



TUVALU NATIONAL ICT POLICY

ENDURING NATION



GOVERNMENT OF TUVALU

On behalf of the Government of Tuvalu and as the Minister for Justice, Communication and Foreign Affairs, I am proud to present Tuvalu National ICT (NICT) Policy. The unique geography of Tuvalu's Islands, which span a vast ocean, present technical and financial challenges to the Government and the telecommunications sector, and more than 50% of our population does not have access to mobile network services. Yet, emerging digital technologies are changing the way we live and work in ways we could never have predicted ten years ago.

Tuvalu's National Strategy for Sustainable Development (2021-2030) *Te Kete* asserts the importance of ICT to the Government of Tuvalu as an enabling digital tool for achieving national goals. Given this, the Government hopes to provide a proactive policy and regulatory framework that not only aligns with contemporary technological realities and dynamics but that also supports the orderly development of the ICT sector to ensure maximum benefit for all Tuvaluans. The policy's ten-year timeframe promises a future-looking pathway for realizing Tuvalu's fundamental ICT objectives that will transform Tuvalu into an information society and a knowledge economy.

This NICT Policy is also critical to Tuvalu because it provides pathways for preserving and maintaining Tuvaluan values into the future. Tuvalu possesses a strong communal culture common to many Pacific nations, but climate change and sea level rise threaten the very existence of our culture on a daily basis. ICT presents to us a new outlook and innovative approach, through which we can digitize our culture and history and utilize the commercial opportunities provided by ICT to fund projects that will preserve our land and heritage. ICT also brings disparate peoples and places together instantly, which reminds us of the extended family systems; *kaitasi*, or shared responsibility; and *falepili*, or positive neighborly relations, we value in Tuvaluan culture. Our proper and future-looking use of ICT further aligns with our Tuvaluan values of preparedness; resilience; adaptation; and *fenua o tagata*, or the ability to survive in difficult conditions. In my experience, ICT can perfectly align with a nation's culture, and I see this policy as providing simultaneously for technological and cultural strengthening.

The strategies outlined in this NICT Policy are geared toward enacting revolutionary transformation in Tuvalu that will launch the country forward while simultaneously promoting and preserving the value systems critical to Tuvalu's national identity. To ensure that all Tuvaluans are benefited by ICT advancements, I invite everyone to embrace this policy and work together to help achieve our goals and set the pace for culturally sensitive and future-looking ICT developments in Tuvalu.

Fakafetai Lasi, Tuvalu Mo Te Atua.

Hon. Panapasi Nelesone
Minister of Justice, Communication and Foreign Affairs

EXECUTIVE SUMMARY

The Tuvalu National ICT Policy was approved by Cabinet on the 5th of October, 2023 and is aligned with the country's vision for the ICT sector. The government aims to leverage emerging technologies to transform public services, promote citizen opportunities, and enhance Tuvalu's economic development. The finalization of this NICT Policy is a significant accomplishment as the policy framework for the country's ICT sector is not yet fully developed.

To support Tuvalu's digital transformation, the government must prioritize extending mobile services to the 8 Outer Islands, constructing a high-speed submarine fiber optic cable, developing secure and widespread information technology infrastructure, and implementing modern internet industrial systems. With the recent deployment of broadband services across Tuvalu, the government hopes to improve the performance of state-owned enterprises by using the internet to accelerate sourcing, sales, and logistics systems, streamline operations, and identify market trends to improve marketing, research, and innovation capabilities.

Consultations with the Tuvalu ICT community and the public have enriched the current policy, setting the pace for enhancing stakeholder knowledge and encouraging citizen participation in value creation through emerging technologies. The NICT Policy outlines 7 strategic focus areas for the development of Tuvalu's ICT sector, including enabling ICT infrastructure and access, government services, universal access, digital transformation, cyber security and safety, values-based ICT human capacity building, and enabling regulatory and legal environment.

To ensure a successful implementation, the government's goal is to deliver effective universal access, affordable, equitable, and reliable broadband, and mobile services to all citizens.

Fakafetai Lahi.

Tauisi M. Taupo

Permanent Secretary for the Ministry of Justice, Communication and Foreign Affairs

TABLE OF CONTENTS

Minister’s Foreword.....	2
Executive Summary	3
1. Introduction.....	6
2. Vision, Mission, and Guiding Concepts	7
3. Policy Overview and Objectives.....	7
4. Background.....	8
4.1 ICT and Tuvalu’s National Strategy for Sustainable Development (2021-2030) <i>Te Kete</i>	8
4.2 Rationale for the Policy	9
4.3 Current Situation Analysis	9
4.3.1 Operational Environment.....	9
4.3.2 Regulatory Background	10
4.3.3 Emerging Technologies	10
4.4 Challenges	11
5. Strategic Approach.....	11
5.1 Enabling ICT Infrastructure and Access	12
5.1.1 Deployment of Climate Resilient ICT Infrastructure Nationwide.....	12
5.1.2 Infrastructure Sharing	12
5.1.3 Internet Exchange Points (IXPs).....	13
5.1.4 Data Centers.....	13
5.1.5 Affordable and Equitable Pricing and Quality of Service (QoS)	13
5.1.6 Fast and Secure International Communications	13
5.1.7 ICT Services for Persons with Disability and Marginalized Communities.....	13
5.1.8 Complementary Infrastructure	13
5.1.9 Sustainable Energy Sources	14
5.2 Government Services	14
5.2.1 Improved E-Government Network	14
5.2.2 Digital Skills for the ICT Department	14
5.2.3 Disaster Management Networks/Early Warning Systems.....	14
5.2.4 E-Applications	14
5.2.5 ICT Department and TTC Reforms	14
5.2.6 DotTV Domain Name.....	15
5.3 Universal Access	15
5.3.1 Universal Coverage for TV and Radio Broadcasts.....	15
5.3.2 Appropriate ICT Tools.....	15
5.3.3 Accessibility.....	15
5.3.4 Attitudinal Changes	16
5.4 Digital Transformation.....	16
5.4.1 Tuvalu National Digital Ledger (TNDL).....	16
5.4.2 Internet Banking.....	16
5.4.3 Mobile Money Deployment.....	16
5.4.4 Innovative Approaches	16
5.4.5 E-Commerce and a Post Courier Market.....	16
5.5 Cyber Security and Cyber Safety	17
5.5.1 New Cyber Laws	17
5.5.2 Strengthened Legal Frameworks	17
5.5.3 Tuvalu Computer Emergency Response Team (CERT).....	17
5.5.4 Cyber Security Awareness Programs.....	17
5.6 Values-Based ICT Human Capacity Building	17

5.6.1	Sustainable ICT Workforce	18
5.6.2	Nationwide Integrated Educational System.....	18
5.6.3	ICT Subject Integration into Education Curricula at All Levels	18
5.6.4	Improved Basic ICT Skills for Citizens.....	18
5.6.5	ICT Center of Excellence.....	18
5.6.6	Opportunities and Support for People with Special Needs, Women, and Youth	18
5.7	Enabling Regulatory and Legal Environment.....	18
5.7.1	Cybercrime and Child Online Protection Legislation.....	19
5.7.2	Data Protection and Privacy Law	19
5.7.3	Electronic Transaction Law	19
5.7.4	Consumer Protection Act.....	19
5.7.5	Telecommunication Regulator.....	19
6.	Implementation of the 2021 Tuvalu National ICT Policy	19
7.	Conclusion	20
8.	List of Acronyms	21
9.	Annex 1: Action Plan—Measurement and Evaluation Framework for NICT Policy Goals	22

1. INTRODUCTION

This 2021 Tuvalu National ICT (NICT) Policy provides a strategic overview of ICT developments in Tuvalu and pursues a culturally sensitive and future-looking ICT-driven approach that will ensure the effective and values-based 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 the 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 Tuvalu's national economic agendas and that improves access to ICT using broadband and mobile networks. The Government of Tuvalu recognizes the critical role of the private sector and aims to leverage ICT to promote national sustainable development goals and ensure effective delivery of service to the public.

