



N A T I O N A L

ICT POLICY 2021



GOVERNMENT OF TUVALU

I am privileged to present to you the 2021 National ICT Policy (NICTP) for Tuvalu on behalf of the Government of Tuvalu and as the Minister for Justice, Communication and Foreign Affairs. This policy articulates the firm commitment of the Government towards maximizing the effective and efficient contribution of information and communication technologies (ICT) to achieving our national goals. Achieving fundamental priorities through our actions in different priority areas will eventually transform Tuvalu into an information society and a knowledgeable economy.

The 2020 Tuvalu Foreign Policy, *Te Sikulagi*, highlights the concept of innovation, which is known in Tuvaluan as “kiloga fou”. “Kiloga fou” shows that our unique cultural values and smallness in size actually lead to the creation of opportunities that allow Tuvalu to leapfrog other nations and drive ICT developments more rapidly. Our National Strategy for Sustainable Development (2021-2030), *Te Kete*, asserts the priorities and importance of ICT as an enabling digital tool for the achievement of our goals and objectives.

Emerging digital technologies are changing the way we live and work in ways we could never have predicted ten years ago. More than 50% of our population does not have access to mobile network services, and the Government concedes the need to provide a pro-active policy and regulatory framework that not only syncs with contemporary technological realities and dynamics but that also supports the orderly development of the ICT sector to ensure maximum developmental impact for the benefit of all Tuvaluans.

The strategies, policies, and action plans in this NICT policy are geared toward bringing about revolutionary transformation in Tuvalu. To ensure we all reap the benefits by effectively utilizing ICT advancements, I invite everyone to embrace this policy and work together to help achieve our goals and set the pace for future-looking ICT developments in Tuvalu.

Fakafetai Lasi, Tuvalu Mo Te Atua.

Hon. Simon Kofe

Minister of Justice, Communication and Foreign Affairs

This policy aims at supporting the realization of our national vision in the ICT sector. The Government intends to exploit the potential of emerging technologies to transform government services, create opportunities for citizens, and add value to the development of our economy, hence the need to revise the 2014 Draft National ICT Policy. Many changes in the ICT sector have occurred since 2014 which leads to the development of this policy – 2021 National ICT Policy.

To harness the digital transformation initiative, it is of great importance to prioritize the extending of mobile service to the outer islands, construction of the high-speed submarine fiber optic cable, developing a secure and ubiquitous new generation information technology infrastructure, and instituting modern internet industrial systems. After the recent deployment of broadband services nationwide, the Government will be expecting improvements in the performance of its state-owned enterprises leveraging the power of the internet to accelerate their sourcing, sales, and logistics systems; streamline operations, and identify market trends to boost their marketing, research, and innovation capabilities.

This policy is enlightened by consultations with the Tuvalu ICT community and as well as public consultations. These consultations set the pace for enhancing the knowledge of key stakeholders and encouraging our citizens to participate in the creation of value for Tuvaluan citizens using emerging technologies in the cyber space. The policy outlines seven strategic focus areas for the development of the ICT sector in Tuvalu including: enabling ICT infrastructure and access, government services, cyber security and cyber safety, universal access, digital transformation, value-based ICT human capacity building, and enabling regulatory and legal frameworks.

To ensure the successful implementation of this policy, it is our goal to enfold the effective delivery of universal access, affordable, equitable and reliable broadband, and mobile services to all citizens.

Fakafetai lasi

Dr. Tausi Taupo



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1. INTRODUCTION

Tuvalu has consistently been at the forefront of rapid technological advancements and changes in legal and regulatory frameworks. The Tuvalu National ICT Policy provides a strategic overview of ICT developments in Tuvalu with a future-looking ICT-driven approach to ensure the effective participation of Tuvaluan citizens in the local and global digital economy. The growing demand for bandwidth, the need for equitable and quality services, a more challenging cyber space, increased demand for IT enabled services, and harmonization of ICT policies at the regional and international level are some of many emerging issues this policy addresses. The policy is the result of an all-inclusive, participatory, and consultative process that sees ICT as an enabler for all national economic agendas and that improves access to ICT using broadband and mobile networks. The Government recognizes the important part played by the private sector and aims to leverage ICT to promote national sustainable development goals and ensure effective delivery of service to the public.

This policy envisions the creation of an inclusive infrastructure environment to ensure uninterrupted internet connectivity with the extension of internet broadband coverage nation-wide. The policy provides enabling infrastructure and frameworks to support the advancement of ICT, such as the development of data centers, Internet of Things (IoT), machine learning, Artificial Intelligent (AI), and cloud computing, while also fostering a secure and innovative ecosystem. The Government realizes the vast contribution ICT has made to the economy amid COVID-19 and aims to increase this contribution by 2030 by using ICT as a platform to create a more robust economy that provides secure income and improved livelihoods for all citizens. The policy promotes the harnessing of global opportunities by leveraging regional and international cooperation and engagements in the global ICT sector. It strives to enhance our educational system to improve the skills of people and foster an innovative ecosystem for small entrepreneurs and start-ups that leads to a global scale.

The Government, through support from development partners, will continue to play its role in promoting broadcasting and telecommunications and internet services through the provision of infrastructure to enable the expansion of TV coverage to the outer islands. This will encourage the development of local content and the ability to use and store local content in the Tuvaluan language. The Government will ensure that the radio frequency spectrum is managed in an equitable and transparent manner with clear conditions, encourage the sharing of infrastructure and enforcement of Quality of Service (QoS) regulations, and ensure that service providers offer reliable services that form

an effective ecosystem for the development of e-commerce and the creation of a digital economy. Unlike other ICT policies, this policy integrates Tuvalu's distinct cultural traits with the development of innovative ICT approaches at the national level.

To effectively implement this policy, a review of the current legal, institutional, and regulatory framework is needed to align the strategic policy focus. This will ensure that affordable and reliable telecommunications services are accessible to all people and allow for the development of an inclusive digital economy that is secure and safe. The legal, regulatory and standards framework required to promote investment in, and use of, digital technology will also be developed. To accomplish our goals, a robust monitoring, measurement, and evaluation framework will be put in place to track implementation and reviews.

2. VISION, MISSION AND GUIDING PRINCIPLES

Vision

A future-looking, ICT-driven, and knowledgeable Tuvaluan society.

Mission

To be innovative and ensure the availability of accessible, efficient, reliable, affordable, and secure ICT services to improve the livelihoods of all citizens.

Guiding Principles

The ICT sector plays an important and critical role in the development of the nation. ICT is a center piece to harnessing the digital transformation to improve the lives of all citizens, and it is the intention of the Government to allow the securing of key technologies at the national, regional, and international levels.

The aim of the policy is to provide Tuvaluans with ubiquitous access to reliable, affordable, high speed satellite broadband and mobile connectivity. Reliable and affordable telecommunications are key to unlocking innovation in various sectors with the use of emerging technologies like Blockchain, IoT, AI, Quantum Computing, Robotics, Cloud Computing, Augmented Reality, Cybersecurity, Automation, and 4G & 5G mobile service. This will also strengthen Constitutional principles and securely improve government accountability, efficiency, service delivery, and protect the rights of our citizens. The following principles were considered when developing the National ICT Policy:

Economic Agenda: *Te Kete* highlights the importance of putting ICT at the forefront of the national economic agenda, recognizing the critical role of the ICT sector as a pillar in national development and fulfilling our goal to become a leader in the digital space.

Cultural Values: *Te Sikulagi* promotes the importance of Tuvaluan values—concepts such as “Fenua o tagata” demonstrate the value of surviving in difficult conditions and has led our people to become more creative in adverse situations.

Ubiquitous Access: To provide our citizens with access to reliable, affordable, high-speed internet connectivity through the use of robust broadband and mobile platforms.

Constitutional Principles: To maintain an open and transparent Government by improving Government accountability and efficiency and providing better service delivery. To protect the rights of the people of Tuvalu, both at present and in the future, as outlined in the Constitution of Tuvalu.

