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ANNUAL REPORT

2021

National Broadcasting and Telecommunications Commission (NBTC)



LONG LIVE THE KING





about the technical and modern technologies, and select the good and effective parts to implement wisely and proactively that suits nation's situation and environment so that the national communications are

fully developed as facilitator of economic and social development and

truly support for nation stability.

Chitralada Villa July 15, 1983

(The Royal Proclamation was bestowed by

His Majesty the Late King Rama IX Bhumibol Maha Adulyadej the Great
on the Occasion of the Centennial of the Post and Telegraph Department
and the National Communications Day, on August 4, 1983)

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Preface

The National Broadcasting and Telecommunications Commission (NBTC) has prepared the NBTC Annual Report in accordance with Section 76 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment which stipulated that the NBTC shall prepare report on the spectrum management, broadcasting, television, and telecommunications services as the case may be, and submit to the Cabinet and the National Assembly within 120 days as from the ending date of each accounting year as well as disclosure to the public.

The NBTC Annual Report 2021 has been conducted with the crucial essence consisting of Major Performance of the NBTC and the Office of the NBTC, aligned with the Government's Policies and the related National Plans, the report on Market Situation and Competition in Broadcasting, Television, and Telecommunications Services, Problems and Obstacles in Broadcasting, Television, and Telecommunications Business Operations which are Important to the people, Budget Management in 2021, as well as Workplan and Expenditure budget in 2022. In this regard, The NBTC expects that the NBTC Annual Report 2021 will be beneficial to individuals and all related parties.

The National Broadcasting and Telecommunications Commission

March 2022

Message from the Chairman Of the NBTC



General Sukit Khamasundara

NBTC Commissioner Acting Chairman of the NBTC (October 6, 2017 - Present)

In 2021, the world has encountered the Coronavirus disease 2019 (COVID-19) pandemic mutation, such as Delta and Omicron variants, which spreading more easily than earlier variants. As a result, The overall Global and Thailand economy continuing slowdown. Through the entire year, the National Broadcasting and Telecommunications Commission (NBTC) has supported the government policies and enabled the measures on resolving and mitigating the impact of the COVID-19 pandemic both short and long terms and Strengthening Broadcasting, Television, Telecommunication, and Satellite industries adjusting to the new normal by facilitating the utilization of the communication technologies. The performance highlights of the NBTC and the Office of the NBTC are as follows:

1. Supporting the government policies and measures on the operation for preventing, controlling, resolving and mitigating the impact of the Coronavirus disease 2019 (COVID-19). The NBTC has issued the assistance measures such as (1) measures to assist people and telecommunications licensees during the COVID-19 pandemic, offering the telecommunications services, communication devices, and necessary equipment to people

in home and community isolations, field hospitals and Central Vaccination Centers. Other measures encompass free SMS from state agencies to people as part of COVID-19 vaccination campaigns and treatment (2) measures to support online education with internet broadband packages to resolved the COVID-19 pandemic (3) measures to assist the licensees in broadcasting, television, and telecommunications business who got effected by the COVID-19 pandemic (4) measures to support public health management of public sector agencies in the situation of COVID-19 pandemic as well as allocating the health service emergency call center 1516 to Bangkok Metropolitan Administration. For booking COVID-19 vaccination under "Thai Ruamjai Krungthep Proad Pai" Project.

2. Spectrum Management. The NBTC has approved the revision of the 3500 MHz range spectrum utilization timeline, and the remedies to the affected parties. In addition, the NBTC has revised the notification of the NBTC on Spectrum Management Master Plan (2019) to support the provision regarding convergence implementation under the plan and timeframe for the enactment of the Royal Decree according to section 30 of the Act on the organization to

Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2562 (2019) including obiligations under the Radio Regulations 2020.

3. Regulation on the Broadcasting, **Television. and Telecommunications services** and Communication Satellite Services. To regulate the related business operations, the NBTC has issued (1) issuing the Notification of the National Broadcasting and Telecommunications Commission on Criteria for Spectrum Ranges Allocation apart from Auctions (2) issuing the Notification of the National Broadcasting and Telecommunications Commission on Criteria for Advance Collection of Fixed Broadband Internet Service Fee (3) issuing the Notification of the National Broadcasting and Telecommunications Commission on Standard Method for Calculating Rental Rates for Digital Terrestrial Television Network. In addition, the NBTC has issued licenses for spectrum and television broadcasting business to provide public digital terrestrial television services.

4. Universal Service and Social Service.

The NBTC and the Office of the NBTC having continuously implemented the project on the provision of Broadband Internet service and mobile phone signal in border areas (Zone C+) and the project on the provision of broadband internet service in remoted areas (Zone C) The projects would strengthen nation competitiveness, bridge the digital divide, and leverage people's quality of life of people of the certain target groups such as teachers, students, the elderly, and patients, in the rural remoted and wilderness areas. Furthermore, the Office of the NBTC has preparing the Third Universal Basic Telecommunications and Social Service Plan B.E. 2565 - 2569 (2022) - 2026), and revising the Notification of the National Broadcasting and Telecommunications Commission on Criteria and Procedure for Revenue Collection to Fund the Provision of Universal Basic Telecommunications Services and Social Services, it is in the process of public consultation.

5. Promotion and Support on Research and Development of Broadcasting, Television, and Telecommunications Services for Public Interest. In 2021, the NBTC had approved the Fund allocation to promote and support various types of funds consisting of the Category 1: Projects funded and financially support by BTFP that are compliance with the objectives set forth in Section 52 (1) (2) and (3) of Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), in the amount of 211.48 million baht, in total of 33 projects, Category 2: Projects that fulfill the objectives specified by BTFP Fund Management Committee, by determining the term of reference of project, in the amount of 466.00 million baht, in total of 25 projects, Category 3: Project that specified by the NBTC, which is 5G Testbed and Use Case Deployment in Chiang Mai University, Khon Kaen University, and Prince of Songkla University, in the amount of 150.00 million baht. Category 4: Fund for supporting the operation according to the law on Thai Media Fund in the amount of 500.00 million baht.

Lastly, on behalf of the NBTC, I would like to express our thanks to all relevant agencies, the executives, officers, and employees of the Office of the NBTC, who have been dedicated and hardworking, as from 2011 to present, supporting the NBTC mission and bringing the organization forward to be recognized as a significant element to drive a stable and sustainable national economy. I ensure the NBTC and the Office of the NBTC would perform our best for the utmost benefit of the nation.

General

Sys milme

(Sukit Khamasundara)

NBTC Commissioner

Acting Chairman of the NBTC

Message from Secretary-General

of the NBTC



Mr. Trairat Viriyasirikul
Deputy Secretary-General Acting
Secretary-General of the NBTC
(July 1, 2020 - Present)

The Office of the NBTC has declared the Honesty Intent of the Executives' administration containing significance that focuses on integrity, transparency and justification, in compliance with the good governance with consideration for the utmost benefit of the people including having collaborated with all related parties in the prevention and anti-corruption. In 2021, the Office of the NBTC has implemented the NBTC's policies in spectrum management and regulation on broadcasting, television, telecommunications, and communication satellite services. The performance highlights are as follows:

1. Maintaining the standard of the Integrity & Transparency Assessment (ITA) of the Office of the NBTC. Having ITA assessment participation aligned with the operation in 2021, the Office of the NBTC has maintained the standard of the ITA in the AA level, for the second consecutive year, with the score of 96.60 The office of the NBTC shall maintain the operation standard with morality and transparency, and commit to improve the performance with sustainable development.

2. Elevating the Office of the NBTC to be fully digitalized (NBTC Digitalization) and recognized as the prototype of the digital governmental agency. In 2021, the Office of the NBTC had been awarded the Digital Government Awards in 2021 (DG Awards 2021), for the second successive year, as one of the most highly digitalized governmental organization, and was in the 4th rank from 1,922 agencies. In this regard, the Office of the NBTC shall commit to elevate the organization into a fully-digitalized governmental organization.

3. Supporting the government policies to mitigate the impact of the COVID-19. To mitigate the impact of the COVID-19, the Office of the NBTC has issued measures to support public health management of state agencies, including communication devices and services offering as well as allocating the health service emergency number 1516 under "Thai Ruamjai Krungthep Proad Pai" project to Bangkok Metropolitan Administration. Other measures encompass free SMS sending from public sectors and state enterprises to people as part of COVID-19 vaccination campaigns and treatment, and measures on online education supporting with internet broadband packages.

- 4. Spectrum Management. The Office of the NBTC has prepared for the spectrum allocation in the frequency band of 3500 MHz to be used in the 5G spectrum auction, aligned with the National Table of Frequency Allocation. By researching and analyzing the impact of 3500 MHz rearrangement, the Office of the NBTC has arranged the draft of Criteria on Licensing and Regulating in the frequency band of 3500 MHz.
- 5. Licensing and regulating the broadcasting, television, telecommunications, and communication satellite services. The key performances of the Office of the NBTC are as follows: (1) granting the rights to utilize the spectrum, and provide digital terrestrial television services to the Government Public Relations Department (PRD) and Ministry of Tourism and Sports (2) granting the rights to utilize satellite orbits to the Geo-Informatics and Space Technology Development Agency (GISTDA), Thaicom Public Company Limited, and the National Telecom Public Company Limited (NTPLC), in accordance with the Notification of the NBTC on Criteria and Licensing Procedure to Obtain the Right to Use Satellite Orbits. In addition, the office of the NBTC has granted permission to utilize foreign satellite to provide domestic services to Thai Airways International Public Company Limited, Thai AirAsia Company Limited, The Geo-informatict and space Technology Development Agency, The Government Public Relations Department, Kasetsart University, The National Telecom Public Company Limited, and TC Broadcasting Company Limited.
- 6. Consumer protection in broadcasting, television, and telecommunications services. In collaboration with Ministry of Digital Economy and Society, Cyber Crime Investigation Bureau, and the operators, the Office of the NBTC has tightened the measures to handle SMS and voice phishing, by prescribing regulations and penalties to content providers, who pursue operations against the law, from warning issuance to license revocation.

- 7. Promoting and supporting on research and development of broadcasting, television, and telecommunications services for the public interest. The Office of the NBTC has been granted fund from the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP) to support 60 projects in the amount of 1,327.48 million baht. The details are described in the annual report.
- **8. Organizing overhead communication lines.** The Office of the NBTC has organized the overhead communication lines covering 3,891 routes, in a total of 7,864.542 kilometers. It has also successfully covered 1,240 incremental routes, in addition to the overhead communication lines management plan. Furthermore, the Office of the NBTC has resolved 2,821 complaints, due to the cable menace in the areas under Metropolitan Electricity Authority and Provincial Electricity Authority.

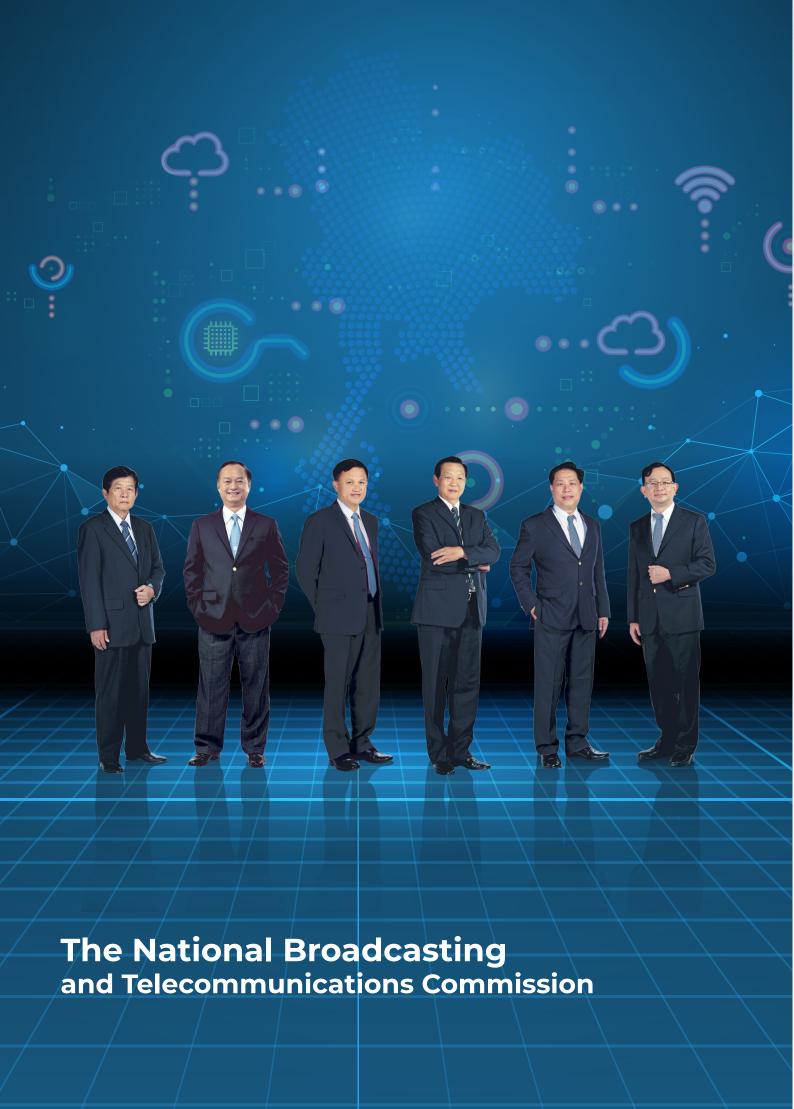
On Behalf of the Office of the NBTC, I would like to express my gratitude to the NBTC Commissioners, the executives and officers of the Office of the NBTC for the support and contributions. I have committed to proactively perform my duties and drive the NBTC policies to be accomplished which will be beneficial to the people and the nation with integrity and transparency, aimed at promoting the national broadcasting, television, telecommunications, and communication satellite services development, for enhancing the quality of life of the people and restore the economy and society to get through the various challenges together.



(Mr. Trairat Viriyasirikul)

Deputy Secretary-General Acting

Secretary-General of the NBTC





General Sukit Khamasundara NBTC Commissioner Acting Chairman of the NBTC

Education

- Bachelor of Science, Chulachomklao Royal Military Academy, Class 20
- M.A. in Political Science (Security Resources Management), Burapha University
- Joint Staff Course, Command and General Staff College
- Certificate, National Defense College of Thailand, Class 44
- Professional Engineer (Civil Engineering), the Board of Control of the Professional Engineering
- Certificate, Top Executive Program, Capital Market Academy, Class 15

Work Experience

- Chief of Army Engineering Battalion 1, Royal Guards
- Ommander of the 1st Development Division
- Deputy Commander-in-Chief of the First Army Area
- Special Consultant to the Royal Thai Armed Forces Headquarters
- Special Royal Guard
- Judge to the Supreme Military Court
- Member of the Committee to Formulate the Policy for the Provision of Universal Basic Telecommunications Services and Social Services, National Telecommunications Commission
- Advisory Board of the Management of Doctoral Philosophy Program in Political Science, Burapha University

- Person in charge of the Construction Project of Entrance and Services Pathways in Suvarnabhumi Airport"
- Director of the Royal Project Don Khun Huay,
 Phetchaburi Province
- Director of the Royal Initiative Project Huay Mae Prieng, Phetchaburi Province
- Director of the Queen Sirikit Forest Park Project, Ratchaburi Province
- Director of the Construction Project of Benchakitti Park, Bangkok
- Chief of the Secretariat on Psychological Operations and Public Relations, Royal Thai Army
- Chief of the Secretariat Office of the Internal Security Operations Command



Colonel Natee Sukonrat, Ph.D. Vice-Chairman of the NBTC

Assoc. Prof. Prasert Silphiphat **NBTC Commissioner**

Education

- Bachelor of Science in Electrical Engineering, Chulachomklao Royal Military Academy (Gold Medal Award)
- 9 Master of Science in Electrical and Telecommunication Engineering, University of South Florida, USA
- 9 Ph.D. in Electrical and Telecommunication Engineering, University of South Florida, USA

Work Experience

- Senior Engineering Officer, Project on Globalstar Low Earth Orbit Satellite, San Diego, California, USA
- Onsultant to the iPSTAR Satellite Project
- Ohairman of the CDMA Project Steering Committee, CAT Telecom Public Company Limited
- 9 Board of Director, TOT Public Company
- Acting CEO, TOT Public Company Limited
- Senior Engineering Officer, Armed Forces Telecommunications Office, Royal Thai Armed Forces Headquarters
- Ohairman of the Working Group on Community Radio Service
- 9 Sub-committee on Broadcasting and **Television Services**
- Ohairman of the Committee for Drafting Spectrum Management Master Plan and National Table of Frequency Allocation
- Ohairman of the Committee for Drafting Telecommunications Master Plan
- Ohairman of the Committee for the Licensing of Broadband Wireless Access Service (BWA)
- Ohairman of the Committee for the Licensing of the International Mobile Telephony or 3G and Beyond
- Ommissioner, the National Telecommunications Commission (NTC)

Education

- 9 Bachelor of Arts (Economics), Chiang Mai University
- 9 M.A. (Economics) Middel Tennessee State University, USA
- O Certificate, National Defense College of Thailand, Class 45
- Certificate, Advanced Course for Executives, Class 33
- O Certificate, Advance Justice Administration Course for Executives, Class 3

Work Experience

- Professor, Faculty of Economics, Chulalongkorn University, 1975 - 2001
- 9 Vice-Chancellor, Chulalongkorn University, 1997 - 2000
- Deputy Secretary-General of King Prajadhipok's Institute, 2000 - 2006
- 9 Special Expert in Economics, the Office of National Telecommunications Commission, 2007 - 2008
- Executive Manager, the Telecommunications Development Fund for the Public Interest, Office of the NTC, 2008 - 2010



Lt. Gen. Perapong Manakit, Ph.D. NBTC Commissioner

Education

- Bachelor of Science, Chulachomklao Royal Military Academy, 1978
- M.A. in Social Development (School of Social Development), National Institute of Development Administration (NIDA), 1987
- Ph.D. Sociology of Development, University of Bielefeld, Germany (Awarded by Germany Government, Thailand-Germany Student Exchange Program 1992)

Work Experience

- Rifle Platoon Leader, Rifle Company, the 3rd Infantry Battalion, the 1st Infantry Regiment Chamberlain Guard, 1978
- Technical Officer, Strategic Research and Development Administration, Institute of Higher Army Studies, 1993
- Performing duties on special advisor group, Internal Security Operations Command, 1997
 2001
- Director of Psychological Operation Division, Military Civil Affairs Department, 1999
- Secretary attached to the Standing Committee on the Military Affairs, the Senate, 2000 - 2005
- Director of Information Division, Directorate of Joint Civil Affairs, 2001
- Performing official duties to support the Counselor to the Minister of Defence, 2001 -2002
- Assistant Chief of Staff Officer to Deputy Supreme Commander, 2004
- Chief of Satellite Television Division, TV5, 2004

- Expert, the Supreme Command Headquarters, 2005
- Deputy Director, Center for Psychological Operations and Public Relations in the Southern Provinces, National Security Council, 2005 - 2006
- Producer of the Radio Program on "Ruk Mueng Thai" (Love Thailand), 2006 - 2010
- Consultant to the Office of National Security Council, 2006 - 2010
- Spokesman of Ministry of Defence, 2008
- Sub-Committee on Inspection and Investigation in the Committee on Inspection and Investigation for National Reconciliation and Study Research Sub-Committee in the Committee on Inspection and Investigation for National Reconciliation, 2008 - 2009
- Secretary Attached to the Committee for Study and Consideration of Capacity Building and Management of the Army under the Committee on the Military Affairs, House of Representatives, 2009 - 2011



Asst. Prof. Thawatchai Jittrapanun, Ph.D.

NBTC Commissioner

Work Experience



- Bachelor of Engineering (Mechanical) Engineering), Chulalongkorn University
- Master of Business Administration (Finance), Georgia State University, USA
- Octor of Philosophy in Business Administration (Ph.D.) (Finance), University of Alabama, USA
- Professor, Faculty of Economics, Chulalongkorn University
- Instructor of Doctoral Program of Finance (Finance Economics), NIDA
- Special Professor of Doctoral Program of Finance (Finance Economics) for the Joint Doctoral Program in Business Administration (JDBA), Chulalongkorn University, Thammasat University, and NIDA
- Chairman of the B.A. Program in Economics (International Program), Faculty of Economics, Chulalongkorn University
- Ohairman of Labor and Management Development Center, Faculty of Economics, Chulalongkorn University
- Director of the Computer Center, Faculty of Economics, Chulalongkorn University
- Scholarship Selection Committee of the Office of the NBTC
- → Special Instructor in Finance, Business Administration Course in Public/Private Universities
- Advisor to the Committee on Finance, Treasury, Banking and Financial Institution, the Senate
- ⊕ Advisor to the Committee on Budget Administration Follow-Up, House of Representatives
- 9 Project Leader, the Index of Exports of the Thai National Shippers' Council

- 9 Bachelor of Medicine, Chulalongkorn University, 1987
- Bachelor of Political Sciences, Sukhothai Thammathirat University, 1992
- Diploma, Preventive Medicine (Public Health), the Medical Council of Thailand, 1992
- Master of Public Health, Institute of Tropical Medicine, Belgium, 1999
- Diploma, Family Medicine, the Medical Council of Thailand, 2004

Work Experience

- Director of Huay Tap Tan Community Hospital, Sri Sa Ket Province
- Director of Sri Rattana Community Hospital, Sri Sa Ket Province
- Director of Lad Bua Luang Community Hospital, Ayutthaya Province
- Director of Uthai Community Hospital, Ayutthaya Province
- Ohairman of Rural Doctors Society
- Secretary-General of the Coordinating Committee of Thai NGOs for Primary Healthcare
- Secretary-General of Foundation for Consumer
- Member of the 2nd National Economics and Social Advisory Council
- Ohairman of Working Group Consumer Protection, National Economics and Social **Advisory Council**
- Executive Director of the Telecommunications Consumer Protection Institute (TCI)
- 9 Sub-Committee of the Human Rights, the National Human Rights Commission of Thailand





NBTC Commissioner



Executive

Summary

The National Broadcasting and Telecommunications Commission (NBTC) and the Office of the NBTC have aimed to manage spectrum and regulate broadcasting, television, telecommunications, and satellite services, as well as supporting the government policies with regard to the new era of regulatory enforcement, conforming with the changing environments which will bring benefits to the people and nation covering all respective dimension of people lives, In 2021, the NBTC has considered the revision of the laws and criteria to regulate the related businesses, and updated the working paradigm to be consistent with the digital economy of the country.



In addition, it has supported the government policies and issued measures on preventing, resolving and mitigating the impact of the coronavirus disease 2019 (COVID-19). Due to the pandemic, personal lives and businesses were disrupted to the New Normal. The technology-driven practices have been introduced and integrated to match the new lifestyle context. Many state agencies, schools and businesses have already transformed to digital platforms and digital solutions. The major performances are as follows:

1. The spectrum management

1.1 The legislation of the Royal Decree according to Section 30 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (No.3) B.E. 2562 (2019)

supports convergence of spectrum and technology to encourage the efficient use of spectrum and access network development, enabling the service providers to develop and provide various to fulfill the needs of customers, which can stimulate consumption and economic growth.

The Office of the NBTC has also revised four new regulations to support the royal decree. At present, the royal decree and the regulations, respectively, were published in the Royal Gazette, encompassing an amendment to the Spectrum Management Master Plan, criteria for applying for business licenses, criteria for spectrum license transfer, and criteria for allocating spectrum range apart from auctions.

1.2 The preparation of the 3500 MHz spectrum band revision has been conducted by the Preparatory Working Group for 3500 MHz Spectrum Revision, by studying the revision impact of the 3500 MHz band adoption from domestic and international cases, considering the optional remedial measures based on quantitative and qualitative analysis, and realigning the adoption timeline. In this regard, according to the resolution of the 23/2021 NBTC board meeting on December 8, 2021, the NBTC approved the adoption timeline for 3500 MHz, and set up the working group to study the revision impact of the 3500 MHz band adoption, including guidelines to remedy the affected parties from the spectrum revision.

1.3 The National Spectrum Monitoring Center (NSMC) establishment has been conducted by the working group appointed to study, analyze and formulate a NSMC establishing plan. The center is aimed for national spectrum management both normal and emergency situations, and information system integration for monitoring and regulating the national spectrum. The NSMC establishment plan has already been carried out by establishing the National Spectrum Monitoring Regional Center (NSMR) in 2021. At present, it is in the process of the NSMC establishing preparation.

2. The regulation on communication satellite services has been conducted in the following aspects:

2.1 The Notification of the NBTC on Criteria and Procedure for Satellite Orbital License Package was published in the Royal Gazette on May 14, 2021 and effective from May 15, 2021 onwards.

The purpose of the notification is to be used as guidelines for granting the rights to use Geostationary Satellite Orbit (GSO), as its satellite operation concession is scheduled to end, licensing expired, or no licensing available before the Satellite Orbital Right Management Plan is enforced. At present, it is in the process of the notification amendment and consideration of rights granting.

2.2 Licensing the right to use satellite orbit granted to the operators as follows:

- 1) The right to use Geostationary Satellite Orbit (GSO) granted to existing users.
- Thaicom Public Company Limited as existing domestic communication satellite service operator, in 10 satellite networks.
- National Telecom Public Company Limited as permitted operator to manage domestic communication satellite service by the Ministry of Digital Economy and Society, in 5 satellite networks.
- 2) The right to use Non-Geostationary Satellite Orbit (NGSO) for new satellite networks to Geo-Informatics and Space Technology Development Agency (GISTDA) in 2 satellite networks.

2.3 Licensing the right to use foreign satellite to provide domestic services as follows:

- 1) Thai Airways International Public Company Limited and Thai AirAsia Company Limited have been granted permission to use foreign satellite to provide domestic service to passengers in accordance with article 15 of the Notification of the NBTC on Criteria and Procedures to License Foreign Satellite to Provide Domestic Service.
- 2) In accordance with article 16 of the Notification of the NBTC on Criteria and Procedures to License Foreign Satellite to Provide Domestic Services, the permission has been granted to 5 agencies including The Geo-Informatics and Space Technology Development Agency (GISTDA), World Food Programme (WFP), the Government Public Relations Department, Kasetsart University, and National Telecom Public Company Limited.
- 3) Permission to use foreign satellite slot to provide domestic services has been granted to TC Broadcasting Company Limited to temporarily use CHINASAT-12 until the assignment of THAICOM-A28 license has completed or as the agreement of the NBTC.

3. The regulation on telecommunications services

3.1 Promoting and supporting 5G the application of 5G Technology continuously. The NBTC and the Office of the NBTC have promoted 5G deployment via many key projects, and support the National 5G Driving Committee in driving the National 5G Strategy to promote 5G use cases and pilot projects in Thailand, as well as cooperating with relevant agencies and educational institutions, to support the transformation to 5G technology and immense uptake.

Furthermore, supported by the NBTC, the "Siriraj World Class 5G Smart Hospital" project was launched in a ceremony on December 16, 2021, hopefully to transform the hospital into a role model for other public hospitals in Thailand, with the aim to enhance advanced healthcare services accessibility to people in remoted areas.

3.2 Organizing and installing all overhead communication lines underground nationwide. The Office of the NBTC has specified organizing and installing all overhead communication lines underground which has been set as important policy and implemented constantly since 2016. In 2021, the overhead communication lines have been organized in the areas of Metropolitan Electricity Authority (MEA) and Provincial Electricity Authority (PEA), covering 3,891 routes in total distance of 7,864.542 kilometers and also successfully covered 1,240 incremental routes, in addition to the overhead cable management plan.

Furthermore, the Office of the NBTC has resolved 2,821 complaints, due to the cable menace in the areas of Metropolitan Electricity Authority (MEA) and Provincial Electricity Authority (PEA). Moreover, with the cooperation of the telecom operators, the overhead communication lines have been brought underground for 20 routes, in the total distance of 42.96 kilometers. During 2016 - 2021, the overhead communication lines have been brought underground completely for 73 routes, in total distance of 115.882 kilometers, to improve people's quality of life to be safe as well as pushing forward Thailand to be ready for the metropolis of ASEAN.

3.3 Supporting the broadband internet network expansion via the provision of Universal Service Obligations (USO). The key projects are as follows:

1) The provision of mobile phone signal and broadband internet service in the border areas (Zone C+) project, covering 3,920 villages, that aims to ensure the availability of public Wi-Fi in the villages, the accessibility of broadband internet services in schools and Sub-district Health Promoting Hospitals and the establishment of Public internet service center (USO Net) and installing mobile phone signal coverage modifier. Currently, it is in phase 2 of the project timeframe.

2) The provision of broadband internet services in the remoted areas (Zone C) project, covering 15,732 villages, that aims to ensure the availability of public Wi-Fi in villages, the accessibility of broadband internet services in schools and sub-district Health Promoting Hospitals and the establishment of Public internet service center (USO Net) and community internet centers (USO Wrap) in schools. Currently, it is in phase 2 of the project timeframe. The projects implementation results in digital divide mitigation in both spatial and social dimensions and enhancing people's quality of life of the target groups living in the rural and remoted areas.

3.4 Supporting the government policies to mitigate the impact of the coronavirus disease 2019 (COVID-19). To mitigate the impact of the coronavirus disease 2019 (COVID-19), the key measures have been issued to support public health management of state agencies in the following aspects;

1) Measures to assist people and telecommunications licensees during the COVID-19 pandemic, including communication devices and services offering to people in "home and community isolations", field hospitals and Central Vaccination Centers, as well as encompassing free SMS sending from state agencies to people as part of COVID-19 vaccination campaigns and treatment.

2) Measures to support online education with internet broadband packages to mitigate the impact of COVID-19 pandemic.

- 3) Measures to assist the licensees in broadcasting, television, and telecommunications services who got affected by the COVID-19 pandemic.
- 4) Measures to support public health management of government agencies as well as allocating the health service emergency Call Center 1516 to Bangkok Metropolitan Administration, for booking COVID-19 vaccination under "Thai Ruamjai Krungthep Proad Pai" project

4. The regulation on broadcasting and television services

4.1 Licensing on the frequency to provide public digital terrestrial television services as public service. The NBTC has approved the principles of spectrum licensing in the following aspects;

- 1) License for obtaining the frequency for public digital television service, Type 3 for regional service, for broadcasting and educating people, about the democratic regime of government with the King as Head of State.
- 2) License for obtaining the frequency for public digital television service, Type 1 to promote learning of children and youth.
- 3) License for obtaining the frequency for public digital television service, Type I to promote health, hygiene, and sports, on people's quality of life. The Office of the NBTC has promoted the license application via Electronic Broadcasting System (e-BCS) during October 21, to November 4, 2021. According to the resolution of the NBTC Meeting No. 22/2021 on November 24, 2021, the NBTC has granted the permission to use frequency for public digital terrestrial television services to the Government Public Relations Department and Ministry of Tourism and Sports.

4.2 Regulation adjustment to align with the changing industry ecosystem. The working group has been set up to revise the criteria on regulating television services and related services, as well as delivering policy recommendations. Also, it has delivered the guidelines on appropriate regulatory scheme and the study on the impact of Over-the-Top (OTT) on broadcasting and

television services and competitiveness of the industry. Currently, it is in the process of studying related laws and regulations to formulate the draft of the Notification on Criteria on Licensing and Regulating Television Services, to mitigate regulatory gap between regulated traditional broadcasters and the unregulated OTT platform providers.