The policy envisions the creation of an inclusive infrastructure environment to guarantee uninterrupted internet connectivity with the extension of internet broadband coverage nationwide. It provides for the development of infrastructure and frameworks to support ICT advancements, such as the development of data centers, Internet of Things (IoT), machine learning, artificial intelligence (AI), and cloud computing, while also fostering a secure, innovative, and culturally sensitive 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. Finally, the policy harnesses global opportunities by leveraging regional and international cooperation and engagements in the global ICT sector and strives to enhance Tuvalu's education systems to improve skills and foster an innovative ecosystem for small entrepreneurs and start-ups that can develop on an international scale.

The Government of Tuvalu, with support from development partners, will continue to promote broadcasting, telecommunications, and internet services by providing infrastructure to enable the expansion of TV coverage to the Outer Islands. This will encourage the development of local content, especially local content in the Tuvaluan language. The Government will further ensure that the radio frequency spectrum is managed in an equitable and transparent manner, encourage the sharing of infrastructure and enforcement of Quality of Service (QoS) regulations, and motivate service providers to offer reliable services that foster e-commerce and the creation of a digital economy.

Finally, this NICT Policy seeks to integrate Tuvalu's distinct cultural traits into the development of innovative ICT approaches at the national level. ICT brings disparate peoples and places together instantly, which aligns with the extended family systems; *kaitasi*, or shared responsibility; and *falepili*, or positive neighborly relations, valued in Tuvaluan culture. The proper and future-looking use of ICT further aligns with Tuvaluan values of preparedness; resilience; adaptation; and *fenua o tagata*, or the ability to survive in difficult conditions. Although it is "new," ICT can work hand in hand with culture and values if a culturally sensitive approach is adopted, and ICT can also preserve culture and values. Given the existential threats sea level rise and climate change pose to Tuvalu, this policy sees the potential to create a digital nation that can sustain Tuvalu's existence regardless of the impacts of sea level rise or the effects of climate mobility.

To effectively implement this policy, a review of the current legal, institutional, and regulatory framework is necessary to guarantee alignment with Tuvalu's strategic policy focus. This will ensure that affordable and reliable telecommunications services are accessible to all people and will allow for the development of an inclusive digital economy that is secure and safe. A legal, regulatory, and standards framework that will promote investment in and the use of digital technology will also be developed. Finally, to accomplish policy goals, a robust monitoring, measurement, and evaluation framework will be enacted to track implementation and reviews.

2. VISION, MISSION, AND GUIDING CONCEPTS

Vision

An innovative, responsible, connected, and empowered Tuvaluan community.

Mission

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

Guiding Concepts

- **Economic Agenda:** Tuvalu's National Strategy for Sustainable Development (2021-2030) *Te Kete* highlights the importance of putting ICT at the forefront of the national economic agenda given the critical role the ICT sector plays as a pillar of national development. A nation can only become a leader in the digital space when it recognizes ICT as key to its economic agenda.
- **Cultural Values:** Tuvalu's 2020 Foreign Policy *Te Sikulagi* promotes the importance of Tuvaluan values in enacting global diplomacy. The nature and implementation of ICT developments dovetail with Tuvaluan values, including innovation; extended family systems; *kaitasi*, or shared responsibility; *falepili*, or positive neighborly relations; and *fenua o tagata*, or the ability to survive in difficult conditions. This demonstrates the potential for a values-based and culturally sensitive approach to ICT development.
- **Ubiquitous Access:** All citizens must have access to reliable, affordable, and high-speed internet connectivity delivered through robust broadband and mobile platforms.
- **Constitutional Principles:** ICT can be used to develop an open and transparent Government service to improve Government accountability and efficiency, provide better service delivery, and protect the rights of the people of Tuvalu now and into the future.
- **Private, Civil, Public, and Academic Sectors:** Private, civil, public, and academic sectors must be promoted through the use of ICT so as to foster entrepreneurship, innovation, investment, and growth.
- **Sustainable Development:** ICT must be promoted to achieve sustainable development, accelerate human development, and foster a knowledge society.
- **Cyber Security and Cyber Safety:** Cyber security awareness and protection should be promoted at all levels in the community, and a cyber-safe society must be created.
- **Regulations:** Modern, independent, and proportionate regulations for ICT must be established.
- **Disaster Risk Management:** ICT must be used as a tool to facilitate effective disaster risk awareness and training nationwide.
- **Climate Change:** ICT infrastructure and systems must be climate proof, and ICT-based systems should be used to monitor the environment so that Tuvalu can adapt to the negative effects of climate change. ICT must be used as a platform for digitizing Tuvalu's records, archives, and administrative services and creating a digital nation that can survive any climate-change-related shocks.

3. POLICY OVERVIEW AND OBJECTIVES

The Government of Tuvalu recognizes the potential of the digital economy and strives to create an enabling ICT environment for the people of Tuvalu. This NICT Policy is designed to take advantage of the digital revolution and emerging technologies and codify trends so that Tuvalu can become a more prosperous participant in the global economy. The policy simultaneously seeks to ensure that ICT developments align with cultural values and work toward the maintenance and preservation of culture.

The Government hopes to leverage a culturally sensitive and future-looking position at all levels of ICT development and in every sector of the economy to achieve the following objectives:

- Create an enabling environment with modern infrastructure including high-speed internet, wider wireless coverage in remote areas, and internet access points across the nation.
- Facilitate the creation of frameworks to support the growth of emerging technologies like big data, IoT, blockchain, 5G, and AI, to foster a secure and innovative ecosystem.
- Use terrestrial broadcasting and internet streaming to extend TV and radio nationwide.
- Streamline the use of ICT to improve its percentage contribution to economic growth with a projected 40% increase in Gross Domestic Product (GDP) by 2030 and leverage regional and international cooperation and engagements to harness global opportunities.
- Develop advanced education systems, such as training institutions, to upskill Tuvaluan citizens and ensure a culturally integrated approach to ICT. Foster an innovative start-up ecosystem so that citizens have access to all opportunities in this digital era.
- Create a gender balance ecosystem enabling better access and affordable ICT & Telecommunication services to communities, schools, clinics, and marginalized groups.
- Improve the delivery of public and Government services to ensure efficiency and QoS and gain global recognition.
- Develop internal capacity by improving the digital skills of ICT staff.
- Strengthen e-Government, e-health, e-education, and e-agriculture services.
- Develop supporting legislation to protect and safeguard the users of ICT services.
- Ensure that ICT developments are culturally sensitive and align with coinciding Tuvaluan values such as innovation, preparedness, surviving in difficult conditions, and communal living systems.
- Strengthen the use of ICT to build a digital nation that can endure the threats of climate change and sea level rise and preserve and maintain Tuvaluan ways of life.

4. BACKGROUND

4.1 ICT AND TUVALU'S NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT (2021-2030) *TE KETE*

Tuvalu's National Strategy for Sustainable Development (2021-2030) *Te Kete* provides a long-term blueprint for national development with the aim of creating a globally competitive and prosperous nation. The goal of the strategy is to transform Tuvalu into a prosperous nation that provides high quality of life for all citizens in a clean and secure environment by 2030. In *Te Kete*, strategic goals are set for ICT so as to provide efficient and high-quality internet infrastructure and support services.