Private, Civil, Public and Academic Sectors: To promote the interests of these sectors so as to foster entrepreneurship, innovation, investment, and growth.

Sustainable Development: To leverage ICT to promote sustainable development, accelerate human development and develop a knowledgeable society.

Cyber Security and Cyber Safety: To provide cyber security awareness and protection in all levels of the community and create a cyber-safe society.

Regulations: To establish modern, independent, and proportionate regulations.

Disaster Risk Management: To use ICT as a tool to facilitate effective disaster risk awareness and training nationwide.

Climate Change: To use ICT to tackle climate change by addressing the problems faced by Tuvalu and other Pacific Islands. To encourage the use of ICT-based systems to monitor weather and environment to help countries adapt to the negative effects of climate change.

3. POLICY OVERVIEW AND OBJECTIVES

The rapid changes in technology have made necessary a review and update of the 2014 Draft ICT Policy. The Government realizes the potential of the digital economy by creating an enabling ICT environment for the people of Tuvalu. This policy is designed to take advantage of the new digital revolution and emerging technologies and keep up with trends that will enable Tuvalu to become a more prosperous participant in the global economy. The Government hopes to leverage a

future-looking position at all levels of ICT development in every sector of the economy so as to achieve the following objectives:

<ul style="list-style-type: none">● Create an enabling environment with modern infrastructure conditions including high-speed internet, wider wireless coverage in remote areas, and internet access points across the nation.
<ul style="list-style-type: none">● Facilitate the creation of frameworks to support the growth of emerging technologies like Big Data, IoT, Blockchain, 5G, and AI with the ability to foster a secure and innovative ecosystem.
<ul style="list-style-type: none">● Use terrestrial broadcasting and internet streaming to extend TV and radio nationwide.
<ul style="list-style-type: none">● Streamline the use of ICT to improve the percentage contribution of ICT to economic growth with a projected 40% increase in Gross Domestic Product (GDP) by 2030. To leverage regional and international cooperation and engagements to harness global opportunities.
<ul style="list-style-type: none">● Develop advanced education systems such as training institutions for upskilling our people. Foster an innovative and start-up ecosystem to allow citizens to access all opportunities in this digital era.
<ul style="list-style-type: none">● Improve the delivery of public and Government services to ensure efficiency and QoS to gain global recognition.
<ul style="list-style-type: none">● Develop internal capacity by improving the digital skills of ICT staff.
<ul style="list-style-type: none">● Strengthen e-Government services, e-health, e-agriculture, and ICT for climate change.
<ul style="list-style-type: none">● Develop supporting legislation to protect and safeguard users of ICT services.

4. BACKGROUND

4.1 ICT AND NATIONAL STRATEGIC FOR SUSTAINBLE DEVELOPEMENT

The Tuvalu National Strategy for Sustainable Development, *Te Kete*, provides a long-term national development blueprint for creating a globally competitive and prosperous nation. The goal is to

transform Tuvalu into a prosperous nation providing a high quality of life for all citizens in a clean and secure environment by 2030. In *Te Kete*, the strategic goals for ICT are set to provide efficient, high quality Internet infrastructure and support services.

With respect to telecommunications and internet services, the policy considers the following initial recognition of needs:

- Domestic and international telecommunications services need to be upgraded to keep pace with rapidly changing technology and common services now available to users around the world, especially the vast arrays of low-cost mobile communication and internet services. The need to upgrade includes ramping up affordability, access speeds, service stability and reliability.
- Information Communication and Technology is identified as an enabler or foundation for socio-economic transformation.
- The role of science, technology, and innovation in a modern economy in which new knowledge plays a central role in boosting wealth creation, social welfare, and international competitiveness.
- An economic and institutional regime that utilises existing knowledge, creation of new knowledge and entrepreneurship, an educated and skilled population, and dynamic information and communication infrastructure that facilitates processing and dissemination of information and effective innovation systems.

4.2 RATIONALE FOR THE POLICY

The review and update of the current Draft National ICT Policy 2014 was necessary to accommodate changes in legal and regulatory frameworks, technological advancements, and other emerging issues.

Legal and Regulatory Frameworks: The following legal frameworks have links to the ICT Policy, and with rapid change in technology, these frameworks need to be reviewed.

1. Constitution of Tuvalu
2. Tuvalu Telecommunications Act 2008
3. Cybercrime Bill

Technological Advancement: Since 2014, several changes have occurred in the ICT sector, including the convergence of ICT technologies, migration from analogue to digital TV broadcasting, the use of a radio spectrum, and advancement of mobile enabling services.

Emerging Issues: There are many issues that have surfaced due to advancements in technology. These include rapid growth in IT-enabled services, increased demand for bandwidth and QoS, the challenges of cyber security, problems of content in an era of social media convergence and globalization, and changes in consumer preferences and online child protection.

4.3 CURRENT SITUATION ANALYSIS

Tuvalu is the second smallest country in the world by population and the fourth smallest by land area with a population of 11,300 citizens on 9 islands dispersed over an Exclusive Economic Zone (EEZ) of approximately 753,139 square kilometers.

4.3.1 OPERATIONAL ENVIRONMENT

4G LTE Coverage: This network is in operation in the main island of Funafuti covering at least 90% of the surface area of the island with a couple of identified blind spots. The 4G LTE network will be rolled out to the rest of the outer islands by next year.

3G Coverage: The 3G service piggybacks on the same 4G network with limited coverage.

Internet Domains: The number of internet domains registered with the dot TV extension has increased to about 512,000 domains throughout the years. Enhancing the subdomain is encouraged to promote Government and other e-services to benefit all citizens.

Broadcasting Services and Subscriptions: Radio Tuvalu is the only radio station transmitting on the Frequency Modulation (FM) band 88.2Mhz. In terms of television, the number of direct home satellite subscriptions for local TV broadcasting has increased over the years, and the number of Sky TV subscriptions has fluctuated over the years.

Table 1 below shows the current access to ICT services by percentage of population. All outer islands are served with Kacific broadband access using 1.2m terminals on customer premises; remaining customers without terminal access use the TTC WiFi network with an average broadband coverage of around 60-70% on each island. Fixed voice services to individual premises are only available in Funafuti.

Table 1: Access to ICT services, 2021 (% of population)

Service	Fixed Lines	Mobile 4G LTE	ADSL & VDSL	Kacific Broadband	Outer Islands WiFi
% pop (penetration)	8.34	29.11	0.23	0.44	10.73
No. of Active Subscribers	971	3390	27	51	1560

Note: The copper telephone network in the outer islands was completely shut down in July 2019

ICT Contribution to Growth: The Tuvalu Household Income and Expenditure Survey (HIES) report 2015|2016 indicates that 31% of the population aged 10+ years reported having used the internet, ranging from 48% in urban Tuvalu to 15% in rural areas. Around 20% of the population aged 10 to 19 years had used the internet, and more than half of the population aged 20 to 39 years had access to the internet. For the age level of 40 years and above, a slow decrease in the access rate was reported, as approximately 3% of the population aged 60 and above was using the internet. It was noticed from the survey that 34% of those using the internet were connected from their workplaces. Respectively, communication through email and social media were the two main reasons for accessing the internet. The chart below shows internet users per 100 people for all Pacific Islands with Tuvalu sitting at a ratio of 32:100—ahead of Tonga, Samoa, Kiribati, and others.

