone behind, the MPT will build ICT learning centers in villages, districts, and provinces to educate and train government employees and public with the ICT skills. Number and location of ICT learning centers to be established by 2025 will be determined in 2021 after conducting a study on the details of ICT learning centers. ICT learning centers will be equipped with Internet-connected computers and will be staffed by tutors available to assist trainees.

5.4 More useful applications and local contents (Relevance)

5.4.1 e-Government

It is obvious that building broadband infrastructure alone will not be sufficient if there is no demand for broadband services. e-Government services can serve as a demand driver for broadband. Generally, such e-Government services include: 1) providing government information online; 2) conducting online interaction and transactions with the government; and 3) participating in the decision making process online. Although e-Government may not be the main driver of broadband demand, e-Government services can contribute to the overall usefulness of broadband services by making interaction and transaction with the government easier, faster, and more transparent. In this respect, by the end of 2021, the MPT will make a comprehensive plan in detail for advanced e-Government in close partnership with the involved ministries and agencies.

The new e-Government Plan will identify and organize key applications for e-Government based on both frequently asked services by citizens and businesses and

mission critical functions essential to the operation of government. The key applications to be developed by 2025 will be clustered around G2C, G2B, G2G, and common infrastructure. A timetable for the development and introduction of each e-Government application will be established together with required resources. The Plan will also focus on meeting the need to develop basic national electronic registries, taking relevant measures to increase take-up of e-Government services and developing civil service capabilities and capacity in ICT.

5.4.2 e-Health

e-Health has a great potential to advance the goal of universal health coverage and improve the quality and efficiency of health services. Broadband helps to achieve significant productivity gains and narrow discrepancies in geographic coverage of health services. Corresponding to the advancement in medical arts, the need for bandwidth of e-Health applications has increased. Since medical records have become more extensive and digital images have become larger, regular telephone lines do not supply adequate bandwidth for most e-Health applications such as telemedicine. For example, broadband capabilities are essential to medical evaluation and other medical applications that use imaging extensively. High-definition video consultations enable rural patients and immobile patients to be seen by specialists in a timely manner. With the rapid growth of mobile phones in Lao PDR, m-Health could be a new frontier in health care.

The MPT in alliance with the Ministry of Health will seek to provide better health services by maximizing the contribution of broadband in the delivery of health care services through the promotion of e-Health/m-Health applications and initiatives, including electronic health/medical records (EHRs/EMRs) and telemedicine.

5.4.3 e-Education

Education is vital to the development of a skilled workforce. The education sector should play a key role in preparing Laotians for a digital future. Broadband-enabled technologies are improving the effectiveness of instruction and enhancing learning outcomes in schools, higher educational institutions and the vocational training sector. Such impacts, however, rely on the wide availability and effective utilization of broadband in education.

The MPT and the Ministry of Education and Sports (MOES) will take proactive steps to enable schools and educational institutions to have the necessary bandwidth to access services and applications to facilitate research, e-learning and access to online curriculum content. To expand the delivery of ICT-enabled education, the MOES will connect broadband Internet to all secondary schools, district education and sports bureaus, teacher training institutions, technical and vocational colleges and

universities by 2023.

5.4.4 e-Commerce

Affordable and reliable broadband service is one of the main pillars of the development of e-Commerce. The ability to engage in e-Commerce enables all businesses, including MSMEs, to sell to customers around the country and the world. The government laid the foundation for e-Commerce by enacting Law on Electronic Transactions in 2012. While e-Commerce market is growing, e-Commerce is not widely used in Lao PDR, due to the low level of information security, the low rate of formal banking and credit card use, and confusing addresses. Specifically, many people feel insecure about purchasing goods and making payments on line because of low information security.