4.3 Responsibility for the rental charges of the digital terrestrial television network (MUX). During July 2020 to August 2021, the Office of the NBTC was responsible for the rental charges of the digital terrestrial television network (MUX) for the network providers in total amount of 1,975.753 million baht, in accordance with the Order of the Head of the National Council for Peace and Order No.4/2019 Regarding Solution for the Television and Telecommunication services, which assigns the NBTC to arrange reimbursement or compensation to the existing digital terrestrial television licensees who are affected by the frequency band of 700 MHz in the range of 694 - 790 MHz, with the revenue obtained from the spectrum allocation to telecommunications services. The compensation must be the actual price and not exceed the amount that the NBTC has agreed upon on the entire remained licensing Period to Provide digital television services of the NBTC.

4.4 Frequency allocation for FM and AM broadcasting services. In accordance with the Section 83 of the Act on Organization to Assign Radio Frequency, and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), to falicitate the broadcasting services of the government agencies and state enterprise, which the licenses are scheduled to expire on April 3, 2022, as well as to offer the opportunity to the new entrants to operate the broadcasting service, In 2021 the NBTC has prescribed the regulations in consistence with the licensing for broadcasting service roadmap for 6 NBTC Notifications, which have been already published in the Royal Gazette, as follows:

- 1) Notification of the NBTC on Criteria and Procedures for spectrum Licensing for Broadcasting service.
- 2) Notification of the NBTC on Radio Frequency Plan for FM Radio.
- 3) Notification of the NBTC on Radio Frequency Plan for Low Power FM Radio.
- 4) Notification of the NBTC on Technical Standard of FM Transmitter.
- 5) Notification of the NBTC on Criteria for Preventing interference to Radio Aviation From FM Radio Station.
- 6) Notification of the NBTC on Criteria, Procedures and Conditions on FM Radio Frequency Auction for Commercial Broadcasting Services.

Currently, the NBTC is in the process of drafting the Notification of the NBTC on Spurious Emission Test of FM Radio Stations.

- 4.5 Developing the guidelines on broadcasting services permission. The NBTC has approved the guidelines on broadcasting services licensing in the following aspects;
- 1) Licensing to use frequency and conditions for broadcasting services according to FM Radio Frequency Plan and AM Radio Frequency Plan for state enterprises and other state agencies operating broadcasting business, in accordance with Section 74 of the Broadcasting and Television Businesses Act B.E. 2551 (2008) and the Notification of the NBTC on Licensing criteria and Procedures for Radio or Television Broadcasting Service B.E. 2555 (2012), in total of 390 frequency slots. In 2021, The NBTC has approved the licensing for state enterprise to use frequency for broadcasting business services in total of 389 frequency slots for 24 agencies. The 5-year license term shall commence upon April 3, 2022 onwards, unless otherwise stated by the new NBTC Commissioners.
- 2) Licensing to use frequency for broadcasting services according to FM Radio Frequency Plan and AM Radio Frequency Plan,

for applicants to operate broadcasting services, in a total of 119 frequency slots, which include 45 slots for public services and 74 slots for business services. The Office of the NBTC has already announced the invitations to apply for FM and AM radio frequency licensing.

3) Licensing to use frequency for broadcasting services according to low power FM broadcasting in area simulation, in accordance with International Telecommunication Union (ITU) Recommendations, in a total of 1,522 frequency slots. In regard to licensing, the frequency use for public services and community services will be considered as a priority. The rest will be considered for commercial services. However, the allocation for commercial services must not exceed 75 percent of the allocation capacity. The Office of the NBTC has already announced the invitations to apply for low power FM radio frequency licensing for public and community services.

4.6 Transition of audio broadcasting trial into licensing. The Office of the NBTC has issued the Announcement on Transition Trial of Audio Broadcasting Services into Licensing, and informed the guidelines on licensing transition and results of consideration to authorized broadcasting stations/licensees. According to the Notification of the NBTC on Criteria on Transitioning Audio Broadcasting Trial into Licensing B.E. 2555 (2012), certified users can apply for licenses in the following services.

- Community services certified users can apply for licenses according to low power FM radio frequency plan for community services.
- Public services certified users can apply for licenses according to low power FM and AM radio frequency plan for public services.
- Commercial services certified users can apply for licenses according to FM and low power FM radio frequency plan for commercial services.

5. Protecting Consumers in the Broadcasting, Television and Telecommunications Services

5.1 Protecting consumers in the broadcasting and television services has been performed by regulating the actions that are considered as exploitation of consumers, promoting and protecting the rights of the disabled and the disadvantaged to access and utilize information in the TV programs, as well as developing criteria on consumer protection in broadcasting and television services, and developing preventing measures and campaigns to protect women, children and youth via multimedia channels.

5.2 Protecting consumers in the telecommunications services has been performed by collaborating with related agencies, to promote telecommunications regulating and consumer protecting for public interest, such as solving spam Short Message Service (SMS) and advertising fraud, developing a digital identity authentication using the mobile phone number, called Mobile ID, developing information management system to protect mobile numbering (the 3-Step Application) the 3rd phase, as well as creating awareness and empowering consumers.

6. Promoting and Supporting the Research and Development of Broadcasting, Television, and Telecommunications Services for Public Interest

In 2021, the NBTC has granted funds to projects in 4 categories according to Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP) as follows:

Category 1 - Projects that are in compliance with the objectives set forth in Section 52 (1) (2) and (3) of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), in the amount of 211.48 million baht, in a total of 33 projects.

Category 2 - Projects that fulfill the objectives specified by BTFP Fund Management Committee, in the amount of 466.00 million baht, in a total of 25 projects.

Category 3 - Projects that specified by the NBTC, which are 5G Testbed and Use Cases Deployment in Chiang Mai University, Khon Kaen University, and Prince of Songkhla University, in the amount of 150.00 million baht.

Category 4 - Fund for supporting the Thai Media Fund in the amount of 500.00 million baht.

7. Organization Development

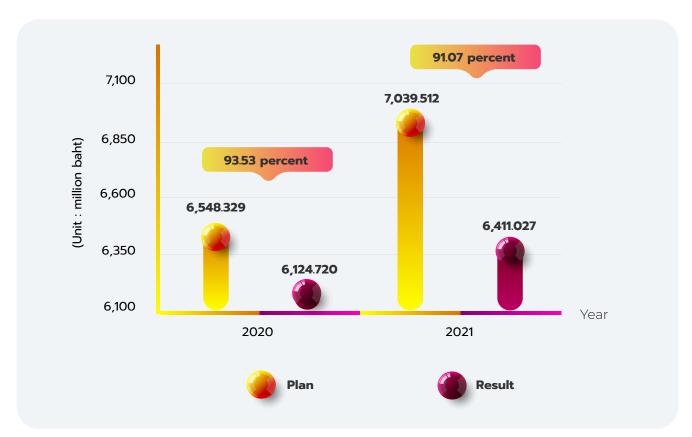
The NBTC emphasizes on driving the organization development strategies with the hope to create the good governance and high-performance organization, and has issued policies to develop the Office of the NBTC to be a fully-digitalized organization in the near future in order to perform duties in response to serve the people and stakeholders effectively. In 2021, the major performances are as follows.

7.1 Maintaining the standard of the Integrity and Transparency Assessment (ITA) and improve a sustainable operation. Having participated in the ITA assessment of the year 2021, the Office of the NBTC has maintained the ITA standard in the AA level, for the second consecutive year, with the score of 96.60, ranked the 4th of the government agency category. Thus, the Office of the NBTC has analyzed the assessment result to improve the organization performance, and initiate guidelines for anti-corruption. Moreover, the NBTC has been drafting the Notification of the NBTC on Officials Code of Ethics to use as a criteria and guidelines, for personnel compliance. At present, the notification is under consideration of the Code of Ethics Committee.

7.2 Elevating the Office of the NBTC to be fully-digitalized (NBTC Digitalization) and recognized as the prototype of the digital government agency. In 2021, the Office of the NBTC has arranged the organization Data Governance, Single Point Data Searching System, and many projects. Also, it has conducted the NBTC Quality Practice in order to encourage the Office of the NBTC to be the prototype of the fully digitalized government agency. With all dedication, the Office of the NBTC won the Digital Government Awards 2021 (DG Awards 2021), as one of the most highly digitalized governmental organization, and was in the 4th rank from 1,922 agencies. Also, it has been awarded as an outstanding organization in applying Data Governance.

7.3 The Budget Management of the

Office of the NBTC. In 2021, the Office of the NBTC had been prepared as a surplus budget with the revenue collected in the amount of 8,462.908 million baht while the expenditure budget in 2021 was prepared for totally 7,039.512 million baht. The result of the budget expenditure of the operation of the Office of the NBTC was 6,411.027 million baht. The NBTC had already summitted to Digital Economy and Society Development Fund according to Section 24(4) of the Digital Development for Economic and Social Development Act B.E. 2560 (2017) based on cash basis in the amount of 1,265.995 million baht. It is expected that the Office of the NBTC will submit more money as state revenue for 785.886 million baht.



Remarks: The NBTC has approved to increase the expenditure budget of 2021 in the amount of 530.079 million baht in order to allocate compensation to project plans that reserve for the reimbursement of the use spectrum license fee to Thai TV Co., Ltd.

8. Major Policies and Important Workplan in 2022

The NBTC and the Office of the NBTC have prescribed policies of 2022 to drive the organization toward succuss and sustainability in broadcasting, television, telecommunications and communication satellite services development, keeping pace with the technology dynamic technological changes, and serving as a key mechanism to drive the economy and society to achieve the sustainable development goals. The key work plan is categorized into 8 missions as follows;

- 1) Regulating the satellite service for the benefit of the nation and people, continuing from the policy in 2021, which initiating the satellite orbit licensing. The NBTC is responsible for fully regulation after the concession contracts ended in 2021.
- 2) Preparing licensing and spectrum use regulations, to support the legislations, of the Royal Decree based on Section 30 of the Act on the Organization (No.3) B.E. 2562 (2019).
 - 3) 4K Television broadcasting Trials.
- 4) Revision regulations of broadcasting and telecommunications business to match the ecosystem of the industries.

- 5) Preparation for spectrum auction to supports 5G technology development policy.
- 6) Transforming the Office of the NBTC to be fully digitalized and maintaining the standard of the Integrity and Transparency Assessment in the AA level.
- 7) Setting up the National Spectrum Monitoring Center.
- 8) Promoting the accessibility and utilization of broadband internet and expanding the telecommunications services to the target groups as the Universal Services Obligations.

9. Expenditure budget plan of the Office of the NBTC in the year 2022

According to the resolution of the NBTC Meeting No.23/2021 on December 8, 2021, the NBTC has approved the expenditure budget of 2022 in the amount of 6,765.781 million baht, in consideration of necessity and appropriateness in organizational operations, and alignment to the National Strategy, the National Economic and Social Development Plan, and other related plans including 3 of NBTC Master Plans, and the Strategic Plan of the office of NBTC as well as urgent mission operations to serve the government policies and the NBTC policies as follows:

No.	Items	Amount (million baht)
1.	Expenditure Budget of the office of the NBTC	5,755.781
1.1	Expenditure for the operation of the NBTC and the Office of the NBTC	3,867.511
	Personnel Expenses	1,888.486
	Organization Management and administration Expenses	1,389.188
	Durable articles, Land and Construction Expenses	202.192
	Other Expenses	387.645
1.2	Expenditure for Projects	1,447.207
1.3	Central Budget	338.000
1.4	Expenditure for the operation of the Performance follow-up	103.063
	and Evaluation committee	
2.	Budget Allocated to the Funds	1,010.000
2.1	The Broadcasting and Telecommunications Research and	1,000.000
	Development Fund for the Public Interest	
2.2	EdTech Fund	10.000
	Total 1 - 2	6,765.781



NBTC

and the Office of the NBTC



On October 7, 2011, the National Broadcasting and Telecommunications Commission or "NBTC" has been appointed by the Royal Proclamation according to Section 17 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (the Act on the Organization), B.E. 2553 (2010) consisting of 11 commissioners which are Chairman of the NBTC, Vice Chairman of the NBTC, and NBTC Commissioners.

On June 22, 2017, the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (No.2) B.E. 2560 (2017) has been published in the Royal Gazette. The Act has abolished Section 6 of the Act on the Organization B.E. 2553 (2010) and stipulated that the NBTC shall consist of seven commissioners with an expertise in broadcasting services, television services, telecommunications services, engineering, laws, economic, and rights and liberties protection. During the recruitment process, according to Section 42 of the Transitory Provisions, "it stipulates that the commissioners who still hold the office on the effective date of this Act shall remain in office to continue performing their duties until the term expiration or vacation of office upon other causes, no matter what causes, it shall be deemed that the NBTC consists of the existing commissioners unless the remaining commissioners consist of less than four persons where all the commissioners shall vacate office upon the cause of term expiration.

The NBTC commissioners shall be appointed according to the Act on the Organization B.E. 2553 (2010), which is additional amended by this Act. While the new NBTC commissioners have not yet been appointed, the existing NBTC commissioners shall continue perform duties until the new commissioners appointed by the Act on the Organization B.E. 2553 (2010), which is additional amended by this Act, take the office. In the case where the Chairman vacates office, the existing commissioners shall elect one among themselves to be the Chairman to continue perform the duties."

On April 24, 2018, the Head of the National Council for Peace and Order had the Order No. 7/2018 Regarding Cancellation and Suspension of the Nomination and Selection Process for the NBTC Commissioners, and the commissioners who still hold the office on the effective date of the Order shall remain in office to continue performing their duties as necessary. Meanwhile, the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting

and Telecommunications Services (No.3) B.E. 2562 (2019) has been amended and published on April 16, 2019 in accordance with the provisions of the constitution.

On July 8, 2019, the Head of the National Council for Peace and Order had the Order No. 8/2019 regarding measures to solve the problems of continuity of the NBTC Commissioners by suspending the nomination and selection process for the appointment of the NBTC Commissioners, until the Act on the Organization with the additional amendment in the part of the NBTC Commissioners nomination and selection process has been enforced, or until the Prime Minister, with the approval of the Council of Ministers, issues Order, and the existing commissioners shall remain in the office to continue performed duties.

On February 28, 2021, the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (No.4) B.E. 2564 (2021) was published in the Royal Gazette and effective from March 1, 2021 onwards. This Act has abolished Section 6 of the Act on the Organization (No.2) B.E. 2560 (2017) and stipulated that the NBTC shall consist of seven commissioners; one of each in broadcasting services, television services, telecommunications services, consumer protection or people's right and freedom promotion, and 2 commissioners in other related fields.

In accordance with Section 10 of the Act, it stipulates that the NBTC commissioners who still hold the office on the effective date of the Act shall remain in office to continue performing their duties. In case of the position is vacated, the remaining NBTC commissioners shall continue their duties until the new commissioners appointed by the Act on the Organization B.E. 2553 (2010), which is additional amended by this Act, take the office. The commissioner, who has held the office less than three years, is eligible to be appointed to the NBTC commission for another term.

Meanwhile, the Secretariat of the Senate shall organize the recruitment of the NBTC commissioners according to the Act on the Organization B.E. 2553 (2010), which is additional amended by this Act, within fifteen days as from the effective date of this Act.

On December 20, 2021, the Senate voted in favor of five of the seven prospective candidates who became new NBTC commissioner, comprising of

- Air Marshal Thanapant Raicharoen (in the broadcasting field)
- 2) Prof. Pirongrong Ramasoota (in the television field)
- 3) Clinical Prof. Sarana Boonbaichaiyapruck (in the consumer protection field)
- 4) Mr.Torpong Selanon (in the right and liberties protection field)
- 5) Assoc. Prof. Suphat Suphachalasai (in the economic field).

The Senate voted against two candidates which are

- Kittisak Sriprasert

 (in the telecommunications field)
- 2) Lt. Tanakrit Ekkayokkaya (in the laws field).

In 2021, the NBTC comprises of 6 commissioners who have been continued to perform their duties, until the appointment of the new commissioners as follows:

General Sukit Khamasundara	Commissioner
	Acting Chairman
	of the NBTC
2. Colonel Natee Sukonrat	Vice Chairman
3. Lt. General. Perapong Manakit	Commissioner
4. Mr. Prasert Silphiphat	Commissioner
5. Mr. Thawatchai Jittrapanun	Commissioner
6. Mr. Prawit Leesathapornvongsa	Commissioner

Authorities and duties of the NBTC

According to Section 27 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 and its amendment, the NBTC shall have the authorities and duties as follows:

- 1. To prepare Spectrum Management Master Plan, Table of National Frequency Allocations, Broadcasting Master Plan, TelecommunicationsMasterPlan,RadioFrequency Plan, Satellite Orbital Right Management Plan, and Telecommunications Numbering Plan and proceed according to the Plans which shall align with the National Digital Economy and Society Development Plan and Policy.
- 2. To assign radio frequencies for the undertaking of broadcasting, television, radiocommunications, and telecommunications services.
- 3. To prescribe characteristics and categories of broadcasting, television, telecommunications and radiocommunications services.
- 4. To license and regulate the use of radio frequencies and radiocommunications equipment in the undertaking of broadcasting, television, and telecommunications services, or radiocommunications service; and prescribe licensing criteria and procedures, conditions, or licensing fees. In this regards, the NBTC may assign the Office of the NBTC to grant licenses instead of the NBTC only for the licensing in the part of radiocommunications equipment according to the criteria and conditions specified by the NBTC.
- 5. To prescribe criteria for the efficient use of radio frequency without causing interference to the same type of business and other type of business.



- 6. To license and regulate the operation of broadcasting, television, and telecommunications business operation to ensure that service users have been provided of services with quality, efficiency, timeliness, reliability and fairness, and prescribe licensing criteria and procedures, conditions, or licensing fees.
- 7. To license and regulate the use of telecommunications numbers, and prescribe licensing criteria and procedures, conditions, or licensing fees.
- 8. To prescribe criteria and procedures for network access and interconnection, and criteria and procedures for setting access charges or interconnection charges to be applied to the undertaking of broadcasting, television, and telecommunications services, both for the same type of business and other type of business, which shall be fair to service users, service providers, and investors, or between the telecommunications service providers with due regard to public interest.
- 9. To set tariff structure and price structure for the broadcasting, television and telecommunications services which shall be fair to service users and service providers with due regard to public interest.
- 10. To set standards and required technical specifications for the broadcasting, television, telecommunications and radiocommunications services.
- 11. To prescribe measure for the prevention of anti-competitive conduct or unfair competition in the broadcasting, television, and telecommunications services.
- 12. To prescribe measure for the provisions of telecommunications services universally and equally in accordance with Section 50.
- (12/1) To refarm the frequencies which is unused or unworthy used or to make it more worth as specified in the Plan, which shall be determined in accordance with (1) from those who have been authorized to re-allocate in accordance with the criteria, procedures and

conditions prescribed by the NBTC. However, such conditions must define the method of compensation, disbursement or remuneration for those whose frequencies have been refarmed by taking into account the rights of those affected by the frequency reforming in each case.

- 13. To protect rights and liberty of the people from being exploited by the operators, protect individual right of privacy and freedom to communicate by means of telecommunications, promote rights, freedom and equality of the people in the access and utilization of frequencies in the radio broadcasting, television and telecommunication services.
- 14. To act as a governmental administrative agency who has an authority in international communication service management with the International Telecommunication Union or international organizations, governments and international agencies either being within the duties and authorities of the NBTC or being assigned by the government including support the public affairs in order to have satellites or obtain the rights to access satellite orbits in order to be accordance with the Plans to be determined under (1) and the National Digital Economy and Society Development Plan and Policy.
- (14/1) To proceed for obtaining and maintaining the rights to access the satellite orbit which is a national treasure and exercising the rights to maximize benefits for the country and the people.

In case that the rights protection has created a burden on the state beyond gaining benefit, the NBTC may waive the said rights as stipulated in the management plan for the rights to access satellite orbit, and report to the Cabinet as well as announcing a detailed reasons to the public. In exercising the rights to access the foregoing satellite orbit, the NBTC shall have the authorities to prescribe criteria, procedures and licensing conditions, fees and exemption of licensing fees, including other expenses on relevant operation for the license applicants



or the licensees, who have to bear the burden, as the case may be. The license fee after deducting the licensing cost shall be remitted as state revenue.

- (14/2) To license and regulate the business operated under this Act by using foreign satellite channels and prescribe licensing criteria and procedures concerning licensing, conditions and licensing fees.
- 15. To determine and resolve issues relating to frequency interference.
- 16. To monitor and provide advices on the undertaking of broadcasting, television and telecommunications services
- 17. To set forth regulation on merger, cross-ownership holding, or frequency-used broadcasting market dominance amongst mass media business or by any other person, which has the effect of impeding the liberty of the public in perceiving information or obstructing public access to a diversity of information.
- 18. To promote a formation of licensees, broadcasters, and mass media professionals in the radio and television businesses into diverse forms of organizations which will have the mandate to set forth ethical standards and self-regulation pertaining to the occupation or profession under the ethical standards.
- 19. To issue regulations or notifications with respect to general administration, personnel administration, budget, finance and property, and other business of the Office of the NBTC according to Section 58.

- 20. To approve the expenditure budget of the Office of the NBTC, including the monetary to be allocated to the Broadcasting and Telecommunications Research and Development Fund for the Public Interest according to Section 52.
- 21. To determine and approve financial allocation for the Fund as proposed by the Fund Management Committee according to Section 55.
- 22. To provide information and participate in negotiations or making agreements between the Kingdom of Thailand and foreign governments or international organizations in matters relating to spectrum management, broadcasting, television, telecommunications services, or other related services.
- (22/1) To provide performance related information of the NBTC and operators authorized by the NBTC, in the digital-related aspects as requested by the Office of the National Digital Economy and Society Commission for utilizing and formulating the National Digital Economy and Society Development Plan and Policy.
- 23. To offer recommendations to the Cabinet for an issuance of, or amendment to, legislation related with frequency allocation and other matters relating to frequencies, broadcasting, television and telecommunications services.
- 24. To prescribe regulations, notifications or orders under the authorities and duties of the NBTC.
- 25. To perform any other acts as prescribed in this Act or other related laws.

Authorities and duties

of the Office of the NBTC



In accordance with Section 56 and Section 60 of the Act on the Organization B.E. 2553 (2010) and its amendment stipulates that the Office of the National Broadcasting and Telecommunications Commission, or called in short "the Office of the NBTC" which is a juristic person having a status of state agency, under the responsibility of the Chairman of the NBTC, and shall not be subject to government agency under the law on public administration, or state enterprise under the law on budgetary procedure or other laws. The Office of the NBTC shall have a Secretary-General of the NBTC who shall be responsible for the operation and performance of the Office of the NBTC, and directly report to the Chairman of the NBTC. Also, the Secretary-General shall be the superiors of officials and employees of the Office of the NBTC. Section 57 has prescribed the authorities and duties of the Office of the NBTC as follows:

- 1. Be responsible for the revenues and expenditures of the Office of the NBTC.
- 2. Prepare the Office of the NBTC's annual expenditure budget and submit to the NBTC for endorsement. The annual expenditure budget shall include any budget with respect to the conduct of official duties of the NBTC, the performance follow-up and Evaluation Committee and Office of the NBTC. Such annual expenditure budget shall be prepared with consideration of worthiness, cost effectiveness and efficiency. In case that any item or project that has been budget allocated but has not paid or created debt obligations within the fiscal year, the item or project shall be cancelled and the Office of the NBTC shall submit the budget for such item or project as state revenue.
- 3. Monitor and follow up spectrum utilization.
- 4. Receive and consider complaints regarding the spectrum use, the operation of broadcasting, television, and telecommunications services with the purpose of examining and solving the problems, or propose recommendations to the NBTC for consideration.
- 5. Study, Compile, and analyze information related to the spectrum, the spectrum use, the broadcasting, television and telecommunications business operation.
- 6. Be responsible for the administrative work of the NBTC and the Fund Management Committee.
- 7. Perform other acts as entrusted by the NBTC.

Preparation of the Annual Expenditure Budget of the Office of the NBTC

In the preparation of the annual expenditure budget under Section 57(2), before the office of the NBTC proposes the draft annual expenditure budget to the NBTC for approval, the Office of the NBTC shall propose the draft budget to the National Digital Economy and Society Commission for consideration, and comment, and It has to improve the draft budget expenditure according to the comment, except the annual budget expenditure of performance Follow-up and Evaluation Committee, the Office of the NBTC shall purpose to the performance Follow-up and Evaluation Committee for futher improvement. In case that the Office of the NBTC of the Performance Follow-up and Evaluation Committee, as the care may be, disagrees with the comment of the National Digital Economy and Society Commission, not less than ninety days, and the National Digital Economy and Society Commission, shall complete the consideration not less than thirty days, prior to the beginning of the fiscal year. In case that the Office of the NBTC or the NBTC Monitoring and Evaluation Committee disagree with the comments of the National Digital Economy and Society Commission, the Office of the NBTC shall propose the draft annual expenditure budget together with the comments to the NBTC for consideration. Subsequently, the Office of the NBTC shall disclose the annual expenditure budget, along with the items or projects approved, to the public through an information network system or other means as it deemed appropriate.

Revenues of the Office of the NBTC

According to Section 65 of the Act on the Organization B.E. 2553 (2010) and its amendment, it prescribes that the Office of the NBTC is revenues include licensing application fees and licensing fees to use the spectrum regarding to Section 44/2 paragraph one, licensing fees and business licensing fees regarding to Section 45 paragraph one, and license transfer fees regarding to Section 44/3. In addition, the revenues or

benefits accrued from the performance under duties of the NBTC and the Office of the NBTC, income derived from the Office of the NBTC's properties, money and properity donated, in accordance with the regulation set forth by the NBTC for the operations of the Office of the NBTC, and subsidies from the government.

After deducted by the cost of operations of the Office of the NBTC, necessary burden costs, and financial allocation to the Fund under Section 52, the EdTech Fund under the national education law, and the Digital Economy and Society Development Fund under the law regarding the digital development for economy and society, the remaining revenues shall be remitted as Public Revenue. In the case where the Office of the NBTC revenues are not sufficient for effective operations of the Office of the NBTC, including necessary burden costs, and other sources are not available, the government shall allocate the national budget to the Office of the NBTC as necessary.

The Broadcasting and Telecommunications Research and Development Fund for the Public Interest

According to Section 52 of the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment, the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP) has been established to fulfill the objectives as follows:

- 1. To ensure complete and equal availability & accessibility to the broadcasting, television, and telecommunications services, including supporting community development and community services as per Section 51.
- 2. To promote and support communication resources development, research and development regarding broadcasting and telecommunications services, including digital literacy, trends on frequency technology, technology for aiding the disabled, elderly, or underprivileged as well as telecommunications industries and related industries.

- 3. To promote and support human resource development in the broadcasting, television, and telecommunications services information technology industries, as well as the operations of the organization regarding setting up professional ethics and standards according to broadcasting and television related laws.
- 4. To support, promote, and ensure consumer protection in the broadcasting, television, and telecommunication services.
- 5. To ensure compliance with the law regarding the Thai Media Fund through appropriate budget allocation.
- 6. To support the effective spectrum utilization, and the spectrum retrieval for reallocation, as well as the compensation, reimbursement and remuneration to the affected licensees.

According to Section 54, the BTFP Fund Management Committee consists of the Chairman of the NBTC, as the Chairman of the Committee, Permanent Secretary of the Prime Minister's Office, Permanent Secretary for Defence, Secretary-General of the National Economics and Social Development Board, Director of Budget Bureau, Comptroller-General, and Director of the National Electronics and Computer Technology Center, including other two qualified committee.

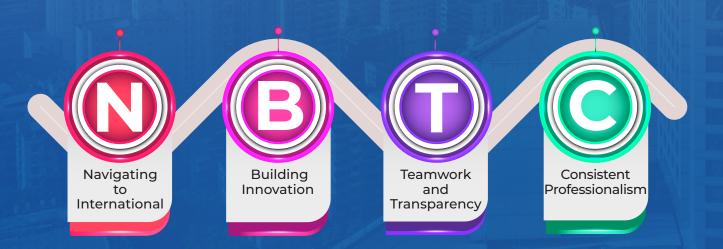
According to Section 55, the BTFP Fund Management Committee shall have the authorities and duties in managing BTFP fund, proposing opinions regarding BTFP fund appropriation for expenditures to the NBTC for approval in accordance with Section 52. In case that the NBTC has opposing opinions, the rationale must be stated for further consideration.





management as well as licensing and regulating the broadcasting, television, radiocommunications, and telecommunications business operation with efficiency, transparency and good reputation in ASEAN.

Core Value



Strategic issues of the Office of the NBTC and the connection with the government's policies, National Strategy, Master Plan under the National Strategy, and the National Reform Plan

The NBTC has prescribed key strategies, which are consistent with the National Plan and Policy, and driven the important missions in broadcasting, television and telecommunications services development, with the provision aim of good quality service to people, the satellite service management, the spectrum allocation with efficiency, as well as supporting the operations to achieve the goals of the national plan. In addition, the strategies envisage to leverage the competitiveness in communication technology of the nation, upskill the human resources to expertise, and provide digital literacy, as well as balancing and improving public administration, in order to expand the digital economy of the nation.

Furthermore, the NBTC has formulated the Spectrum Management Master Plan, Telecommunications Master Plan, Broadcasting Master Plan, and Satellite Orbit Rights Management Plan, into the Strategic Plan of the Office of the NBTC as guidelines to operate and achieve the mission of the NBTC in compliance with the National Strategy, Master Plan under the National Strategy, the National Reform Plan, and the Digital Economy and Society Development Plan.



The High - Level Executives of the Office of the NBTC

Mr. Trairat Viriyasirikul

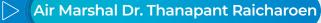
Deputy Secretary-General, Acting Secretary-General of the NBTC. (July 1, 2020 - present)



Mr. Trairat Viriyasirikul



Deputy Secretary-General of Strategic and Internal Affairs Cluster



Deputy Secretary-General of Regional Affairs Cluster



Asst. Prof. Phoomsisth Mahavessiri



Deputy Secretary-General of **Broadcasting Cluster**

Mr. Suthisak Tantayotin

Deputy Secretary-General of Telecommunication Cluster



Principal Expert





Mrs. Supinya Jampee

Principal Legal Expert



Mr. Sombat Leelapata

Principal Legal Expert



Mr. Chanthaphat Khamkhokgruad

Principal Policy and Planning Expert



Mr. Saneh Saiwong

Principal EngineeringExpert

Assistant Secretary General





Ms. Achara Panyavanija

Assistant Secretary-General, Strategic and Internal Affairs Cluster



Ms. Chitsata Sripasertsuk

Assistant Secretary-General, Telecommunications Cluster



Mr. Chalermchai Kokkeadtikul

Assistant Secretary-General,
Administration Cluster



Ms. Maneerat Kamjornkitjakarn

Assistant Secretary-General,
Broadcasting Cluster

Organization Structure and Manpower of the Office of the NBTC

The Office of the NBTC is a juristic person having a status of State agency, according to Section 56 and Section 57 of the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment (the Act on Organization). It is responsible for the administrative work of the NBTC and other acts as entrusted by the NBTC.

The Office of the NBTC shall have a Secretary-General of the NBTC, the superior of officials and employees of the Office, who directly answerable to the Chairman of the NBTC. Though the Office of the NBTC shall be an independent regulatory agency established by the constitution and laws, it has prescribed criteria and guidelines, which are consistent with the government policies, to be enforced with the aim of effective and efficient operations.