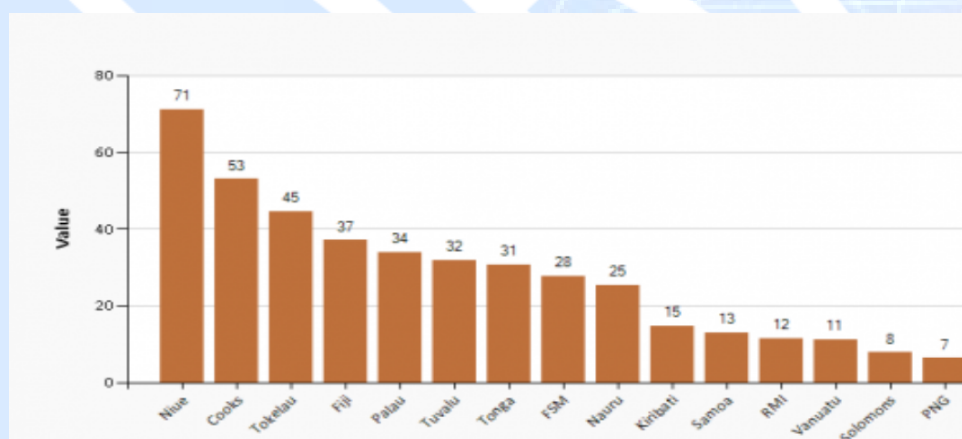


Figure 1: Individual access to internet – internet users per 100 people (Census, DHS, MDG 8.16) | Source: <https://sdd.spc.int/tv>

4.3.2 REGULATORY BACKGROUND

The main frameworks for regulating the ICT sector in Tuvalu are as follows:

- The Constitution of Tuvalu 2008 Revised Edition – CAP 1.02
- The Tuvalu Telecommunications Corporation Act 2008 Revised Edition – CAP. 35.05

The ICT Department under the Ministry of Justice, Communication and Foreign Affairs is the current responsible regulatory body in Tuvalu.

4.3.3 TECHNOLOGICAL TRENDS

Ubiquitous Communications: Many people, using devices such as mobiles, WiFi, cable and other means, are accessing the internet and this trend is expected to intensify, and increase given the availability of improved connectivity speeds. We expect everyone and everything to connect to the network and generate more data.

Pervasive Instrumentation: More devices and elements in our environment are interconnected, producing tremendous amounts of data, which is known as the IoT. IoT can remotely impact physical change and inherently poses significant challenges while simultaneously providing enormous advantages. You can now remotely monitor, manage, and change processes and stages without having to physically be present, but this can also do damage, destroy facilities, and injure people remotely.

Big Data: The aggregation and storage of enormous volumes of data generated by people, devices and instruments has led to a technical phenomenon called big data. The storage, analysis and interpretation of big data requires specialized techniques and equipment, which we must be prepared to implement. Tuvalu will become a net emitter of data, and it is the intention of the Government to develop suitable facilities capable of storing and using our own data.

Deep Learning: Machine learning is a branch of artificial intelligence focusing on data classification, trend identification and predictive analytics. Deep learning has led to fundamentally useful outcomes such as accurate speech recognition; automated expert-level medical diagnosis; better-than-human computer vision; holistic systems like self-driving cars and self-guiding drones; and more mundanely improved purchase recommendation systems, customer credit ratings and epidemic outbreak prediction. Even though this technological advancement is beyond existing technologies in Tuvalu, the internet is bridging the gap and allowing us to grow in this area.

Blockchain and Digital Payments: Blockchain is a peer-to-peer distributed digital ledger that provides an immutable time-sequenced record of all transactions. Blockchain can be used to track digital assets whose ownership can be verified digitally such as land, equities, shares and derivatives, votes, and currency. It has been most famously implemented in Bitcoin, but it is not limited to those domains. The integrity of blockchain hinges on strong cryptography that validates, and chains together blocks of transactions, making it nearly impossible to tamper with any individual transaction record without being detected. The Government is currently exploring this emerging technology.

The Sharing Economy: The Sharing Economy is a socio-economic ecosystem built around the sharing of human, physical, and intellectual resources. A sharing economy is an economic model in which individuals can borrow or rent assets owned by someone else. The sharing economy model is most likely to be used when the price of a particular asset is high, and the asset is not fully utilised all the time. The Government comprehends the importance of this approach, despite the non-existence of competition in our telecom sector.

The Gig Economy: The gig economy is a labor market characterised by the prevalence of short-term contracts or freelance work as opposed to permanent jobs. The fastest job growth globally is in “nonemployee” firms, that is, self-employed, short term contracts (measured in hours), remote and/or telecommuting workers. The Government envisions the potential of a gig economy and, therefore, encourages specialized citizens to join and make use of “gig” opportunities.

Adaptive Security Architecture: The complexities of digital business and the algorithmic economy, combined with an emerging “hacker industry”, have significantly increased the digital threat to our nation. We need to develop the capacity to detect and respond to threats, secure our communications and data, protect our people and infrastructure, and develop resilience in the face of disaster.

4.4 CHALLENGES

The ICT sector faces many significant challenges. To achieve our goals, this policy seeks to overcome the challenges outlined below:

- Underutilization of ICT in the provision of Government services.
- Cybercrime and Cyber-security vulnerabilities.

• High cost and unreliable telecommunication services.
• Limited country-wide ICT awareness that hinders cultural and attitudinal change.
• A wide internal digital divide between rural and urban areas as well as low bandwidth.
• Inadequate policies and legal frameworks.
• Inadequate competency and skilled human capacity.
• The low availability of ICT hardware in Tuvalu.
• Disrupted power supply in the islands.

5 FOCUS AREAS OF THE POLICY

This section outlines the seven focus areas of the policy including, enabling ICT infrastructure and access, government services, cyber security and cyber access, universal access, digital transformation, value-based ICT human capacity building, and enabling legal and regulatory frameworks.

5.1 ENABLING ICT INFRASTRUCTURE AND ACCESS

Over the years, the Government has invested heavily in telecommunications infrastructure, enabling 89% of our citizens to access the internet, mostly via satellite-based connectivity. Accessing the internet anywhere in Tuvalu is an important factor that contributes to the successful growth of our economy. The Government recognizes the global trend of ubiquitous computing and the growing need for internet access anywhere at any time. This policy will drive a mobile and broadband-first approach to ensure that every Tuvaluan has reasonable access to the internet by focusing on mobile and broadband infrastructure. It is the aim of the Government to provide a network that enables Tuvalu to cater to the fast-growing ICT sector through the following:

• Infrastructure investment for the extension of mobile and broadband networks to the outer islands, development of data centres and broadcasting services, and the establishment of a Tuvalu National Digital Ledger using Blockchain.
• Implementing digital payments and a logistics infrastructure.
• Adoption of e-commerce platforms.

- Provision of a trusted security and certification infrastructure for all e-communications and transactions.
- Provision of an inclusive ICT environment to encourage the involvement of women, youth, and persons with disabilities.
- Coordination and cooperation with international systems and platforms for global reach.

5.2 GOVERNMENT SERVICES

Improvement in the delivery of public services can enhance the level of national and local collaboration with Government in every island of Tuvalu. Hence, the need to incorporate all arms of Government so as to build, operate, and manage locally built systems and successfully deliver Government services. This policy aims to allow for the implementation of high-quality systems for our citizens to access Government services online in a secure and convenient manner. The policy requires the following:

- Government services are easily accessible to all citizens anywhere and anytime using their mobile devices.
- The Government is transparent and accountable in all revenue collection.
- All Government-owned and state-owned enterprises implement and manage back-end and front-end systems to deliver services nationwide.
- All e-services, such as e-education, e-health, and e-agriculture, are provided on a secure platform.
- Current and future systems are integrated to avoid duplication and inconsistency.
- Citizens are provided with nationwide access to all Government services at any time.

5.3 CYBER SECURITY AND CYBER SAFETY

Advancements in technology expose Pacific Island nations to cyber threats due to being isolated, lack of resources, and distance from other countries while amid COVID-19. As we start to connect to high-speed internet, more users are able to download large files in a relatively short time, which can lead to an increase in the number of copyright violations, particularly with file-sharing systems. Spam

is the most common cybercrime experienced in the Pacific as reported by International Telecommunication Union (ITU) and this policy realizes the importance of harmonizing cybercrime legislation in Tuvalu. The Government encourages the establishment of the Tuvalu Computer Emergency Response Team (CERT) as well as the recognition of initiatives from organisations such as Pacific Cyber Security Operational Network (PaCSON), Global Forum on Cyber Expert (GFCE), Get Safe Online (GSO), and Oceania Cyber Security Centre (OCSC) with the intention for Tuvalu to join these initiatives.