Given the vision set out in *Te Kete*, this NICT Policy recognizes the following basic needs for telecommunications and internet services:

- Upgrade domestic and international telecommunications services to keep pace with rapidly changing technologies and services now available to users around the world, especially the vast array of low-cost mobile communication and internet services. To meet the growing demand for high-quality internet services, a significant upgrade is required that primarily involves enhancing affordability, access speeds, service stability, and reliability.
- Identify ICT as an enabler or foundation for socioeconomic transformation.
- Acknowledge the important role science, technology, and innovation play in a modern economy, where new knowledge holds a central role in boosting wealth creation, social welfare, and international competitiveness.

- Create an economic and institutional regime that utilizes existing knowledge, the creation of new knowledge and entrepreneurship, an educated and skilled population, and dynamic information and communications infrastructure to facilitate the processing and dissemination of information and effective innovation systems.
- Realize the political will to implement ICT developments that align with and promote cultural values and that seek to maintain and preserve culture, sovereignty, and statehood in the face of climate change and sea level rise.

4.2 RATIONALE FOR THE POLICY

The rationale for the NICT Policy is its culturally sensitive and future-looking approach. It is Tuvalu’s first policy developed to specifically accommodate the recent and rapid changes in ICT legal and regulatory frameworks, as well as technological advancements. Digital transformation is affecting every aspect of human life and is changing the way we interact with each other and the world around us. This transformation can have both positive and negative implications for Tuvaluan society. It has therefore been necessary to develop the NICT Policy to ensure that the expansion, diversification, and application of ICT is secure, safe, and beneficial to the well-being of every Tuvaluan and consistent with core values enshrined in Tuvaluan communities and society. The NICT Policy has also been created to harness the digital transformation so that Tuvaluan ways of life can be preserved even in the event of the most severe impacts of sea level rise, extreme disaster, or mass migration.

4.3 CURRENT SITUATION ANALYSIS

Tuvalu is the second smallest country in the world by population and the fourth smallest by land area. It commands a population of 11,300 citizens who reside on 9 Islands spanning an Exclusive Economic Zone (EEZ) of approximately 753,139 square kilometers.

4.3.1 OPERATIONAL ENVIRONMENT

The existing networks in Tuvalu consist of a 4G LTE network; a 3G service piggybacks on this 4G network with only limited coverage. These mobile networks are only available on Tuvalu’s capital Island Funafuti with deployment progressing to the outer islands. Tuvalu’s country code top-level domain is .tv and the number of internet domains registered with the .tv extension has varied throughout the years with the hope that subdomains can be increasingly applied to promote e-services for the benefit of Tuvaluan citizens.

Radio Tuvalu is the only radio station in Tuvalu that transmits on the Frequency Modulation (FM) band broadcasting at 88.2Mhz. Direct home satellite subscriptions for local TV broadcasting have increased over the years as the number of Sky TV subscriptions has fluctuated.

Table 1 below shows current access to ICT services by percentage of population with outer islands served with Kacific broadband access via 1.2-m terminals installed on customer premises, and customers without terminal access use the Tuvalu Telecommunications Corporation (TTC) WiFi network with only limited broadband coverage available on each Island. The fixed voice service for individual residences, government entities, and companies are only available on Funafuti.

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

Service	Fixed Lines	Mobile 4G LTE	ADSL & VDSL	Kacific Broadband	Outer Islands WiFi
% of 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 decommissioned in July 2019

The Tuvalu Household Income and Expenditure Survey (HIES) report 2015|2016 indicates that 31% of the Tuvalu population aged 10 years or older uses the internet. Approximately 20% of the population aged 10 to 19 years uses the internet, and more than half of the population aged 20 to 39 years has internet access. At 40 years and older, fewer Tuvaluan citizens have internet access, with only approximately 3% of the population aged 60 and older using the internet. According to the HIES, 34% of citizens using the internet connected from their workplaces (only a small percentage can gain access from their homes), and email and social media were cited as the two main reasons people used the internet.

4.3.2 REGULATORY BACKGROUND

The Ministry responsible for Communication is the current responsible regulatory body in Tuvalu with TTC acting as the main service provider. The following legal frameworks are linked to the NICT Policy. However, given rapidly changing technologies, these frameworks must be reviewed:

- Constitution of Tuvalu
- Tuvalu Telecommunications Corporation Act
- Telecommunications (Radio) Regulations
- Telephone Regulations
- Television License Regulations
- Public Broadcasting Act
- Proceeds of Crime Act

Since 2008, 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 advances in mobile enabling services. Many issues have emerged due to these technological advancements, including rapid growth in IT-enabled services, increased demand for bandwidth and QoS, challenges to cyber security and online child protection, problems of content in an era of social media convergence and globalization, and changes in consumer preferences.

4.3.3 EMERGING TECHNOLOGIES

As more devices and elements in our environment have become interconnected, more people have begun to use mobile phones, WiFi, cable, and other means to access the internet, and this trend is expected to intensify as internet speeds increase. The operations of all governments and organizations have been disrupted due to the COVID-19 pandemic, and the implications of this pandemic are still unfolding, with the threat of more disruptive changes to come. Given this, the Government of Tuvalu is committed to ensuring that ICT matures quickly so it can support all operations regardless of future changes and absorb the impacts of disruptive markets through the use of digital tools that improve digital transformation processes. The Government sees the following emerging technologies as able to adapt to disruptive changes and fill current gaps:

- The sharing economy, which is an economic model where people can borrow or rent assets owned by others. This creates an ecosystem that is built around the sharing of human, physical, and intellectual resources, a concept similar to the Tuvaluan value of *kaitasi*, or shared ownership and responsibility. The sharing economy model is typically adopted when the price of a particular asset is high, and the asset is not fully utilized at all times. The Government of Tuvalu sees the importance of this approach, despite the lack of competition in the nation's telecommunications sector.
- The gig economy, which will provide opportunities for Tuvaluan citizens to enter labor markets where they can take up short-term contracts or engage in freelance work as opposed to holding permanent jobs. The Government sees the tremendous potential of the gig economy and, therefore, encourages citizens with specialized skills to join and make use of gig opportunities.

- Technologies that detect and respond to threats, secure communications, and data, protect people and infrastructure, and develop resilience in the face of disaster. The complexities of digital business and the algorithmic economy, combined with an emerging “hacker industry,” have significantly increased the digital threat to Tuvalu, highlighting the necessity of these preventative technologies.
- Machine learning, AI, big data, 5G, IoT, and blockchain. These technologies can be used to create a knowledgeable Tuvaluan community.

4.4 CHALLENGES

Tuvalu’s ICT sector faces significant challenges that this policy seeks to overcome:

- The small size of Tuvalu’s communications sector and the extreme remoteness of its 9 islands create a financial burden that is very costly as the same ICT infrastructure must be deployed across all islands at great expense to the Government and service providers.
- Limited local market size, which leads to unprofitable businesses and services.
- Underutilization of ICT in the provision of Government services.
- Vulnerability to cybercrime.
- Costly and unreliable telecommunication services.
- Limited nationwide ICT awareness 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.
- Low availability of ICT hardware.
- Disrupted power supply in the islands.

5. STRATEGIC APPROACH

This NICT Policy consists of 7 focus areas consists of enabling ICT infrastructure and access, government services, universal access, digital transformation, cyber security and cyber safety, values-based ICT human capacity building, and enabling regulatory and legal environment (see *Figure 1*).