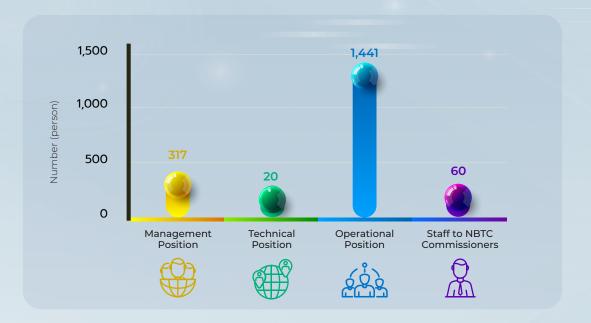
In addition, for the purpose of discretion and transparency, the monitoring and evaluation of the performance and management of the NBTC and the Office of the NBTC have been conducted by internal departments, as well as external agencies which are the NBTC Monitoring and Evaluation Committee established by the Senate, and the Internal Audit Committee established under Section 62 paragraph 2 of the Act on Organization. The Internal Audit Committee

shall be independent in its conduct of duties without intervention from the NBTC, the Office of the NBTC and other agencies. It shall inform the NBTC of the audit results in every one hundred and eighty days in order to monitor and audit the expenditure, property and management of the Office of the NBTC, as well as giving statements to improve the operations, the effectiveness of the risk management process, and orderly controlling and regulating, which deemed to be a mechanism to regulate, monitor and balance the operations conducted under the authorities and duties with integrity, morality, brevity in discretion without prejudices, conforming with the intendment of the Constitution of the Kingdom of Thailand.

In 2021, the organization structure of the Office of the NBTC consists of 5 clusters, 43 bureaus, 4 regional offices, and 1 institute, with the manpower totally 1,838 persons as shown in Chart 1.



Chart 1: Manpower of the Office of the NBTC in 2021



Manpower of the Office of the NBTC in 2021

Management Position		Technical Position	
Acting Secretary-General	1 person	Principal Experts	4 persons
Deputy Secretary-General	3 persons	Senior Experts	6 persons
Assistant Secretary-General	4 persons	Experts	10 persons
Executive Directors	48 persons		
Division Directors	261 persons		

Operation Position	٤	Staff to NBTC Commission	oners
Senior Officers Middle-level Officers Junior Officers	447 persons 416 persons 302 persons	Advisor/Secretary/Staff	60 persons
Employees	276 persons		

Remarks: Data as of December 31, 2021

Source: Human Resources Management Bureau, Office of the NBTC



Organization Structure

Standard Approval Bureau

Broadcasting Consumer Protection Bureau

of the Office of the National Broadcasting and Telecommunications Commission







Chairman of the NBTC



Internal Audit Committee



Secretary-General of the NBTC



Regional Affairs Cluster

Deputy Secretary-General

Secretary-General







Telecommunications Cluster

Deputy Secretary-General



Assistant Secretary-General



Regional Affairs Bureau

Assistant

- Office of the NBTC, Region 1 (Central)
- Office of the NBTC, Region 2 (Northeast)
- Office of the NBTC, Region 3 (North)
- Office of the NBTC, Region 4 (South)

Telecommunications Policy and Resources Management Bureau

Legal Telecommunications Bureau

Telecommunications Tariffs Bureau

Facilities-based Telecommunications Business Licensing Bureau

Service-based Telecommunications Business Licensing Bureau

Telecommunications Enforcement Bureau

Telecommunications Technology and Standard Bureau

Numbering Management Burea

Government Radiocommunications Licensing Bureau

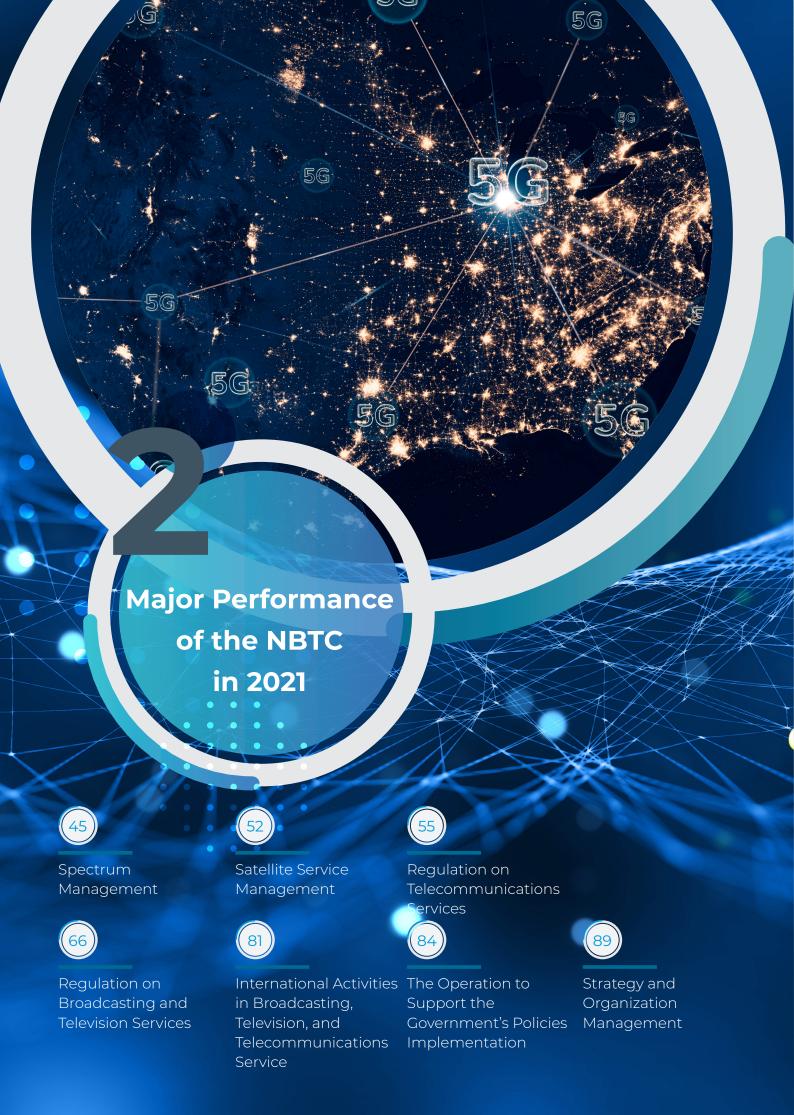
Business Radiocommunications Licensing Bureau

Telecommunications Access Bureau

Universal Services Bureau

Telecommunications Consumer Protection Bureau





Major Performance of the NBTC in 2021



Spectrum Management

The NBTC has operated spectrum management for the utmost benefit of the nation and the people, by prescribing the spectrum management policies, spectrum utilization regulations, and cooperation regarding spectrum management with both domestic and international organizations, in order to promote the communication service infrastructure development, improve people's quality of life, as well as increasing the nation competitiveness. In 2021, the major performances and important achievements are as follow:

1. Prescribing policies in spectrum management

1.1 The legislation of the Royal Decree according to Section 30 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (No.3) B.E. 2562 (2019) supports convergence of spectrum and technology to encourage the efficient use of spectrum and access network development, enabling the service providers to develop and provide various service to fulfill the needs of customers, which can stimulate consumption and economic growth. The Royal Decree according to Section 30 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services

(No.3) B.E. 2562 (2019) B.E. 2564 (2021) was published in the Royal Gazette on November 8, 2021. Also, the NBTC has prepared the 4 criterias to support the royal decree as follows:

- 1) The Notification of the NBTC on Spectrum Management Master Plan B.E. 2562 (2019), published in the Royal Gazette on November 8, 2021.
- 2) The Notification of the NBTC on Spectrum Allocation via Other Methods apart from Auction, published in the Royal Gazette on November 8, 2021.
- 3) The Notification of the NBTC on Criteria and Procedure on Spectrum License Transfer, published in the Royal Gazette on November 8, 2021.

4) The Notification of the NBTC on Criteria and Procedure on Additional Licensing for Broadcasting, Television and Telecommunications Services, published in the Royal Gazette on November 8, 2021.

1.2 The issuance of the Notification of the NBTC on Spectrum Management Master Plan (No.2) B.E. 2564 (2021) derived from the revision of the Notification of the NBTC on the Spectrum Management Master Plan B.E. 2562 (2019) in part of Appendix A (Details of frequency specified for use in the broadcasting and television service, telecommunications service, and other services), Appendix B (Guidelines for the spectrum refarming, Guidelines for spectrum reallocation, and Guidelines on spectrum utilization revision B.E. 2562 - 2566 (2019 - 2023) and the National Table of Frequency Allocation B.E. 2562 (2019)), in accordance with the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services (No. 3) B.E. 2562 (2019), and support the provisions on convergence, implementation under the plan and the time frame for the enactment of the Royal Decree, according to section 30 of the Act on the Organization to Assign the Spectrum including the obligations under the Radio Regulation 2020 of International Telecommunication Union (ITU). The issuance of the Notification of the NBTC on Spectrum Management Master Plan (No.2) B.E. 2564 (2021) results in the recognition of the spectrum refarming time frame, spectrum reallocation and spectrum utilization revision in a 5 years period B.E. 2562 - 2566 (2019 - 2023), as well as preparation for the NBTC regarding broadcasting, television, telecommunications, and radiocommunication services.

1.3 Guidelines preparation and criteria development for spectrum utilization regarding spectrum management policies

• Policy on Private 4G/5G has been formulated by the study and analysis of demand for private 4G/5G in the organizations and has meetings and seminars held to provide

knowledge about applying 5G technology for work to potential organizations. In addition, the NBTC has held a focus group consultation meetings to gather comment of stakeholders in the industry, telecom equipment manufacturers, telecommunications service providers and related system providers in order to prepare the suitable guidelines for 5G technology deployment as Private 5G Network for set policy and developing the related criteria.

• The usage of frequency band of 6 GHz band has been a captivating spectrum band in many countries. Manufacturers have been rapidly developing the compatible devices to support the 6 GHz band utilization (5.925 - 7.125 GHz). Some countries have already released the new rules and regulations, as well as granting the permission to use and merchandise. Thus, the study on the new technology development regarding 6 GHz band such as Wi-Fi 6E and 5G NR/NRU and the regulatory practices of the international regulators has been conducted as well as the feasibility and potentials analysis of the country. In addition, the focus group meetings with relevant agencies have been held to jointly consider the appropriate policy options to be prescribed as the policy and regulations.

• The usage of the frequency range 450 - 480 MHz and 1427 - 1518 MHz for International Mobile Telecommunications (IMT) has been studied and surveyed, both domestic and international, in the aspect of the technology standards, related regulations and the readiness of compatible devices. Moreover, the focus group consultation meetings with relevant agencies have been arranged to gather opinions, and prepared the research on guidelines and possibility of the usage of the frequency range 450 - 480 MHz and 1427 - 1518 MHz for International Mobile Telecommunications (IMT) has been carried out. According to the research, it states that the spectrum utilization in such range should be held until the compatible devices have been fully developed. It also preferably recommends to use the spectrum,



in fixed services in some parts of the country, for IMT business for economic efficiency purposes. Accordingly, the NBTC shall consider the research outcomes to formulate and prescribe the appropriate measures and policies on the revision of spectrum utilization and radio frequency plan for IMT.

• The policy review on the assignment of 800 MHz spectrum band for disaster prevention and mitigation, and for emergencies has been conducted by the NBTC by issuing the Notification of the NBTC on Criteria on Spectrum Use or Disaster Prevention and Mitigation and for Emergencies. The notification has assigned the 800 MHz spectrum band for voice and broadband data communications in such emergency cases. The Office of the NBTC has also studied and explored the current 800 MHz spectrum adoption status for disaster prevention and mitigation to ensure the consistency of the 800 MHz spectrum assignment with the current situation. Furthermore, the focus group meetings with relevant agencies also have been arranged to seek opinions and review the guidelines on the assignment of 800 MHz spectrum band for disaster prevention and mitigation and for emergencies. Accordingly, the NBTC shall consider the meeting outcomes to formulate and prescribe the appropriate regulations.

• The use of International Mobile Telecommunications (IMT) spectrum in the frequency band of 900 MHz (885 - 890 MHz and 930 - 935 MHz) which assigned for rail transport has been studied and surveyed locally in the aspect of current usage status, related laws and regulations, technical specifications the frequency band of 900 MHz for IMT, and the given signals for domestic and international rail transport. The purpose of the study is to consider and prescribe measures which appropriate to IMT usage without interference with GSM-R. The focus group meetings with relevant agencies also have been arranged, and the NBTC shall consider the meeting outcomes to formulate and prescribe the appropriate regulations accordingly.

• The spectrum utilization for scientific work in Thailand has been conducted in limited scope or specific agencies such as Thai Meteorological Department, National Astronomical Research Institute of Thailand, Kasetsart University and Geo-Informatics and Space Technology Development Agency. Also, there are different types of scientific usage, and in some cases, data gatherings for spectrum usage database of thailand are not available. Therefore, to ensure the practical and up-to-date database for spectrum allocation consideration as well as for country statement in the international spectrum management meetings, the research has been conducted together with the conferences with the science-related agencies. Accordingly, the NBTC shall consider the research and conference outcomes to formulate and prescribe the appropriate regulations.

2. The revision of spectrum usage and monitoring the radio frequency plan

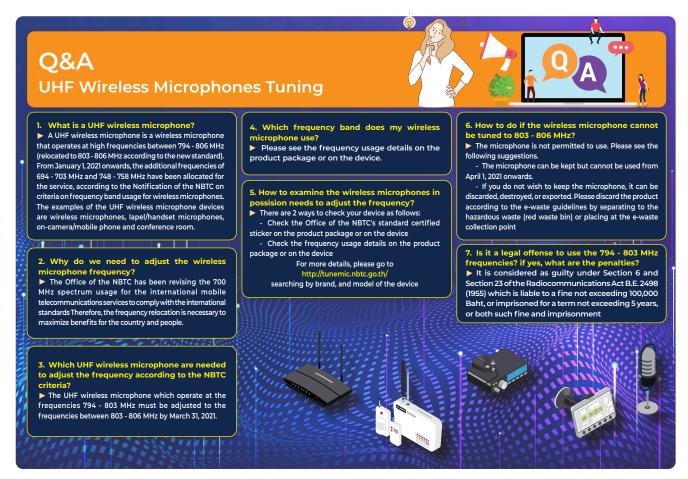
2.1 The migration of wireless microphone service from the frequency range 794 - 803 MHz has been carried out in accordance with the Notification of the NBTC regarding Criteria on Frequency Usage for Radiocommunication Equipment for Wireless Microphone (No.3) which become effective from March 20, 2021 onwards. In order to lighten the burden of existing wireless microphone possessors who had not adjusted to the right frequency within March 31, 2021, the NBTC has released the public relations media with the useful information about frequency adjustment for radiocommunication equipment in the category of wireless microphone and radio broadcasting media in the frequency band of 95 MHz, 90 MHz and 88.5 MHz, through online channels (Facebook/LINE) of the Office of the NBTC and newspapers, as well as collaborating with the radio broadcasters to create awareness to the people involved.

2.2 The usage of the frequency range

50 - 55 MHz has been considered in the purpose of effective spectrum sharing in fixed, mobile and amateur radio services. The NBTC has taken this issue into account and agreed to revise the usage of the frequency range 50 - 55 MHz.

2.3 The usage of the frequency band of 850 MHz and 900 MHz has been considered in the meetings with the stakeholders continually in order to determine the guidelines and approaches to prevent and mitigate the frequency interference between the band of 850 MHz and 900 MHz. The guard band installation of Dtac TriNet Company Limited and National Telecom Public Company Limited has been monitoring regularly the band pass filter circuit and the progress reports have been submitted to the NBTC quarterly. As the installation process completed, the operators shall notify the NBTC within 30 days or on the completion day.

2.4 The preparation for spectrum usage revision in the frequency band of 3500 MHz has been proceeded by studying the impact regarding the revision of the spectrum use locally and internationally. The study shows that there are 2 affected groups in fixed satellite services in Thailand, including: (1) Licensees using frequency band of 3500 MHz or users in VSAT satellite ground stations. (2) General users or satellite television viewers. Moreover, the spectrum usage improvement will bring benefits to the economy and social. However, the NBTC has analyzed the suitable measures to mitigate the impact of the spectrum usage revision with the consideration of quantitative and qualitative factors. According to the resolution of the NBTC Meeting No. 23/2021 on December 8, 2021, the NBTC has approved the time frame for the revision frequency band of 3500 MHz usage and appointed the working panel to study the impacts of such implementation and remedy guidelines for the affected groups.



2.5 The spectrum sharing using the frequency band of 700 MHz and 800 MHz has been considered in the aspect of frequency interference prevention guidelines with the Trunked Radio System licensees in the frequency band of 800 MHz. As National Telecom Public Company Limited won the auction for the frequency band of 700 MHz, which is close to 800 MHz, Therefore, To prevent such interference problems, the NBTC has monitored and complied the database of Trunked Radio System, frequency band of 800 MHz to analyzed and considered in the frequency interference prevention quidelines.

3. Coordination in spectrum management along the border areas, the international spectrum registration, and the notification of the spectrum use in Thailand to the International Telecommunications Union (ITU) and neighboring countries

3.1 The frequencies registration with the neighboring countries and the border areas. In 2021, Thailand has notified registration with Malaysia in total of 545 items, Cambodia 407 items, and Lao People's Democratic Republic (Lao PDR) 119 items. Besides, Thailand has been notified registration from Malaysia in total of 564 items.

3.2 Coordination in spectrum management along border areas.

I) The special agenda meetings with Malaysian Communications and Multimedia Commission (MCMC), Malaysia's regulator, and mobile operators of both countries was held on January 13, 2021 and on February 17, 2021 via virtual meetings, with a focus on solving problems of spectrum interference along Thailand - Malaysia common border, as well as considerated in revising the parameter for the use frequency band of 2600 MHz. The resolution was to assign the operators to check and adjust the signal strengths in their own network as well as the effect of interference, prior to further consideration in parameter adjustment.

2) The meeting for solving spectrum interference in frequency band of 2600 MHz along Thailand - Lao PDR common border was held on August 3, 2021 via online conference. The meeting has considered the problem solutions and assigned the mobile operators of both countries to exchange information and jointly examine the signal strength and the effects to spectrum usage, prior to further consideration in parameter adjustment.

3) The meeting for solving spectrum interference with mobile base stations in frequency band of 700 MHz along the border areas from Cambodia's terrestrial television stations was held on September 15, 2021 via online conference, together with Thailand's mobile operators, the regulator and the terrestrial television service providers of Cambodia to solve problems of frequency interference with mobile base station in frequency band of 700 MHz, which after the signal strength of the Cambodia's terrestrial television stations has been tuned. the intensity of the interference decreased accordingly, yet affected the frequency band of 700 MHz usage in Thailand. The resolution was to assign the coordinators of each country and notify the regulator coordinators of Thailand and Cambodia via email to pursue the interference solving.

4) The 35th Meeting of Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand - Malaysia Common Border (JTC) and the special agenda meetings were held during November 1 - 3, 2021 via online conference, the purposes of the meeting were for regulatory data sharing, frequencies registration, solving frequency interference problems, and revision of the agreement on spectrum collaboration in broadcasting, television, mobile and radiocommunications services. The NBTC has presented the status of the digital radio broadcasting stations for trial or testing in Bangkok involving the digital radio broadcasting trial plan, broadcasting trial operation status, the number of channels participating for testing, the functional test, stations, the application test, and the broadcasting trial/test plan in the

next phase in Bangkok and regional areas. The meeting has been informed the progress of digital broadcasting service of Thailand, and has considered the exemption of low power FM stations from minimum frequency separation requirements for the radio stations located in designated areas for Thailand - Malaysia broadcasting collaborations. In addition, the resolution was to discuss further in the next meeting. Meanwhile, the low power FM stations were regarded as temporary acceptance.

3.3 Coordination with the International Telecommunications Union (ITU) in international frequency use notification. In 2021, the Office of the NBTC, as a government administrative agency in international communication service management, has coordinated with ITU to notify Thailand's frequency use as follows:

1) Notifying the Radiocommunication Bureau, International Telecommunication Union (ITU), of the use of short-wave frequency of International Broadcasting Bureau (IBB) in 67 stations in Udon Thani province in order to know the spectrum usage, and the frequency interference of the stations by submitting High Frequency Broadcasting Schedule for A21T1 Schedule for ITU Submission-Thailand through the ITU system.

2) Coordination for Notifying the frequency interference in 10 stations of Vietnam.

3) Notifying the Radiocommunication Bureau ITU, of the use of short-wave frequency of International Broadcasting Bureau (IBB) in 36 stations in Udon Thani province, by submitting High Frequency Broadcasting Schedule for B2ITI Schedule for International Telecommunication Union (ITU).

4) Notifying Confirmation of the frequency use of 17 AM radio broadcasting stations

5) Notifying Confirmation of the frequency use of government agencies in 81 stations.

4. Analyzing and solving domestic frequency interference

4.1 Solving inference between C-Band satellite television service and solar cell street lights with motion sensor circuit. The meeting with relevant agencies has been held on February 28, 2021 to discuss and analyze the causes of interference. The meeting has suggested the operators to select and import the solar cell street light with Microwave Motion Sensor, which use the allocated spectrum for general purpose, and exempted from the radiocommunications license application. Furthermore, the public relations on technical information and guidelines to avoid the further interference have been carried out in order to build understandings for the people and provide appropriate guidelines.

4.2 Solving interference between the cable television and mobile phone network in frequency band of 700 MHz. The survey in the affected areas in Banglamung district, Chonburi province, has been conducted to analyze the causes of the interference. Preliminarily, the operators have been suggested to switch the frequency channels, which are not consistent with mobile phone network in the frequency band of 700 MHz. Besides, the survey included the access points where the coaxial cables have been blocked in order to prevent external signals to infiltrate into the cable network. The Office of the NBTC has also submitted the fact and related information to the Digital Infrastructure Committee in the Senate Standing Committee on Information Technology, Communication and Telecommunication on March 18, 2021 for consideration in the case of the effects of 5G spectrum use to the cable television services of the Cable TV Operations Association.

5. Preparation for the National Spectrum Monitoring Center (NSMC) establishment

The working panel for preparation for the Nation Spectrum Monitoring Center (NSMC) has been appointed to study, analyze and formulate a NSMC establishing plan. The center is aimed for national spectrum management in normal and emergency situations, as well as having integrating monitoring information and information system with data related on the spectrum management to be used for policy dicisions in the spectrum management in Thailand. The NSMC establishment plan has already been carried out by defining the strategic issues to drive the success goal of the National Spectrum Monitoring Center establishment, as follow:

- 1) Strategic for the Development of competency and professional expertise of the human resource in frequency examination. The development has been executed by providing 5 workshops on theory and practice to upskill the human resource in the new communication technologies to the professional expertise level.
- 2) Strategic for the Development and revision of the frequency examination process. With the purpose of up-to-date and effective results, the frequency examination process development and revision plan have been set up together with 3 manuals to support the radio frequency examination operations.

- 3) Strategic for the Improvement of frequency examination devices and equipment effectively. The provision of up-to-date and high-quality frequency examination devices and equipment has been carried out in order to operate the examination efficiently and effectively. In addition, the existing devices and equipment have been upgraded to their full capacity.
- 4) Strategic for the Development of information system for collaboration and integration. The information system has been developed to support the workflow and operations of the Regional Spectrum Monitoring Center and the National Spectrum Monitoring Center, as well as the integration of licensing information which enhancing the connection of the database and the appropriate devices and equipment.

In 2021, the NSMC establishment plan has already been carried out by establishing the National Spectrum Monitoring Regional Center (NSMR). At present, it is in the process of the NSMC establishing preparation for the effective spectrum management in normal and emergency situations.

Setellite Service Management



The NBTC has arranged the National Broadcasting and Telecommunications Commission on Satellite Orbital Rights Management Plan B.E.2563 (2020) in accordance with the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment, and prescribed criteria and procedures to obtain the rights to use satellite orbits, as well as granting permission to use foreign satellite transponders to provide domestic services, in order to maintain the rights to access satellite orbits and avoid overdue documentation of the regulatory period process which may lead to the cancellation of the assignments of satellite services or clarification, according to the ITU radio regulations. In the year 2021, the major performances and important achievements are as follow:

1. Licensing on obtaining the rights to use satellite orbits

According to the NBTC Notification on criteria and procedures to obtain the rights to use satellite orbits, the licenses have been granted as follows:

1.1 Licensing to obtain the rights to use Geostationary satellite Orbit (GSO) in Thailand for existing entitlement.

1) Licensing to obtain the rights to use satellite orbits as entitled parties to operate business under the domestic communication satellite services contract.

Thaicom Public Company Limited has been granted licenses to obtain the rights to utilize satellite orbits in 10 satellite networks in accordance with Appendix B of the Notification of the NBTC on Satellite Orbital Rights Management Plan (2020) and Section 40 of Transitory Provisions on the Notification of the NBTC on Criteria and Procedures to Obtain the Rights to Use Satellite Orbits, in the case where the company is entitled to operate the business under the domestic communication satellite services contract (concession contract). The license term starts from the effective date of the notification as of February 18, 2020 to September 10, 2021

based on the concession contract end date. Nonetheless, in case of having an Arbitral Award or court order regarding law issues in domestic communication satellite service operation concerning dispute cases under concession contract which may misrepresent the facts for licensing consideration, the Office of the NBTC shall propose the NBTC to reconsider the licensing to obtain the rights to use satellite orbits, and collect the licensee fees, in accordance with the Notification of the NBTC on Criteria and Procedures to Obtain the Rights to Use Satellite Orbits.

2) Licensing to obtain the rights to use satellite orbits as entitled parties in property management after the end of domestic communication satellite services contract from Ministry of Digital Economy and Society.

National Telecom Public Company Limited has been granted licenses to obtain the rights to use satellite orbits as entitled parties in property management after the end of domestic communication satellite services contract from Ministry of Digital Economy and Society, in accordance with Section 41 of Transitory Provisions on the Notification of the NBTC on Criteria and Procedures to Obtain the Rights to Use Satellite Orbits. The license term starts as of September 11, 2021 and ends by each satellite lifespan. In such case, the operation life of Thaicom 4 will end in 2023, and Thaicom 6 in 2032 or by the NBTC regulation. The licensing consists of the following.

- (1) Licensing to obtain the rights to use satellite orbits; 5 satellite networks for use via Thaicom 4 and Thaicom 6.
- (2) Permission to expand the scope of communication satellite in Transponder service leasing with wholesale services, under the authorized telecommunications license type 3.
- (3) Licensing to the use of spectrum and set up 2 satellite ground stations.

1.2 Licensing to obtain the rights to use Non-Geostationary Orbit (NGSO) satellites for new services.

The NBTC has granted the license to Geo-Informatics and Space Technology Development Agency to obtain the rights to use the primary orbit for THEOS2-SMALLSAT (NGSO) satellite and the complete orbit for THEOS2 (NGSO) satellite.

2. Licensing on obtaining the right to use satellite orbital slot packages

The NBTC has prescribed the Notification of the NBTC on Criteria and Licensing Procedures to Obtain the Right to Use Satellite Orbital Slot Packages, which was published in the Royal Gazette on May 14, 2021 and effective as from May 15, 2021 onwards. The purpose of the notification is to be used as guidelines for granting the permission to use Geostationary Satellite Orbit (GSO) as the concession is scheduled to end, licensing expired, or no licensing available before the Satellite Orbital Right Management Plan is enforced. At present, it is in the process of the notification amendment and rights granting consideration.



3. Licensing the Use Foreign Satellite transponders to provide domestic services

3.1 Granting the rights in accordance with Section 15 of the Notification of the NBTC on Criteria and Procedures on Licensing to Use Foreign Satellite to transponder Provide Domestic Services.

Thai Airways International Public Company Limited and Thai AirAsia Company Limited have been granted the permission use foreign satellite transponders to provide domestic services by means of telecommunications services to passengers on aircraft.

3.2 Granting the rights to use the foreign satellite transponders to provide domestic services in accordance with Section 16 of the Notification of the NBTC on Criteria and Procedures on Licensing to the Use Foreign Satellite to Provide Domestic Services.

The NBTC has granted the permission to use foreign satellite transponders to provide domestic service to the following agencies.

- 1) Geo-Informatics and Space Technology Development Agency for ELSA-d satellite in accordance with Section 16 (1) (1.6).
- 2) World Food Programme (WFP) for NSS12 satellite in accordance with Section 16 (1) (1.1).

- 3) The Government Public Relations Department for ASIASAT5 satellite for temporary use in accordance with Section 16 (2) (2.8) for broadcasting UEFA Euro 2020.
- 4) Kasetsart University for SuperView-1 satellite constellation in accordance with Section 16 (1) (1.3) and 16 (2) (2.4).
- 5) National Telecom Public Company Limited for ASIASAT5 satellite for temporary use in accordance with Section 16 (2) (2.8) for broadcasting the 32nd Olympic Games.
- 6) Kasetsart University for Skywalker satellite constellation in accordance with Section 16 (2) (2.4).
- 7) Department of Disaster Prevention and Mitigation for Inmarsat-4 F1 satellite in accordance with Section 16 (1) (1.6).
- 3.3 Granting the rights to use foreign satellite transponders to provide domestic services.

TC Broadcasting Company Limited has been granted permission to use foreign satellite transponders, to provide domestic service for CHINASAT-12 satellite for temporary use until the assignment to use THAICOM-A2B satellite completed or by any criteria prescribed by the committee.

Ragulation on Telecommunications Sevices



The NBTC has carried out important mission in regulating telecommunications services by developing related criteria and policies and driving the implementation under the government policy and the National Strategy, especially promoting 5G technologies deployment, to build the stable foundation to support the transition to digital economy, as well as accelerating the expansion of telecommunications network and infrastructure rollout. As a result, Thailand is the first country to launch a 5G commercial service in the ASEAN region, with its value more than 300 billion baht. In 2021, the major performances and important achievements are as follow:

1. Continuous promotion of 5G technologies deployment promotion

The NBTC has supported the implementation of many significant projects with 5G adoption and deployment continuously, including supporting projects operations through the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP), supporting work of the National 5G Committee in driving 5G pilot projects as well as collaborating with the relevant sectors and educational institutions, in order to enhance the efficiency of the technology through the following corporations.

1.1 Memorandum of Understanding (MoU) with educational institutions and setting up 5G testing centers have been conducted with the aims to transform those institutions into the high-standing smart universities using the most innovative digital platforms, including Chiang Mai University, Khon Kaen University and Prince of Songkla University.

In addition, the project proposals of 5G testing and Use Cases with the 3 universities have been approved in total of 13 projects. At present, they have been submitted to the BTFP committee for consideration and approval.

Some of the projects are 5G Testing Centers in Northern Region (Chiang Mai University), 5G Testing Centers in North-Eastern Region (Khon Kaen University) and 5G Application in Telemedicine to address current challenges and unlock new possibilities in medical and healthcare system, 5G Technology Application for Agriculture (Smart Agriculture), 5G Adoption in Services to improve people's quality of life, and Smart City Development, as well as enhancing the national security, safety, and tourism with 5G technologies.

1.2 Supporting the National 5G Committee through proceeding the 5G application pilot projects of the country has been executed by the NBTC to consistently enhance the competitiveness, foster the investment environment for the nation and the people benefits. In 2021, the pilot projects which have been approved by the National 5G Committee in the field of 5G deployment are the 12 projects. Details are shown in Table 1.