5.4 UNIVERSAL ACCESS

This policy highlights the importance of providing public and private ICT services, including the knowledge necessary to use these services, so that citizens can easily access and participate in a knowledge economy. Thus, citizens should be provided with access to a rapid internet connection, an appropriate device such as a smart phone, sufficient internet data, and the ability to regularly use the internet. Therefore, the Government ensures the following:

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| • The availability of high-quality internet access to all Tuvaluans. |
| • The ability of citizens to purchase affordable devices to access the internet. |
| • The establishment of a social obligation fund. |
| • Every citizen has the skills needed to make the choice to use appropriate technology. |
| • Promotion of the development and use of spectrum management, infrastructure policy, and a regulatory environment. |
| • The introduction of tax regimes on ICT devices to drive competition and lower the prices of ICT devices in the market. |
| • The recognition of Tuvalu as a safe place for digital business. |

This policy underlines the challenges of equipping our entire nation with infrastructure and connectivity. It is the role of the Government to provide access to mobile and public WiFi infrastructure nationwide. To allow the full participation of every Tuvaluan, a multidimensional approach is needed to provide appropriate ICT tools, obtain skills and knowledge, and provide support for attitudinal change so that our citizens can participate in the digital future.

5.5 DIGITAL TRANSFORMATION

Amid the new normal of COVID-19 and in a world that is increasingly dependent on digital technologies, governments around the world are accelerating digital transformation to reduce service delivery and operational costs and improve service quality in terms of delivering more efficient and effective services that contribute to economic growth. The Government recognizes the magnitude of adopting and enforcing digital transformation, and, therefore, explores business options to ensure a smooth transformation of services through non-digital processes. This policy formulates an important digital-transformation strategy that will serve as a central concept in integrating the coordination, prioritization, and implementation of digital transformation within the Government and the private sector. To ensure the smooth adoption of various emerging technologies, the Government will initiate the following objectives:

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|--|
| • Conduct awareness prior to the launch of any new e-Government service. |
| • Encourage the establishment of internet banking in all our financial institutions. |
| • Allow the use of mobile money to create avenues for small business. |
| • Allow Tuvaluans to take new opportunities in emerging markets. |
| • Enable citizens to use appropriate electronic commerce platforms. |

5.6 VALUE-BASED ICT HUMAN CAPACITY BUILDING

The Government promotes the importance of our cultural values in every Tuvaluan upbringing, including the *falepili* concepts which outlined moral responsibility which amplify the idea of being a good neighbor that allows the sharing of skills and knowledge as explicitly expressed under the *kaitasi concept*. Therefore, by taking these values in to consideration when developing ICT skills can rapidly improve skills across the ICT sector. To grow our ICT sector, a Human Resources Development Plan must be put in place with the inclusion of these cultural value concepts. The Government will allow for collaboration with academic institutions to identify gaps that must be covered in academic curricula on ICT. This will ensure that all Tuvaluans are computer literate and able to engage in the digital era to earn a good living. In its approach, the Government will perform the following:

<ul style="list-style-type: none"> • Develop a sustainable ICT workforce.
<ul style="list-style-type: none"> • Allow Tuvaluans to access educational platforms from wherever they are at an affordable price.
<ul style="list-style-type: none"> • Incentivize industries with ICT specializations so that Tuvaluans can enroll in various IT programmes.
<ul style="list-style-type: none"> • Integrate ICT subjects in all levels of school curricula.
<ul style="list-style-type: none"> • Create a conducive ICT environment for citizens.
<ul style="list-style-type: none"> • Establish ICT centers of excellence.

5.7 ENABLING REGULATORY AND LEGAL FRAMEWORKS

Apart from the Telecommunications Act 1992, which was amended in 2008 and which outlines the incorporation and management of Tuvalu’s only telecommunications institution, the Tuvalu Telecommunications Corporation, Tuvalu lacks a legislative framework that allows for the effective utilization of e-commerce. Legislation on acceptance and the legality of electronic transactions and documents is also missing. Additionally, there are no laws governing e-contracts for electronic payments and fund-transfer transactions and no laws that establish electronic crimes as an offence. The Government is urging the implementation of more measures to protect the rights of citizens to their own data. Importantly, to ensure the economic and social benefits gained from implementing such regulations, the Government is also firm in protecting our social and cultural values. Consequently, this policy will do the following:

<ul style="list-style-type: none"> • Provide a conducive and enabling environment for sustainable social and economic development, including through universal access schemes, online transactions, data, and information security.
<ul style="list-style-type: none"> • Implement ICT policy, legislation and regulatory frameworks that promote open and non-discriminatory access to ICT, including access to information and guarantees as to the privacy of citizens.
<ul style="list-style-type: none"> • Address socially undesirable activities including cybercrime and online child pornography.
<ul style="list-style-type: none"> • Develop ICT regulations that are consistent with international and national laws, technical standards, and obligations.

6.1 ENABLING ICT INFRASTRUCTURE AND ACCESS

The Government recognizes the importance of building an advance and robust infrastructure backbone to enable Tuvalu to compete globally. This policy outlines the conditions required for the provision of services and provides for the regulation of and incentives for affordable high-speed broadband and mobile access across Tuvalu. Given the inability of TTC to invest, it is vital for the Government to foster investment, allowing service providers to offer last mile access solutions and equitable and affordable access to the internet.

6.1.1 DEPLOYMENT OF ICT INFRASTRUCTURE NATIONWIDE

The Government has invested in the deployment of Kacific broadband on all islands of Tuvalu and continues to invest in improving network infrastructure in the outer islands and the ongoing ICT Project to install the Tuvalu Submarine Cable. The Government encourages local governments to provide ICT infrastructure and skills development to their communities to take advantage of this policy. The Government, with the help of other providers, will offer adequate technical and knowledge support. The Government will facilitate the ubiquitous deployment of new-generation high-speed wireless broadband connectivity infrastructure to reduce the curb and in-building deployment costs; make broadband delivery and access cost effective; and provide effective, reliable, secure internet infrastructure. All new Government network builds and deployments will consider a wireless-first approach. This requirement will apply especially to village, small-community, and Government-building networks.

6.1.2 INFRASTRUCTURE SHARING

Infrastructure development and deployment is a capital-intensive undertaking and should be managed prudently at the national level. The Government will continue, as it has in the past, to invest in common, publicly available high capital undertakings such as a national data transport backbone, central and regional data centres, and carefully managed shared radio frequencies. The Ministry of Justice, Communication and Foreign Affairs through the Department of ICT will oversee access,

license operators, and regulate access to infrastructure built with Government funds. A legal framework will be developed to provide for a fair use policy, by which privately established infrastructure may be made available by one operator to others on fair commercial terms, thus creating competition. The Ministry will ensure that arrangements between operators and service providers offer national resilience during disasters and equitable access to naturally limited resources and sites and that collocation of services and equipment is encouraged. The Ministry will also ensure optimal service reliability, redundancy, carrier and net neutrality, and the security of data both at rest and in transit.

6.1.3 INTERNET EXCHANGE POINTS (IXPs)

The Government will establish Internet Exchange Points (IXPs) in Funafuti to allow local traffic to pass between internet service provider networks instead of routing traffic overseas. IXPs can benefit local communities with improved internet quality and affordability; they can serve as a hub for technical activities and encourage the development of content and applications locally, boosting local service hosting.

Partnership with other vendors is a Government priority. This is because it can enhance interconnection and peering through other IXPs given that the Government is now in the process of procuring a submarine cable to enable enhanced links to the region and international markets.