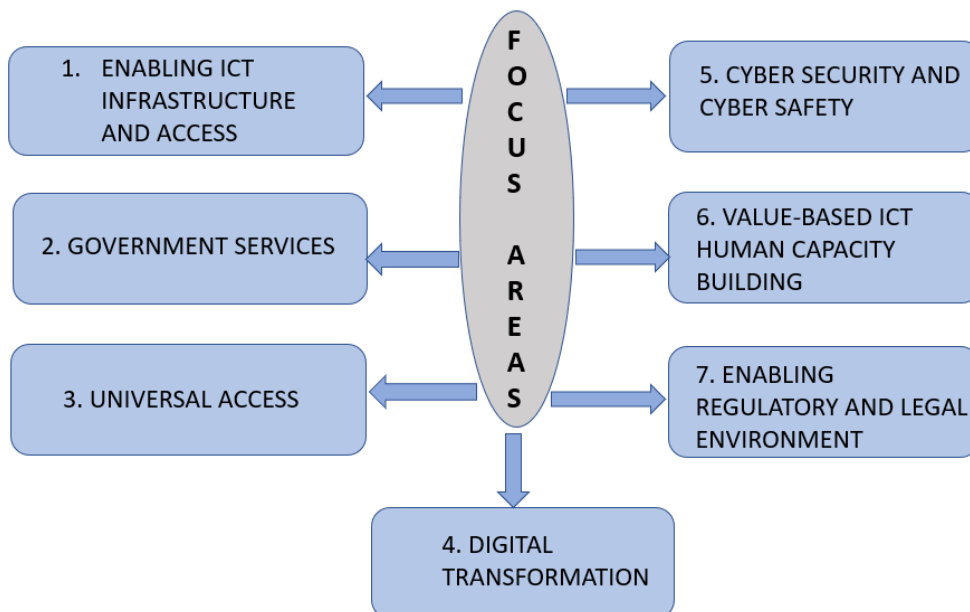


Figure 1: Focus Areas for the NICT Policy

5.1 ENABLING ICT INFRASTRUCTURE AND ACCESS

The increased uptake of internet-based and other ICT-related services requires appropriate infrastructure to enable social and economic growth. Thus, infrastructure-related policy is increasingly focused on how to effectively ensure affordable and widespread access to ICT services. Infrastructure is the foundation of an integrated ICT ecosystem. Without enabling infrastructure, all other components cannot exist. Policy that governs how a country's infrastructure is developed and managed is therefore fundamental to the supply of services that enable growth.

Given this, the Government of Tuvalu recognizes the importance of building a conducive, resilient, and a robust infrastructure backbone to enable connectivity, support ICT applications, and ensure Tuvalu is competitive globally. This NICT Policy outlines the conditions required for the provision of ICT services and provides for regulations and incentives to facilitate affordable high-speed broadband and mobile access across Tuvalu. Given that Tuvalu's sole telecommunications provider, TTC, cannot 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. Focus must also be placed on how enabling ICT infrastructure can be used to promote the preservation of Tuvaluan culture and values through digitization efforts and the creation of a digital nation impervious to the threats of climate change. The "Enabling ICT Infrastructure and Access" focus area is divided over 9 sub-areas as follows.

5.1.1 DEPLOYMENT OF CLIMATE RESILIENT ICT INFRASTRUCTURE NATIONWIDE

Given the geographic and climatic conditions in Tuvalu, it is critical that ICT infrastructure is built and operated in a way that anticipates and adapts to tropical climates and corrosion from saltwater, changing climatic conditions, and the effects of climate change and sea level rise. This will ensure longevity and low maintenance requirements for critical communications infrastructure and guarantee the development of a digital nation impervious to the long-term effects of climate change and climate mobility.

For specific infrastructure development, Tuvalu's top level domain name DotTV is one of the Government's most valuable assets. Therefore, a robust DNS Node must be deployed locally. The Government has already invested in the deployment of Kacific broadband on all Islands of Tuvalu and continues to invest in improving network infrastructure in the Outer Islands, with investments undergirded by the Government's ongoing submarine cable project. Additionally, the Government encourages local Governments to provide ICT infrastructure and skills development for their communities. The Government, with the help of other providers, will offer technical and knowledge support while also facilitating the ubiquitous deployment of new-generation high-speed wireless broadband connectivity infrastructure to reduce in-building deployment costs; make broadband delivery and access cost effective; and provide effective, reliable, and 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.

5.1.2 INFRASTRUCTURE SHARING

Infrastructure development and deployment is a capital-intensive undertaking and should be managed prudently at the national level. The Government will continue to invest in common, publicly available, and high-capital undertakings such as a national data transport backbone, central and regional data centers, and carefully managed shared radio frequencies. The ICT Department will oversee and regulate access and license operators to properly utilize infrastructure built using Government funds. A legal framework will also be developed to provide for a fair use policy where privately established infrastructure can be made available by one operator to others on fair commercial terms, thus creating competition and aligning with Tuvaluan ideals of *kaitasi*, or shared ownership and responsibility. The ICT Department will guarantee that arrangements between operators and service providers facilitate disaster resilience, equitable access to naturally limited resources and sites, and the collocation of

services and equipment. The Department will also ensure optimal service reliability, redundancy, carrier and net neutrality, and the security of data both at rest and in transit.

5.1.3 INTERNET EXCHANGE POINTS (IXPS)

The Government will establish IXPs options either at the local context or through regional or backbone. IXPs can benefit local communities with improved internet quality and affordability; they can also serve as a hub for technical activity and encourage the local development of content and applications, boosting local service hosting.

Developing partnerships with other vendors is a government priority. Partnerships can enhance interconnection and peering through other IXPs, especially now that the Government is procuring a submarine cable to enable enhanced links to regional and international markets.

5.1.4 DATA CENTERS

The Government will develop guidelines for future data centers to avoid inefficient ad-hoc investments from the public and private sectors. The Government also encourages Ministries, Departments, and Agencies to make use of data centers to share information. Government data centers will be created to foster national security, and development of all centers will be approved by the Ministry concerned with ICT to avoid duplication and provide a cost effective, scalable, and secure environment for Government data and information storage.

This NICT Policy mandates the development of standards for data centers to provide legal and regulatory coherence with Tuvalu's safety and environmental protection standards, including national disaster recovery and resilience frameworks. The Government will ensure that proper regulations and laws are enacted so that data is processed fairly and lawfully in accordance with the rights of citizens and obtained only for specific and lawful purposes.

5.1.5 AFFORDABLE AND EQUITABLE PRICING AND QUALITY OF SERVICE (QOS)

The Government will develop a matrix that compares telecommunications 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 QoS guaranteed. A survey will also be conducted to assess service status and to determine a strategy for reducing internet pricing including government subsidies in the form of Community Service Obligation (CSO) support grant.

5.1.6 FAST AND SECURE INTERNATIONAL COMMUNICATIONS

The Government of Tuvalu 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 capital island of Funafuti to an international submarine cable system providing for data interconnection, including the development of a national submarine cable system linking all islands of Tuvalu. Major infrastructure investment of this kind will allow Tuvaluan citizens to compete globally and create value in the digital space; it will also ensure that Tuvaluan values and culture can be preserved at home through large-scale digitization and the creation of a digital nation.

5.1.7 ICT SERVICES FOR PERSONS WITH DISABILITY AND MARGINALIZED COMMUNITIES

The Government will set appropriate requirements for ICT tools and software so that people with disabilities can access ICT services for daily use and during disasters. These services will be available nationwide to allow ease of access, and funds will be channeled to responsible bodies to help secure appropriate ICT devices.