Table 1:5G Application Pilot Projects

	Projects	Responsible Agency
1	Digital Agriculture Pilot Project with 5G Technology at Pha Mee Training Center, Chiang Rai	Mae Fah Luang Foundation
2	Smart Hospital Project with 5G Technology and Artificial Intelligence (AI)	Faculty of Medicine, Siriraj Hospital, Mahidol University
3	Digital Agriculture Pilot Project with 5G Technology at Roi Jai Rak Project, Chiang Mai	Mae Fah Luang Foundation
4	Smart Irrigation System for Sustainability Pilot Project with 5G Application	Udon Thani Province
5	Smart Station Pilot Project with 5G Application at Bang Sue Grand Central Station	State Railway of Thailand
6	Smart Campus Pilot Project with 5G Technology	Dhurakij Pundit University
7	Ban Chang 5G Smart City Project and Digital Telecommunications Infrastructure Development	Ban Chang sub-district, Rayong Province
8	5G District Pilot Project, (5G Smart Health), Chiang Mai	Chiang Mai University
9	5G Use Case in Screening and Notification System for Phuket Sandbox Project, Phuket	Prince of Songkla University
10	Seabass and Glacilaria Fisheri Farming in Songkhla Lake with 5G Technology System Project	Prince of Songkla University
11	5G District Pilot Project, (5G Smart Mobility and Traffic), Chiang Mai	Chiang Mai University
12	Smart Factory with 5G Technology Pilot Project at PTT Global Chemical Company Limited (PTTGC)	PTTGC



1.3 Smart Hospital Project with 5G Technology and Artificial Intelligence (AI) of Siriraj Hospital has been budget supported by the NBTC. "Siriraj World Class 5G Smart Hospital" opening ceremony was launched on December 16, 2021. The project aims to transform the hospital into a role model for other public hospitals nationwide, and improve the medical services and overall efficiency, as well as providing access to advanced healthcare services to the people in remote areas.

1.4 5G Technology network provision has been supported by the NBTC by prescribing the spectrum auction conditions requiring those who won the 2600 MHz band, which are Advanced Wireless Network Company Limited (AWN) and TrueMove H Universal Communication Company Limited (TUC), to provide 5G network coverage for at least 50 percent of the Eastern Economic Corridor (EEC), covering Rayong, Chachoengsao and Chonburi provinces, within one year after the auction or by 2021. The conditions also require 5G network coverage for at least 50 percent of the population in Bangkok and its vicinities, and economic cities which are Chiang Mai, Nakhon Ratchasima, Khon Kaen, Songkhla, and Phuket provinces, within 4 years after the auction or by 2024. In accordance with Section 17 of the Notification of the NBTC on Criteria and Procedures for Spectrum Licensing for International Mobile Telecommunications Service in the Frequency Band of 700 MHz, 1800 MHz, 2600 MHz, and 26 GHz.

In 2021, AWN and TUC have accelerated the 5G network rollout, which covers more than 90 percent of the EEC area, deemed as the 2 licensees comply with the 2600 MHz auction conditions.

2. Organizing and Installing Overhead Communication Lines Underground

To support the government policy regarding the telecommunications infrastructure sharing to accelerate the digital connectivity for the utmost benefit of the nation, organizing overhead communication lines and instaling underground have become the key missions of the Office of the NBTC, integrating cooperation with Metropolitan Electricity Authority, Provincial Electricity Authority, Bangkok Metropolitan Administration, local governments, and the Telecommunications Association of Thailand under the Royal Patronage as well as the telecom operators.

The performance highlights are as follows:

2.1 Organizing Overhead Communication

In 2021, the overhead communication lines have been organized in the areas under Metropolitan Electricity Authority covering 8 routes¹ in a total distance of 45.44 kilometers, and in the areas under the Provincial Electricity Authority covering 3,891 routes in total distance of 7,864.542 kilometers, consisting of 264 routes in the Northern region, 1,642 routes in the Northeastern region, and 1,254 routes in the Southern region. It has also successfully covered 1,240 incremental routes, in addition to the overhead cable management plan.

Lines

¹ The operation under the Overhead Cable Management Plan have been delayed due to the COVID-19 pandemic.

Furthermore, as receiving complaints from the NBTC call center 1200 and other channels. in the Metropolitan Electric Authority area and the Provincial Electricity Authority area to focus on solving the problems of telecom and broadcast cables that may be dangerous to people's lives and properties in case of emergency, fire on communication lines, the massy lines its can be dangerous, and the overhead communication lines in low in the electric pole. the Office of the NBTC has resolved 1,210 complaints in Bangkok, Nonthaburi and Samut Prakan, due to the cable menace in the areas under Metropolitan Electricity Authority. It has also resolved 1,611 complaints under the areas of Provincial Electricity Authority, consisting of 411 complaints in the Northern region, 231 complaints in the Northeastern region, 522 complaints in the Central region, and 447 complaints in the Southern region.

2.2 Installing Overhead Communications Lines Underground

In 2021, with the cooperation of the Office of the NBTC and telecom operators, the overhead communication lines have been install underground for 20 routes as follows:

2.2.1 Installing Overhead Communication Lines underground in the areas under Metropolitan Electricity Authority in 6 routes including:

1) The dismantling of utilities obstructing construction of the high-speed rail linked 3 airports project, in total of 2 routes, consisting of Phayathai to Don Mueng and Suvarnabhumi to U-Tapao (Suvarnabhumi to end of Metropolitan Electricity Authority area).

2) The replacement of aerial cables to underground cables project, in total of 4 routes, consisting of Rajavithi Road (from U Thong Nai to Sawankhalok), Sri Ayudhya Road (from U Thong Nai to Rama V Road), Rama V Road (from Sukhothai Road to Rajavithi Road) and Lang Suan Road (from Ploenchit Intersection to Sarasin Intersection).

2.2.2 Installing Overhead Communication Lines underground in the areas under Provincial Electricity Authority in 14 routes including;





(1) The electrical system development in big cities phase 1, in total of 7 routes, consisting of Hat Yai City Municipality (Sriphuwanart Road part 1 and Supasarnrangsan Road) Nakhon Ratchasima Province (Chumpol Road (lot1.2)) Chonburi Province (Lot1 North Pattaya, Lot2 Central Pattaya, and Lot9 South Pattaya part 2) and Songkhla Province (Sriphuwanart Road part 2)

(2) The projects supported by local administration organization, in total of 5 routes, consisting of Udon Thani Province (Chaloem Prakiat Circle (clock tower intersection) to Udon Dusadi Road to Fountain Roundabout (Ha Yaek Nam pu) to Pho Sri Road (junction across Amphoe Road), Phuket Province (Taweewong Road at Laem Petch junction to Klong Pak Bang Bridge), Ubon Ratchathani Province (Oparatch Road at Fountain Roundabout to Thung Sri Muang Intersection at Kuen Road, Sri Narong

Road to Palo Rangrit Road), Nong Khai Province (Prachak Silpakom Road at Vietnam Monument junction to Pho Chai Intersection), and Yala Province (Siroros Road from Pad Rod Fai Road to Bae Mo canal Phase 2).

- 3) The project under the operation of Provincial Electricity Authority in 1 route at Phimai Historical Park Route.
- 4) The 1 Province 1 Chaloem Prakiat Road in 1 route at Songkhla Province (Pla Tha Road from Anuban Songkhla School Intersection to Chalathat Intersection).

2.2.3 From 2016 - 2021, the overhead communication lines have been installed underground completely for 73 routes, in total distance of 115.882 kilometers, consisting of 43 routes in Bangkok and its vicinities areas in a distance of 48.792 kilometers, and 30 routes in provinces in a distance of 67.09 kilometers as shown in the Table 2.

Table 2: Summary of Installing Overhead Communication Lines
Underground Project 2016 - 2021

Year	Metropolitan Electricity Authority (MEA) Area (km)	Provicial Electricity Authority (PEA) Area (km)
2016	0.50	-
2017	18.10	-
2018	4.40	-
2019	9.582	5.90
2020	8.08	26.36
2021	8.13	34.83
Total	48.792	67.09

Source: Telecommunications Policy and Resources Management Bureau, Office of the NBTC

2.2.4 Integrating cooperation with relevant agencies

The Office of the NBTC has worked with the Metropolitan Electricity Authority, Provincial Electricity Authority and Bangkok Metropolitan Administration in the meeting held on December 20, 2021 in order to arrange the 3-year term integration plan (2022 - 2024) in organizing and installing the overhead communication lines underground, which following up on a Cabinet resolution on November 23, 2021.

The plan is divided as follow:

1) Organizing overhead communication lines in Bangkok and its vicinities in 2022, in a total distance of 456 kilometers, and 936 kilometers in 2023 - 2024.

2) Organizing overhead communication lines in provincial areas under Provincial Electricity Authority, according to the Organizing Overhead Communication Lines Plan, in a total distance of 6,000 kilometers in 2022 - 2024.

Besides, the missions and responsibilities have been established and assigned clearly to every agency involved with the hope to accomplish the project successfully. A single last mile operator to be the host of organizing the overhead communication lines also has been proposed in the meeting in order to reduce redundancy. In addition, the NBTC shall propose the meeting outcomes to the Cabinet. The achievement of the project would be a great force to accelerate the nation economy, develop other sectors such as tourism, service and social development, improve the landscape and quality of life for safety, as well as making Bangkok an ASEAN metropolis.



3. Telecommunications Numbering Management for the provision of Internet of Things (IoTs) Service

In 2021, the NBTC has allocated 510,000 numbers to Advanced Wireless Network Company Limited for IoTs service provision, according to the Notification of the NBTC on Criteria for Telecommunications Numbering Allocation and Management, and criteria and procedures on telecommunications numbering for Internet of Things which regarded as a guideline for user identification and authentication, consumer protection, public interest as well as social safety.

Moreover, the telecommunications numbering for IoTs usage data monitoring has been conducted after the allocation to analyze the trend of IoTs service provision in telecommunications industry and other industries as well. The operators are assigned to prepare usage reports timely and as required by numbering regulation.

4. Consumer Protection in **Telecommunications Service**

The NBTC has realized the importance of building an operating mechanism with various sectors and agencies to promote effective telecommunications regulations, and enhance further development of digital technologies for efficient and effective consumer protection, which benefit the public and people.

In 2021, the significant performances are as follows:

4.1 Solving Spam Short Message Service (SMS) and Advertising Fraud.

The NBTC has discussed with the mobile operators, the people's network, and SMS wholesalers to determine the solving guidelines. The mobile operators have been cooperated in monitoring spam SMS, online gambling websites, and obscene websites.

In 2021, more than 600 spam SMS sender names have been blocked and reported to the Cyber Crime Investigation Bureau (CCIB) for legal proceedings. The CCIB investigation shows

that 131 sender names which used to infract the law with fake bank accounts had been tracked down and captured, causing the total damage value more than 317 million baht. Nonetheless, to facilitate the proceedings, the NBTC shall disclose the results and useful information to the public to protect the consumers.

4.2 The Identity Verification and Authentication System by Electronic Identity Cards on Mobile Phones (Mobile ID) Development

As continuation from 2020, the NBTC has signed the Memorandum of Understanding (MoU) with Department of Provincial Administration, Department of Land Transport, and Social Security Office in 2021 to expand the collaborations in the system development in order to secure data privacy and to promote innovations in electronic transactions, offering the consumers, government and private agencies a safer alternative to access the services with safety and convenience.

On December 3, 2021, the NBTC has been providing the Mobile ID service trial in cooperation with Advanced Wireless Network Company Limited, True Move H Universal Communication Company Limited, dtac TriNet Company Limited, National Telecom Public Company Limited, and Bangkok Bank Public Company Limited. Initially, people can apply for their Mobile ID account at specified mobile operators' sandbox service points in December 2021. Later, they can use their Mobile ID to open bank accounts with Bangkok Bank Public Company Limited instead of using their national ID in Ouarter1/2022 and onwards. The services will also cover digital driving license application (DLT QR License) at the Department of Land Transport, verification for taxes payment via e-filing system of the Revenue Department, parcel delivery with Thailand Post, and opening an account with Stock Exchange of Thailand (SET). Furthermore, the NBTC has extended the cooperation to telecom sector and other government and private agencies in jointly developing the electronic



transactions to be more reliable, convenient and secure, in consistent with the changing consumer behaviors in digital economy, as well as driving the government policy in digital infrastructure development.

To facilitate the relevant agencies in the trial process with the same standard, the NBTC has approved 3 Standards and Technical Specifications for Operation on Mobile ID Platform in accordance with the standard and specification of the Electronic Transactions Development Agency (ETDA), consisting of;

- 1) Specification of Digital Identity Service using Mobile ID
- 2) Technical Specification of Connecting Mobile ID with Identity Provider
- 3) Technical Specification of Connecting Mobile ID with Service Provider

4.3 Information Management System Development to Protect Mobile Numbering (the 3-Step Application) Phase 3

The 3-Step Application has been carried on to support the fingerprint scan and face scan system with smartphones and compatible devices instead of using 5-digit pin login. The system will also support the connection with the chatbot system of the Office of the NBTC which can interact with the 3-Step Application users via automated text messaging application, including supporting database system in recording questions and answers as well as detecting the keywords from the questions for analytical process. The information management system has also been modified to allow flexibility in altering structures and interface of the application.

4.4 The Database System and the Procheck Application

The Procheck application has been developed by the Office of the NBTC to facilitate the telecommunications service providers in delivering mobile service packages and promotions to the NBTC, in accordance with the Notification of the NTC on Maximum Rate of Service Tariff and Advance Collection of Service Tariff in Telecommunications Business B.E. 2549 (2006) and the Notification of the NBTC on Regulation of Structure Rate of Domestic Mobile Service, through the Content Management System (CMS) in replace of submitting paper documents and information in Microsoft Excel form, in order to minimize errors and reduce preparation time. The Procheck mobile application and website application have also been developed to be the database system for consumers to access to mobile service packages and promotion information with ease and accuracy.



4.5 The NetCare Application Development Phase 2

The NetCare application, used by parents to control the internet access of their children or family members on mobile phones and computers, has been continued to develop in Phase 2 to enhance the efficiency, with the purpose of preventing the internet addiction and exploitation. The application also enables the parents to set appropriate duration of internet use; therefore, the family members can have more quality time to spend together.

4.6 Promoting Consumer Awareness and Rights Protection in Using Telecommunications Services and Empowering the People

In 2021, due to the COVID-19 pandemic, the promoting consumer awareness and rights protection activities have been implemented via online channels as follows:

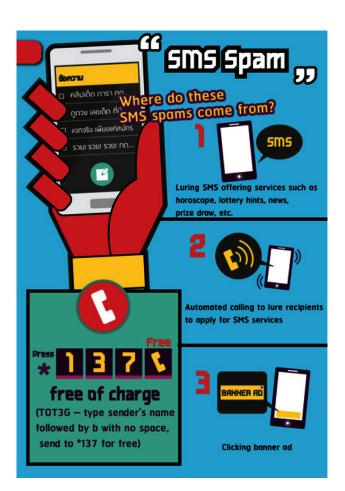
- 1) Organizing 4 online workshops for the participants from 6 regions have been held to promote the consumer rights in telecommunications services, including;
- (1) Northeastern province group (Surin, Ubon Ratchathani, Mukdahan, Si Sa Ket, Amnat Charoen, Khon Kaen, Kalasin, Chaiyaphum, Maha Sarakham, Nakhon Ratchasima, Buriram, Sakon Nakhon, and Bueng Kan)
- (2) Northern province group (Uthai Thani, Tak, Uttaradit, Chiang Mai, Chiang Rai, Phitsanulok, Phichit, Kamphaeng Phet, and Nan)
- (3) Southern province group (Phatthalung, Pattani, Narathiwat, Phuket, Krabi, Phang Nga, Trang, Ranong, Surat Thani, and Chumphon)
- (4) Central province group and Bangkok (Chachoengsao, Ratchaburi, Samut Songkhram, Chonburi, Nakhon Pathom, Suphanburi, Ang Thong, Singburi, Nakhon Nayok, Prachin Buri, Sa Kaeo, and Bangkok).

Besides, the infographic has been created as publicity about the activities, and the activities outcomes have been assessed by the participants via online evaluation form.

2) Educating people on consumer rights in telecommunications services has been conducted through public media such as billboards, public transportation advertising, vinyl banners, etc.

3) Consumer rights in telecommunications services guidebooks have been published in order to educate people about the fundamental rights of the consumer, relevant contents on current situations, and the official channel for complaints.

4) Infographics about SMS fraud warning and solutions have been created and publicized to raise awareness and protect the consumers. To unsubscribe the SMS, people can press *137 following by the call button. Nowadays, the SMS fraud and SMS phishing have been the major complaints because the scammer was use this channel for phishing attack which causing damage to the people.



5. Supporting the Broadband Internet Network Expansion

The NBTC has continually supported the broadband internet network expansion nationwide, and collaborated with Ministry of Digital Economy and Society (MDES) to drive the government's Thailand 4.0 policy. The target villages are 44,352 in non-commercial areas which include 40,432 villages in the remote areas (Zone C) and 3,920 villages in the border areas (Zone C+). In Zone C, MDES is responsible for 24,700 villages, and the remaining 15,732 villages for the Office of the NBTC. The Office of the NBTC is also responsible for 3,920 villages in the Zone C+.

The project achievement can reduce the digital divide in basic telecommunications services, and improves the quality of life of the target people living in the remoted areas. Besides, it becomes a crucial factor to strengthen competitiveness of the country, to facilitate the digital economy transformation, as well as supporting the country to move forward to Thailand 4.0 effectively and efficiently.

In 2021, the key performances are as follows:

5.1 The project on the mobile phone signal and broadband internet services provision in the border areas (Zone C+) for 3,920 villages is separated into 3 phases; Phase 1 for equipment provision, installation and operation test; Phase 2 for services provision for 5 years; and Phase 3 for delivery of service equipment after the mobile phone and broadband internet services provision period for every service area, including free public Wi-Fi for villages, high-speed internet for schools and Sub-district Health Promoting hospitals, and public internet service centers (USO Net) as well as installation of mobile phone signal coverage modifier. At present, it is in the process of phase 2 operation.

5.2 The project on the mobile phone and broadband internet services provision in rural areas (Zone C) for 15,732 villages is separated into 3 phases:

Phase 1 for equipment provision, installation and operation test.

Phase 2 for services provision for 5 years.

Phase 3 for delivery of service equipment after the broadband internet services provision period for every service area, including free public Wi-Fi for villages, high-speed internet for schools and Sub-district Health Promoting hospitals, and public internet centers (USO Net) as well as installation of mobile phone signal coverage modifier. At present, it is in the process of phase 2 operation.

6. The Important Development of rules and regulations regarding licensing and regulating telecommunications service and radiocommunications service such as:

6.1 The Notification of the NBTC on Criteria on Frequency Licensing and Regulating for Local Governments (No.2) was published in the Royal Gazette on February 23, 2021 to improve the criteria on spectrum licensing and regulating for local governments and reduce the licensing restrictions, in order to facilitate the local governments to utilize the frequency in broadcasting official announcements, and to support the increasing demand of frequency use. In 2021, the NBTC has allocated the frequency band of 430.2250 MHz to substitute the 420.2000 MHz, and allocated 4 frequency of Ultra High Frequency (UHF) (in the range 430 - 433 MHz and 435 - 438 MHz) to the local governments for fixed service which applicable to analog and digital technologies.

6.2 The Notification of the NBTC on Standard Conditions of Telecommunications Service Licensing was published in the Royal Gazette on May 25, 2021 with the purpose to revise the standard conditions of the telecommunications services licensing to be consistent with the current situation, and to inform the operators to act upon the conditions as well as to know the necessary conditions in advance.

6.3 The Notification of the NBTC on Criteria for Licensing and Regulating Radiocommunications Services for Navigating in Thai Territorial Water was published in the Royal Gazette on June 21, 2021 in accordance with the Notification of the NBTC on Radio Operators Regarding the Radiocommunication Act B.E. 2498 (1955), The notification requires a radio operator applicant to get the radio operator certificate from the NBTC which complying with radio regulations suffixed to Telecommunications Convention

6.4 The Notification of the NBTC on Criteria for Mobile Number Portability and MNP Porting Process Manual according to the Notification of the NBTC on Criteria for Mobile Number Portability were published in the Royal Gazette on September 24, 2021. In compliance with the technologies changing, the purpose of the notification is to protect the rights and benefits of the consumers, as they can retain their phone numbers when switching to another mobile network operator, and eliminate the complexity of the number porting process, as well as supporting free and fair competition.

Regulation Broadcasting and Television Services



The NBTC has carried out important missions in regulating broadcasting and television services by developing rules and regulations in order to encourage free and fair competition, reduce the regulation gap between the traditional broadcasting operators under the NBTC regimen and the OTT service providers, which have been unregulated, and revise the regulating process to comply with the changing environment and the business ecosystem.

In addition, the NBTC has emphasized on consumer protection, consumer network empowerment, and media literacy, as well as adopting digital technologies for improving consumer service and for the utmost benefit of the nation. In 2021, the major performances and important achievements are as follow:

1. Regulating Digital Terrestrial Television Service

1.1 Having granted frequency licensing for operating public digital terrestrial television service in category of the public service.

The NBTC has approved the principle of Frequency Licensing for operating public digital terrestrials television service by consideration of legal duties, appropriateness and necessity of public services provision, and proportion of frequency allocation for public sector, which consisting of: (1) License for obtaining the frequency for operating public digital terrestrial television service, Type 3 for regional service, for broadcasting and educating people about the democratic regime of government with the King as Head of State. (2) License for obtaining the frequency for operating public digital terrestrial television service, Type 1 for promoting learning of children and youth. (3) License for obtaining the

frequency for operating public digital television service, Type 1 for promoting health, hygiene and sports, as well as enhancing quality of life of the people.

Subsequently, the Office of the NBTC has announced the invitations to apply license via Electronic Broadcasting System (e-BCS) during October 21, to November 4, 2021. Due to the resolution of the NBTC meeting No. 22/2021 on November 24, 2021, the NBTC has granted the permission to use frequency for operating public digital terrestrial television services to the Government Public Relations Department and Ministry of Tourism and Sports in the following licenses.

• The Licenses to obtain the frequency for operating public digital terrestrial television service, Type 3 for regional service have been granted to the Government Public Relations Department, effective as of November 24, 2021 until December 31, 2030. The licensee may share one of the allocated frequency with other licensee, under the NBTC regulation. The licensee is required to be readily available in regional content broadcasting on 4 channels under Channel 11, including 1) NBT Central 2) NBT North 3) NBT Northeast and 4) NBT South.

• The Licenses to obtain the frequency for operating public digital terrestrial television service, Type 1 have been granted to Ministry of Tourism and Sports, effective as of November 24, 2021 until December 31, 2030. The licensee may share one of the allocated frequency with other licensee, under the NBTC regulation. The licensee is required to broadcast the content on Channel 7 (T Sports 7).

1.2 Improving the resolution standard and bitrate of Standard-Definition channels (SD) and High-Definition TV channels (HD) for digital terrestrial television network

The Office of the NBTC has studied the current status of bitrate and multiplex capacity,

options for improving the resolution standard and bitrate, and the impact of executing each option, with the purpose to prepare guidelines for improving the resolution and optimizing the multiplex capacity, in compliance with the Broadcasting and Television Master Plan (No.2) B.E.2563-2568 (2020 - 2025). According to the resolution of the NBTC meeting No.21/2021 on November 10, 2021, the NBTC has approved the guidelines for improving the resolution and the bitrate of TV channels, and informed the digital terrestrial television operators to adjust the optimal bitrate as shown in Table 3.

Table 3: Guidelines for improving the resolution standard and bitrate of Standard-Definition channels (SD) and High-Definition channels (HD) for digital terrestrial television network

	Max. SD Max. HD Channel Channel	Max. HD	Bit rate of SD (Mbps)		Bit rate of HD (Mbps)		Total Video	
		Min	Max	Min	Max	Bit rate	MUX	
	6	0	0.75	3	2	9	19.00	
0.00 - 50.00 (percent)	3	1	0.75	3	2	9	19.00	MUX#1
(percerre)	0	2	0.75	3	2	9	19.00	
50.01 - 75.00 (percent)	6	1	0.75	2.75	2	8	19.00	
	3	2	0.75	2.75	2	8	19.50	MUX#3 #4 #5
	0	3	0.75	2.75	2	8	20.50	
75.01 - 100.00 (percent)	6	2	0.75	2.5	2	7	19.00	
	3	3	0.75	2.5	2	7	19.50	MUX#2

Remarks: 1. means additional adjustment from former technical guidelines.

2. Total Video Bit rate shown is for guidance only as it depends practically on equipment and MUX limitations. It may be slightly higher or lower than the guidance.

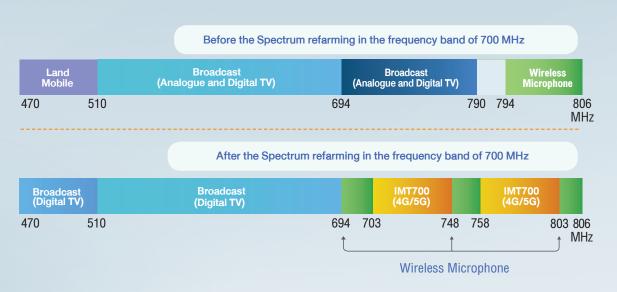
Source: Broadcasting Technology and Engineering Bureau, Office of the NBTC

1.3 Refarming in the frequency band of 700 MHz

1) The digital terrestrial television network has been adjusted by transitioning in the range 510 - 790 MHz to 470 - 694 MHz, in order to accommodate the spectrum refarming in the frequency band of 700 MHz to

reallocate for re-assign the International Mobile Telecommunications (IMT) service. The spectrum refarming is an approach to maximize the utilization of the available spectrum resources, and a massive opportunity for developing the country. Details are show in Picture 1.

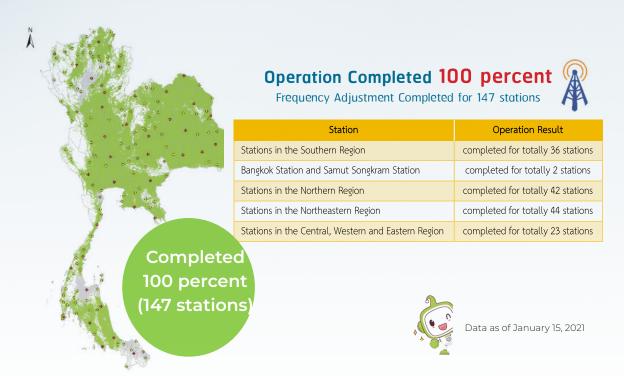
Picture 1: Spectrum Utilization Adjustment in Television Services of Thailand



Currently, there are 168 digital terrestrial television stations in Thailand, out of which 147 stations are targeted to be relocated to the new frequency as a result of the spectrum recall of

the 700 MHz. The transitioning process has been accomplished nationwide by January 15, 2021. Details are show in Picture 2.

Picture 2: Overall Status of Frequency Adjustment of Thailand's Digital Terrestrial Television Services



2) The NBTC has assigned the network and facility providers to submit the information of digital terrestrial television signal monitoring and evaluation at the transmitter stations, and to file 2 reports including (1) the report on technical performance in accordance with the digital terrestrial television network adjustment implementation plan to accommodate the 700 MHz spectrum refarming, and (2) the report on digital terrestrial television signal monitoring at the transmitter stations, in total of 6 stations, by considering the key parameters².

3) On October 1, 2021, the NBTC has determined the compensation and remuneration to the licensees, the digital terrestrial television network and facility providers who are affected by the 700 MHz³ spectrum refarming in the range of 694 - 790 MHz, in the amount of 756,994,491 baht, in compliance with the criteria, procedures and conditions regarding the practices of disbursement plan, memorandum of agreement on compensation payment between the NBTC and each network provider4. Currently, the network providers have already completed the network equipment modification/replacement and filed the performance reports, according to the network adjustment plan, and equipment monitoring and commissioning plan.

4) The assistance center has been established with the aim of solving the signal problems due to digital terrestrial television network adjustment, corresponding to the frequency band of 700 MHz spectrum refarming, via Call Center 020 700 700, providing information and guidance to retune the television, and coordinating with the digital terrestrial television network providers to fix the aerial receivers, adjust the antenna, run a test as well as providing

installation advices, as free of charge services. In 2021, the problems regarding digital terrestrial television have been solved in the total of 22,641 cases.

5) The NBTC has amended the notifications by formulating the additional edition of the following notifications; the Notification of the NBTC on Technical Standard of Antenna for Digital Terrestrial Television Service (No.2), and the Notification of the NBTC on Technical Standard of Receiver Amplifier for Digital Terrestrial Television Service (No.2). Both of the Notifications were published in the Royal Gazette on August 10, 2021 with the aim of improving the technical standard of the receiver equipment for digital terrestrial television service, providing optimal results of the spectrum utilization, and aligning with the radio frequency plan for digital terrestrial television service, as well as enabling the effective utilization that does not cause interference with other services.

1.4 Subsidizing the terrestrial broadcasting network (MUX) rental fee According to the Head of National Council for Peace and Order No.4/2019 on measures to solve problem of Television and Telecommunications Services, it prescribes the NBTC to compensate or reimburse the digital terrestrial broadcasting licensees, who are affected by the spectrum refarming of the 700 MHz, in the range of 694 - 790 MHz, by subsidizing the MUX rental fee with the revenue derived from the spectrum allocation for the telecommunications business. The NBTC shall subsidize MUX rental fees at actual cost and must not exceed the maximum rate approved by the NBTC, for the remaining years of the digital television licenses, from June 2020 onwards. On June 10, 2020, the NBTC signed the

² The key parameters include Effective Radiated Power (ERP), Carrier Frequency Offset, Modulation Error Ratio (MER), Bit Error Rate (BER), Crest Factor, Amplitude Frequency Response, and Group Delay

In accordance with the Order of the Head of National Council for Peace and Order No. 4/2019 on Measure to Solve Problem of Television and Telecommunication Services

⁴ The compensation value is equivalent to the actual expense of modifying or replacing network equipment, in compliance with the criteria, procedures and conditions regarding compensation and remuneration.

Memorandum of Understanding (MOU) with the digital television network licensees and digital terrestrial broadcasting licensees regarding procedures and conditions on MUX rental fee subsidy. From June 2022 - August 2022, the NBTC has subsidized the MUX rental fee for the digital television network licensees in total amount of 1.975.753 million baht.

In 2021, the Notification of the NBTC on standard of terrestrial broadcasting network rental fee calculation was published in the Royal Gazette on August 31, 2021, as a regulatory guideline for revising the terrestrial broadcasting network rental fee to be in line with the service costs reasonably, with respect to equality, fairness, and public interest as well as effective resource management.

1.5 Preparing technical guidelines for testing or trial on digital terrestrial television broadcasting in 4K technology

The NBTC has prepared the technical guidelines for testing or trial on digital terrestrial television broadcasting in 4K technology, by conducting a study and research on feasibility of digital terrestrial television broadcasting in 4K technology trials, related standards and technologies, and case studies on prescribing technical conditions in other countries, as well as conducting the focus group meetings and survey with the stakeholders in the industry. According to the resolution of the NBTC meeting No.21/2021 on November 10, 2021, the NBTC has approved the foregoing technical guidelines and signed the Notification of the Office of the NBTC on technical guidelines on proposal assessment for digital terrestrial television broadcasting in 4K trial project on January 5, 2022.

1.6 Supporting the rating survey of television program channel to promote the digital television industry⁵

The NBTC has allocated a budget of 288.898 million baht, which derived from the spectrum allocation for telecommunications business, to the Association of Digital Television Broadcasting (Thailand) for conducting the rating survey and developing the new ratings system to create credibility, accuracy and transparency in the research methods, covering changes in technology and consumer behaviors in the digital era as well as upgrading the industry quality.

According to the Memorandum of Understanding (MOU) with the Office of the NBTC, the Association of Digital Television Broadcasting (Thailand) shall undertake the following implementation; (1) conducting an establishment survey and TV audience measurement to be used as a fundamental of cross-platform television program ratings (2) conducting cross-platform digital television ratings including the new survey software to promote the digital television industry and (3) monitoring the survey results by internationally recognized independent auditors. The cross-platform digital television rating measurement will extend the survey scope from the television survey only to "live linear and on-demand linear" surveys as well as streaming via various channels such as computer, tablet, smartphone, etc. The new rating results will not be limited to digital television operators and the NBTC, but the government agencies or educational institutions can benefit from the ratings report as well.