6.1.4 DATA CENTRES

The Government will develop guidelines for future data centres to avoid inefficient public and private ad-hoc investments. The Government also encourages Ministries, Departments, and Agencies to make use of data centres for sharing information. Apart from creating data centres under the Government for the purpose of national security, the development of these centres will also be approved by MJCFA to avoid duplication and provide a cost effective, scalable, and secure environment for Government data and information storage.

This policy mandates the development of standards for data centres, providing legal and regulatory coherence with Tuvalu safety and environmental protection standards such as national disaster recovery and resilience frameworks. The Government will make sure proper regulations and laws are put in place to guarantee that data is processed fairly and lawfully in accordance with the rights of citizens and obtained only for specific and lawful purposes.

6.1.5 ACCESS TO AFFORDABLE AND EQUITABLE PRICING AND QUALITY OF SERVICE

The Government will conduct research to formalize a matrix that compares prices offered in the Pacific region and around the world. Using proper regulations, the regulator will ensure affordable and consistent prices are offered to citizens with quality of service delivered. A survey will be conducted to assess the status of the service to determine a strategy for reducing internet pricing.

6.1.6 FAST AND SECURE INTERNATIONAL COMMUNICATIONS

The Government will deliver a high-quality low-latency traffic route between Tuvalu and the rest of the world. The Government is committed to building a submarine fiber cable link from the main island of Funafuti to an international submarine cable system and to provide for data interconnection, including the development of a national submarine cable system between all islands of Tuvalu. Major infrastructure investment of this kind will set a path for Tuvaluan citizens to compete globally and provide opportunities to create value in the digital space.

6.1.7 ACCESS TO ICT SERVICES FOR DISABLED PERSONS

The Government will set appropriate requirements for providing ICT tools and software to enable disabled persons to access ICT services for daily use and equipped them in time of disasters. These services will be available nationwide to allow ease of access and to channel funds to the responsible body to help with the securing of appropriate ICT devices.

6.1.8 COMPLEMENTARY INFRASTRUCTURE

The Government recognizes that the economic impact of ICT is contextual and dependent on other complementary infrastructure such as energy, transport, and communications. The Government will:

1. Provide incentives that enable the development of infrastructure that will serve the public good;
2. Strengthen mechanisms that ensure open access for all players and users; and
3. Provide support infrastructure such as roads, power-grid access, and security to support

ICT development.

6.1.9 SUSTAINABLE ENERGY SOURCE

Major ICT infrastructure in Tuvalu faces challenges due to interrupted power supply; therefore, sustainable energy sources are necessary. The Government realises the impact of power disruptions on the life of ICT equipment—mainly in the outer islands. This policy highlights the importance of ensuring efficient and reliable power backups are installed in all islands of Tuvalu.

6.2 GOVERNMENT SERVICES

6.2.1 IMPROVE E-GOVERNMENT NETWORK

The Government will ensure reliable internet connectivity is provided to all offices within the Government building and Government entities outside the Government building.

6.2.2 ENHANCE GOVERNMENT INTERNAL COMMUNICATIONS AND COLLABORATION TOOLS

The Government will design and deploy customized internal communications using emerging communication tools. An official government website will also be deployed, and subdomains assigned to all Ministries.

6.2.3 TRAININGS ON ICT SKILLS FOR THE GOVERNMENT ICT DEPARTMENT

Developing ICT skills within the ICT department is of paramount importance given the Government initiative towards digital transformation. This policy recognizes the importance of building the capacity of ICT personnel to keep abreast of changes in technology. Motivation is key, and, therefore, investing in training and development of competencies is an appropriate solution for upskilling.

6.2.4 DISASTER MANAGEMENT NETWORK/EARLY WARNING SYSTEMS

Secure and reliable internet and communication connectivity in all outer islands can be easily established independently of the usual TTC network. The Government will further ensure the

establishment of a mobile SMS service as an early warning system for all the outer islands using the TTC 4G network.

6.2.5 E-APPLICATIONS

The Government will promote and encourage the development of e-applications in major sectors such as health, education, agriculture, land, civil registration, and licensing authorities. There will be a special focus on the development of mobile phone-based applications using existing and new data in Government databases.

6.2.6 REFORM ICT DEPARTMENT AND TTC

Advances in technology trigger the need for more development in Government and public services. An effective organizational structure must be implemented to place staff with special skills in their allocated fields to ensure the effective and efficient management and deployment of both the Government network and the TTC network. The Government realizes the need to better structure the two major ICT bodies to allow for the smooth deployment of the digital transformation. Consequently, the Government aims to reform both the ICT Department and TTC.

6.2.7 IMPROVE KNOWLEDGE AND SKILLS IN THE DOMAIN INDUSTRY

Dot TV is the Government's most crucial asset. It is economically valuable because the abbreviation TV represents television. The revenue generated from this asset contributes enormously to the Tuvalu Government National Budget, which benefits our people. Due to competition in the top-level domain market, the Government realizes that it is extremely important to invest in building the capacity of our people to improve their skills and knowledge in this area of study. The Government seeks to allow our people to develop tools to better market our domain and use these skills to create businesses online.

6.3 UNIVERSAL ACCESS

It is the intention of the Government to ensure that public and private ICT services, and the knowledge necessary to deploy and use these services, are readily available to our citizens whenever, wherever, and however they are required. The Government will also guarantee that all citizens can and will

participate in the knowledge economy. The challenge of equipping the nation with the infrastructure and connectivity necessary to making data available is variously addressed in this policy document. It is the Government's policy to treat all citizens equally and provide equitable infrastructure per capita.

6.3.1 UNIVERSAL COVERAGE OF TV AND RADIO BROADCASTS

The Government will extend the coverage of National TV to all of Tuvalu's outer islands. Depending on market growth, the Government will extend the license of broadcast signal distribution services and utilise required radio frequency spectrum resources to ensure that the use of broadcasting infrastructure is maximised and frequencies are utilised efficiently.

6.3.2 APPROPRIATE ICT TOOLS

Tools provide the environment through which people can access, use and enjoy technology in their work, community and recreational activities. These tools include services, devices, access, and applications. It is the Government's policy to provide the following:

- | |
|--|
| • A Digital Identity for every citizen for the safe and lawful use of services. |
| • Public key infrastructure to provide for security of transactional data, party recognition and contractual validity. |
| • A legal framework and technical support for blockchain to securely record all transactions. |
| • Regulatory and legal support for digital payments to enable safe financial transactions. |
| • A delivery services framework for the delivery of physical goods and services. |
| • Recognition and enforcement of digital contracts to build confidence in online transactions. |
| • Cyber and computer crime and critical Infrastructure legislation. |

6.3.3 ACCESSIBILITY

In support of Strategic Priority Area 1 of *Te Kete*, this policy ensures that people can access affordable and reliable telecommunications services. The Government, through TTC and the ICT Department, will ensure that ICT services and emergency communications are made available to the public and will provide alternative accessible formats for persons with disabilities.

6.3.4 ATTITUDINAL CHANGES

As technology and the internet are shaping the way we interact as human, i.e., digital culture, this policy reminds all Tuvaluans to embrace our cultural values when choosing their preferred activities. All levels of society will be encouraged to integrate digital technologies into their lives as a natural way of performing all the activities necessary for happiness. To ensure that our future workforce is prepared for the rapid growth of and changes in technology, this policy is set to encourage the integration of digital technologies into educational and vocational systems at all levels.

6.4 DIGITAL TRANSFORMATION

The aim of this policy is to spur economic growth and realize ICT as an enabler for everyone. The Government hopes to invest in creating a digital platform for the people of Tuvalu to utilize and earn a good living. This policy has been developed to ensure that the people utilizing digital platforms are treated fairly during transactions in a market context. Contracts and agreements will be properly enforced and national resources, such as spectrum and fairly allocated rights-of-way, properly utilized. Digital transformation is all about technology, data, process, and organizational change. Consequently, this policy focuses on the following initiatives.