5.1.8 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 infrastructure.

Consequently, the Government will provide incentives to encourage the development of infrastructure that serves the public good; strengthen mechanisms that ensure open access for all players and users; and develop complementary infrastructure, such as roads, power-grid access, and security, to support ICT development.

5.1.9 SUSTAINABLE ENERGY SOURCES

The implementation of major ICT infrastructure in Tuvalu is hindered by interrupted power supply, especially in Tuvalu's outer islands; therefore, sustainable energy sources are necessary. This policy highlights the importance of installing energy efficient sources such as solar power solution as reliable power backups for all islands of Tuvalu.

5.2 GOVERNMENT SERVICES

Most citizens in Tuvalu are employed through the public sector, making the provision of telecommunications via government services critical to achieving ubiquitous ICT access. By facilitating enhanced services, the government can also ensure that all administrative practices are digitized in the lead up to building a digital nation and guarantee that wide-reaching access to ICT is extended in a culturally sensitive manner, respecting the unique ways of life of the Tuvaluan people. This NICT Policy outlines 7 sub-areas critical to Government telecommunication services in the hope that streamlined, efficient, and fully functional Government services will undergo nationwide ICT upgrades.

5.2.1 IMPROVED E-GOVERNMENT NETWORK

The Government will ensure that reliable internet connectivity is provided to all Ministries, Departments, Agencies, and Offices situated in Tuvalu's main government building (which houses most civil servants), as well as to government entities operating outside of the government building.

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

5.2.2 DIGITAL SKILLS FOR THE ICT DEPARTMENT

Developing digital skills within the government's ICT Department is of paramount importance given the government's initiative toward digital transformation. This NICT Policy recognizes the necessity of capacity-building for ICT personnel so they can remain abreast of ongoing technological changes. Motivation is key in this endeavor, and investing in training and the development of competencies is an appropriate solution for upskilling.

5.2.3 DISASTER MANAGEMENT NETWORKS/EARLY WARNING SYSTEMS

Secure and reliable internet and communication connectivity can be easily established in all of Tuvalu's outer islands independent of the usual service provider network. However, the Government will also use the TTC 4G network to develop a satellite-based mobile base station providing SMS and data services as early warning systems for outer islands.

5.2.4 E-APPLICATIONS

The Government will promote and encourage the development of e-applications for major sectors such as health, education, agriculture, land, civil registration, and licensing authorities. Special focus will be placed on the development of mobile phone-based applications that utilize existing and new data found in Government databases to digitize administrative services.

5.2.5 ICT DEPARTMENT AND TTC REFORMS

Advances in technology trigger the need for the enhanced development of government and public services. An effective organizational structure must be implemented to place staff with special skills in the appropriate fields and ensure the efficient management and deployment of both government and TTC networks. The government anticipates the need to better structure Tuvalu's two major ICT bodies so that

digital transformation can become a reality in the short term. Consequently, the government aims to reform both Tuvalu's ICT department and its main service provider TTC.

5.2.6 DOTTV DOMAIN NAME

DotTV is the country code top-level domain for Tuvalu. The domain is popular because of its connection to media/entertainment companies that broadcast via television and reflects the creativity inherent in Tuvaluan innovation. The government through TTC is actively promoting the .tv domain name in consultations with relevant stakeholders so as to instill buyer confidence and gain maximum returns from this key ICT asset. The Government and TTC will also ensure that brand association with .tv is developed so that the domain name is immediately recognized Tuvalu's cctld. Finally, the Government will promote Tuvalu as an ICT destination in discussions with bilateral partners, multilateral organizations, and companies. In this way, Tuvalu can utilize the global brand value of .tv while also attracting new investments.

5.3 UNIVERSAL ACCESS

The government will ensure that public and private ICT services, and the knowledge necessary to deploy and utilize these services, are readily available to Tuvaluan citizens in all circumstances. The government will also guarantee that all citizens can participate in the knowledge economy. This is consistent with Tuvaluan values of shared ownership or responsibility and caring and sharing, and universal access will also ensure that Tuvaluan values, ways of life, and even sovereignty can be more effectively preserved and maintained. The challenge of equipping Tuvalu with the infrastructure and connectivity necessary to making data available is variously addressed in this NICT Policy document, and it is the Government's responsibility to create a policy that treats all citizens equally and provide equitable infrastructure per capita as outlined in the 4 sub-areas below.

5.3.1 UNIVERSAL COVERAGE FOR TV AND RADIO BROADCASTS

The government will assist the Tuvalu Broadcasting Corporation (TVBC) in extending coverage of Tuvalu's national TV station to all of Tuvalu's outer islands. Depending on market growth, the government will also extend the license for broadcast signal distribution services and utilize required radio frequency spectrum resources to ensure that broadcasting infrastructure and frequencies are utilized efficiently.

5.3.2 APPROPRIATE ICT TOOLS

Appropriate ICT tools create an environment where people can access, use, and enjoy technology at their work, in their communities, and during their recreational activities. These tools include services, devices, access, and applications, and it is the Government's goal to provide the following:

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

5.3.3 ACCESSIBILITY

In support of Strategic Priority Area 1 in Tuvalu's National Strategy for Sustainable Development (2021-2030) *Te Kete*, this NICT Policy ensures that citizens have access to affordable and reliable telecommunications services. The Government, through the ICT department and TTC, will guarantee

that ICT services, as well as emergency communications services, are available to the public and will also provide alternative services that extend appropriate access to people with disabilities.

5.3.4 ATTITUDINAL CHANGES

Technology and the internet are shaping the way we interact as humans, creating a digital culture. A culture that shapes the use of digital technologies to collaborate, innovate, and offer individual access to products, services and support. This NICT Policy serves to remind all Tuvaluans that digital culture and Tuvaluan culture and values need not be mutually exclusive and are, in fact, well aligned. People at all levels of society are encouraged to integrate digital technologies into their daily lives in ways that coincide with, maintain, and preserve Tuvaluan way of life. This policy promotes the integration of digital technologies into all educational and vocational systems and encourages an attitudinal change toward wider utilization of digital technologies to ensure that Tuvalu's future workforce is prepared for rapid technological changes.

5.4 DIGITAL TRANSFORMATION

The aim of this policy is to spur economic growth and realize ICT as a universal enabler. The government hopes to invest in creating a digital platform for the people of Tuvalu that can be utilized for beneficial economic activities, especially in recognition of innovation as a critical Tuvaluan cultural value. This NICT Policy has been developed to ensure that the people using digital platforms are treated fairly during market transactions. Contracts and agreements will be properly enforced and national resources, such as spectrum management and fairly allocated rights-of-way are properly adopted. Digital transformation is about technology, data, process, and organizational change. Consequently, this policy focuses on the following 5 sub-areas.

5.4.1 TUVALU NATIONAL DIGITAL LEDGER (TNDL)

The Government of Tuvalu is interested in the potential of developing a national digital ledger using blockchain technology to create new business models, improve services, optimize processes, and allow for greater agility in emerging markets. The government is eager to explore opportunities to leverage the capabilities of blockchain technology.

5.4.2 INTERNET BANKING

The establishment of internet banking is critical so that customers can make payments, check account balances, and make international transfers at any time and place. Internet banking promises to increase financial efficiency, and it is the intention of the government to leapfrog limitations faced by financial institutions and provide citizens with easy-to-access, secure, and always available financial services.

5.4.3 MOBILE MONEY DEPLOYMENT

Most countries in the Pacific region now utilize mobile money, and Tuvalu is in the early stage of securing a suitable mobile money system for the nation. The Government considers it necessary to implement a fully inclusive mobile payment system so that citizens can 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. The Government anticipates that TTC will provide an enabling ICT infrastructure enabling financial institutions in the country to carry out financial technology solutions such as mobile finance and internet banking services.