In accordance with the Order of the Head of National Council for Peace and Order No.4/2019

2. Regulating on radio Broadcasting Service

2.1 Frequency licensing for broadcasting service regarding the Radio Frequency Plan for FM and AM System

In accordance with Section 83 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), to facilitate the broadcasting services of the government agencies and state enterprises, which the licenses are scheduled to expire⁶ on April 3, 2022, as well as to offer the opportunity to the new entrants for obtaining the license to operate the broadcasting service, In 2021 the NBTC has prescribed the regulations in consistence with the licensing for broadcasting services roadmap for 6 NBTC Notifications as follows:

- (1) Notification of the NBTC on Criteria and Procedures for spectrum Licensing for Broadcasting service.
- (2) Notification of the NBTC on Radio Frequency Plan for FM Radio.
- (3) Notification of the NBTC on Radio Frequency Plan for Low Power FM Radio.
- (4) Notification of the NBTC on Technical Standard of FM Transmitter.
- (5) Notification of the NBTC on Criteria for Preventing interference to Radio Aviation from FM Radio Station.
- (6) Notification of the NBTC on Criteria, Procedures and Conditions on FM Radio Frequency Auction for Commercial Broadcasting Services.

Currently, the NBTC is in the process of drafting the Notification of the NBTC on Spurious Emission Test of FM Radio Stations prior to publishing in the Royal Gazette.

2.2 Transition of the audio broadcasting trials to licensing in accordance with the regulation regarding the frequency licensing for broadcasting services

According to the Supreme Administrative Court judgment of the decided case No. 1365/2020 on December 22, 2020 to revoke Section 7 of the Notification of the NBTC on trial licensing criteria for audio broadcasting trials B.E. 2555 (2012) and retroactive to the effective date of the notification, the notification has been revised by offering opportunity to the new entrants for obtaining the licenses. Promoting free and fair competition practices and compliance to the law have been taken into account in licensing criteria. According to the resolution of the NBTC meeting No.10/2021 on May 25, 2021, the NBTC has agreed to arrange the Radio Frequency Plan for Low Power FM, and technical standards to support transition of the audio broadcasting trials to licensing. The aim of the plan is to solve the frequency interference and to manage the frequency utilization properly for the benefit of the licensees, under the Notification of the NBTC on trial licensing criteria for audio broadcasting trials B.E. 2555 (2012), who have proposed for broadcasting trials, according to the Notification of the NBTC on criteria for FM audio broadcasting trial, to continue their trials under the licensed business and services. The licensees shall retain their rights to broadcasting trial until 2024. The key performances are as follows:

- 1) Preparing 3 notifications and related criteria to support the operation plan, consisting of;
- (1) The Notification of the NBTC on Technical Standard of FM Transmitter for Low Power FM Broadcasting, published in the Royal Gazette on November 29, 2021.

⁶ In accordance with Section 7 of the Order of the Head of National Council for Peace and Order No. 76/2016 Re: Measures for Promoting Business Operation of Broadcasting and Telecommunications Service for Public Interest

- (2) Draft of the Notification of the NBTC on Criteria for FM Audio Broadcasting Trial, in the process for publishing in the Royal Gazette.
- (3) Draft of the Notification of the NBTC on Technical Standard Test for FM Transmitter for Low Power FM Broadcasting.
- 2) Releasing the Notification of the Office of the NBTC on transition of the audio broadcasting trials to licensing on June 22, 2021. The notification has been published in the Office of the NBTC website, and informed the trial licensees/the licensed stations about the transition guidelines on the audio broadcasting trials to licensing and the results of consideration, with the purpose of licensing preparation for the licensees. According to the foregoing notification, the licensees under the Notification of the NBTC on trial licensing criteria for audio broadcasting trials B.E. 2555 (2012) can shift to licensing system by the following methods.
- Community Service: the licensee can submit the application form for obtaining license regarding the Radio Frequency Plan for Low Power FM radio for community service.
- Public Service: the licensee can submit the application form for obtaining license regarding the Radio Frequency Plan for Low Power FM radio for public service, or the Radio Frequency Plan for Low Power AM radio for public service.
- Commercial Service: the licensee can submit the application form for obtaining license regarding the Radio Frequency Plan for FM radio for commercial, or the Radio Frequency Plan for Low Power FM radio for commercial service.



2.3 Preparing guidelines on frequency licensing for broadcasting service

According to the resolution of the NBTC meeting No.21/2021 on November 10, 2021, the NBTC has approved in principle of the guidelines on frequency licensing for broadcasting service in the following details.

(1) First, the licenses regarding the Radio Frequency Plan for FM radio and the Radio Frequency Plan for AM radio for the government agencies, whose permission granted for broadcasting service and frequency use in accordance with Section 74 of the Act on the Radio and Television Broadcasting Service B.E. 2551 (2008), and the Notification of the NBTC on Criteria and Procedures on Licensing for Broadcasting and Television Service B.E. 2555 (2012), have been granted for public service in total of 390 frequency accounted for 100 percent of the license capacity.

According to the resolution of the NBTC meeting No. 24/2021 on December 17, 2021, the NBTC has considered the frequency licensing for broadcasting service regarding the Radio Frequency Plan for FM Radio and the Radio Frequency Plan for AM Radio for the government agencies, and granted licenses to 24 government agencies in total of 389 frequency slots for public service broadcasting, with the 5-year term, effective as of April 3, 2022 onwards unless further notice of the new NBTC commissioners consideration.

(2) Second, the licenses regarding the Radio Frequency Plan for FM Radio and the Radio Frequency Plan for AM Radio for the licensees intended to use frequency for broadcasting service have been granted in total of 119 frequency slots, consisting of 45 slots for public services, and 74 slots for business services. On December 2, 2021, the invitation to apply for AM radio frequency licensing for public service has been announced for 45 frequency slots allocation. In addition, the invitation to apply for FM radio frequency licensing for business service has been announced on December 27, 2021.

(3) Third, the licenses regarding the Radio Frequency Plan for Low Power FM Broadcasting in FM system for the licensees, intended to utilize low power FM frequency for broadcasting in service area simulation, in compliance with the ITU recommendations, have been granted in total of 1,522 frequency slots for public and community services as the priority. The remaining slots shall be allocated for business service which not exceed 75 percent of the license capacity. On December 2, 2021, the invitations to apply for low power FM radio frequency licensing for public and community services have been announced to the public.

3. Regulatory imposition on broadcasting operators

The law and regulations have been imposed on both licensed and unlicensed broadcasting operators by admonition, allegation and prosecution, in order to regulate the frequency use without interference, and to be in compliance with the relevant measures. In 2021, the summary of legal actions are described in Table 4.

Table 4: Frequency Use Monitoring and Prosecution in 2021

		Quantity		
Category	Status	Issue	Station/area	
Licensed Broadcaster				
Padio Proadcasting (Frequency Interference)	pending	1	2	
Radio Broadcasting (Frequency Interference)	problem-solved	4	8	
Dadia Dandantina (Danasatina)	preparing prosecution	1	1	
Radio Broadcasting (Prosecution)	impleading	1	2	
Unlicensed Broadcaster				
Radio Broadcasting	search-seizure	3	3	
(FM Transmitter and Antenna)	impleading	11	11	
	preparing prosecution	3	11	
Television Broadcasting (TV Set-top Box)	impleading	2	2	
	completed	1	2	
Talayirian Drandonsting (Cable TV)	preparing prosecution	-	-	
Television Broadcasting (Cable TV)	completed	1	1	

Remarks: Data as of January 1 - December 31, 2021

Source: Broadcasting Enforcement Bureau, Office of the NBTC

4. Revising the regulatory process to comply with the changing ecosystem of the industry

The NBTC recognizes the importance of reducing the regulatory gap between the traditional broadcasting operators under the NBTC regulations and the Over-the-Top (OTT) service providers which are unregulated. Due to the rapid technological development, the convergence of multi-media has become inevitable, resulting in new services including OTT services. Consumers can enjoy the content and TV program via multiple devices; however, the existing broadcasting regulations do not comply with the changing circumstances. Therefore, the NBTC has revised the regulatory process to comply with the changing ecosystem of the industry, following an objective of the Strategy 2: Development of the National Television Broadcasting Service in the New Context, under the Broadcasting Master Plan No.2 B.E. 2563 - 2568 (2020 - 2025).

The NBTC has also appointed a working panel to revise the criteria and prepare the policy recommendations in regulating broadcasting and related services as well as submitting the report on law and regulations amendment to comply with the changing context. In 2021, the working panel has prescribed the operational guideline, and studied the market competition in the television broadcasting business and the ecosystem of the industry.

Currently, it is in the process of researching the guidelines to revise, and drafting the notification regarding licensing criteria and regulations, in order to obtain the updated information for preparing the policy recommendations, and to promote the radio and television broadcasting services in all dimensions. In addition, the study on related act and laws has been carried out to prepare the law revision proposal. At present, the working panel has already filed the progress report of the year 2021 to the NBTC sub-committee on broadcasting service.

5. Consumer protection in broadcasting and television services

In 2021, the NBTC has carried out activities to protect consumer in broadcasting and television services by prescribing regulation to prevent the consumer from being exploited, empowering the consumer, promoting media literacy, protecting the rights of the disabled and the underprivileged and promoting the information accessibility and utilization through radio and television broadcasting services, as well as developing the mechanism and measures to prevent bullying and persecution of women, children and the youth by campaigning for protection via multi-media.

The operation focuses on 3 aspects, consisting of 1) prescribing regulation to prevent consumer from being exploited by implementing the proactive monitoring and handling complaints effectively, 2) empowering consumer to participate in the regulatory process, and 3) facilitating the disabled and the underprivileged in information access. The details are as follows:

5.1 Prescribing regulation to prevent consumer from being exploited

The NBTC has developed the regulatory mechanism to proactively prevent the consumer in the broadcasting and television services from being exploited by monitoring broadcasting and television business, and handling complaints, in accordance with the Notification of the NBTC on Consumer Exploitation in Broadcasting and Television Services B.E. 2555 (2012), regarding on-air programs or advertisement such as advertising of food, drugs and health products, as they may affect the people by misleading information, money waste, lack of opportunity for medical treatment. In addition, the regulation imposition includes over-limit advertising time length, advertisement of products related to tame and superstition (talisman) which are non-scientific proof. Particularly during the COVID-19 pandemic and new normal lifestyle adjustment, regulating the health-related contents is necessary as some advertisement may lead to misconception of the product which may be within the scope of consumer exploitation. Moreover, some consumers are being exploited by false information spreading via radio broadcasting. Subsequently, the proactive regulation has been prescribed to prevent such exploitation manners in the following aspects.

1) Integration of relevant agencies and regulators under Memorandum of Understanding (MOU) on regulating illegal advertisement of food, drugs and health products, or exploitation of consumer in broadcasting, television, and telecommunications services, signed on February 26, 2019. In addition, collaboration and mutual law enforcement have been proceeded in 5 agencies, consisting of the Office of the NBTC, the Food and Drug Administration (FDA), the Office of the Consumer Protection Board (OCPB), the Royal Thai Police (RTP) and Ministry of Digital Economy and Society.

2) Collaboration mechanism has been developed to support operation in central and regional offices. The Region offices of the NBTC have collaborated with Provincial Public Health Offices in data synchronizing as well as integrating regulatory conduct with the Office of the NBTC (Head office).

3) Technology-equipped system developed for broadcasting monitoring and investigating the illegal contents on radio and television broadcasting has been used to monitor 200 radio and television stations in Bangkok, Chonburi, Chiang Mai, Udon Thani, and Phuket. Currently, the system utilization has been expanding to other provinces.

Regarding the passive approach of regulation on consumer exploitation in radio and television broadcasting services, the NBTC attempts to reduce the licensee infringement by monitoring the broadcasting service operations and developing the complaint handling system, as well as considering the administrative order which may affect the party's right. Thus, the sub-committee on broadcasting consumer protection has offered the opportunity to the licensees to receive sufficient information, dispute and present evidence in line with the process, as well as complying with the law for further action. Due to the process, the NBTC has considered the consumer exploitation actions in terms of advertisement on food, drugs and health products. Details are shown in Table 5.



Table 5: Inspection of illegal contents on food, drugs and health products in 2021

Procedure	Digital	Non-frequency	Broadcasting
	Terrestrial TV	used TV	service
Detecting the presence of licensee's advertisement considered as consumer exploitation in radio and television broadcasting services	5 licensees	11 licensees	366 licensees
	5 cases	11 cases	671 cases
Licensees provenguilty by the Food and Drug Administration (FDA)/ Provincial Public Health Offices	5 licensees	11 licensees	290 licensees
	5 cases	11 cases	575 cases
Issuing orders to suspend the advertisement	5 licensees	11 licensees	160 licensees
	5 orders	11 orders	160 orders
Issuing orders to temporarily suspend the actions considered as consumer exploitation in radio and television broadcasting services	5 licensees	5 licensees	1 licensee
	5 orders	5 orders	1 order
Advertisement considered guilty of consumer exploitation in radio and television broadcasting services (2 nd time)	1 licensee 1 case	5 licensees 5 cases	-
Issuing order to fine in case of order regarding violation in consumer exploitation in radio and television broadcasting services in accordance with Section 31 of the Act on the Organization to Assign the Radio Frequency	1 licensee	4 licensees	42 licensees
	1 order	4 orders	42 orders
Issuing order to fine in accordance with Section 37 of the Broadcasting Business Act (fine in case of advertisement that has severe impact on public health)	-	-	4 licensees 4 orders

Remarks: Data as of January 1 - December 31, 2021

Source: Broadcasting Consumer Protection Bureau, Office of the NBTC

5.2 Empowering consumer and improving media literacy

The NBTC has emphasized on the media literacy for people and consumer empowerment to enable them to protect their own rights, which consistent with the National Reform Plan in Mass Communication and Information Technology, through the following process.

1) Building consumer network in broadcasting services has been conducted to raise awareness of consumer rights protection through various activities, such as on-site training, online activities and workshops on capacity development of consumer network leaders in broadcasting services, under the project on encouraging participation of broadcasting consumer network in 3 regions; North - Chiang Mai, South - Songkhla, and Northeastern - Udon Thani.



The project contributes to the awareness of the consumer rights in broadcasting services. As a result, the consumers can monitor the media operation and make complaints to the Office of the NBTC, and the relevant agencies as well as passing their knowledge to their families, communities and society.

- 2) Promoting the media literacy has been conducted in the following activities.
- Organizing the upskill training courses on broadcasting and television services in 4 levels, which are secondary education (junior high school/high school), higher education, and general public, as well as promoting the utilization of the skills in educational institutions, agencies, and organizations. In addition, it includes producing instructional media such as the course handbooks in document and e-Book versions, video media, animation media, and so forth to support educational organization operations and lifelong learning.
- Organizing community activities, cooperating with the educational institutions which joining the "Khontansue" project, and continuing the work process by establishing the "Khontansue" association.
- Supporting the production of television programs related to media literacy development for general and special needs groups such as D-Meedee show which contains sign language, closed captions, and audio description, as well as promoting media literacy via multi-channels, including http://bcp.nbtc.go.th and https://www.facebook.com/con.rights.
- 5.3 Protecting the rights of the disabled⁷ and the underprivileged and promoting equal access and utilization of information from broadcasting programs

The NBTC has promoted the accessibility and utilization of information for the disabled and the underprivileged, by supporting the television programs broadcasting in 21 channels of digital terrestrial television services to provide sign language, closed captions, and audio description.

It also prescribes the broadcasting conditions including (1) sign language for the disabled at least 1,260 minutes/day, (2) closed captions at least 1,260 minutes/day, and (3) audio description at least 630 minutes/day. In 2021, the key performances of protecting the rights of the disabled and the underprivileged, and promoting equal access and utilization of information from broadcasting programs are as follows:

- 1) Regulating the broadcasting service, according to the Notification of the NBTC on protecting the rights of the disabled and promoting equal access and utilization of information from television programs, has been conducted by monitoring the report on sign language, closed captions, and audio description service provision of the year 2020. As a result, the warnings have been prescribed to 3 licensees to comply with the Notification.
- 2) Promoting information access for the disabled and the underprivileged has been conducted by organizing an online public hearing event, to gather opinions from the organizations related to different types of disabilities, and relevant professional organizations, putting forward to the broadcasters to provide sufficient services in line with the standards and measures on promoting information access for the disabled.
- 3) Building an understanding of the rights of the disabled to access and utilize information has been conducted by collaborating with the National Association of the Deaf in Thailand in organizing workshops on learning TV sign language for the deaf. It aims to prepare the members of the association to access and utilize information from television service as well as creating understanding and raise awareness of communication rights in television service. The training for sign language interpreter has also been organized in order to provide quality interpretation for the benefit of the deaf.

⁷ The disabled include the people with virtually and hearing impaired.

Furthermore, the events and public relations media through television and online channels have been arranged to build understanding, and raise awareness of the service providers, the disabled, the consumers and the general public regarding television service with sign language, closed captions, and audio description. In addition, the collaboration has been carried out not only with the National Association of the Deaf in Thailand, but also the National Association of Sign Language of Thailand, and Thailand Association of the Blind, to evaluate the quality of sign language interpretation, closed captions and audio description on television respectively.

4) Supporting the disabled to recognize their rights to access and utilize information and acknowledging the people to understand and aware of promoting and protecting the rights of the disabled

5.4 Developing criteria on consumer protection in broadcasting services

In order to protect the rights and liberty of the consumer and prevent them from exploitation in radio and television broadcasting services, the NBTC has issued the Notification on the actions considered as consumer exploitation in radio and television broadcasting services (No.2), and added "herbal products regarding to the herbal products law" in the "herbal products" definition in Section 3 of the Notification of the NBTC on the actions considered as consumer exploitation in radio and television broadcasting services B.E. 2555 (2012). The revised notification was published in the Royal Gazette on December 29, 2021.

6. Developing the mechanism and measures to prevent bullying and threatening on women, children and the youth through multi-media campaigns

In 2021, the campaign for creating positive contents and lessening bullying has been one of the key policies of the NBTC. For

many years, we have seen large number of cyber bullying and threatening problems on women, children and the youth, which lead to wideranging impact to the society. The NBTC has emphasized on developing the mechanism and measures to prevent bullying and threatening on the foregoing groups through multi-media campaigns, and studying on the bullying causes, behaviors and effects in every aspect including legal, economic, social and technological aspects, covering family institution, educational institutions, government agencies and the civil society.

Thestudyresults have been disseminated to the target groups and relevant parties such as parents, educational institutions, government and private sectors, and broadcasting service providers. Also, the campaign has been publicized for creating positive contents and lessening bullying through 1-minute advertisement and infographics, enabling the women, children and the youth to protect themselves from cyber threats and bullying, promote media literacy, and utilize the technology effectively with creativity and responsibility.

7. Promoting and developing broadcasting and television services

7.1 Professional development in broadcasting and television services

The survey on the need of human resource development in broadcasting and television services in technological convergence era together with the dynamic change of the industry infrastructure, has been conducted by studying problems and obstacles in individual and structural levels, gathering opinions through focus group meetings, and studying the course developing guidelines of other countries, in order to prepare the 5-year professional development plan in broadcasting and television services for the application of operators, mass media practitioners, and personnel in related industries.

The study shows that every sector in the industry focusing on utilizing digital technology convergence in media organization management in many aspects such as technology system and computer networks for broadcasting and telecommunications integration, creating a new media with much lower production costs. Thus, it is essential to lay the foundation of the courses that emphasize on adaptation in each dimension such as creating content to meet the social preferences on digital platforms, presentation and communication, adaptation of practitioners, etc.

The plan is divided into 3 phases, in a total of 34 projects; the 1-year action plan for conducting urgent trainings - 15 projects, the intermediate 3-year action plan consisting of the projects aimed to develop media industry, in compliance with the professional development plan in mass media from international media organizations - 15 projects, and the long term 5-year action plan consisting of the projects which enable the operators to develop the broadcasting and television services in the future - 4 projects.

7.2 Promoting liberty and rights of the people to equally access and utilize various information

The plan to support the people to receive services comprehensively in broadcasting and television services has been conducted to be used as a promoting and supporting guideline for the people and the underprivileged to equally access and utilize appropriate information, and extending the channels to deliver the information.

The implementation of the plan includes revising the operations and related plans, policies and strategies, as well as examining the access to broadcasting and television services of the target groups, by considering many factors such as network availability, affordability and accessibility, the need to access to useful contents, obstacles of service access, information awareness, physical and cognitive readiness of

the people in social dimension, and practices for operational integration with other agencies, in consistence with the 20-year National Strategy in the aspect of creating opportunities and social equality.

7.3 Prescribing guidelines on presenting crime news and violence-related contents in digital terrestrial television service

Due to the fierce competition in digital terrestrial television business, the content providers have to attract the audiences by presenting the images or video clips from social media, mostly in the social interest and violence contents, live reporting, or presenting animation/infographics to demonstrate the violence. In this regard, a working panel has been set up to consider such matters together with relevant agencies and licensees, and drafted the guidelines on presenting crime news and violence-related contents for the licensees to conform.

7.4 Providing knowledge to the personnel in television industry and technology-related industries

The seminar on "Challenges vs. Opportunities of Thailand's Television Industry Adaptation in the New Media Era" was held to exchange the viewpoints on the current television business and bring those viewpoints and recommendations to develop and promote the competitiveness of television industry in the technological changing ecosystem. The participants of the seminar included television operators, TV content providers, online media operators, and broadcasting and television related associations.



7.5 Human resource development in broadcasting and television business

The human resource development in broadcasting and television business has been conducted by organizing meetings and training courses in the following topics.

- 1) Providing knowledge on news reporting to the news reporters, announcers and moderators, in order to build correct understanding of news reporting in each circumstance, and improve their skills to report professionally with fairness and social consciousness.
- 2) Building understanding of revenue derived from broadcasting and television business and annual license fee payment via electronic system to licensees, accountants and auditors, as well as procedures on submitting license fee payment form.

- 3) Providing guidance on contents presentation during the COVID-19 pandemic to the digital terrestrial television licensees, in order to present contents fairly and precisely, and avoid words and images that may cause misunderstanding, confusion and panic, which affecting the disease control.
- 4) Presenting the crime news and violence-related contents to the digital terrestrial television licensees in order to avoid presenting images, sound or contents emphasizing on social violence, murder demonstration, or abuse, which may lead to imitation behavior.
- 5) Presenting on the contents presentation after the Constitutional Court decision to the digital terrestrial television licensees in order to present the program contents carefully, and avoid the contents against the Constitutional Court decision and related laws.



International Activities in Broadcasting, Television, and Telecommunications Service



The NBTC as the administrative of Thailand who has an authority in international communications service management by cooperation with the International Telecommunication Union or international organizations, governments and international agencies, under the authorities and duties of the NBTC or as assigned by the government as well as supporting the government affairs to acquire the rights to use satellite orbits, and coordinated in spectrum management with both local and international agencies. In 2021, the major performances and important achievements are as follow:

1. Performing operations as a member of the ITU Council of the International **Telecommunication Union**

The Cabinet meeting on April 27, 2021 agreed to assign the NBTC to apply for the election for the International Telecommunication Union (ITU) Council Member (for 2023 - 2026) for Region E (Asia/Australasia). The Plenipotentiary Conference 2022 (PP-22) will be held from September 26 - October 14, 2022 in Bucharest, Romania. To ensure the orderly and effective application for the position of ITU Council member, the NBTC has established a working group for the Plenipotentiary Preparation Conference 2022 (PP-22) by considering the guidelines, workplan and strategies for the foregoing applying including studing, and analyzing the draft proposal/proposals for revision, or new proposals submitted by the Asia-Pacific Telecommunity

(APT) members in the preparatory meetings of the Asia and the Pacific regions. Currently, the working panel is in the process of operations in line with the plan.

2. The International Telecommunication **Union Conference**

2.1 The NBTC has assigned the representatives to attend the ITU online conferences in the ITU Telecommunication Standardization Sector (ITU-T) including the conference of the Study Group on Quality of Service (QoS) and Quality of Experience (QoE) Regulation for communication devices, telecommunications network, services and applications, cyber security, identity management, data privacy, and monitoring on telecommunications technology use in television broadcasting in Ultra-High definition, 3D TV broadcasting through cable and hybrid network.

2.2 The NBTC has assigned the representatives to attend the ITU online conferences in the ITU Telecommunication Development Sector (ITU-D) as follows:

- 1) The Regional Preparatory Meeting for the WTDC for Asia and the Pacific (RPM-ASP) has been joined to exchange the opinions and address the issues to foster the development of telecommunications and ICTs.
- 2) The Inter Regional Meeting to prepare for WTDC (IRM) has been joined to discuss and identify common positions and agreement on key issues ahead of the World Telecommunication Development Conference 2021 (WTDC-21), which focusing on defining regional initiatives of the Asia and the Pacific, to suitable for the current situation revising or drafting resolutions, and addressing Study Questions for the study groups.
- 3) The 21st Global Symposium for Regulators (GSR-21) has been joined to exchange information and opinions on enhancing confidence in digital and technological use, regulation for digital transformation and inclusive connectivity.
- 4) The Study Groups meetings under significant topics have been attended by the NBTC representatives to share the viewpoints to experiences in order to formulate guidelines on adaptation to the changing technologies, Moreover preparatory meetings for World Telecommunication Development Conference 2021 (WTDC-21) such as;
- The TDAG Working Group on Resolutions, Declaration and Thematic Priorities (TDAG-WG-RDTP) has been joined to review proposals related with project of ITU-D Study Groups and Study Questions, declaration and thematic priorities for WTDC-21.
- The 28th Telecommunication Development Advisory Group (TDAG) has been joined to consider the outcomes of the TDAG working groups and discuss relevant issues as preparations for WTDC-21.

• The 3rd TDAG Working Group on the Strategic and Operational Plans has been joined to consider the strategic plan, and the Addis Ababa Action Agenda.

3. International meetings in important agenda

The NBTC has assigned the representatives to attend international meetings such as the High-Level Policy Session of the World Summit on the Information Society (WSIS) Forum 2021, to exchange viewpoints and monitor the progress and achievements of the operations in line with the WSIS Action Lines to achieve the United Nations' sustainable development goals.

4. Organizing conferences and negotiations with international agencies

- 1) The Girls in ICT Day meeting was hosted by the Office of the NBTC and International Telecommunication Union (ITU) to encourage girls and young women's potential in ICT worldwide in order to apply the ICT skills to further their studies and pursue careers in ICT. Over 422,000 girls and young women from 171 countries participated in the meeting, together with the high-level representatives from various organizations namely: Ministry of Digital Economy and Society; Ministry of Education; United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Economic and Social Commission for Asia and the Pacific (UNESCP), United Nations Entity for Gender Equality and the Empowerment of Women (UN Women); United Nations International Children's Emergency Fund (UNICEF), and Chulalongkorn University.
- 2) The Executive Round Table, ITU GSR Regional Regulatory Roundtable for Asia and the Pacific and the Regional Economic Dialogue (RED) was held virtually from June 8-9, 2021 via online conference to accelerate digital transformation and promoting accessibility and utilization of connectivity which the issues that has received international attention.

The representative from Thailand has discussed the regulatory issues such as satellite licensing, emerging technologies regulation and new technology adoption.

3) The 3rd Bilateral Meeting between Office of the NBTC and Telecommunication Regulator of Cambodia (TRC) via Virtual Meeting to exchange information, regulatory and policy environments of both organizations, discuss regulatory issues, lay out ways forward for bilateral cooperation over the coming five years, and strengthen partnerships to be a leading regulation organizations in the ASEAN.

5. Trade and service negotiations meetings

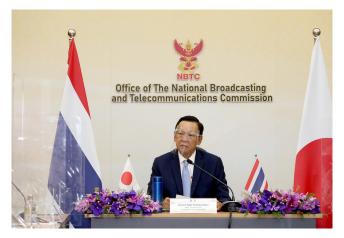
The NBTC has assigned the representatives to attend trade and service negotiations meetings to discuss and exchange viewpoints and information as well as considering documents and resolutions under the relevant international obligations and agreements as follows:

- The Committee on e-Commerce conference (CEC) under the ASEAN-Australia-New Zealand Free Trade Area Joint Committee.
- The Meeting with Directorate-General for Trade (DG Trade) on Joint Understanding on the Scope and Level of Ambition of a Future EU-Thailand and Investment Agreement.
- The sub-committee meeting to proceed according to the Cabinet Resolution regarding Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in trade, service and investment.
- The public hearing on the draft negotiations for EU-Thailand Free Trade Agreement (FTA).
- The meeting to consider draft Term of Reference for FTA and European Free Trade Association (EFTA) (Iceland/Switzerland/ Norway/ Liechtenstein).
- The meeting to prepare the revision of obligation table in telecommunications service for WTO Uruguay Round.

6. Bilateral Collaboration

In 2021, the NBTC has assigned the representatives and speakers to attend meetings and exchange the information and viewpoints in the related issues, in order to build relationships with other countries and cooperate in knowledge-sharing as well as preparing MoU process with international agencies in the future which will benefit the telecommunications regulation. Some of the significant meetings are as follows:

- The International Symposium on 5G and Driving the Benefits of Big Data.
- The IIC Annual Asia Telecommunications and Media Forum
- The International Telecommunications Society (ITS).
- The online seminar on "Measuring Digital Transformation in Thailand".
- The bilateral meeting between Office of the NBTC and the Ministry of Internal Affairs and Communications (MIC), Japan.





The Operation to Support the Government's Policies Implementation



The ongoing Corona Virus disease (COVID-19) pandemic since 20208 has severe impact on Thailand's economy, affected the country's GDP to fall by 6.1 percent in 2020 and in 2021, Thailand's economy is expected to grow at 1.2 percent from 2020. Nonetheless, the impact of the COVID-19 pandemic to the communications industry is not as intense as the business relating with manufacturing, export or tourism. To cope with the crisis, the government has responded boldly by introducing measures to decrease the infection rate and mitigate the impact to the people such as facilitating field hospitals, encouraging Work from Home policy, and supporting the Home Isolation (HI) and Community Isolation (CI) policies.

In 2021, the NBTC has supported the government policy implementation on mitigating the impact of the coronavirus disease 2019 (COVID-19) that continuously pandemic and supported the public health administrative agencies by offering communication devices and services to facilitate their work, as well as prescribing measures on regulating broadcasting, television and telecommunications services under the Acts to alleviate burdens of the operators and the public. The major performances and important achievements are as follow:

Box 15 Page 19 Page



1. Measure on provision of telecommunications service, communication devices and necessary equipment to support patient treatment and prevent the COVID-19 pandemic. The NBTC has supported the government policy to prevent and control the COVID-19 pandemic by financing 200.000 million baht for the following operations.