6.4.1 ESTABLISHMENT OF THE TUVALU NATIONAL DIGITAL LEDGER (TNDL)

The Government's goal is to develop a national digital ledger using blockchain to create new business models, improve services, optimise processes, and allow for greater agility in emerging markets. The Government is eager and motivated to explore opportunities to leverage the capabilities of blockchain technology.

6.4.2 ESTABLISHMENT OF INTERNET BANKING

It is hoped that internet banking will be established so that all customers can make payments, check account balances, and make international transfers wherever they may be to increase financial efficiency. It is the intention of the Government to leap-frog financial institutions to provide citizens with easy-to-access, secure, and always available financial services.

6.4.3 DEPLOYMENT OF MOBILE MONEY

As most of the Pacific region utilises mobile money, Tuvalu is now at the early stages of securing a suitable mobile money system for Tuvalu. The Government, through the Ministry of Justice, Communication and Foreign Affairs, considers necessary the implementation of a fully inclusive mobile payments system to help citizens make payments using their mobile devices in a more convenient and efficient manner. The implementation of this system will allow financial institutions, TTC, and the Government of Tuvalu to develop and integrate a successful mobile money service that will create avenues and benefits for small-scale entrepreneurs and citizens.

6.4.4 INNOVATIVE APPROACH

The Government recognizes the potential for frontier technologies such as Blockchain, IoT, AI, Big Data, Cloud Computing, and 5G mobile services to promote new innovative applications that can leverage social and economic benefits.

6.4.5 PROMOTE E-COMMERCE AND POST COURIER MARKET

The Government identifies the growth in digital commerce (e-commerce) as attributable to the increasing use of the internet, which has allowed buyers and sellers to transact efficiently using appropriate platforms. An effective postal and courier system is also key to the development of e-commerce, and, therefore, the Government ensures that all citizens can access basic postal services that are efficient across the country. This policy also considers promoting investment in fisheries, trade, and commerce as extremely important.

6.5 CYBER SECURITY AND CYBER SAFETY

Emerging technologies with greater internet speed expose us to a more vulnerable digital economy. Therefore, the Ministry encourages those Departments and Agencies concerned to raise awareness about cyber security and identify ways to protect children, citizens, and businesses against cyber threats.

6.5.1 REVIEW AND CREATE NEW CYBER LAWS

The Government will develop cyber laws following standard frameworks/models developed by the International Telecommunication Union (ITU), specifically those developed for Pacific Islands. The model law will be distributed to responsible agencies such as the Police and the Attorney General's Office.

6.5.2 STRENGTHEN LEGAL FRAMEWORKS

The Government will develop key indicators to guide the evaluation and identification of existing and related legal frameworks to meet the highest standards in the region and internationally. This will enable Tuvalu to combat cybercrime activities.

6.5.3 ESTABLISH A TUVALU COMPUTER EMERGENCY RESPONSE TEAM (CERT)

The Government will form a cyber taskforce that includes Departments from responsible Ministries such as the Police, the ICT Department, the PMU, and TTC. The Tuvalu CERT will become part of a regional network of CERTs that share information to inform and assist Government and private sector Internet users in the event of cyber-attacks which help to limit the spread of malware such as scams, computer viruses, trojans, worms and botnets.

6.1.1 CONDUCT CYBER SECURITY AWARENESS PROGRAMS

The emergence of new threats always impacts organisations and the Government despite technological defenses put in place to keep organisations and the Government safe. Sophisticated social engineering techniques are used by cybercriminals to by-pass defenses, and it only takes one employee clicking a malicious link to ruin the entire network. This policy sets targets to ensure awareness programs are conducted for employees in the Government, businesses, and organisations as the first line of defense against cybercrime. The Government envisions the need to educate and equip our citizens using cyber security awareness programs to allow the creation of a security-first culture.

6.2 VALUE-BASED ICT HUMAN CAPACITY BUILDING

Through its Foreign Policy, *Te Sikulagi*, the Government of Tuvalu recognise the importance of cultural values to the upbringing of all Tuvaluans. Therefore, this policy is set to ensure that cultural

values are taken into consideration when building the capacity of our people in the area of ICT. The policy is designed to move Tuvalu's ICT sector beyond mere trade in technological items, system deployment and software development. It is the intention of the Government to develop a network of up-to-standard training institutions that produce the highest quality manpower to support our national goals. This policy also ensures that all citizens of Tuvalu are computer literate and able to engage and reap benefits in this digital era.

6.2.1 DEVELOP A SUSTAINABLE ICT WORKFORCE

This policy aims at equipping and sustaining Tuvalu's ICT workforce to allow for proper delivery of effective and efficient services. The policy aims at assessing gaps in ICT skills and working with academic institutions and the Government to provide academic curricula and support to ensure a sustainable ICT workforce for Tuvalu. This will help improve general and digital literacy and assist with upskilling the current ICT workforce, thereby allowing the use of ICT not only as part of our everyday life but to ensure that no one is left behind in ICT development.

6.2.2 DEPLOY AN INTEGRATED EDUCATIONAL SYSTEM NATION-WIDE

The Government will develop and deploy a nation-wide e-education system that will support all levels of schooling, including small-to-medium-size training institutions, across the country. This interconnected system allows for the sharing of information and provides curriculum integration to better shape strategic plans for developing education and vocational training.

6.2.3 INTEGRATE ICT SUBJECTS IN THE CURRICULUM FOR ALL LEVELS OF EDUCATION

While the use of ICT in education in the Pacific is relatively recent, it has nevertheless made an impact on education systems. This policy encourages the integration of ICT subjects into the curricula for primary and secondary schools.

6.2.4 IMPROVE BASIC ICT SKILLS OF CITIZENS

The emergence of new technologies has led to the need for an ICT-literate population. The Government, with the support of partners and donors, encourages the institution of educational

networks for sharing educational resources and promoting e-learning at primary and secondary schools across the country through distance learning. It is also encouraged that virtual institutions be developed to enable citizens to obtain basic ICT skills with realization of the importance of our cultural values in our traditional way of sharing knowledge.

6.2.5 ENCOURAGE THE ESTABLISHMENT OF ICT CENTRES OF EXCELLENCE

The establishment of an ICT Centre of Excellence will improve the capacity of Tuvalu in areas such as hardware and software engineering, network design and large-scale ICT project management. This policy aims to increase the diffusion of ICT knowledge nationwide with clear objectives and goals to ensure proper execution and sustainability.

6.2.6 OPPORTUNITIES AND SUPPORT FOR PEOPLE WITH SPECIAL NEEDS, WOMEN, AND YOUTH

To ensure every Tuvaluan will be computer literate and able to access opportunities in the digital economy, the Government encourages the creation of opportunities for the disadvantaged, people with special needs, women, and youth. The Government will enable the acquisition of ICT skills by all people through e-inclusion and e-accessibility activities and programmes.

6.3 ENABLING REGULATORY AND LEGAL ENVIRONMENT

The security of our infrastructure, our resilience in the face of attack, and our coherent internal policies that protect citizens from abuse and illegal exploitation are critical given the introduction of emerging technologies and the growth of internet connectivity in the country. It is critical for Tuvalu to develop comprehensive defensive and offensive cyber-capabilities. It is the Government's duty under the ICT Department to review and implement the Cyber Security Strategy so that relevant legislation can be developed to achieve cyber security policy objectives as outlined below:

6.3.1 IMPLEMENT CYBERCRIME AND CHILD ONLINE PROTECTION LEGISLATION

The Government will establish and develop mechanisms to reduce the exposure of vulnerable groups like children and youth to risks and vulnerabilities online. Awareness programs will be conducted to

allow a better understanding of the online habits of children and youth with emphasis on the following protections for children:

- Protections against content and contact risks, including exposure to pornography, cyber grooming, and cyberbullying;
- Protections against consumer-related risks, such as online marketing and fraudulent transactions;
- Protections against privacy and security risks, including the use of social networks without sufficient understanding of potential long-term consequences.