To facilitate e-Commerce, the Ministry of Posts and Telecommunications and the Ministry of Industry and Commerce, in consultation with industry, will coordinate a whole-of-government review of legislation and regulations to identify and remove barriers to electronic transactions, mobile and electronic banking, electronic funds transfer (EFT) and electronic data interchange (EDI), and to provide for the recognition of digital signatures and data privacy. Particularly, legal framework for taxation, classification for business registration, and consumer protection will be addressed along with problems involved in the address system. The MPT will complete legal documents to support e-Commerce by 2025.

5.4.5 Promote local content

Content is linked to applications and services, meaning the information viewed, created and shared. Useful content is an important factor of broadband adoption. Lack of attractive and useful local content is the main reason for not adopting broadband in many developing countries.⁵¹ Local content refers to content that is in the local language and relevant to the local context and uses local sources. As broadband access is made more widely available, the development of local content is vital in a country where there is limited local content. While affordability of service is still an important issue, many non-broadband users assert that broadband service is simply not relevant to them. Local content includes government services, commercial content, entertainment content as well as user-generated content. It also contains content that preserves national identity and local traditions. Thus, local content can virtually be construed as a lens through which national identity and values are disseminated,

51. According to the UN Broadband Commission for Sustainable Development, lack of relevant local content and applications, low digital literacy and unaffordability are the drawbacks why the use of broadband has not fully matched its increasing supply.

while preserving societal norms and cultural heritage. In this respect, it is desirable for Lao PDR to unlock its valuable content by putting online so that it can be enjoyed by Laotians and the world as well.

Notwithstanding its true national importance, local content in Lao PDR is very limited. Widely consumed contents by Laotians are mostly hosted overseas. Especially, most of Laotians can understand Thai. Also, the cultures of Thai and Laotians are alike, so Thai contents have become very popular in Lao PDR. But downloading Thai contents requires expensive international links, which also incurs significant latency. One possible solution in the short-term is to establish Thai content distribution platform in Lao PDR to save international bandwidth until Thai contents are replaced by Lao local contents.

There are many challenges to create local content. The building blocks for generating local content, such as software development kits, may not be available in Lao language. Entrepreneurs often need the ability to both fund and sell their local content services, which can be ensured through various means including an appropriate copyright law and its enforcement. Under the circumstances, the government as a whole should play a key role in promoting local content by helping local content producers overcome these challenges. Above all, the Prime Minister should take conscious actions to make a strong political commitment to envision the development of local content industry as a national agenda. Following the vision for local content industry, the MPT will strengthen policy efforts to ensure that local, relevant and interesting content is produced to increase the demand for broadband services in the country. The policy efforts will include both financial assistance and technical support. Direct grants for the production of local content, tax credit, and low-interest loans to local content industry will be considered for financial assistance. The MPT will also provide technical support, such as the development of standardized keyboards, character sets and character encoding. This type of technical support enables users to create content in Lao language.

In addition, the MPT and the Ministry of Industry and Commerce will conduct a feasibility study for establishing a content industry park dedicated to the provision of centralized facilities for producing contents and marketing, while integrating training with a clustering of content companies in 2021. Furthermore, to create an effective enabling environment for the development of local content, legal and regulatory issues will be reexamined, including the issues of content regulation and intellectual property rights. The laws and rules that regulate online content will be amended as needed in 2021.

6. Implementation and performance indicators

6.1 Implementation structure

The policy goals envisaged in the National Broadband Plan 2021-2025 and the related policy actions are very challenging, going beyond the comfort zone. It is therefore crucial for stakeholders to start acting immediately with strong commitment to accomplish the goals. Moreover, collaboration and coordination among stakeholders are essential to implement the shared targets jointly set in the Plan. As the lead Ministry of the Plan, the MPT will play a key role as the focal point for implementation.

For a five-year plan to be successful, flexibility should be allowed, subject to the rapid pace of technological progress, economic factors, stakeholder capabilities and political leadership. It is therefore important to note that uncertainty or unexpected elements are likely to have an impact on the policy actions in this Plan.