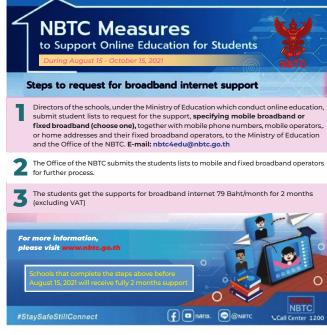
1) Supporting the telecommunications services and devices for Tele-Consultation treatment at 98 field hospitals (97 field hospitals, and Bang Sue Grand Station Vaccination Center), which can serve the COVID-19 patients with 21,398 hospital beds

2) Supporting the COVID-19 patient treatment management for Home Isolation and Community Isolation for non-severe patients, and supporting the state agencies in public health administration such as (1) supporting Bangkok Metropolitan Administration in setting up 4 community isolation centers, consisting of COVID-19 Medical Treatment Management Center, Public Health Center, Community Isolation Center, and Emergency Operation Center (EOC), as well as offering mobile

phones and sim cards with internet in a total of 200 sets to the medical team to handle patients who had volunteer to takecare of the patient via AMED - Telehealth, and (2) supporting Saraburi Province in setting up a Call Center system, Telecommunication systems for Call Center mobile phones and sim cards with internet, and waive service fee for the medical team and volunteers at the Public Health Administration Center of Saraburi Province.

3) Supporting free SMS from state agencies to people as part of COVID-19 vaccination campaigns and treatment such as state agencies include Institute of Dermatology (Bang Sue Grand Station), Sam Kok Hospital, Provincial Public Health Center, and Suranaree University of Technology, etc. The telecommunications operators who joined the campaign include Advanced Wireless Network Company Limited, True Move H Universal Communication Company Limited, Dtac TriNet Company Limited, National Telecom Public Company Limited, True Internet Corporation Company Limited, Triple T Broadband Public Company Limited, and Triple T Internet Company Limited.





2. Measure on Broadband Internet Provision for Online Education to Mitigate the Impact of the COVID-19 Pandemic

Financed by 1,300 million baht, the measure on broadband internet provision for online education has been carried out to support online education in schools under Ministry of Education, schools under Border Patrol Police Headquarters, schools under Bangkok Metropolitan Administration, schools under Ministry of Interior, and schools under Ministry of Higher Education, Science, Research and Innovation. The assistance measure offers the mobile broadband package with 10 Mbps speed and unlimited data usage, and the fixed broadband package for online education at 79 baht per month (not including VAT) for 2 months (2 bills payment rounds) for the semester of 2021 from August 15 to October 15).

3. Measure to assist the licensees in broadcasting, television, and telecommunications business affected by COVID-19 pandemic. The NBTC has issued the Notification of the NBTC on revenue remittance and allocation to the Broadcasting and Telecommunications Research and Development Fund for Public Interest, collected from the licensees in broadcasting, television, and telecommunications business, affected by the COVID-19 pandemic. The Notification was published in the Royal Gazette on May 28, 2021, with the purpose to assist the licensees by extending the remittance period of annual fee and allocation to the Broadcasting and Telecommunications Research and Development Fund for Public Interest. The licensees, who are obligated to remit the annual fee to the fund according to the Notification of the NBTC on Criteria and Method for Annual Contribution Remittance to the Broadcasting and Telecommunications Research and Development Fund for Public Interest Within May 30 - November 30, 2021, shall complete their remittance process by November 30, 2021 or as notified by the NBTC.

4. Allocating the health service emergency number 1516 to Bangkok Metropolitan Administration. To facilitate people in acquiring information about the vaccine reservation in "Thai Ruam Jai for Safe Bangkok", the health service emergency number 1516 has been allocated to Bangkok Metropolitan Administration, and waived the application fee and numbering fee, in a total of 450 lines. With support from the mobile operators, people can also call to other hotlines free of charge, regarding to the COVID-19 pandemic as follows:



5. Measure on technical standard tests exemption for the broadcasting trials in a state of emergency. The NBTC has issued the Notification of the NBTC on measure on technical standard test exemption for the broadcasting trials in a state of emergency (the second time) to mitigate the impact of the COVID-19 pandemic on the broadcasting trials by exempting the technical standard tests, including the broadcasting transmitter technical standard test, and the spurious emission Test radio

stations. The notification is effective as of April 18, 2021 onwards until the COVID-19 Management Center cancel the order announce the emergency situation.

6. Supporting the government policy in controlling fake news. The fake news spreading has a huge negative impact to the society as it causes confusion, misunderstanding, chaos, and fake news, as well as obstructing the government control of the COVID-19 pandemic. To support the government policy in controlling fake news, the NBTC encourages the people to contact the NBTC Call Center 1200 regarding to inquiries or information about fake news. Accordingly, the NBTC shall monitor the identified fake news and carry out the law proceedings.

7. Licensing to use spectrum in the Broadcasting and Television Services for education-related content production and broadcasting. Regarding to the resolution of the NBTC meeting No. 12/2021 on June 23, 2021, the NBTC has approved the licensing period extension of Thai Public Broadcasting Service (Thai PBS) for using spectrum in the broadcasting and television services for trial or temporary test, according to Active Learning TV (ALTV) project, for 6 months (during July 1 - December 31) as from the previous license term expiration (from January 1 - June 30, 2021).

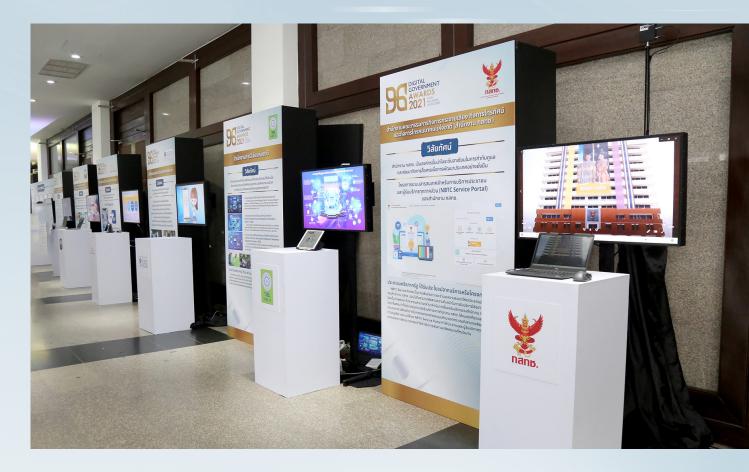
The project aims to produce and promote the education-related content broadcasting, the useful-content TV programs that encourage potential development and quality of life as well as offering opportunity for children and the youth to access educational sources equally, reduce the education gap, enable them to utilize the information and adjust themselves to the changing environment.

8. Digital radio broadcasting trial. In 2021, the digital radio broadcasting trial has been continued in Bangkok and its vicinities area in phase 2, under the Memorandum of Understanding (MOU) with Royal Thai Army. In this phase, the Royal Thai Army Radio and Television Station has conducted additional technical adjustment to digital radio broadcasting trial in Bangkok and its vicinities area in phase 1 including sound quality, signal quality and service areas. Currently, it is the process of the DAB+ Digital Radio broadcasting trial of the

same content as the FM and AM broadcasting. In addition, the test and trial include the application program testing such as electronic broadcast schedule, disaster warning system, and testing traffic report system in the further. In addition, the regional DAB+ digital radio broadcasting has been tested (in Chonburi, Chiang Mai, Khon Kaen and Songkhla) of the same content as the FM and AM broadcasting in Bangkok and its vicinities area and adding content of regional-content programs.



Strategy and Organization Management



To maintain the operational standard of integrity, transparency and sustainable development is one of important policies that the NBTC has assigned to the executives and officers of the Office of the NBTC, as a guideline to perform their duties. The policy aims to elevate the work procedures and service provision with digital technologies in order to contribute the transparent and good governance organization, as well as offer opportunity and equality in information access and digital utilization of the people. To support the National Strategy implementation and the government policies to reach "Digital Thailand" onward. In 2021, the major performances and important achievements are as follows:

1. Morality and Transparency Policy

The NBTC has emphasized on performing duties with good governance in morality and transparency, taking the utmost benefit to the nation and people as the priority, and cooperating with every sector to prevent corruption. As a result, Since 2019, the Office of the NBTC has continually gained high scores in the Integrity and Transparency Assessment.

In 2021, the Office won the Digital Government Awards 2021 (DG Awards 2021), with the score of 96.60 (AA level), and was in the 4th rank among participated government agencies. Accordingly, the Office of the NBTC has continued to develop the operations and service provision to facilitate the people effectively, and embed the cultures and values in performing duties with integrity for a continuous and sustainable standard.



2. Elevating the Office of the NBTC to be a fully-digitalized organization

The NBTC has emphasized on mission for the people and driving the organizational development strategies with the hope to create a high-performance fully-digitalized organization, and adopting technology for productive regulation. In 2021, the Office of the NBTC won the Digital Government Awards 2021 (DG Awards 2021) for the second successive year, was in the 4th rank from 1,922 agencies, and won the excellence award in Data Governance.

3. Budget of the Office of the NBTC

The NBTC has made a surplus budget with the revenue collected in the amount of 8,462.908 million baht, and set up the expenditure budget of 2021 in the amount of 7,039.512 million baht. The actual operation expenditure of the Office of the NBTC was 6,411.027 million baht. The NBTC had summitted money to the Digital Economy and Society Fund according to Section 24(4) of the Digital Development for Economic and Social Development Act B.E. 2560 (2017) based on Cash Basis in total amount of 1,265.995 million baht. It is expected that the Office of the NBTC will be able to submit 785.886 million baht as state revenue.

4. Promoting and Supporting the Research and Development of Broadcasting, Television, and Telecommunications Services for Public Interest

In 2021, the NBTC has approved the allocation of funds which consistent with the purpose of the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP); consisting of Category 1: Projects that are in compliance with the objectives set forth in Section 52 (1) (2) and (3) of Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010), in the amount of 211.48 million baht, in a total of 33 projects. Category 2: Projects that fulfill the objectives specified by BTFP Fund Management Committee, in the amount of 466.00 million baht, in a total of 25 projects. Category 3: Projects that specified by the NBTC, which are 5G Testbed and Use Cases Deployment in Chiang Mai University, Khon Kaen University, and Prince of Songkla University, in the amount of 150.00 million baht. Category 4: Fund for supporting the Thai Media Fund in the amount of 500.00 million baht.

5. Social assistance and contribution

In collaboration with relevant organizations, projects and activities for social contribution have been carried out to assist the people affected by the natural disasters and the disease outbreak as follows:

- 1) Arranging the voluntary activities to perform good deeds for the society as follows:
- Mee Laew Bang Pun" (Have and Share) voluntary activity, held at Bangkok COVID-19 Monitoring Center, Bangkok City Hall, to assist the people who suffer from the COVID-19 pandemic
- "Roo Ruk Sa Muk Kee, Ruk Sing Vad Lom, Patthana Kunnaparb Cheevit" (Build Harmony, Protect Environment and Quality of Life Development" Voluntary activies.
- Glong Pan Num Jai NBTC Mee Leaw Bang pan (Happiness Box : essential supplies sharing) voluntary activities.

- 2) Arranging "Thai Ruam Krungthep Proad Pai" project in collaboration with the following organizations;
- Collaborating with Bangkok Metropolitan Administration, Thai Chamber of Commerce, hospitals, public and private agencies, to prepare the locations and facilities to the medical teams as well as assisting the people to get vaccinated in other hospitals.
- Collaborating with Department of Disaster Prevention and Mitigation, Radio Amateur Society of Thailand, and voluntary organizations to assist people living in the affected areas of "Tian Mu" tropical storm which brought heavy rains and flooding in many areas.
- Collaborating with the telecommunications operators in monitoring and controlling the quality of service and base stations as well as extending the service payment term.







Efficiency and Effectiveness of Consumers' Complaints Consideration in Broadcasting, Television, and Telecommunications Services

Telecommunications Services



Management of the Broadcasting and Telecommunications Research and Development Fund for the Public Interest

Major Performance of the Office of the NBTC in 2021



Management of the Office of the NBTC

The Office of the NBTC has performed its duties with integrity and transparency, and emphasized as professional excellence on human resources performance enhancing to support the digital economy and society transformation. In addition, it aims to support the NBTC staff "become a good and capable person" including elevating the office of the NBTC to be a fully digitalized organization, in order to serve the people and consumers promptly and efficiently. In 2021, the Major performances and achievements are as follows:

1. Maintaining operation standards and anti-corruption with good governance, and enhancing staff to perform their duties with integrity and transparency as a part of corporate culture

1.1 Good governance promotion plan, and moral ethics and transparency promotion measures have been prepared in the fiscal year 2021, and implemented to uplift the ethics and transparency of the organization. For example, the measure to improve work operation has been conducted by continual monitoring and improving the quality of services to ensure the effective and efficient services and in compliance with the standards, procedures and specified period austerely. Also, the measure to publicize information through the Office of the NBTC website has been concentrated in order to



facilitate the stakeholders about information access, to optimize the communications and publicize information transparently.

Besides, the Office of the NBTC has continuously organized the events and activities to promote good governance such as meetings, training, and Honorary Awards and Certificates Ceremony for the eligible employees to be "The Best of NBTC", to support them to perform their duties with ethics and integrity.

Accordingly, in 2022, the Office of the NBTC will consider the operational works to participate in the Public Sector Excellence Award (PSEA), to encourage the employees to be creative and innovative in developing service provision processes, regarding prompt, transparent, convenient and people-centric processes.

1.2 The Office of the NBTC has implemented the Anti-Corruption Action Plan of the fiscal year 2021 as a mechanism to drive the operational work in preventing and controlling corruption, and to raise awareness of the good governance conducts and implementation, by creating corporate values in anti-corruption, and fostering the values further to be corporate cultures.

1.3 The Office of the NBTC has participated in the Integrity and Transparency Assessment (ITA) of the year 2021, and received good appraisal in the AA level with the score of 96.60, and was in the 4th rank among the participating government agencies. In this regard, the organization shall maintain the operation standard with integrity, and transparency, and commit to improve the performance with sustainable development.

2. Elevating the Office of the NBTC to be a fully digitalized (NBTC Digitalization) and recognized as the role model of the digital governmental agency

2.1 The 3-Year NBTC Digital Roadmap (2020 - 2022) has been implemented to drive the Office of the NBTC to be a fully-digitalized organization. In 2021, the Office of the NBTC has continued its work, by focusing on Data Government preparation and information technology system development to support digital services provision to the people,

such as Single Point Data Searching System development, and the NBTC Service Portal development.

2.2 The data policy of the Office of the NBTC has been declared in order to enhance the organization's data management securely, appropriately, and effectively as well as ensure the data quality complied with the Data Governance Framework. A data governance working group has also been appointed to prescribe policies, guidelines and information standards, in accordance with the Notification of the Digital Government Development Committee which stipulates for the availability of government data management and work integration between government agencies to be consistent and linked to each other securely.

2.3 The Office of the NBTC won the Digital Government Awards 2021 (DG Awards 2021), for the second successive year, ranked the 4th among 1,922 participating agencies, and also won the excellence award in Data Governance. The DG Awards 2021 were the awards honoring for the role model and outstanding digitalized governmental transformation organizations. Such achievement awards reflect the Office of the NBTC employees' engagement and determination to reach "Data-driven Organization", by adjusting and improving their mindset and working process, that leverage them to work with unity, and lead them to the leveraged data and workflow management efficiency to transform to the digital organization.



3. Prescribing policies and practices in information security

The Office of the NBTC has prescribed the policies and practices in information security, and risks of cyber threats handling and mitigation, in order to ensure the security and reliability of the electronic transactions (e-transaction) according to the Royal Decree Prescribing the Rules and Procedures of the Public Sector's Electronic Transactions B.E. 2549 (2006). The Office of the NBTC also organized the training courses for staff to educate about information technology security practices, the Personal Data Protection Act B.E. 2562 (2019), and the Cybersecurity Act B.E. 2562 (2019), with the purpose to raise awareness of cyber threats and impact of careless usage of information technology system.

4. Risk management and internal control of the Office of the NBTC

The Office of the NBTC has recognized the importance of organization risk management to be in line with the international standard. A risk management committee of the Office of the NBTC, consisting of the administration and officers with competent in strategic planning and risk management, has been appointed to prepare the Office of the NBTC Risk Management Plan and its implementation, according to Section 79 of the State Fiscal and Financial Discipline Act B.E. 2561 (2018), and the Ministry of Finance rules on standards and procedures of public sector's risk management B.E. 2562 (2019) which stipulates the public sector to arrange internal audit, internal control, and risk management as well as risk management monitoring to minimize the risks to an acceptable level, respond to the risks promptly, and provide internal control monitoring system.

Accordingly, an internal control evaluation committee, consisting of experts from external organizations with competent in risk management, has been appointed to arrange the evaluation guidelines for the Office of the NBTC internal audit and the annual report preparation, Reporting every 6 months.

5. Human resource development and knowledge sharing to the employees

The Office of the NBTC has carried out human resource development continuously by providing digital literacy and related fields, in order to prepare for the digital organization transformation goal to Organization 4.0







In 2021, the key performances are as follows:

- 1) Organizing internal training courses and providing external training courses for employees to attend, according to Human Resource Development Plan, in various fields such as legal practices development, technologies and regulation in broadcasting, television, telecommunications, and communication satellite services, digital skills improvement to support the digital economy driving era, as well as foreign languages development.
- 2) Organizing the NBTC annual academic seminar in order to have a forum for exchanging knowledge and research in broadcasting, television, and telecommunications services aspects, as well as establishing academic collaborations between the Office of the NBTC and researchers, scholars, relevant individuals and the public.

- 3) Organizing the seminars regarding regulations and related technologies in various topics namely:
- (1) "Enabling 5G Cybersecurity" to raise awareness of the mobile service providers, and both public and private sectors to prepare for cybersecurity, and to implement the safety standard guidelines for the 5G telecommunications;
- (2) "Challenges vs. Opportunities of Thailand's Television Industry Adaptation in the New Media Era" to upskill the personnel in television broadcasting and related industries.
- 4) Inviting experts of the office of the NBTC and the experts from external organizations to share knowledge and expertise to the staff, in order to implement the knowledge for effectiveness and drive the regulatory performances in broadcasting, television, telecommunications, and communication satellites among the rapidly changing circumstances.



The Follow-up and Monitoring the Utilization of Spectrum in Broadcasting, Television, and Telecommunications Services

The Office of the NBTC has monitored and followed up the spectrum utilization in broadcasting, television, and telecommunications services, to be in line with the International Telecommunication Union (ITU) radio standardization, and related criteria notifications. In addition, the Office of the NBTC has resolved consumer complaints in broadcasting, television, and telecommunications services, as well as cooperating for public interest with both public and private sectors and the people. In 2021, the major performances and achievements are as follows:



1. Monitoring the radio frequency possession

The radio frequency possession has been monitored to comply with the radio frequency utilization with the criteria and conditions of the Office of the NBTC, and to prepare an up-to-date radio frequency possession database, used for effective frequency allocated consideration for new frequency, sharing frequency, and unutilized frequency refarming. The database is also used as primary information in monitoring unauthorized frequency for consideration, further monitoring radio frequency possession, and suppression

of violations, under the requirements of the ISO 9001:2008. In this regard, the Office of the NBTC in regional and sub-regional offices have operated the radio frequency possession monitoring in 2021 as follows:

1) Frequency traffic monitoring in 30 MHz - 3000 MHz has been conducted by dividing into 11 Frequency Band Occupancy (FBO) programs, 24 hours per program. The monitoring result shows that there is dense traffic in some frequency bands such as usage of citizen bands, amateur radios, broadcasting, digital television, and telecommunications services.

The dense traffic results from the nation-wide frequency usage for broadcasting, digital television, and telecommunications services at all times, while some other frequencies are used periodically or used as a reserved network in some areas. Some frequencies are slightly used due to transmission factors and utilization manners such as military communications networks as well as public and private sectors networks.

2) Verifying frequency possession for the usage-found bands has been conducted to prove the frequency ownerships, and ensure that they have the updated user database and actual area usage details, with the purpose for effective frequency allocation for new frequency and sharing frequency, and unutilized frequency refarming, as well as regulating and preventing illegal usage of frequency.

2. Monitoring the radio frequency emission standard

The radio frequency emission monitoring aims to control the emission, to be in line with the standards and conditions prescribed in the license of the Office of the NBTC, and to provide technical measuring service of radio frequency emission as requested or coordinated with domestic and international agencies. The operations have been conducted under the requirements of ISO 9001:2008 and ITU recommendations which relating to bandwidth field strength and spurious emissions. Details are shown in Table 6.

Table 6: Parameters for Frequency Emission Standard Monitoring

Type of Station	Monitoring Parameters
1. Radio Broadcasting Main Stations	Frequency Deviation Limits
2. Radio Broadcasting Stations for Trial	Unwanted Emission
3. Digital Television Stations	Frequency Deviation LimitsPower (Channel Power)Bandwidth
	 MER (Modulation Error Ratio) CBER (BER before LDPC) LBER (BER after LDPC)
	C/N (Carrier-to-Noise Ratio) Constellation Diagram











The Office of the NBTC has monitored the frequency emission standard in a total of 7,474 stations (7,516 times), divided into 4 categories which are (1) Radio broadcasting stations for trial (2) Radio broadcasting main stations, (3) DTV stations and (4) mobile phone/radiocommunications base stations, under the operational plan to monitor the emissions and follow up the problem resolutions.

In 2021, from the total of 7,474 monitored stations, the Office of the NBTC found that 7,346

emission standards, while 170 stations have not complied yet. Also, 42 stations were monitored repeatedly as their emissions failed to meet the standards. The primary cause of non-standardized emission is the frequency deviation limits that exceed the standards, and the spurious emission that brings about frequency interference. In this regard, the Office of the NBTC has notified the operators to solve and improve the emission to meet the standards. Details are shown in Table 7.

Table 7: Monitoring Result of Frequency Emission Standard in 2021

		Type of Station					Monitoring Result		
Regional Offices of the NBTC	Quantity (Stations)	Radio Broadcasting Stations for Trial	Radio Broadcasting Main Stations	DTV Stations	Mobile Phone/ Radio Communi- cations Base Stations	Meet the Standard	Fail to Meet the Standard	Total	
Region 1	1,725	1,401	74	194	60	1,690	39	1,729	
Region 2	2,367	2,111	133	146	0	2,330	60	2,390	
Region 3	2,157	1,846	76	250	0	2,124	48	2,172	
Region 4	1,225	870	106	249	0	1,202	23	1,225	
Total	7,474	6,228	389	839	60	7,346	170	7,516	

Remarks: Data as of December 31, 2021

Source: Regional Affairs Bureau, Office of the NBTC

3. Monitoring and resolving radio frequency interference

Radio frequency interference has been monitored to analyze the causes of domestic frequency interference as well as interference along the borders, informed by the relevant agencies and the people, or as identified by the Office of the NBTC directly. After the frequency possession and the causes of interference examination, the resolving process will be conducted immediately, especially the interference with aeronautical radio service (AEROTHAI) which impacts the aviation safety.

In 2021, there are complaints and frequency interference problems in a total of 221 cases, consisting of 68 station interference cases, 58 aeronautical radio service interference cases, 38 communication satellite interference cases, 30 radiocommunications service interference cases, 23 broadcasting service interference cases, and 4 digital TV and cable TV interferences cases respectively. The Office of the NBTC has already resolved and ceased the interference regarding the foregoing complaints, accounting for 100 percent of the total complaints, as shown in Table 8 and Chart 2.

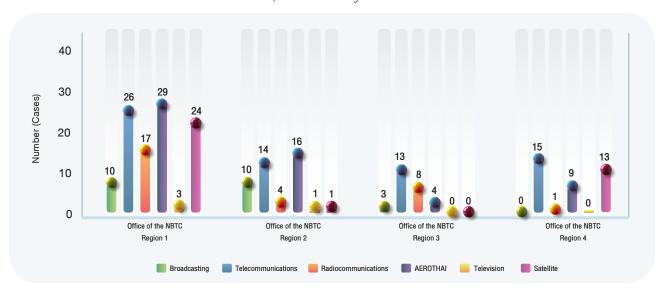
Table 8: Statistics of the Number of Complainants in Radio Frequency Services in 2021

Regulatory Agency	Office of the NBTC				Total	Interference	Percentage of	
Service	Region 1	Region 2	Region 3	Region 4	(Cases)	Ceased (Cases)	Success	
Broadcasting	10	10	3	-	23	23	100	
Telecommunications	26	14	13	15	68	68	100	
Radiocommunications	17	4	8	1	30	30	100	
Aeronautical Radio (AEROTHAI)	29	16	4	9	58	58	100	
DTV/Cable TV	3	1	-	-	4	4	100	
Satellite	24	1	-	13	38	38	100	
Total	109	46	28	38	221	221	100	

Remarks: Data as of December 31, 2021

Source: Regional Affairs Bureau, Office of the NBTC

Chart 2: Statistics of the Number of Complainants in Radio Frequency Services in 2021, Classified by Services



4. Monitoring the unauthorized frequency

According to the provisions of the International Radio Regulations, the Radiocommunications Act B.E. 2498 (1955) and the relevant notifications, the radio frequency usage has been monitored by examining the radiocommunications stations and/or unauthorized frequency, fact finding, acquiring the information and identifying the locations of

the unauthorized stations, as well as conducting the legal proceedings.

In 2021, the Office of the NBTC has monitored the frequency usage and received complaints from the people, public and private sectors, in a total of 18 cases, and unauthorized frequency usage for 17 cases, divided into frequency for broadcasting service for 12 cases, and frequency for telecommunications service for 5 cases, Details are shown in Table 9 and Chart 3.

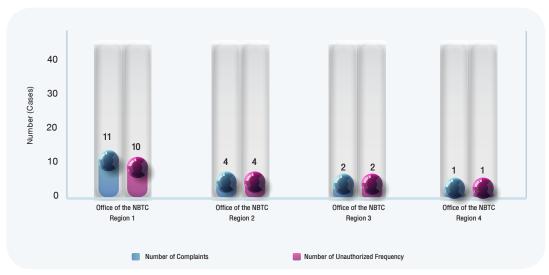
Table 9: Monitoring Results of Unauthorized Frequency in 2021

Regulatory Agency	Number of Complaints	Number of Unauthorized	Number of Unauth Classified by Ty		
Regulatory Agency	(Cases)	Frequency (Cases)	Broadcasting/ Television	Radio Communications	
Office of the NBTC, Region 1	11	10	7	3	
Office of the NBTC, Region 2	4	4	4	-	
Office of the NBTC, Region 3	2	2	-	2	
Office of the NBTC, Region 4	1	1	1	-	
Total (Cases)	18	17	12	5	

Remarks: Data as of December 31, 2021

Source: Regional Affairs Bureau, Office of the NBTC

Chart 3: Monitoring Results of Unauthorized Frequency in 2021



5. Legal searching and arresting

In order to encourage legal frequency utilization without causing interference, and to control unauthorized radiocommunications use, installation and trade, the Office of the NBTC has imposed the regulations by searching and arresting offenders in broadcasting, television, and radiocommunications services as well as unauthorized radiocommunications use.

In 2021, the Office of the NBTC has joined force with the police in searching and arresting offenders, and forwarding to the inquiry officers for prosecution, in a total of 16 cases, divided into the offense in broadcasting and television services for 1 case, and offense in radiocommunications service for 15 cases. 112 items of exhibits have also been found in the searching and arresting processes. Details are shown in Table 10.

Table 10: Statistics of Searching and Arresting Offenders in 2021

	Type of Service		Property in	
Regulatory Agency	Total Cases	Broadcasting/ Television	Radio Communications	Dispute (Items)
Office of the NBTC, Region 1	3	-	3	8
Office of the NBTC, Region 2	1	1	-	5
Office of the NBTC, Region 3	12	-	12	99
Office of the NBTC, Region 4	-	-	-	-
Total	16	1	15	112

Remarks: Data as of December 31, 2021

Source: Regional Affairs Bureau, Office of the NBTC

6. Health and safety regulations regarding the utilization of radiocommunications equipment and measurement on Electromagnetic Field (EMF) exposure of the radiocommunications station

To comply with the guidelines on health and safety regulations, and the Notification of the NTC on safety standard for the Use of Radiocommunication Equipment on Human Health (NTC. TS. 5001-2550), the Office of the NBTC has imposed the measurement on

Electromagnetic Field (EMF) exposure. The results of the measurement would be compared with the electromagnetic exposure limits, when a device is placed near the body's head or less than 20-centimeter distance from the body in a normal use position, which the Specific Absorption Rate (SAR) ranging from 100 kHz - 10 GHz for the occupational exposure group and general exposure group must not exceed the NTC. TS. 5001-2550 standard. Details are shown in Table 11.

Table 11: NTC. TS. 5001-2550 Standard

1	SAR Limit for Occupational Exposure Group	SAR Limit (W/kg)
	SAR Average for Whole-Body	0.4
	SAR Average for Head & Trunk	10
	SAR Average for Limbs	20
2	SAR Limit for General Exposure Group	SAR Limit (W/kg)
2	SAR Limit for General Exposure Group SAR Average for Whole-Body	SAR Limit (W/kg)
2		

The Office of the NBTC has assigned the telecommunications operators with base stations owned to display the SAR limit of radiocommunication devices, with EMF exposed components closing to the body's head or less

than 20-centimeter distance from the body in a normal use position, and fixed radiocommunications devices with wide-area radiation, according to the NTC. TS. 5001-2550 standard. Details are shown in Table 12 and 13.

Table 12: Electromagnetic Field Strength⁹ Limits for the Occupational Exposure Group

Frequency	E-field Strength (V/m)	H-field strength (A/m)	Equivalent Plane Wave Power Density S _{eq} (W/m²)
9 kHz - 65 kHz	610	24.4	-
65 kHz - 1 MHz	610	1.6/f	-
1 MHz - 10 MHz	610/f	1.6/f	-
10 MHz - 400 MHz	61	0.16	10
400 MHz - 2 GHz	3f ^½	0.008f ^½	<i>f</i> /40
2 GHz - 300 GHz	137	0.36	50

Table 13: Electromagnetic Field Strength Limits for the General Exposure Group

Frequency	E-field Strength (V/m)	H-field strength (A/m)	Equivalent Plane Wave Power Density S _{eq} (W/m²)
9 kHz - 150 kHz	87	5	-
150 kHz - 1 MHz	87	0.73/f	-
1 MHz - 10 MHz	87/f ^{1/2}	0.73/f	-
10 MHz - 400 MHz	28	0.073	2
400 MHz - 2 GHz	1.375f ^½	0.0037f ^½	f/200
2 GHz - 300 GHz	61	0.61	10

 $^{^{9}}$ 1) E-field strength is the intensity of an electromagnetic field. The standard unit is Volt per meter (V/m).

²⁾ H-field strength is the intensity of an electromagnetic field. The standard unit is Ampere per meter (A/m).

³⁾ f means frequency. The standard unit is Megahertz (MHz)

⁴⁾For frequencies ranging from 100 kHz to 10 GHz, the Seq, E² and H² are the average of any 6-minute period.

⁵⁾ For frequencies over 10 GHz, the S_{eq} , E^2 and H^2 are the average of any $68/f^{105}$ minute period. In this case, f means frequency and the standard unit is Gigahertz (GHz).

The Office of the NBTC has regularly monitored the technical standard of the telecommunications operators' radio frequency emission of the mobile base stations, by prescribing the emission monitoring plan for human health and safety from harms caused by electromagnetic emission of the

radiocommunications devices after the station installation, in compliance with the regulatory measure on human health and safety on radiocommunications equipment usage, and relevant notifications of the NBTC. Details are shown in Table 14.