5.4.4 INNOVATIVE APPROACHES

The Government recognizes the potential of using frontier technologies, such as blockchain, IoT, AI, big data, cloud computing, and 5G mobile services, to promote innovative applications that can leverage social and economic benefits.

5.4.5 E-COMMERCE AND A POST COURIER MARKET

Growth in digital commerce or e-commerce can be attributed to the increased use of the internet, which has allowed buyers and sellers to conduct efficient transactions using appropriate digital platforms. E-commerce is a critical facet in enacting digital transformation. An effective postal and courier system is also key to the development of e-commerce, and the government will ensure that all citizens can access efficient basic postal services. This NICT Policy also sees enhanced investment in fisheries, trade, and commerce as necessary to the digital transformation.

5.5 CYBER SECURITY AND CYBER SAFETY

The combination of emerging technologies and greater internet speeds in the digital economy has made us more vulnerable to cyber-attacks. Therefore, the government encourages relevant departments, agencies, and offices to raise awareness on cyber security and identify ways to protect all citizens, especially children, and businesses against cyber threats. Promoting cyber security and cyber safety is key to ensuring that Tuvaluan culture can be well expressed through digital platforms in a safe and secure space. Strategies for ensuring cyber security and cyber safety are outlined over 4 sub-areas.

5.5.1 NEW CYBER LAWS

The government will establish cyber security and cyber safety laws in accordance with standard frameworks and models from the International Telecommunication Union (ITU), specifically those developed for Pacific nations. Model laws will be distributed to responsible agencies such as the Tuvalu Police Service and the Attorney General's Office.

5.5.2 STRENGTHENED LEGAL FRAMEWORKS

The Government will develop key indicators to guide the evaluation and identification of existing legal frameworks relevant to cyber security and cyber safety so as to meet the highest regional and international standards. This will enable Tuvalu to effectively combat cybercrime activities.

5.5.3 TUVALU COMPUTER EMERGENCY RESPONSE TEAM (CERT)

The government will form a cyber task force that includes relevant departments, agencies, and offices, such as the Tuvalu Police Service, the ICT Department, the Programme Management Unit (PMU), and TTC. The Tuvalu CERT will join a regional network of CERTs that share information to assist government and private sector internet users in the event of cyber-attacks. This will limit the spread of malware such as scams, computer viruses, trojans, worms, and botnets.

5.5.4 CYBER SECURITY AWARENESS PROGRAMS

New threats will always impact organizations and governments despite technological defenses established to promote safety. Cybercriminals use sophisticated social engineering techniques to bypass defenses, and an entire network can be ruined if one employee clicks a malicious link. This NICT Policy sets targets to ensure awareness programs are conducted for government employees, businesses, and organizations as a first line of defense against cybercrime and to create a security-first culture.

5.6 VALUES-BASED ICT HUMAN CAPACITY BUILDING

ICT is a tool at our disposal, and depending on how it is used by people, organizations, or the Government, it can either be an enabler for positive development or a threat to Tuvaluan values and communal ways of life. It is the human component of ICT that is the true determinant of how technology will impact Tuvalu, and it is for this reason that the government takes a values-based approach to ICT human capacity building.

The government promotes the importance of Tuvaluan cultural values, especially *kaitasi*, or shared ownership and responsibility; *falepili*, or being a good neighbor; Tuvalu's communal living system; and innovation. These values suggest that the sharing of ICT skills and knowledge dovetails with Tuvaluan ways of life and that ICT skills can be rapidly improved across Tuvalu's ICT sector. To grow the ICT sector, a culturally sensitive Human Resources Development Plan that reflects Tuvaluan values must be

enacted. The Government will also collaborate with academic institutions to identify gaps that must be filled in ICT curricula and ensure that all Tuvaluans are computer literate and able to engage in and reap benefits from the digital era. The “Values-Based ICT Human Capacity Building” focus area is outlined over 6 sub-areas.

5.6.1 SUSTAINABLE ICT WORKFORCE

This policy aims to cultivate Tuvalu’s ICT workforce so that it can properly deliver effective and efficient services. The Government will assess gaps in existing ICT skill sets and work with academic institutions to develop culturally sensitive curricula and support that can ensure a sustainable ICT workforce uniquely suited to the Tuvaluan context. This will assist with improving digital literacy, upskilling the existing ICT workforce, and developing a values-based approach to ICT, ensuring that no one is left behind in terms of ICT development.

5.6.2 NATIONWIDE INTEGRATED EDUCATIONAL SYSTEM

The government will develop and deploy a nationwide e-education system that will support all levels of schooling, including small-to-medium training institutions. This interconnected system will allow for the sharing of information and curriculum integration so that strategic plans for education and vocational training can be better shaped. It will also account for Tuvaluan cultural values and ways of knowing so as to create a uniquely Tuvaluan education system for ICT.

5.6.3 ICT SUBJECT INTEGRATION INTO EDUCATION CURRICULA AT ALL LEVELS

While the use of ICT in education in the Pacific region is relatively recent, it has already had an impact on education systems. Consequently, this policy encourages the integration of ICT subjects into the national curricula for primary and secondary schools with the view that these subjects should be tailored to Tuvaluan culture and ways of knowing so as to provide high-impact learning experiences for students.

5.6.4 IMPROVED BASIC ICT SKILLS FOR CITIZENS

Emerging new technologies require an ICT-literate population. The Government, with the support of partners and donors, encourages the establishment of educational networks for sharing resources and promoting e-learning at primary and secondary schools nationwide. The Government also encourages the development of virtual institutions so that citizens can obtain basic ICT skills in culturally sensitive ways that recognize the importance of ICT to preserving Tuvaluan values and culture.

5.6.5 ICT CENTER OF EXCELLENCE

The establishment of an ICT Center of Excellence will improve Tuvalu’s capacity in areas such as hardware and software engineering, network design, and large-scale ICT project management. This policy aims to disseminate ICT knowledge nationally with clear objectives and goals provided to ensure proper execution and sustainability.

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

To ensure that every Tuvaluan can achieve computer literacy and access opportunities in the digital economy, the government encourages the targeted creation of opportunities for the disadvantaged and people with special needs, women, and youth. The Government will facilitate the widespread acquisition of ICT skills through e-inclusion and e-accessibility activities and programs.

5.7 ENABLING REGULATORY AND LEGAL ENVIRONMENT

The security of ICT infrastructure, resilience in the face of attack, coherent internal policies that protect citizens from abuse and illegal exploitation, and compliance with licensing regulations are now critical given the introduction of emerging technologies and the growth of internet connectivity in Tuvalu. Consequently, the Government must develop comprehensive defensive and offensive cyber-capabilities.

It is the government's responsibility under the ICT Department to review and implement a Cyber Security Strategy so that relevant legislation can be developed to achieve policy objectives for cyber security and oversight. This is consistent with Tuvaluan values of preparedness, protection, and innovation highlighted throughout this policy and is outlined under 5 sub-areas below.

5.7.1 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 online risks. 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 the potential long-term consequences.

5.7.2 DATA PROTECTION AND PRIVACY LAW

The Government will establish laws to provide Tuvaluans with a clearer understanding of their right to ascertain who holds their personal data, the reasons their data is being held, that the data being held is accurate, and that the integrity of said data is maintained. The laws will also protect and assist citizens in asserting their rights in respect of items posted about them online without their consent.