To expedite implementation of the Plan and to facilitate collaboration and coordination, Broadband Steering Committee will be established, consisting of high-level representatives of the key Government Ministries and industry stakeholders. The Steering Committee will be chaired by the Deputy Prime Minister. Under the Steering Committee, two subcommittees and one working group will be set up.

- The Broadband Implementation Subcommittee, chaired by the Minister of MPT, consists of senior representatives of all Government ministries that have a role in implementing the National Broadband Plan. This subcommittee will be responsible for coordination of the efforts of all stakeholders, ensuring progress in the Plan's implementation, monitoring progress for the fulfillment of the policy targets throughout the planning period.
- The Application and Content Subcommittee, chaired by the Deputy Minister of MPT, is composed of a minimum of seven members with experience and exposure to application, local content, local market knowledge across all areas that need to be addressed in this Plan.
- The Working Group on Affordability, chaired by the Deputy Minister of MOF, is composed of senior representatives of telecom operators, ISPs and consumer groups as well as senior officials of relevant ministries involved in price regulation of telecommunication charges, and senior official from NCDP.

6.2 Measuring progress and performance indicators

The Broadband Implementation Subcommittee will monitor and measure the progress of the National Broadband Plan 2021-2025 based on the performance indicators set

forth in as follows.

The MPT shall be responsible for measuring progress of the Plan. The MPT will publish relevant information and statistics compiled by other Government Ministries, on a dedicated broadband portal—www.BroadbandForLao.gov.la—which will bring together all relevant information about the development of the broadband sector in Lao PDR, including data relating to all the key measures of progress identified in this Plan.

<Table 13> Performance indicators for the Plan

Areas	Targets	Metrics
More places connected (Availability)	- 90% of villages access to broadband	- % of villages with access to broadband/ total number of villages in 2025
	- Financial assistance to the network construction for the unserved and underserved area by Telecommunication Development Fund	- Operation of Telecommunication Fund - Number of unserved and underserved areas subsidized from Telecommunication Development Fund
	- Timeline for each unserved and unserved areas for rolling out broadband infrastructure	- Plan for rolling out broadband infrastructure for unserved and underserved areas by 2021
	- Additional IXPs	- Northern region IXP in 2022 - Southern region IXP in 2023
	- Increased caching capacity	- Web cache effectiveness (savings in bandwidth)
	- Enforce universal service obligation	- Number of cases enforcing universal service obligation by 2025 (1 case: UNITEL)
	- Leverage the use of wireless and emerging technologies	- Availability of free WiFi in Vientiane and Luang Prabang
	- Collaboration system for infrastructure sharing	- Development of Information System on Broadband Infrastructure by 2024
More affordable prices (Affordability)	- Establish sound regulatory environment	- Establishment of independent regulatory agency
	- Replace minimum price regulation - Make entry-level fixed broadband affordable	- Introduction of maximum price regulation - Less than 5% of average monthly income by 2025 (Monthly fee for 512K fixed broadband/monthly income per capita in 2025)
	- Lower taxes on PCs and ICT products	- Reduced tax rates (customs duties, VAT)
	- Discount for disabled/disadvantaged groups	- Rate of discount for disabled/disadvantaged groups, Number of disabled persons benefitted from discount
More people use (Take-up, usage)	- Aggregate demand for the public sector	- Government-wide demand aggregation arrangements
	- Strengthen ICT training	- Number of ICT learning centers by 2025
More useful applications and local contents (Relevance)	- e-Government	- Number of e-Government applications developed - Take-up of e-Government services
	- e-Health	- Number of e-Health applications in use by year - Number of health centers connected to broadband Internet
	- e-Education	- Number of schools connected to broadband
	- e-Commerce	- Number of e-Commerce websites by year - Legal framework for e-Commerce by 2025

	<ul style="list-style-type: none"> - Promote local content 	<ul style="list-style-type: none"> - Development of local content as a national agenda - Number of local contents produced - Amount of financial assistance for content production - Number of new local content companies established - Feasibility study for establishing a content industry park
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