Table 14: Plan-Result of Radiocommunication Stations EMF radiation measurement in 2021

	Regulatory Agency									
Month	Office of	the NBTC ion 1		the NBTC ion 2		the NBTC ion 3		the NBTC ion 4	То	tal
	Plan	Result	Plan	Result	Plan	Result	Plan	Result	Plan	Result
Jan	67	54	92	63	60	83	48	77	267	277
Feb	66	224	92	114	60	112	48	74	266	524
Mar	66	179	93	167	60	109	48	83	267	538
Apr	66	71	95	85	60	75	48	60	269	291
May	66	96	97	103	60	113	48	87	271	399
Jun	64	85	96	84	60	92	48	105	268	366
Jul	64	70	96	73	60	31	48	68	268	242
Aug	64	37	96	85	60	110	48	57	268	289
Sep	63	40	94	67	60	61	48	93	265	261
Oct	63	178	93	83	60	49	48	85	264	395
Nov	63	124	94	179	60	61	48	105	265	469
Dec	-	2	91	62	60	4	48	43	199	111
Total	712	1,160	1,129	1,165	720	900	576	937	3,137	4,162

Remarks: Data as of December 31, 2021 Source: Regional Affairs Bureau, Office of the NBTC In 2021, the Office of the NBTC has conducted the electromagnetic field strength examination of the telecommunications operators' base stations nationwide, in a total of 3,137 times, according to the plan¹⁰ as well as conducting the additional examination

as informed by the people complaints, in a total of 1,025 times. From the total of 4,162 times, the results show that the electromagnetic field radiation of the operators' radiocommunication stations conform to the standards. Details are shown in Table 15

Table 15: Results of Electromagnetic Field (EMF) Radiation measurement of Radiocommunication Stations in 2021, Categorized by Operators

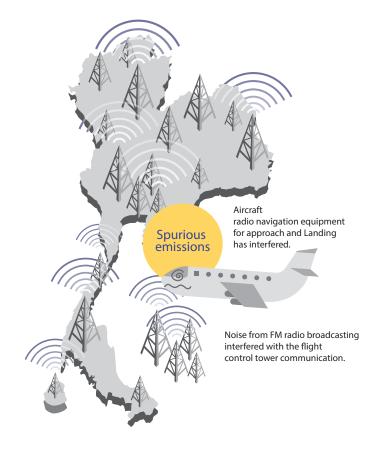
	Operation Plan		Oper	ators	EMF Radiation	
Regulatory Agency	in 2021	AWN	DTN	TUC	NT	Measurement Results
Office of the NBTC Region 1	712	303	238	249	370	1,160
Office of the NBTC Region 2	1,129	282	241	239	403	1,165
Office of the NBTC Region 3	720	223	187	175	315	900
Office of the NBTC Region 4	576	233	208	184	312	937
Total	3,137	1,041	874	847	1,400	4,162

Source: Regional Affairs Bureau, Office of the NBTC

7. Regulating the utilization of frequency and devices of broadcasting stations to comply with the specified standards

To resolve the frequency interference with the aeronautical radio service, in order to encourage effective frequency utilization without interference, the Office of the NBTC has developed a mechanism for broadcasting monitoring by improving the effectiveness and facilitating the relating technical services as follows:

- 1) Registration of monitoring/certifying agencies for audio broadcasting transmitters for trial broadcasting service, in a total of 65 agencies.
- 2) Setting up a LINE group for spurious emission testers, as a communication channel for counseling, problem solving, and facilitating the testers 24 hours a day.
- 3) Enabling the access to relocation information after receiving the approval, in order to enable the stations to perform the technical examination without the approval documents waiting.



The NBTC annual electromagnetic fields radiation monitoring plan must cover the area not less than 70 percent of total districts under the NBTC regional offices' responsibility, and must cover the services of all operators

Efficiency and Effectiveness of Consumers' Complaints Consideration in Broadcasting, Television, and Telecommunications Services



The Office of the NBTC emphasizes on regulating broadcasting, television and telecommunications services to protect the consumers from being exploited. The consumers who encounter any problems or inequality and difficulties relating to broadcasting, television or telecommunications services can consult the issues, ask for information or file complaints to the Office of the NBTC.

All these years, the Office of the NBTC has developed and improved the effectiveness of the Call Center 1200 service, in order to cope with the consumers' complaints. Consumers can file complaints and obtain additional information through various communication channels such as the NBTC Call Center 1200 (Hotline 1200 toll-free), the website http://1200.nbtc.go.th, email 1200@nbtc.go.th, the application 'Mobile NBTC 1200', social network; Facebook 'NBTC', LINE application '@NBTC1200', and the postal service, etc.

In addition, the Office of the NBTC has developed the communication channels to facilitate the visually and hearing impaired, as well as collaboration on receiving complaints and integrating the information regarding the consumer protection with the following agencies; the Government Contact Center "GCC 1111", Office of the Permanent Secretary, and Office of the Consumer Protection Board (OCPB) "Call Center 1166". The Office of the NBTC has also integrated the telecommunications licenses database, through the NBTC Data Center System with the Office of the Consumer Protection Board (OCPB).

In 2021, the major performances and achievements are as follows:

1. Receiving complaints

In 2021, the Office of the NBTC has received complaints from the people through the Call Center 1200 in a total of 11,332 cases, the top-three issues as follows:

- 1) complaints about mobile phone services for 9,106 cases, such as unsubscribed SMS charges, spam SMS, SMS fraud, mobile number portability.
- 2) complaints about internet services for 1,694 cases.
- 3) other complaints for 371 cases, such as television service contracts, cable TV, satellite dishes, inappropriate contents on television/radio.

According to the statistics, the number of complaints has increased significantly, compared to 2020, due to a steady increase of the spam SMS and SMS frauds, Details are shown in Table 16.



Table 16: Complaints received through NBTC Call Center 1200 in 2021

No.	Complaints	Quantity	Increase/	
NO.	NO. COMPIAINES		2021	(Decrease)
1	Mobile Phone Services - Unsubscribed SMS Charges, Spam SMS, SMS Fraud, Mobile Number Portability		9,106	7,674
2	Internet Services	458	1,694	1,236
3	Unable to View TV Programs via Satellite Boxes		103	(42)
4	Installation of Mobile Phone base stations and Radiocommunications Stations	67	58	(9)
5	Others such as Television Service Contracts, Cable TV, Satellite Dishes, Inappropriate Contents on Television/Radio, Out-of-Service Fixed Line Network, etc.	175	371	196
	Total	2,277	11,332	

Remarks: Data as of December 2021

Source: Data Operation Center Bureau, Office of the NBTC

For inquiry service through the NBTC Call Center 1200, there were a total of 50,435 cases, consisting of;

- 1) Inquiries about communication channels to contact the service providers in broadcasting and telecommunications businesses, complaints follow-up, and disorderly communication lines problems report, for 22,380 cases.
- 2) Inquiries about mobile phone services such as information of the internet broadband packages as a part of COVID-19 supporting

- measure, broadband internet services in border areas, invalid service charges, mobile number portability, and SMS frauds, etc. for 16,498 cases.
- 3) Inquiries about radiocommunications license application process, drone registration, internet service information, for 9,021 cases.
- 4) Inquiries about broadcasting and digital terrestrial television services, etc. for 2,536 cases.

Details are shown in Table 17.

Table 17: Statistics on Inquiries through the NBTC Call Center 1200

		Quantity	/ (Cases)	Increase/
No.	Inquiries	2020	2021	(Decrease) from 2020
1	Inquiries about mobile phone services such as information of the internet broadband packages as a part of COVID-19, supporting measure broadband internet services in border areas, invalid service charges, mobile number portability, and SMS frauds, etc.	26,244	16,498	(9,746)
2	Inquiries about broadcasting service information, digital terrestrial television viewing information, cable TV, satellite TV, and radio broadcasting.	6,565	2,536	(4,029)
3	Inquiries about radiocommunications license application process, drone registration, internet service information.	10,563	9,021	(1,542)
4	Others such as inquiries about communication channels to contact the service providers in broadcasting and telecommunications businesses, complaints follow-up, and messy communication lines problems report, etc.	4,658	22,380	17,722
	Total	48,030	50,435	

Remarks: Data as of December 2021

Source: Data Operation Center Bureau, Office of the NBTC

2. Effectiveness and efficiency of consumers' complaint handling in broadcasting, television, and telecommunications services

2.1 Complaint handling in broadcasting and television services

1) The Office of the NBTC has solved the complaints in broadcasting and television services, according to the Notification of the NBTC on Process and Duration in Complaint Consideration regarding Broadcasting and Television Services, and the fact-finding process based on the Notification of the NBTC on Criteria

and Procedures on Facts Finding of Infractions in Broadcasting and Television Services, which are subject to administrative penalties B.E. 2556 (2013). Consequently, the Office of the NBTC has prepared the analysis and proposals for the NBTC consideration according to the Notification of the NBTC on the actions considered as consumer exploitation in radio and television broadcasting services B.E. 2555 (2012). Overall, the Office of the NBTC has considered the complaints within the stipulated time frame or faster. The complaint handling process is described as follows:

- Receiving complaints from various channels, and assigning to the responsible persons to effectively cope with those complaints.
- Notifying the receipt of complaints to the complainants, gathering facts from the licensees, operators and other sources as well as collaborating with public sector and relevant agencies, such as Food and Drug Administration (FDA), and Office of the Consumer Protection Board (OCPB), etc.
- Considering the complaints according to the process. That is, the subcommittee of consumer protection in broadcasting and television, consisting of the experts in consumer protection and related fields services, are appointed under the Act on Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment. The subcommittee is responsible for preparing the proposals to the NBTC for consideration.

- Implementing the NBTC resolutions such as prescribing administrative penalty to a licensee who executes the consumer exploitation, as well as settling a complaint, or coordinating with related agencies.
- Notifying the complainants of the consideration results, the proceedings and the consumer rights.
- Prescribing conditions to the digital television operators to prepare the specific mechanism for receiving complaints and report the problem-solving results to the NBTC on a sixmonthly basis.

However, the people and the complainants can follow up their complaint solving process and results through the specified channel of the Office of the NBTC and the website. Details are shown in Table 18.

Table 18: Results of Handling Complaints Relating to the Actions Considered as Consumer Exploitation in Broadcasting and Television Services

Dataile	Quantity	Settled/Completed		In progress	
Details	(Cases)	Cases	Percentage	Cases	Percentage
Number of complaints by the process	144	108	75.00	36	25.00
Number of complaints to review with other	29	-	-	29	100.00
agencies					
Total	173	108	62.43	65	37.57

Remarks:

- 1) Data as of December 31, 2021, collected from October 1, 2020 September 30, 2021 as the complaint handling and consideration process in broadcasting and television services, according to the Notification of the NBTC on process and duration in complaints consideration regarding broadcasting and television services, includes the operating duration by the process at least 90 120 days.
- 2) The complaints by the process are the complaints considered internally and completed according to the process.
- 3) The consideration duration of the complaints to review with other agencies, such as the Food and Drug Administration (FDA), cannot be specified as a fixed duration cannot be prescribed to other agencies.

Out of the total of 173 complaint cases, 108 cases were settled or completed by the process, accounting for 75.00 percent. 36 cases have been in the handling process of the NBTC, accounting for 25.00 percent, and 29 cases have been reviewed with other agencies. Also, categorized by service, 158 cases were complaints in the television service,

while 15 cases were in the broadcasting service. Most of the television service complaints related to television broadcasting errors, changing the terms of service without at least 30 days prior notice, cancellation of service contract, delay in the deposit-refund process, and billing errors. Details are shown in Table 19.

Table 19: Results of Complaints Handling Relating to the Actions Considered as Consumer Exploitation in Broadcasting and Television Services

	Quantity	Settled/C	ompleted	In pro	ogress
Type of Service	Cases	Cases	Percentage	Cases	Percentage
Television Service					
1. Digital Terrestrial Television					
1.1 Program Channels	25	17	68.00	8	32.00
2. Subscription Service					
2.1 Network					
2.1.1 Satellite Box	123	86	69.92	37	30.08
2.1.2 Cable TV	5	2	40.00	3	60.00
2.2 Program Channels	5	3	60.00	2	40.00
Total	158	108	68.35	50	31.65
Broadcasting Service					
1. High power radio broadcasting					
(Existing Operators) Main station	-	-	-	-	-
2. Broadcasting Trial Licensees					
2.1 Public Service	-	-	-	-	-
2.2 Community Service	-	-	-	-	-
2.3 Business Service	15	-	-	15	100.00
Total	15	-	-	15	100.00
Grand Total	173	108	62.43	65	37.57

Remarks:

- 1) Data as of December 31, 2021
- 2) Data collected from October 1, 2020 September 30, 2021 as the complaint handling and consideration process in broadcasting and television services, according to the Notification of the NBTC on process and duration in complaints consideration regarding broadcasting and television services, includes the duration for operating by the process at least 90 120 days.

Besides, according to the complaint handling process, if the NBTC has an administrative order that may affect the right of the party, the subcommittee of consumer protection in broadcasting and television services (assigned by the NBTC) shall offer the licensee an opportunity to acquire sufficient information, refute, and present proof. The subcommittee may also clarify the legal compliances, or offer recommendations for the licensee to improve its programs and advertisement broadcasting services by taking consumer protection into account which attempt to reduce the infractions that will continue to affect the consumers

Out of the total of 173 complaint cases, 93 cases are the complaints on infractions, under the Notification of the NBTC on the standards of subscription cable television service contract B.E. 2556 (2013), Consisting of changing in terms of service, television program broadcasting adjustment, billing inaccuracy, cancellation of service contract and delay in the deposit-refund process. Out of those 93 cases, 66 cases were settled or completed, and the complainants were willing to terminate the complaints, accounting for 70.97 percent. The NBTC has also considered and agreed to terminate those complaints. Details are shown in Table 20.

Table 20: Results of Complaints Handling Relating to the Actions Considered as Infractions under the Notification of the NBTC on the Standards of Subscription Cable Television Service Contract

Standards of Subscription Cable Television Service Contract	Quantity (Cases)	Settled/ Completed	In Progress
Changing in Terms of Service	24	19	5
Television Program Broadcasting Adjustment	35	22	13
Billing in accuracy	7	6	1
Cancellation of Service Contract	19	15	4
Delay in the Deposit-Refund Process	8	4	4
Total	93	66	27

The Office of the NBTC has operated the complaints consideration under the provision of the Notification of the NBTC on Process and Duration in Complaints Consideration regarding Broadcasting and Television Services, and defined the indicators of Strategy 3: Content Regulation, Consumer Protection and Promotion of Civil Rights and Liberty (to improve the problemsolving duration and complaint handling to be within the specified timeframe) of the Second Broadcasting Master Plan B.E. 2563 - 2568 (2020 - 2025). The purpose is to reduce the complaint consideration duration in order to solve the complaint effectively.

Considering during October 1, 2020 to September 30, 2021, the handling process analysis shows that the average complaint handling duration is 119 days, which is still within the specified timeframe under the foregoing notification (120 days). However, the timeframe for some cases cannot be specified; for example, the cases in the process of clarification by the operators or in consideration of other agencies, such as the Food and Drug Administration (FDA). In addition, some cases are complicated. Cooperating within the office of the NBTC and other agencies to find facts, proofs and records, is needed to analyze and prepare the proposals. Therefore, the timeframe cannot be fixed.

2) The Office of the NBTC has solved the complaints on the program schedules and contents in broadcasting and television services within the timeframe of 120 days11, according to the Notification of the NBTC on Process and Duration in Complaint Consideration regarding Broadcasting and Television Services, and the fact-finding process based on the Notification of the NBTC on criteria and procedures on facts finding of infractions in broadcasting and television services, which are subject to administrative penalties B.E. 2556 (2013), and submitted the complaints to the subcommittee for consideration, prior to submission of the issues to the NBTC subcommittee on broadcasting service and the NBTC for further consideration.

The complaint handling process facilitates the complainants to file their complaints and follow up through various channels, namely the NBTC Call Center 1200, the website 'https://1200.nbtc.go.th/contact/', Facebook 'NBTC1200', LINE Application '@ NBTC1200', as well as onsite services at the Office of the NBTC (headquarters and regional offices) and Illegal Radio and Television Contents Monitoring Center. The Office of the NBTC has also collaborated with relevant organizations

to regulate the program contents. Due to all complaints from all channels that flow into the examination process, the problem-solving duration indicators have been defined to reduce complaint handling time, less than the criteria specified in the Notification of the NBTC on Process and Duration in Complaint Consideration regarding Broadcasting and Television Services, which categorized into 5 levels as follows:

Level 1: The average duration with 1 percent faster than the duration specified by the Notification.

Level 2: The average duration with 2 percent faster than the duration specified by the Notification.

Level 3: The average duration with 3 percent faster than the duration specified by the Notification.

Level 4: The average duration with 4 percent faster than the duration specified by the Notification.

Level 5: The average duration with 5 percent faster than the duration specified by the Notification.

In addition, to solve the problems more efficiently, the complexity¹² of the complaints is divided into 3 levels as follows:



¹¹ In case of period extension, it must not exceed 157 days.

^{12 1)} Less complicated issues mean the complaints with comprehensive evidence and no opinions of external agencies or experts needed.

²⁾ Moderately complicated issues mean the complaints with some proof-finding difficulties or opinions of a external agency or an expert are needed.

³⁾ Very complicated issues mean the complaints with proof-finding difficulties, or opinions of external agencies or experts are needed, or additional proceedings are needed to solve the problems and promote the efficiency in regulating program schedules and contents in broadcasting and television services.

The Office of the NBTC has solved the complaints regarding program schedules and contents in broadcasting and television services under the complaint handling process, in a total of 89 cases, accounting for 100 percent of the total complaints.

The complaints can be categorized by service types as follows:

- 1) Digital terrestrial television service for 51 cases.
- 2) Non-frequency used television (satellite and cable TV) for 10 cases.
- 3) Audio broadcasting for 28 cases (existing radio service for 4 cases and trial radio broadcasting for 24 cases).

Besides, the total complaints of 89 cases can be categorized as follows:

1) The complaints filed to the Office of the NBTC by the people, in a total of 44 cases (digital terrestrial television for 33 cases, non-frequency used television (satellite and cable TV) for 6 cases, existing radio service for 3 cases, and trial radio broadcasting for 2 cases).

2) The problems detected by the Office of the NBTC, in a total of 42 cases (digital terrestrial television for 15 cases, non-frequency used television (satellite and cable TV) for 4 cases, existing radio service for 1 case, and trial radio broadcasting for 22 cases).

3) The issues notified by external organizations, in a total of 3 cases, related to digital terrestrial television.

The complaint handling duration complies with the timeframe under the Notification of the NBTC on Process and Duration in Complaint Consideration regarding Broadcasting and Television Services, and the specified indicators. The average duration is in Level 5 (5 percent faster than the duration specified by the notification), consuming an average of 114 days. The complaints can also be categorized by the complexity as follows: less complicated issues for 19 cases, moderate complicated issues for 24 cases, and very complicated issues for 46 cases. Details are shown in Table 21.

Table 21: Complaints on Program Schedules and Contents in Broadcasting and Television Services

			Operation Completed				
Source	Quantity	Digital Terrestrial Television	Satellite and Cable TV	Existing Radio Service	Trial Radio Broadcasting	Cases	Percentage
Complaints filed by the people	44	33	6	3	2	44	100
Problems detected by the Office of the NBTC	42	15	4	1	22	42	100
Issues notified by external organizations	3	3	-	-	-	3	100
Total	89	51	10	4	24	89	100

Remarks: 1) Data as of December 31, 2021

²⁾ Data collected under the complaint handing process during October 1, 2020 - September 30, 2021

According to the complaint consideration, the most common issue is the Prohibited broadcasting program content under Section 37 of the Broadcasting Business Act B.E. 2551 (2008), which are 1) the contents that are contrary to public orders or good morals, relating to crime news and violence illustration, and 2) the contents with severe impact on public health, relating to claims on the eye-disease healing properties of the supplements, information on the COVID-19, or the COVID-19 vaccine efficacy, accounting for 44.94 percent. The second most common issue is failure to comply with the revenue earning

conditions of trial radio broadcasting in public and community services, accounting for 26.97 percent, in consideration with the Notification of the NBTC on regulatory criteria on trail radio broadcasting B.E. 2556 (2013). The third is improper use of speech or language, accounting for 13.48 percent. Besides, the presentation of inaccurate information and bias, mostly relating to the COVID-19 pandemic and vaccines, accounted for 12.36 percent. The last issue is the television program rating system, relating to sexual harassment and violence against women, accounting for 2.25 percent. Details are shown in Chart 4.

Chart 4: Complaints on Program Schedules and Contents



2.2 Complaint Handling intelecommunications service

1) The Office of the NBTC has coped with the complaints of the consumers and the sufferers in telecommunications service, according to the provisions of the Notification of the NBTC on the Complaint Process and Consideration to the Complaints of Telecommunications Services B.E. 2559 (2016). Overall, the complaint consideration of the Office of the NBTC is within the specified timeframe or faster. The process of complaint handling is described as follows:

- Receiving complaints through various channels and verifying the documents and relevant proofs
- Notifying the licensees of the complaints and examining the information from the licensees by clarification and presentation of relevant proofs
- Notifying the problem-solving results and clarifications to the complainants. In the case that the complainants are satisfied with the clarifications, the complaints are settled. Whereas, the complainants are not satisfied with the clarifications, the Office of the NBTC shall take the issues into the consideration process.

For the uncomplicated cases, it will be submitted to the Secretary-General to consider by following the diagnostic guidelines, while the complicated case will be submitted to the subcommittee of consumer protection in telecommunications service, appointed by the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment. The subcommittee consists of the experts in consumer protection and related fields, responsible for proposals preparing for the NBTC consideration.

 Notifying the consideration results, the proceeding to the complainants and the operators

In 2021, the Office of the NBTC has solved the complaints and problems of the plaintiffs in telecommunications service such as spam SMS, standards and quality of services, billing inaccuracy, cancellation of add-on services, and service terms limitation. Out of the total complaint of 2,267 cases, 1,620 cases were solved and settled, accounting for 71.46 percent, while 647 cases are in progress, accounting for 28.54 percent, Details are shown in Chart 5.



Chart 5: Status of Complaint Handling in Telecommunications Service in 2021

The settled complaints can be categorized into 1) mobile phone service for 1,716 cases, accounting for 75.69 percent 2) internet service for 542 cases, accounting for 23.91 percent

and 3) Fixed-line service for 9 cases, accounting for 0.4 percent. Details are shown in Table 22 and Chart 6.

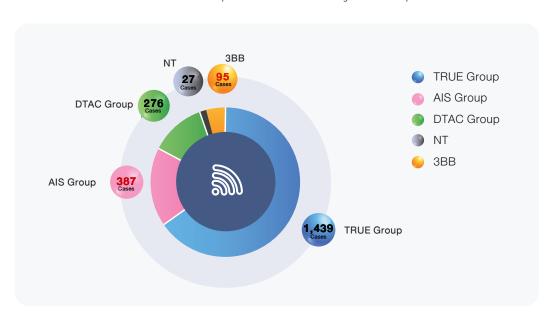
Table 22: Status of Settled Complaints in Telecommunications Service in 2021

Nia	No. Type of Service	Total Case				
NO.		Quantity (Cases)	Percentage			
1	Mobile Phone Service	1,716	75.69			
2	Internet Service	542	23.91			
3	Fixed-Line Service	9	0.4			
	Total	2,267	100.00			

Remarks: Data as of November 19, 2021

Source: Telecommunications Consumer Protection Bureau, Office of the NBTC

Chart 6: Number of Complaints Classified by Service providers



Remarks: Data as of November 19, 2021

Source: Telecommunications Consumer Protection Bureau, Office of the NBTC

According to the filed complaints, the top-5 most concerned issues are as follows:

1) problem of receiving spam SMS for 600 cases, accounting for 26.47 percent, 2) billing inaccuracy for 537 cases, accounting for 23.69 percent, 3) cancellation of service for 484 cases, accounting

for 21.35 percent, 4) standard of service provision for 418 cases, accounting for 18.44 percent and 5) validity of Service for 99 cases, accounting for 4.37 percent respectively. Details are shown in Table 23.

Table 23: Results of Settled Complaints, Categorized by the Problem Issues in 2021

Time of Computations	O ventito i	Davisantania	Status			
Type of Complaints	Quantity	Percentage	Settled	In progress		
Receiving spam SMS	600	26.47	496	104		
Billing inaccuracy	537	23.69	357	180		
Cancellation of service	484	21.35	363	121		
Standard of service provision	418	18.44	279	139		
Validity of service	99	4.37	56	43		
Quality of service provision	61	2.69	36	25		
Personal data privacy	58	2.56	26	32		
Incorrect/insufficient information	6	0.27	4	2		
Service accessibility	2	0.08	1	1		
Prepaid service top-up	1	0.04	1	0		
Other complaints	1	0.04	1	0		
Total	2,267	100	1,620	647		

Remarks: 1) Data as of December 31, 2021

2) Data collected under the complaint handling process during October 1, 2020 - September 30, 2021

Source: Telecommunications Consumer Protection Bureau, Office of the NBTC

To handle the most common problem of receiving spam and fraud SMS, the Office of the NBTC has collaborated with the relevant agencies, which are Ministry of Digital Economy and Society, Royal Thai Police, Cyber Crime Investigation Bureau (CCIB) and telecommunications operators to elevate the measures against fraud SMS problem, and strictly penalize the content providers by pursuing legal proceedings against

the scammers, according to the Computerrelated Crime Act, in order to efficiently solve the problems.

Considering the total complaints of 2,267 cases, 1,620 cases were solved and settled in 2021, accounting for 71.46 percent. In this regard, the Office of the NBTC has been striving to improve the complaint handling rapidly and effectively. Details are shown in Table 24.

Table 24: Efficiency of Complaint resolved in 2020 and 2021

			2020		2021		
No.	Complaint Issues	Total Quantity (Cases)	Settled	In progress	Total Quantity (Cases)	Settled	In progress
1	Receiving spam SMS	-	-	-	600	496	104
2	Billing inaccuracy	489	429	60	537	357	180
3	Cancellation of service	375	340	35	484	363	121
4	Standard of service provision	491	382	109	418	279	139
5	Add-on Services	161	153	8	-	-	-
6	Validity of service	102	77	25	99	56	43
7	Quality of service provision	63	51	12	61	36	25
8	Personal data privacy	45	39	6	58	26	32
9	Incorrect/insufficient information	11	10	1	6	4	2
10	Service accessibility	1	1	-	2	1	1
11	Other complaints	6	4	2	1	1	-
12	Prepaid service top-up	1	1	-	1	1	-
	Total	1,745	1,487	258	2,267	1,620	647

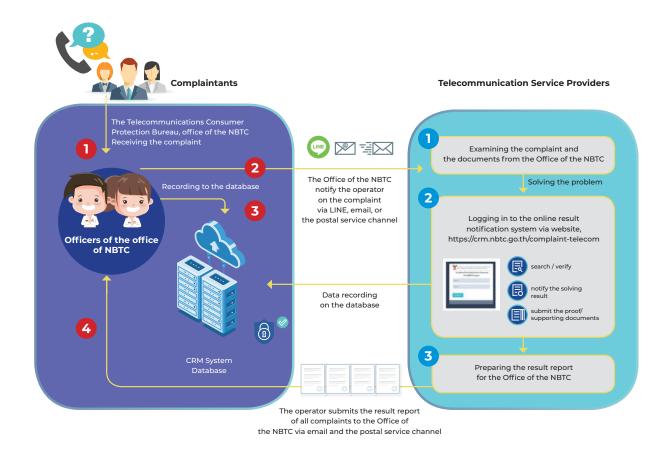
Source: Telecommunications Consumer Protection Bureau, Office of the NBTC

2) The Notification of the NBTC on the Complaint Process and Consideration to the Complaints of Telecommunications Services B.E. 2559 (2016) has been revised by the working group to comply with the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment. Currently, it is in the process of the study and analysis, as well as notification preparation.

3) The Database system development for supporting the complaints receipt and consumer protection in telecommunications service. The Office of the NBTC has continually developed the database system for supporting the complaints receipt and dispute resolution in telecommunications service.

In 2021, the CRM system has been improved to enable the Application Programming Interface (API) to connect to the information of Department of Provincial Administration, Ministry of Interior, in compliance with the Notification of the Department of Provincial Administration regarding ID card copied document cancellation, and with Thailand 4.0 Policy, since November 1, 2021. In addition, the Office of the NBTC has developed the complaint statistics reporting system in telecommunications service and consumer network database as well as the evaluation system to monitor the quality of service. Currently, it is in the preparation of CRM system development as a channel for telecommunications operators to be involved in complaint handling.

Picture 3: Channels for Complaint Resolving of the Telecommunications Service Providers



Management of the Broadcasting and Telecommunications Research and Development Fund for the Public Interest



In 2021, The major performances and achievements of the Broadcasting and Telecommunications Research and Development Fund for the Public Interest (BTFP), under the operations of the Fund Management Committee, are as follows:

1. The major performances

1.1 Strategic plan implementation

The 4-Year Action Plan of the Broadcasting and Telecommunications Research and Development Fund for the Public Interest B.E. 2563 - 2566 (2020 - 2023) has been implemented and evaluated in order to pursue the mid-term plan review (during the end of 2021 to early 2022), by comparing the fund spending outcomes to the strategic issues, strategies, and the plan key indicators, with the purpose to identify the goal achievements and the compliance with the national plans and policies, the NBTC master plans, consisting of the Spectrum Management Master Plan, the Telecommunications Master Plan, the Broadcasting Master Plan and the Universal Basic Telecommunications and Social Service Plan

1.2 Fund allocation

The fund has been allocated to the projects with the purpose to enhance the public interest in the following categories.

Category 1: Projects with objectives in compliance with Section 52 (1) (2) and (3) of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment, for 33 projects, in a total of 211.48 million baht.







Category 2: Projects with specified objectives by the Fund Management Committee, 25 projects, in a total of 466.00 million baht, including the fund allocated to the government agencies in a total of 164.03 million baht.

Category 3: Projects with the NBTC specification, 6 projects, in a total of 7,851.86 million baht as follows:

- 1) 5G Testbed and Use Case Deployment Projects of Chiang Mai University, Khon Kaen University, and Prince of Songkhla University, in a total of 150.00 million baht.
- 2) Supporting the IT expenses in the Construction of Agricultural Research and Development Center of the Royal Project Foundation, in a total of 212.60 million baht.
- 3) Supporting the consulting project of the property account management, service monitor provision, and property counting after the provision service terms ending of mobile phone signal and broadband internet service in the border areas (Zone C+) and the remoted areas (Zone C) project, under the Universal Basic Telecommunications and Social Service Plan No. 2 B.E. 2560 2564 (2017 2021), in a total of 500.00 million baht.
- 4) Supporting the government policy in providing universal basic telecommunications and social service, in a total of 5,677.11 million baht.
- 5) Prescribing measures to support online education with internet broadband packages to mitigate the impact of the COVID-19 pandemic, phase 2, in a total of 1,310.22 million baht.
- 6) Promoting the qualified community broadcasting operators (the 4^{th}), according to the Notification of the NBTC on criteria to promote the qualified community and support the qualified community broadcasting operators B.E. 2560 (2017) (B.E. 2564 (2021)), in a total of 1.93 million baht

Category 4: Fund for supporting the Thai Media Fund, in a total of 500.00 million baht

1.3 Financial management The total revenue of the BTFP is 15,166.15 million baht.

- 1) Budget allocated from the Office of the NBTC, in a total of 1,100.00 million baht.
- 2) Contributions from the licensees in broadcasting, television, and telecommunications services, in a total of 7,387.14 million baht.
- 3) Profits of the BTFP, in a total of 410.64 million baht.
- 4) Tax income, in a total of 691.54 million baht.
- 5) Budget borrowed by the Office of the NBTC, in a total of 5,514.34 million baht.
- 6) Others, in a total of 62.48 million baht.

The total expenditure of the BTFP is 5,665.67 million baht.

- 1) Budget allocated to the projects according to the fund's objective, in a total of 4,169.05 million baht.
- 2) Refund of overpaid license fees, in a total of 988.62 million baht.
- 3) Others such as submitting sales tax, in a total of 508.00 million baht.