6.3.2 DATA PROTECTION AND PRIVACY LAW

The Government will establish laws to provide Tuvaluans with a clearer understanding of their right to know who holds their personal data, to understand the reason their data is being held, to ensure the data held is correct and to maintain the integrity of said data.

The law will protect and assist citizens in asserting their rights in respect to items about them that are posted online without their consent.

6.3.3 ELECTRONIC TRANSACTION LAW

This policy seeks to establish an electronic transaction law to allow for the recognition of electronic transactions as contracts and as admissible as evidence in all court proceedings. Laws will also be established to deal with online contracts and electronic signatures.

6.3.4 CONSUMER PROTECTION ACT

This policy seeks to establish a consumer protection act to protect consumers from unfair trade and prescribes a standard for product safety performance, establishing understanding, trust, awareness, and cultural barriers.

6.3.5 TELECOMMUNICATION REGULATOR

This policy seeks to establish an independent Telecommunication Regulator to oversee the performance of Telecommunications licensees and their compliances with relevant legislation, license

conditions, and applicable mandatory instruments. The body will provide recommendations to and advise the Minister on the formulation of policies for the telecommunications sector.

7 IMPLEMENTATION OF THE 2021 TUVALU NATIONAL ICT POLICY

The Ministry of Justice, Communication and Foreign Affairs has the overall responsibility for the implementation of the 2021 Tuvalu National ICT Policy. Inputs from multiple stakeholders were incorporated into the policy to maintain the integrity of the policy and its efficient and effective implementation.

A National ICT Steering Committee was established to provide ICT Policy and technical advice to the Ministry during the development of the National ICT Policy.

The PMU and the ICT Department shall support the Minister responsible for ICT and Telecommunications in his/her duties by coordinating Government ICT activities and developing and managing an e-Government system to ensure interoperability, minimal duplication of effort, greater coordination, and adherence to the ICT Policy.

The new Telecommunication Regulator will act as an implementing agency for specific ICT development initiatives when such implementation cannot be effectively executed by the responsible Ministry or Department.

The Ministry takes the lead in facilitating a regular review of the ICT Policy. This review process can be based on the monitoring and evaluation framework and its defined time frames (*refer to Annex 1*). The review will ensure that Tuvalu remains steadfast against challenges brought about by technological advancements in this innovation and information era.

8 CONCLUSION

The ICT sector in Tuvalu is still in a progressive state. The development and enhancement of telecommunications and ICT systems plays an important part in the growth of the national economy and improving the livelihoods and well-being of all Tuvaluans.

Since the development of the 2014 Draft National ICT Policy, the number of connected devices in Tuvalu increased from 3,521 in 2016 to 4,718 in 2021. In June 2020, the Government of Tuvalu signed a major contract with Kacific for the deployment of Kacific terminals to all outer islands, providing

fast satellite broadband connectivity and stretching the reach of modern communications to people living in the outer islands. Another ongoing and major project will bring a fast and secure international communications link to Tuvalu through the deployment of a submarine cable to Funafuti, with plans to extend this link to the rest of the outer islands as well.

This 2021 National ICT Policy will be the first to be officially endorsed and launched. This policy established ten guiding principles and nine broad goals and objectives, including in these objectives are key targets to be established throughout this year and next year, such as the extension of high-quality telecommunications services (e.g., voice and the internet) and broadcasting services (e.g., radio and television) to reach communities, schools, and clinics nationwide. The rest of the objectives were planned to complete throughout the duration of the policy.

Even though the deployment of modern technologies will present major challenges, the Government, through this policy, recognizes the rights of every Tuvaluan to access a full range of modern tech and, therefore, ensures that everyone can participate and contribute to this digital era.

9 ANNEX 1: ACTION PLAN - MEASUREMENT AND EVALUATION FRAMEWORK FOR NICT POLICY GOALS

Annex 1: Measurement and Evaluation Framework for Tuvalu National ICT Policy Goals					
Goals	Activities	Responsibility	Timeline	KPIs	Resources
7.1 Enabling ICT Infrastructure and Access					
7.1.1 Deployment of ICT Infrastructure nationwide	Ensure proper infrastructure is in place for future ICT developments, especially the extension of broadband coverage and complete deployment of Mobile networks in the outer islands.	MJCFA, TTC & OI Kaupule	100% mobile and broadband coverage in all islands of Tuvalu by Dec 2022. A 5-10Mbps bandwidth. 50% coverage at the end of 2021 and 100% in 2022.	% of population with mobile coverage & % of population with broadband coverage. % of population with 5-10Mbps data coverage in comparison to previous years	TTC
7.1.2 Infrastructure Sharing	Create competition and raise provision for new models that provide sharing of infrastructure for unserved and under-served areas.	TTC, ICT Depart & TEC	100% of fiber network coverage in Funafuti by 2022, and new entrants to the market.	50% of population accessing FTH and the number of entities sharing the infrastructure	TTC, ICT Depart, TEC
7.1.3 Internet Exchange Points (IXPs)	MJCFA to facilitate the establishment of IXPs by any operator.	ICT Depart, TTC & Tuvalu USP Campus	Establish in Funafuti within one year and roll out to outer islands in the next 2-3years.	Number of IXPs established in Tuvalu	MJCFA and ICT Depart
7.1.4 Data Centres	Datacenter development. Pilot installations initiated. Support from partners.	ICT Depart & TTC	Within 3-5years	Number of islands with a data center	ICT Depart
7.1.5 Affordable and equitable pricing and quality of service	Assessment of regional and international pricing with consent from regulator once established. Maintain quality of service and experience for all Tuvalu Islands.	TTC & MJCFA	At least 30% decrease in internet price by June 2021. Reduce 50% price by January 2022.	50% increase in number of users on the network in relation to previous years	TTC

7.1.6 Fast and secure international communications	Tuvalu Submarine Cable Project.	PMU, TTC, MJCFA	100% completion for the installation of the cable in 2023. 50% deployment rate by mid-year 2022.	% of population connecting to the fiber link. % of bandwidth increase. % of increase in Mbps/user	PMU
7.1.7 Access to ICT services for disabled persons	Further research on the establishment of funds for the purpose of purchasing special equipment.	MEYS, FUSIALOFA	On going	Fund established; number of special equipment items supplied to disabled persons.	Development partners MEYS & FUSIALOFA
7.1.8 Complementary Infrastructure	Establish communications with ICT-related ministries regarding ICT related development infrastructure, particularly resolving the power issue.	PWD, TEC, Local Governments, TTC, ICT Depart, Energy Depart, Ministry of Transport	Progressive over the next 2 years	% coverage of fiber on land, % of solar backup systems for TTC, % conduits replaced	PWD, TEC, Local Governments, TTC, ICT Depart, Energy Depart, Ministry of Transport
7.1.9 Efficient and reliable power backup at all main ICT Infrastructure sites	Installation of efficient power backups in all Islands with main ICT infrastructure.	PWD, TEC, Local Governments, TTC, ICT Depart, Energy Depart, Ministry of Transport	100% power backup by 2022	Number of times the power cuts, and the number of islands with efficient power backup	PWD, TEC, Local Governments, TTC, ICT Depart, Energy Depart, Ministry of Transport
7.2 Government Services					
7.2.1 Improve e-Government platform	Assess the entire e-Government infrastructure.	ICT Depart.	Within one year	Assessment report	ICT Depart
7.2.2 Enhance Government internal communications and collaboration tools	Design and deploy a customised internal communication using emerging communication tools. Deploy www.gov.tv website and assign subdomains to all ministries.	ICT Depart	By end of year 2021	New communication platform established.	ICT Depart