5.7.3 ELECTRONIC TRANSACTION LAW

This policy seeks to establish an electronic transaction law so that electronic transactions are recognized as contracts and are admissible as evidence in court proceedings. Laws will also be established to outline procedures and protocols for online contracts and electronic signatures.

5.7.4 CONSUMER PROTECTION ACT

This policy further seeks to establish a consumer protection act to safeguard consumers from unfair trade and prescribe a standard for product safety performance that establishes understanding, trust, awareness, and appropriate cultural barriers.

5.7.5 TELECOMMUNICATION REGULATOR

Finally, this policy will establish an independent Telecommunication Regulator to oversee the performance of telecommunications licensees and their compliance with relevant legislation, license conditions, and applicable mandatory instruments. The Regulator will advise the Minister concerned on the formulation of policies for the telecommunications sector.

6. IMPLEMENTATION OF THE 2021 TUVALU NATIONAL ICT POLICY

The Ministry concerned with ICT has the overall responsibility for implementing the 2021 Tuvalu NICT Policy. Inputs from multiple stakeholders were incorporated into the policy to ensure its integrity as well as its efficient and effective implementation. A National ICT Steering Committee was also established to provide ICT policy and technical advice to the Ministry concerned during the development of the NICT Policy.

The PMU and the ICT Department will support the Minister concerned with ICT in his/her duties by coordinating government ICT activities, developing and managing an e-Government system to ensure interoperability, minimal duplication of effort, greater coordination, and adherence to the policy.

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

The Ministry will lead regular reviews of the NICT Policy, and this review process will be based on the monitoring and evaluation framework outlined in *Annex 1* and its defined time frames. Regular reviews will ensure that Tuvalu can withstand challenges brought about by technological advancements in this innovation and information era.

7. CONCLUSION

Tuvalu's ICT sector is still developing, and enhanced telecommunications and ICT systems will play an important part in the growth of Tuvalu's national economy. If ICT developments are well aligned to the goals of maintaining and preserving Tuvaluan culture, values, and sovereignty in the face of climate change and sea level rise, ICT will also improve the livelihoods and well-being of all Tuvaluans in culturally sensitive ways and will allow for the creation of a digital backup plan for Tuvalu existence in the metaverse.

From 2016 to 2021, the number of connected devices in Tuvalu has increased from 3,521 to 4,718. In June 2020, the Government of Tuvalu signed a major contract with a satellite broadband provider providing rapid satellite broadband connectivity and delivering cutting-edge communications systems to people living in the outer Islands. The ongoing arrangement for a submarine cable landing on the capital with plans to construct a domestic cable will bring a fast and secure international communications link to Tuvalu. As the country awaits the deployment of submarine cables, TTC has plans for the construction of a GPON network replacing the existing copper cable providing FTTH to residential customers, government entities, and business.

This 2021 NICT Policy will be the first ICT policy officially endorsed and launched by the Government. The policy establishes 10 guiding concepts and 11 broad goals and objectives. These include key targets to be achieved in 2021 and 2022, such as the extension of high-quality telecommunications services (e.g., voice and internet) and broadcasting services (e.g., radio and television) to communities, schools, and clinics nationwide. Other objectives will be attained at different points over the duration of the policy.

Although deploying modern technologies presents major challenges, the Government has established the NICT Policy recognizing the right of every Tuvaluan to access a full range of modern technology and participate in and contribute to the digital era.

8. LIST OF ACRONYMS

AI	Artificial Intelligence
BIT	Blockchain in Tuvalu
CERT	Computer Emergency Response Team
EEZ	Exclusive Economic Zone
FM	Frequency Modulation
FTTH	Fiber To The Home
GDP	Gross Domestic Product
HIES	Household Income and Expenditure Survey
ICT	Information and Communication Technology
IoT	Internet of Things
ITU	International Telecommunication Union
IXP	Internet Exchange Point
NICT Policy	National ICT Policy
PMU	Programme Management Unit
TNDL	Tuvalu National Digital Ledger
TTC	Tuvalu Telecommunications Corporation
QoS	Quality of Service

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

Annex 1: Measurement and Evaluation Framework for NICT Policy Goals					
Goals	Activities	Responsibility	Timeline	KPIs	Resources
5.1 Enabling ICT Infrastructure and Access					
5.1.1 Deployment of climate resilient 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 to the Outer Islands.	Ministry for ICT, TTC, & OI Kaupule	100% mobile and broadband coverage in all Islands of Tuvalu by Dec 2022	% of population with mobile coverage % of population with broadband coverage % of population with coverage in comparison to previous years	TTC
5.1.2 Infrastructure sharing	Create competition and deliver new models that provide infrastructure sharing for unserved and under-served areas.	TTC, ICT Depart, & TEC	100% fiber on land network coverage on Funafuti by 2022 New entrants to the market	30% of population accessing FTH Number of entities sharing the infrastructure	TTC, ICT Depart, & TEC
5.1.3 Internet Exchange Points (IXPs)	Facilitate the establishment of IXPs by any operator.	ICT Depart, TTC, & Tuvalu USP Campus	Established in Funafuti within 1 year and rolled out to Outer Islands in the next 2-3 years	Number of IXPs established in Tuvalu	Ministry for ICT & ICT Depart
5.1.4 Data centers	Develop data centers, initiate pilot installations, and secure support from partners.	ICT Depart & TTC	Completed within 3-5 years	Number of Islands with a data center	ICT Depart
5.1.5 Affordable and equitable pricing and quality of service (QoS)	Assess regional and international pricing with consent from the regulator (once established). Maintain QoS and experience for all Tuvalu Islands.	TTC & Ministry for ICT	Reduce prices by 50% by January 2022	50% increase in number of network users in relation to previous years	TTC
5.1.6 Fast and secure international communications	Execute Tuvalu submarine cable project.	PMU, TTC, & Ministry for ICT	50% deployment rate by 2023 100% completion of cable installation by 2025	% of population connecting to the fiber link % of bandwidth increase % of increase in Mbps/user	PMU

5.1.7 ICT services for persons with disabilities and marginalized communities	Further research the establishment of funds for the purpose of purchasing special equipment.	Ministry for Education & Fusi Alofa	Ongoing	Fund established. Number of special equipment items supplied to people with disabilities	Development partners, Ministry for Education, & Fusi Alofa
5.1.8 Complementary infrastructure	Establish communications with Ministries dealing with ICT-related matters regarding ICT-related development infrastructure, especially to resolve issues regarding power disruption.	PWD, TEC, Department of Local Government, TTC, ICT Dept, Energy Dept, & Ministry for Transport	Progressive over the next 2 years	% coverage of fiber on land % of solar backup systems for TTC % of conduits replaced	PWD, TEC, Department of Local Government, TTC, ICT Dept, Energy Dept, & Ministry of Transport
5.1.9 Sustainable energy sources	Install efficient power backups on all Islands with main ICT infrastructure.	PWD, TEC, Department of Local Government, TTC, ICT Dept, Energy Dept, & Ministry for Transport	100% of power backups installed by 2022	Number of times the power cuts Number of Islands with efficient power backup systems	PWD, TEC, Department of Local Government, TTC, ICT Dept, Energy Dept, & Ministry for Transport
5.2 Government Services					
5.2.1 Improved e-Government network	Assess the entire e-Government infrastructure.	ICT Depart	Completed within 1 year	Assessment report developed	ICT Depart
5.2.2 Enhanced internal communications and collaboration tools for Government	Design and deploy customized internal communications using emerging communication tools. Deploy www.gov.tv website and assign subdomains to all Ministries.	ICT Depart	Completed by end of 2021	New communications platform established	ICT Depart
5.2.3 Digital skills for the ICT Department	Organize capacity building for ICT personnel.	ICT Depart & Ministry for ICT	Ongoing	Number of trainings completed	ICT Depart & Ministry for ICT