7.2.3 Improve trainings on ICT skills for the Government ICT Department	Capacity building for ICT personnel to be organized.	ICT Depart & MJCFA	Ongoing	Number of trainings completed	ICT Depart. & MJCFA
7.2.4 Disaster Management network and early warning systems	Establish clusters for disaster management network and establish national early warning system.	Disaster Depart, MET, TTC	Ongoing review of current early warning systems and disaster management network. In 1-2 years, new systems should be put in place	New and Updated early warning systems. Upgraded disaster management network	Disaster Depart and MET
7.2.5 E-applications	Promote the use of emerging technologies by encouraging the development of e-applications.	ICT Depart and other interested partners	Ongoing	Number of applications launched	ICT Depart and other interested partners
7.2.6 Reform ICT department	Reforming the ICT Department to cater for the development of additional Government services.	ICT & MJCFA	Reform completed by 2022	New ICT Department structure	ICT & MJCFA
7.2.7 Improve knowledge and skills in the domain name industry	Conduct research and create appropriate models to maximise contribution from Dot TV.	PMU & MJCFA	By end of year 2021	% increase in revenue from Dot TV in comparison to previous year	ICT Depart & PMU & MJCFA
7.3 Universal Access					
7.3.1 Universal coverage for public service TV and radio broadcasting	Extend National TV coverage to the outer islands and improve coverage of radio broadcasting.	Tuvalu Media & MJCFA & TTC	100% National TV coverage nationwide, and improve radio signals in the outer islands by 2023	Number of TV subscribers, and % of households accessing radio Tuvalu FM	Tuvalu Media & MJCFA & TTC & Statistics Depart
7.3.2 Appropriate ICT Tools	Develop appropriate ICT tools at the workplace and the community level	ICT Depart & TTC & Judiciary	100% deployment of digital identity for citizens by 2023. 50% completion of legal-framework enforcement by end of 2021	Blockchain framework; recognition of digital contracts for online transaction.	ICT & Judiciary

7.3.3 Accessibility	Provide ICT services and emergency communications to the public and for persons with disabilities.	FUSIALOFA TTC & ICT Depart	100% of user population access to ICT services and emergency communications by 2030.	% of users using ICT services, % of user population that can access emergency communication during disasters with special ICT service delivery for persons with disabilities	ICT & Fusialofa
7.3.4 Attitudinal Changes	Promote digital culture.	All	70% of workforce can adapt to technology changes by 2022	% of the workforce population that can adapt to technology change. % of schools with integrated digital technologies	ICT & MEYS
7.4 Digital Transformation					
7.4.1 Establishment of a Tuvalu National Digital Ledger (TNDL)	BIT team in partnership with the Government to conduct a feasibility study and monitor the current project.	MJCFA & BIT & Financial institutions	50% completion of the TNDL project by 2021, 100% by the end of 2025	Feasibility study report, including frameworks and Yearly progress report	MJCFA & BIT
7.4.2 Establishment of Internet Banking	Financial institutions to establish internet banking.	NBT, DBT, TNPf & BIT	50% completion in 2022 and 100% deployment by 2023	% of users using internet banking and the rate of adoption by financial institutions	All financial institutions & BIT
7.4.3 Deployment of Mobile Money	TTC in partnership with the Government of Tuvalu to establish mobile money.	TTC & NBT & BIT	100% of user population using mobile money by 2022. 50% population of mobile users by end of 2021.	% of users population using mobile money	TTC & NBT & DBT & TNPf
7.4.4 Innovative approach	Explore opportunities in emerging markets.	All Ministries, SOEs, TNPSO	Feasibility studies within 4 years	Progress reports	All Ministries, SOEs, TNPSO
7.4.5 Promote E-Commerce and Post Courier Market	Develop appropriate e-commerce, postal and courier service platforms for conducting e-business efficiently.	Department of Trade, ICT Depart & Postal Services	Adopt current trade platform. Feasibility study for new e-commerce platform within the next 2 years	% population and businesses conducting e-business	Department of Trade & ICT Depart
7.5 Cyber security and cyber safety					

7.5.1 Review and enact the Cybercrime Bill	Implement and enforce a Cybercrime Act of Tuvalu.	AG's Office, Police & MEYS	Up to date cyber laws by 2021	Cybercrime bill passed	AG's Office, Police & MEYS, ITU
7.5.2 Strengthen International Engagement	Identify avenues to attract International Security frameworks and partnerships.	AG's Office & Police	Progressive over 2 years	Number of legal frameworks	AG's Office & Police
7.5.3 Establish a Tuvalu Computer Emergency Response Team (CERT)	Establish a Tuvalu CERT.	TTC, Police & ICT Depart *others	Formation of the Tuvalu CERT by end of 2022	Tuvalu CERT established	TTC, Police & ICT Depart
7.5.4 Conduct Cyber Security awareness programs	Conduct effective awareness programs for all of Tuvalu.	MJCFA, Police, AG's Office and MEYS	Start awareness programs by 2021	Number of programs conducted in a year	MJCFA, Police, AG's Office and MEYS
7.5 Value-based ICT Capacity Building					
7.5.1 Develop a sustainable ICT workforce	Assess skills required/needed for the country. Develop a sustainable Human Resources Plan.	MJCFA & ICT Depart.	By 2023	Number of trainings conducted. % of ICT personnel trained in new IT-related qualifications	ICT Depart & MJCFA
7.5.2 Deploy an integrated educational system nation-wide.	Identify an e-learning system that supports ICT at Primary and Secondary Schools across the country.	MEYS & MJCFA	Progressive over 2 years in Secondary Schools, and within one year in Primary Schools	% of schools connected to the integrated e-learning platform	MEYS
7.5.3 Integrate ICT subjects into school curricula	Coordinate the insertion of ICT subjects into Primary and Secondary School curricula.	MEYS, MJCFA & TTC	100% integration in Secondary Schools, 50% completion in Primary Schools by 2022	% of schools with ICT curriculum	MEYS
7.5.4 Improve value-based ICT skills of citizens	Establish educational networks for sharing educational resources for citizens to access and improve skills connected to cultural values.	TTC & Private educational institutions	80% of the population to become computer literate by 2024	% of population using at least a mobile, tablet, laptop, or computer. Some realization of citizens using ICT tools for the right purpose and in a good, fair, and just way	Private Institutions & Statistics Depart

7.5.5 Encourage the establishment of ICT Centres of Excellence	Deploy an ICT Centre of Excellence in Funafuti.	MJCFA & ICT Depart	50% by end of 2021, and 100% by end of 2022	% completion of the centre and operational level	ICT Depart
7.5.6 Create opportunities and provide support for the disadvantaged, people with special needs, women and youth	Offer opportunities and provide support if needed.	MEYS, HR, Fusialofa, Gender Affairs, FATU LEI	Progressive over the years	Number of job opportunities and number of scholarships and trainings offered	MEYS, HR, Fusialofa, Gender Affairs, FATU LEI
7.6 Enabling Regulatory and Legal Environment					
7.6.1 Establish measures to protect vulnerable groups like children so they have a safe environment and derive value from cyberspace	Conduct cyber awareness programs.	Judiciary, AG's Office, Police, ICT Depart & MEYS	Programme begins in 2021 and to cover all outer islands within 3 years	% coverage thereafter, number of cyber awareness programs conducted, *awareness measure	MJCFA & MEYS
7.6.2 Data protection and privacy law	Establish law on data protection and privacy.	AG's Office, Police, ICT Depart & TTC	50% completion by 2022, and 100% complete by 2023	Upon completion	MJCFA
7.6.3 Electronic transaction law	Develop an online transaction act.	AG's Office, Police, ICT Depart	50% completion by 2022, and 100% complete by 2023	Upon completion	MJCFA
7.6.4 Consumer Protection law	Develop a consumer protection law.	AG's Office, Police, ICT Depart	100% completion by early 2022	Consumer protection act in place	MJCFA
7.6.5 Telecommunication Regulator	Establish an independent regulatory body or unit under MJCFA.	MJCFA, TTC and AG's Office	Ongoing	Tuvalu Telecommunication body established	MJCFA