5.2.4 Disaster management networks/early warning systems	Establish clusters for disaster management networks and establish national early warning systems.	Disaster Depart, MET, & TTC	Ongoing review of current early warning systems and disaster management networks Implement new systems in 1-2 years	New and updated early warning systems Upgraded disaster management network	Disaster Depart & MET
5.2.5 E-applications	Promote the use of emerging technologies by encouraging the development of e-applications.	ICT Depart & other interested partners	Ongoing	Number of applications launched	ICT Depart & other interested partners
5.2.6 ICT Department and TTC Reforms	Reform the ICT Department to cater for the development of additional Government services.	ICT Depart & Ministry for ICT	Reform completed by 2022	New ICT Department structure	ICT Depart & Ministry for ICT
5.2.7 DotTV Domain Name	Conduct research and create appropriate models to maximize contributions from DotTV.	PMU & MJCFA	Completed by end of year 2021	% increase in revenue from DotTV in comparison to previous year	ICT Depart, PMU, & Ministry for ICT
5.3 Universal Access					
5.3.1 Universal coverage for TV and radio broadcasts	Extend National TV coverage to the Outer Islands and improve coverage of radio broadcasting.	TVBC, Ministry for ICT, & TTC	100% National TV coverage nationwide Improve radio signals in the Outer Islands by 2023	Number of TV subscribers % of households accessing radio Tuvalu FM	TVBC, Ministry for ICT, TTC, & Statistics Depart
5.3.2 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 2022	Blockchain framework developed. Recognition of digital contracts for online transactions	ICT Depart & Judiciary
5.3.3 Accessibility	Provide ICT services and emergency communications to the public and for people with disabilities.	Fusi Alofa, TTC, & ICT Depart	100% of user population can access ICT services and emergency communications by 2030	% of users adopting ICT services % of user population that can access emergency communication services during disasters with special ICT service delivery provided for people with disabilities	ICT & Fusi Alofa

5.3.4 Attitudinal changes	Promote digital culture.	All Ministries & Departments	70% of workforce can adapt to technological changes by 2022	% of the workforce population that can adapt to technological changes % of schools with integrated digital technologies	ICT & Ministry for Education
5.4 Digital Transformation					
5.4.1 Tuvalu National Digital Ledger (TNDL)	Blockchain in Tuvalu (BIT) team, in partnership with the Government, to conduct a feasibility study and explore possibilities for the TNDL project.	Ministry for ICT, BIT, & financial institutions	50% completion of the TNDL discovery phase by 2021 100% completion by the end of 2025	Feasibility study report, including frameworks. Yearly progress report	Ministry for ICT & BIT
5.4.2 Internet banking	Financial institutions to establish internet banking.	NBT, DBT, TNPF, & BIT	50% completion by 2022 100% deployment by 2023	% of users adopting internet banking Rate of adoption by financial institutions	All financial institutions & BIT
5.4.3 Mobile Money deployment	TTC, in partnership with the Government of Tuvalu, to establish mobile money systems.	TTC, NBT, & BIT	100% of user population adopting mobile money by 2022 50% of mobile user population adopting mobile money by end of 2023	% of user population adopting mobile money	TTC, NBT, DBT, & TNPF
5.4.4 Innovative approaches	Explore opportunities in emerging markets.	All Ministries, SOEs, & TNPSO	Feasibility studies completed within 4 years	Progress reports	All Ministries, SOEs, & TNPSO
5.4.5 E-commerce and a post courier market	Develop appropriate e-commerce and 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 completed within the next 2 years	% of population and businesses conducting e-business	Department of Trade & ICT Depart
5.5 Cyber Security and Cyber Safety					
5.5.1 New cyber laws	Implement and enforce a Cybercrime Act for Tuvalu.	AG's Office, Police, & Ministry for Education	Complete updated cyber laws by 2022	Cybercrime bill passed	AG's Office, Police, Ministry for Education, & ITU

5.5.2 Strengthened legal frameworks	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
5.5.3 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
5.5.4 Cyber security awareness programs	Conduct effective awareness programs for all of Tuvalu.	Ministry for ICT, Police, AG's Office, & Ministry for Education	Start awareness programs by 2021	Number of programs conducted in a year	Ministry for ICT, Police, AG's Office, & Ministry for Education
5.6 Values-Based ICT Human Capacity Building					
5.6.1 Sustainable ICT workforce	Assess skills required/needed for the country and develop a sustainable and culturally sensitive Human Resources Plan.	Ministry for ICT & ICT Depart	Completed by 2023	Number of trainings conducted % of ICT personnel trained in new IT-related qualifications	ICT Depart & Ministry for ICT
5.6.2 Nationwide integrated educational system	Identify an e-learning system that supports ICT at primary and secondary schools across the country.	Ministry for Education & Ministry for ICT	Progressive over 2 years in secondary schools Completed within 1 year at primary schools	% of schools connected to the integrated e-learning platform	Ministry for Education
5.6.3 ICT subject integration into education curricula at all levels	Coordinate the insertion of ICT subjects into primary and secondary school curricula.	Ministry for Education, Ministry for ICT, & TTC	100% integration in secondary schools 50% completion in primary schools by 2022	% of schools with ICT curriculum	Ministry for Education
5.6.4 Improved basic ICT skills for citizens	Establish educational networks for sharing educational resources so that citizens can improve ICT skills, especially those connected to, supporting, and preserving Tuvaluan 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 that citizens should use ICT tools for the right purpose and in a good, fair, and just way	Private institutions & Statistics Depart
5.6.5 ICT Centers of Excellence	Deploy an ICT Center of Excellence in Funafuti.	Ministry for ICT & ICT Depart	50% by end of 2021 100% by end of 2022	% completion of the establishment and operations of the center	ICT Depart

5.6.6 Opportunities and support for people with special needs, women, and youth	Offer opportunities and provide support if needed.	Ministry for Education, HR, Fusi Alofa, Gender Affairs, & FATU LEI	Progressive over the years	Number of job opportunities Number of scholarships and trainings offered	Ministry for Education, HR, Fusi Alofa, Gender Affairs, & FATU LEI
5.7 Enabling Regulatory and Legal Environment					
5.7.1 Cybercrime and child online protection legislation	Conduct cyber awareness programs.	Judiciary, AG's Office, Police, ICT Depart, & Ministry for Education	Program begins in 2021 and covers all Outer Islands within 3 years	% coverage Number of cyber awareness programs conducted. *Awareness measures	Ministry for ICT & Ministry for Education
5.7.2 Data protection and privacy law	Establish law on data protection and privacy.	Judiciary, AG's Office, Police, ICT Depart, & TTC	50% completion by 2022 100% completion by 2023	Data protection and privacy law established	Ministry for ICT
5.7.3 Electronic transaction law	Develop an online transaction act.	AG's Office, Police, & ICT Depart	50% completion by 2022 100% completion by 2023	Online transaction act established	Ministry for ICT
5.7.4 Consumer protection act	Develop a consumer protection law.	AG's Office, Police, & ICT Depart	100% completion by early 2022	Consumer protection act in place	Ministry for ICT
5.7.5 Telecommunication regulator	Establish an independent regulatory body or unit under Ministry for ICT.	Ministry for ICT, TTC, & AG's Office	Ongoing	Tuvalu Telecommunications regulatory body established	Ministry for ICT



GOVERNMENT OF TUVALU