The BTFP has made bank deposit with the commercial banks and domestic specialized financial institutions, according to the regulations of the Fund Management Committee on capital preservation, disbursement, accounting and accounting system B.E. 2555 (2012) and its amendment, gaining the yield rate at 0.49 percent.

1.4 Monitoring and evaluation

The guidelines on the fund monitoring and evaluation have been prescribed as follows:

1) Setting up the subcommittee on the Broadcasting and Telecommunications Research and Development Fund for the Public Interest projects monitoring and evaluation, to follow up and evaluate the outcomes of fund spending, in compliance with the BTFP's objectives, as well as inviting the grantees to report the progress regularly.

- 2) Notifying the grantees to submit the progress reports and expenditure reports within the timeframes.
- 3) Setting up a committee with the experts in the related fields to examine the project outputs and research effectively, to achieve the projects' objectives according to the fund granting contracts, as well as approving the grantees' outputs. Since 2013 2021, a total of 286 projects have been examined.

1.5 Enhancing the BTFP image

To enhance the BTFP's image, the public relations activities to publicize information, policy, duties, responsibilities, and performances of the BTFP have been provided via both offline and online media, such as television, newspaper, and online platform to disseminate and access to a large number of public quickly which is suitable for the current public information exposure. In addition, a variety of public relations types have been carried out such as advertorial, special interviews, press releases, news photos arrangement, contents on BTFP Facebook and YouTube Channel. Furthermore, the press releases on the granted projects to promote useful program contents production and broadcasting for public interest have been publicized through the relevant government agencies as follows:

- 1) The press releases on the granted projects to promote useful program contents production and broadcasting for public interest have been publicized through the relevant government agencies, in a total of 18 projects, consisting of;
- (1) projects to promote useful program contents production and broadcasting for public interest, for 11 sub-projects.
- (2) projects to promote digital television programs production and broadcasting for children, the youth and families, for 4 subprojects.
- (3) projects to promote the rights of the disabled and savvy-utilization of television services, for 3 sub-projects.

- 2) Field surveys to monitor the granted project operations have been carried out, such as the project on increasing the potential of health service provision during COVID-19 pandemic, with negative pressure cohort ward at Queen Savang Vadhana Memorial Hospital, Si Racha District, on November 11, 2021, and the 'No-Breaker Home 4.0' project to enhance electricity consumption revolution and risk prevention with HoME@Cloud technology, at Singto Plastic Company Limited, Saen To, Tha Ma Ka District, Kanchanaburi Province, during December 27 28, 2021.
- 3) The volunteer activities for social contribution have been conducted with the collaboration of the Fund Management Committee, the administration and employees of the Office of the NBTC, such as food distribution through Klong Toei Dee Jung Foundation and Bangkok Community Help Foundation, to support and encourage the people and the labors quarantined in the community.

2. Efficiency and effectiveness evaluations

2.1 Efficiency evaluation

2.1.1 The fund allocation to support the project operations according to Section 52 has been operated efficiently with optimal number of projects and cost-effective results. In 2021, the BTFP promoted and supported the Category 1 projects under the budget limit of 400.00 million baht. There were 113 applicants for the grants in a total amount of 1,567.124 million baht. However, the Fund Management Committee has considered and selected the candidates that mostly deserve the grants, adjusted the budget to match the tasks of the proposed projects, and maximized benefits, and proposed the consideration results to the NBTC for approval. As a result, 33 proposed projects have been granted in a total of 211.482 million baht, saving a total of 184.806 million baht, accounting for 47 percent. Details are shown in Table 25.

Table 25: Approved Projects by the NBTC

Unit: million baht

No.	Project	Approved Budget	Objectives
1	Project on telemedicine development with broadband internet network to help people in the remoted areas of Phanom Phrai District Health System, Roi Et Province, to Honor Her Royal Highness Princess Chulabhorn Krom Phra Srisavangavadhana	4.246	 To take care of patients, the underprivileged, the disabled and the general public. To solve the problem of healthcare services access by coordinating with 15 Sub-district Health Promotion Hospitals in Phanom Phrai District, and collaborating with Chulabhorn Hospital, Roi Et Hospital, and Roi Et Provincial Public Health Office.
2	Project on the extension of internet centers for the underprivileged societies in the highlands	7.844	To set up the prototype of internet center for the underprivileged societies in 2 highland villages which are Ban Tee So Mae, Tha Song Yang District, and Ban Tee Jor Si, Umphang District, Tak Province, by applying the innovation of local energy derived from biodiversity-based resources to utilize in the communities and the remote areas.
3	The training project on the Metaverse: Merge Reality Become Reality	6.904	To provide a training course on the Metaverse technology adoption in business, and details, work plan, selection criteria, Topics such as AR, VR, MR, and prototype production, by organizing the training course 4 times in 4 regions, to achieve the business model of 40 projects/ 20 prototypes.
4	The New Medias - New Gen Project	1.398	To organize the online training courses for promoting new generation television and radio professionals for 6 times on various topics, such as the 5G era adaptation and the program production, quality content production in every platform, and storytelling content creator. The target groups are the new-gen workers in the television and radio business, aged under 30, and the senior university students of Journalism, Communication Arts, and Mass Communication faculties.
5	The Story Hub Thailand Project	10.980	 To set up an area for Story Hub Content Thailand to be a center for creating short films, series, documentaries, and digital-related stories. To provide a 3-phase training course on screenwriting which are "Kean Dai camp" for 120 participants. After the first course completion, 60 screenwriters will be selected to participate in "Kean Bote camp". Then, 30 screenwriters will be further selected in the final stage to participate in the "Advanced Kean Bote camp" respectively, whose articles will be publicized in the Story Hub website.
6	The research project on knowledge integration from Agricultural wise man to SMART agriculture with Big Data and Al technologies	7.203	To establish 10 learning centers as the prototypes of SMART farming demonstration space in greenhouses for farmers, students, undergraduates, and people, and to provide knowledge on SMART agriculture for at least 500 farmers from 10 community enterprises, in order to implement knowledge for more effective products with cost reduction.
7	The Knowledge Development of mass media in Broadcasting and Television Business Project	6.361	To provide knowledge on mass media in broadcasting and television business such as the high-level and middle-level management programs for 55 participants in 5 subjects, such as World Economy, Economy of Thailand, Public Health, Inequality, and Contemporary Situations, etc.

No.	Project	Approved Budget	Objectives
8	The Hackathon U-league Boot Camp Project to improve the vulnerable groups' quality of life with digital technology	3.277	 To organize a creativity and innovation contest for the undergraduates, to promote the digital technology utilization to create jobs or facilitate the disabled, the elderly, and the underprivileged. To organize the Boot Camp Coaching Day for 60
			undergraduates all over Thailand, and a Pitching Day: Hackathon U League by selecting 3 prototypes.
9	The Training Project on Digital Marketing Transformation	1.890	To organize a Digital Marketing Transformation Program in the topic of Finance and Business Environment, Business Model Canvas, E-Commerce, Product Storytelling, in order to obtain 25 digital business models.
10	The nationwide project to promote learning in telecommunications engineering in schools	6.981	 To organize the training courses of the searching tools development for KidRF radiocommunications signal source, for 10 times, 20 educational institutions each. To organize the radiocommunications signal source searching in emergency simulation competition with the searching tools, developed by the participating teachers from 200 institutions, in a total of 1,000 sets, creating 500 trainers, and getting the teaching aids from KidRF, together with the monitoring result of the tool utilization in the institutions not less than 90 percent.
11	The workshop on potential development for regional reporters in communication innovation and grassroots economy	3.388	 To upskill the regional reporters in news production by organizing the seminars in 7 areas including the Northern region, the three Upper-Central region, the Central region, the Upper Northeastern region, the Lower Northeastern region, the Southern region, and the three southern border provinces, under the topics of economy and politics, international security, social media. To create the grassroots-economy and Thai innovation website and produce 600 pieces of news content/articles of at most 800 words, and 40 video clips of in-depth interviews regarding the provincial economic database and innovation.
12	The project on promoting media utilization for developing the underprivileged in the Muslim way in the southern border provinces	6.504	 To conduct English for Communications classes via online technology for the students in the private Islamic schools in the southern border provinces, and sales and online marketing classes for people in the foregoing provinces. To obtain the participatory action research on information technology innovation development, and educational communication learning for the students in the private Islamic schools.
13	The rich and happy from success cases Project	3.984	 To improve the potential of entrepreneurs in the One Tambon One Product (OTOP) project to utilize the new technologies for marketing. To organize the nationwide workshops for 10 classes, 20 groups each, in a total of 200 groups. To promote at least 50 entrepreneurs Fan Pages.

No.	Project	Approved Budget	Objectives
14	The upskill project providing for correspondent with special expertise and credibility, who can work independently for "the newgroup reporters / e-reporters" in mass media agencies such as public sector, television operators, radio stations, magazines and newspaper.	9.517	 To upskill 400 e-reporters from 20 organizations and magnify the outcome to 3 persons/organization. To provide knowledge exchange channel, and monitor the reporters and their performances. To show reporters performances and prepare a leadership evaluation guidebook of the e-reporters/mass media agencies.
15	The project to support the youth in professional preparation in broadcasting business by introducing the communication channel for the youth to create the programs with code of ethics and morals.	3.371	 To organize a guideline training course on prevention and promotion of ethical standards for the youth, in a total of 50 participants. To study and analyze the situations and the digital media usage behavior of the youth as well as analyzing the domestic and international laws and policies (at least 2 countries) and organize 2 workshop meetings with related agencies for 60 participants. To prepare a summary report on outcome, problems, obstacles, and recommendations, create the youth digital media usage behavior prototype, and prepare the policy recommendations as pocket books for 100 copies.
16	The project to develop the transformation system of TV scenes to touchable scenes for people with visually impaired	3.372	 To develop the transformation system of TV scenes to touchable scenes for people with the visually impaired to improve their quality of life and enjoy TV programs through the touchable scenes. To expand TV audiences to cover people with visually impaired and expand TV service from the government sector thoroughly with effectiveness and fairness.
17	The project on creative media and technological innovations to create jobs for the disabled in Thailand	1.345	 To explore the methods of media reception and accessing to create jobs for the disabled in Thailand. To study and categorize the employment of people with disabilities by the type of work that all available job opening in Thailand. To determine the necessary skills and work contents that the disabled should have or leverage to prepare for variaus types of work.
18	The knowledge providing project about impact monitoring of electromagnetic emission from 5G base stations on human health	6.292	 To provide knowledge for human resource in telecommunications business, officers, consumers, and people, to understand the procedures and methods including impact monitoring of electromagnetic emission from 5G base stations on human health, by presented the study results and distribute guidebooks on impact monitoring of electromagnetic emission from 5G base stations to use as guideline. To set up a reference operation room for examining the electromagnetic emission from 5G base stations, by the ISO/ IEC 17025, which is neutral, reliable, and internationally recognized, with the purpose of consumer protection in telecommunications service in case of complaints or disputes occurred.

No.	Project	Approved Budget	Objectives
19	The Smart Flood Monitoring Platform Project	8.426	To design and develop a digital platform to monitor the complete cycle of flood area at Trang River Basin, in 3 periods consisting of pre-flood period, flooding period, and post-flood period.
20	The KidBright Net Project: The Communications Network for Education	4.600	 To expand the telecommunications network usage to the schools to become a sharing networks community for information utilization such as community agriculture. To upskill teachers and students with the essential knowledge and digital technology skills, such as the wireless communications network, Internet of Things, and Data sciences. To promote the internal communication network development in school with small budget. To disseminate information and knowledge on communication network technology for public interest in the aspects of economy and society, by organizing the activities such as establishing the communication network for education (KidBright Net) in 30 pilot schools. The KidBright Net in each school consists of 1 UtuNoi Base Station, transmitting data within a radius of 1-2 kilometers.
21	The Online Platform to rehabilitate the elderly with cognitive deficiency by adopting VR technology through 5G network Project	3.539	 To create a platform to facilitate the innovation development of the virtual reality treatment room for dementia patients, taking the thinking dimensions that need practicing, stimulation, and treatment for better into account. To design the treatment room which a variety of enjoyable activities of thinking dimensions to stimulate the brain working of the patients to get enjoyment, fun, intriguing, and good experiences.
22	The Millimeter Band Pass Filter Circuit Creating by 3D-Printing Technology for 5G and Space Work Project	2.290	 To study and analyze the 3D-printing technology and feasibility for the Passive Millimeter Wave Circuit production. To develop an application for synthesizing the connected co-efficient matrix from the required frequency responses of the band pass filter circuits. To design, simulate, create, adjust, and test the band pass filter circuits with the 2-circuit Millimeter Wave for 5G and the uplink of satellite stations in the Ka-Band with CNC and 3D-printing technologies.
23	The study project on TV advertising guidelines in digital context under the balance between consumer protection and TV business survival	2.841	To study the television advertisement circumstances in the digital context to get consumer insights, which leads to the advertising practices to survive in the disruptive context, in compliance with the NBTC regulatory guidelines on television advertisement.
24	The project to study and develop the Smart Air Purifier tower using solar power and IoTs control system to reduce PM 2.5 in public areas	4.489	To research and develop the Smart Air Purifier Tower with the water spray dust-trapping system, to solve particulate matter (PM) problems in high risk semi-closed areas, including mass transit stations, public transports waiting areas, and car park buildings. The Smart Technology integration consists of the research and development of the Internet of Things (IoTs) system to collect data of the sensors and control the air-purifying operations, and Cloud Platform for Data Computing and Storage Development, to increase the efficiency of management and report users data to monitor the operations of the tower.

No.	Project	Approved Budget	Objectives
25	The development of dental service and treatment with digital technologies on high-speed digital network Project	14.660	 To collaborate with the Provincial Public Health Offices and the dental service units in the pilot provinces; Saraburi, Singburi, and Nan, to explore the technology needs in order to develop the projects with True Corporation Public Company Limited to enhance the computer network by adopting 5G technology in tertiary care dental hospital. To develop the information technology software in the tertiary care dental hospitals with Mor Corporation Company Limited to support the teledentistry services and the Intraoral Scan from the three pilot provinces. To develop the application for patients in the urban areas to access telemedicine services and to be suitable for all types of users, by implementing the system and conducting the evaluation in the aspects of the primary dental service recipients, as well as the primary and tertiary dental service providers to match the needs and usage of the communities in the pilot provinces.
26	The distance emergency alert system for the disabled, the elderly, and the patients Project	7.676	To create the distance emergency help alert system by integrating with the Smart City Project in Khon Kaen as a pilot province according to Thailand 4.0 Policy. The system aims to create a communication channel for the people with visually impaired, hearing impaired, and speaking disabilities, as well as the elderly, the bedridden patients, and the patients who are unable to self-help in remote areas in case of emergency.
27	The Traffic Police Checkpoint Working System (TPWOS) Project	17.567	 To analyze the obstacles in applying information technology to the public service provision. To develop a working system prototype for traffic police at the checkpoints. To create an application to provide traffic-related information for the public. To set the operational standards of the traffic law enforcement for the traffic police.
28	The project on forensic science investigation improvement for sex offence cases with AI technology	3.302	To develop the automatic Artificial Intelligence system to examine the semen with Image Processing and Deep Learning methods, to identify and count the amount of sperms on the microscope slides, and to enable the system to cooperate or assist the medical teams for laboratory confirmation of sexual intercourse for the sexually harassed people.
29	The Telehealth Monitoring and Assistive System for the Elderly and the Disabled People Project	14.848	To research and develop the Telehealth Monitoring and Assistive System for the elderly and the disabled people.
30	The Information System for disease and health hazard surveillance Project	10.206	 To develop the Information system for the disease and health hazard surveillance by connecting data from the HIS system of the hospitals to the main platform of the Department of Disease Control, secure by encryption management system according to the Personal Data Protection Act to prevent access from outsiders. To obtain the Big Data & Data Analytic System to analyze the data and prepare the visualization report to be displayed on the dashboard of the Department of Disease Control for the contagious diseases monitoring and the disease and health hazard surveillance in domestic areas and nationwide (Alert).

No.	Project	Approved Budget	Objectives
31	The THAImap Development for Equal Access to Spatial Data Project	11.479	 To acquire the information for Thailand Digital Map, consisting of highly accurate information on the important landmarks, land and buildings boundaries with explanations both in Thai and English. To develop a web application and APIs for the application developers to connect to various types of devices such as APIs for iOS, Android, and JavaScript, to enable online map service and collect the service charges, to support the service and further develop the geographical database for location searching and navigating.
32	The Platform Application Development Project for Integrated leveraging the economy of the local communities	2.036	 To develop the Free Marketplace Platform to connect between the buyers and the sellers in the community level. To develop the Smart Tag to prevent the community product counterfeits. To create a communication channel for community product brand prevention. To develop the prototype of an application for the community agricultural manual.
33	The Home Healthcare Promoting System for the Elderly and the Community with 5G Technology Project	8.666	To develop a service platform for promoting healthcare and home visiting (the service center located at the Faculty of Medicine, Ramathibodi Hospital, Phayathai Campus), by having the support systems such as the Patient Management System, the Patient Visiting Schedule Management System, the Patient Database System, the Patient Education System and the Telemonitoring System, which enable team members to obtain the health information of patients, assess the symptoms and prescribe suitable guidance to the patients and their relatives.
	Total		

Remarks: Data as of December 31, 2021

Source: Research and Development Fund Bureau, Office of the NBTC

2.1.2 The BTFP has estimated the cash flow, according to the BTFP receivable and expenditure obligation plans as necessary in the saving accounts. The remaining funds have been invested in the fixed deposit accounts of the commercial banks and domestic specialized financial institutions, by considering the credit risk and liquidity risk of each bank/financial institution, for the best return on investment at low risks, according to the Fund Management Committee's criteria on investment consideration.

In 2021, the BTFP received the average return on investment at 0.49 percent, higher than the average of the 5 largest commercial banks at 0.39 percent. The BTFP has a disbursement plan in a total of 14,148.06 million baht, however, the actual disbursement

is 4,331.67 million baht, accounting for 30.62 percent, lower than the target, due to the delay in the operations of the Category 3 projects (the provision of mobile phone signal and broadband internet service in the border areas (Zone C+) project, and the provision of broadband internet services in the remote areas (Zone C) project). The delay in the operations also results from the difficulties in service installation in the forest zones and restricted areas where permissions from the relevant organizations are needed, according to the law and regulations, as well as the spread of COVID-19. Currently, the Office of the NBTC has been cooperating with the relevant organizations and the counterparties to find solutions to the problems. Details are shown in Table 26.

Table 26: The disbursement of the fund, compared to the target

Unit: million baht

Type	Detail	Target	Actual Disbursement	Percentage
1	Projects in which eligible persons apply for funding and financial support from the BTFP that are in compliance with the objectives set forth in Section 52 (1) (2) (3) and (4) of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment	431.31	168.12	38.98
2	Projects that fulfill the objectives specified by BTFP Fund Management Committee under Section 52 (1) (2) (3) and (4) of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment, and support the operations to comply with the government policies, the Spectrum Management Master Plan, the Telecommunications Master Plan, the Broadcasting Master Plan, and the Universal Basic Telecommunications and Social Service Plan	942.00	342.08	36.31
3	Projects or operations according to the NBTC policies	12,274.75	3,321.46	27.06
	3.1 The USO projects such as USO Net for the border areas, and USO Net for the remote areas	9,446.90	1,574.89	16.67
	3.2 Other projects	2,827.85	1,746.57	61.76
4	Projects to support Thai Media Fund	500.00	500.00	100.00
	Total	14,148.06	4,331.67	30.62

Remark: During 2021, the NBTC has the resolution to support the use of Mobile Broadband Internet for 10 GB in a budget limit of 3,000 million baht from the Category 3 Projects (Other projects)

2.2 Effectiveness Evaluation

2.2.1 According to the fund operation in 2021, the BTFP has the revenue in a total of 8,826.26 million baht, decreased from the previous year at 32,263.33 million baht, whereas the expenses are in a total of 2,919.42 million baht, decreased from the previous year at 5,616.45 million baht. Regarding the financial position of the Fund in 2021, it has the assets in a total of 113,990.21 million baht, increased from the

previous year at 8,593.85 million baht; the total debts at 69,639.04 million baht, increased from the previous year at 2,687.01 million baht. The fund is stable with the Current Ratio of 4.8 times, decreased from the previous year at 4.75 times, above the accounting standard which should not below 1.5 times, and the Debt Ratio of 0.61 times, decreased from the previous year at 0.03 times, above the accounting standard which should not exceed 1.5 times. Details are shown in Table 27.

Table 27: The BTFP Financial Statement Comparison between 2020 and 2021

Unit: million baht

	2021 (as of Dec 31)*	2020 (SAO Certified)	Increase (Decrease)	Percentage
Performance				
Revenues	8,826.26	41,089.60	(32,263.34)	(78.52)
Revenue from contribution	8,258.02	40,408.19	(32,150.17)	(79.56)
Income from deposit interests	299.02	532.32	(233.30)	(43.83)
Other revenue	269.22	149.09	120.13	80.58
Expenses	2,919.42	8,535.87	(5,616.45)	(65.80)
Financial support expenses	1,500.22	7,459.98	(5,959.76)	(79.89)
Depreciation and amortization	1,419.20	1,075.89	343.31	31.91
Revenues above (below) expenses	5,906.84	32,553.73	(26,646.89)	(81.86)
Financial Position				
Assets	113,990.21	105,396.36	8,593.85	8.15
Cash and cash equivalents	23,198.13	12,106.17	11,091.96	91.62
Short-term investment	41,695.05	42,770.18	(1,075.13)	(2.51)
Other current assets	10,197.01	13,901.24	(3,704.23)	(26.65)
Non-current assets	38,900.02	36,618.76	2,281.26	6.23
Liabilities	69,639.04	66,952.03	2,687.01	4.01
Current liabilities	15,631.75	7,203.51	8,428.24	117.00
Non-current liabilities	54,007.29	59,748.51	(5,741.22)	(9.61)
Net Assets	44,351.17	38,444.33	5,906.84	15.36
Cash Flow				
Earnings	15,166.15	14,322.95	843.20	5.89
Cash received from contribution	8,487.14	12,653.63	(4,166.49)	(32.93)
Cash received from deposit interests	410.64	769.70	(359.06)	(46.65)
Others	6,268.37	899.62	5,368.75	596.78
Disbursements	5,665.67	9,076.10	(3,410.43)	(37.58)
Financial support	4,169.05	7,433.55	(3,264.50)	(43.92)
Others	1,496.62	1,642.55	(145.93)	(8.88)
Earnings above (below) disbursement	9,500.48	5,246.85	4,253.63	81.07
Financial Ratio				
Current Ratio (times)	4.80	9.55	(4.75)	(49.74)
Debt Ratio (times)	0.61	0.64	(0.03)	(4.69)

Remarks: * The financial statement of 2021 shown above has not been certified and commented from the State Audit Office of the Kingdom of Thailand (SAO)

Source: Research and Development Fund Bureau, Office of the NBTC

2.2.2 The performance of the BTFP has efficiently achieved the specified objectives as the fund granted projects are beneficial to the radio, television and telecommunications businesses in the aspects of the research and development, the innovation and facilities, education and people's quality of life improvement, and human resource development in radio and television businesses widely. According to the overall efficiency and effectiveness assessment of the granted projects, the projects completed in 2021 have a relatively high level of efficiency, with a score of 4.20 out of 5.

To consider the efficiency of the projects, the assessment takes 6 aspects into account, which are 1) research and development, 2) technology, innovation and facilities, 3) service provision, learning promotion, and people's quality of life improvement, 4) training and skill development, 5) media production, and 6) prescribing policies and work plans in broadcasting, television, and telecommunications services.

1) The overall efficiency and effectiveness assessment results

- The projects granted and completed in 2021 have a relatively high level of efficiency with a score of 4.03 out of 5, divided into the following aspects: the prescribing policies with a score of 5; the technology, innovation and facilities, and media production both score 4 out of 5; then, the training and skill development; the service provision, learning promotion, and people's quality of life improvement; and the research and development respectively.
- The projects granted and completed in 2021 have a high level of effectiveness with a score of 4.38 out of 5, divided into the following aspects: the research and development, and the prescribing policies with a score of 5; the media production with a score of 4.25; then, the technology, innovation and facilities; the service provision, learning promotion, and people's quality of life improvement; and the training and skill development respectively. Details are shown in Table 28.

Table 28: The Overall Efficiency and Effectiveness Assessment Results, Categorized by Project Type in 2021

Unit: million baht

Categorized by Project Type in 2021 Aspect	Average Score			
categorized by Froject Type III 2021 / Epect	Efficiency	Effectiveness	Final Rating	
1. Research and development	3.67	5.00	4.34	
	(relatively high)	(high)	(high)	
2. Technology, innovation and facilities	4.00	4.00	4.00	
	(relatively high)	(relatively high)	(relatively high)	
3. Service provision, learning promotion, and people's quality of life improvement	3.67	4.00	3.84	
	(relatively high)	(relatively high)	(relatively high)	
4. Training and skill development	3.83	4.00	3.92	
	(relatively high)	(relatively high)	(relatively high)	
5. Media production	4.00	4.25	4.13	
	(relatively high)	(high)	(relatively high)	
6. Prescribing policies and work plans in broadcasting, television and telecommunications services	5.00	5.00	5.00	
	(high)	(high)	(high)	
Total Average Score	4.03	4.38	4.20	
	(Relatively high)	(high)	(Relatively high)	

Remarks: (1) The total average score from 1.00 - 1.80 are considered as a low level.

(2) 1.81 - 2.60 are considered as a relatively low level.

(3) 2.61 - 3.40 are considered as a moderate level.

(4) 3.41 - 4.20 are considered as a relatively high level.

(5) 4.21 - 5.00 are considered as a high level.

- 2) The efficiency and effectiveness outcomes assessment of the completed projects in 2021 can be summarized as follows:
- Research and development aspect
 There are 3 projects for knowledge
 dissemination to people as follows:
- (1) The Intelligent Innovative Mixed Use Senior District (IIMSD) Project, which matches the community's needs, and facilitation for the elderly, the disabled, and the general public;
- (2) The application for farmers to monitor rice cultivation and forecast the outputs with satellite data for selecting a suitable planting period, and managing the cultivation plan and the water system efficiently;
- (3) Development Project of Smart Pig Farm using LoRaWAN to analyze the optimal environment and food quantity for pig farming, and to reduce costs incurred by dead pigs, and weight cheating in trading. The model can also be demonstrated to other business operators, especially the SMEs.

The overall efficiency and effectiveness assessment result is at relatively high to high levels.

• Technology, innovation and facilities aspect

The project about "technology, innovation and facilities" is the project on the warning system and water quality monitoring, for the floating-basket fish farming along the Mekong River to reduce the fish death rate. The overall efficiency and effectiveness assessment result is in a relatively high level.

• Service provision, learning promotion, and people's quality of life improvement aspect

There are 3 projects of knowledge dissemination to the target groups as follows:

(1) The project to promote media literacy nationwide for 2,500 people, enabling the target groups to utilize social media safely, enhancing the concept of Digital Literacy to the Digital Intelligence and Literacy, in order to

mitigate the risk of social media content engagement;

- (2) The project to protect consumers by providing knowledge to children and the youth in the schools, in a total of 5,678 people;
- (3) The project to build immunity by organizing the training on media literacy for the youth, in a total of 12,212 people;

The overall efficiency and effectiveness assessment result is at moderate to relatively high levels.

Training and skill development aspect
 There are 6 projects for promoting media literacy, and developing the human resource for labor market in radio and television services as follows:

- (1) The project on local and regional program producer development to produce programs for children, the youth, and families, in a total of 300 people;
- (2) The career path guiding camp project to upskill the students and the undergraduates for the careers in IT, broadcasting, television and telecommunications businesses, in a total of 1,720 people, to have knowledge on information technology, radio program hosting, and news announcer in order to be the radio and television businesses workforces in the future;
- (3) The knowledge Development for Broadcasting Media Executive Project;
- (4) The Rak Santi Project to promote media literacy and the roles of the youth to develop the southern border provinces;
- (5) The Social Media Smart Page Award Project to promote information literacy;
- (6) The Media Literacy Kit and Activities Development Project

The overall efficiency and effectiveness assessment result is at moderate to relatively high levels.

• Media production aspect

There are 4 projects for promoting media production, that focus on the general public and the special target groups, which are children and the youth group, the people with disabilities group, the ethnic group, and the underprivileged group, as follows:

- (1) The Mahidol Channel Kids Project
- (2) The Koateekla TV Program Project
- (3) The media literacy promoting project for people through the "Nok-Roo" program
 (4) The media literacy promoting project for people through the "THE YES SIR" program

The overall efficiency and effectiveness assessment result is at relatively high to high levels.

• Prescribing policies and work plans

aspect

The project to survey the attitudes and demand of people with hearling disabilities towards television program of NBTC, acquiring the qualitative and quantitative information to prescribe the content and program adjustment guidelines to suit their needs, and achieving the social responsibility objective of the Office of the NBTC in raising the consciousness of the TV content providers for the people with hearing impaired or communication problem. Thus, the overall efficiency and effectiveness assessment result is at a high level.

3) Details of the project efficiency and effectiveness assessment

3.1) The Intelligent Innovative Mixed Use Senior District (IIMSD), adopting the Information Technology and facility-based technology, to support the contemporary lifestyle of the elderly and the disabled.

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	3 (moderate)	 Be able to conduct the activities within the specified period The IIMSD model complies with the people's needs in the community and society, and can be applied to facilitate the elderly, the disabled, and the general public The in-depth study on IT and facility-based technologies as well as the study on economics, business and the disabled and the elderly societies have been clarified by the researchers in 4 aspects. The model concept is to facilitate the elderly and the disabled or the pre-aging people. However, a constraint in project operation is about economic values creating, and business benefits, and the disabled & the elderly societies as the achievements will be more concrete in the phase 2 (trial phase), in which the target areas will be selected for the IIMSD model trial.
2. Effectiveness	50	5 (high)	 Be able to conduct the activities within the specified period. The IIMSD model has been developed by adopting the IT and facility-based technologies to support the contemporary lifestyle of the elderly and the disabled, and the driving guidelines for the empirical outcomes by adopting IT and digital technologies to develop and apply to support the contemporary lifestyle of the elderly and the disabled in 4 aspects, including 1) daily basic activities 2) healthcare and medical 3) hobbies and recreational activities and 4) generating sufficient incomes. Having a report on the preparation on supporting the contemporary lifestyle of the elderly and the disabled, which contains the information, opinion analysis and recommendations from the public hearing events with the relevant organizations, the network partners, the stakeholders and the experts in related fields.
	Final Rating		4.00 (Relatively high)

3.2) Prototype Development of SMART Agriculture platform integrating Remote Sensing Technology with Aquacrop Model

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	3 (moderate)	 Be able to conduct the activities within the specified period. The application for the local farmers in Phra Nakhorn Si Ayutthaya and Roi Et provinces has been developed with the purpose of monitoring the rice cultivation and forecasting the outputs with data through satellite service to select a suitable planting period, and manage the cultivation plan and the water system efficiently. The average satisfaction rate of 24 participants attending the application usage training class at Phra Nakhorn Si Ayutthaya province, together with 19 farmer respondents, accounts for 95.40 percent, and the average satisfaction rate of 5 officers accounts for 97.60 percent. The average satisfaction rate of 27 participants attending the application usage training class at Roi Et province, together with 15 farmer respondents, accounts for 91.60 percent, and the average satisfaction rate of 6 officers accounts for 82.20 percent. Currently, the RiceSAP mobile application has provided on Android and iOS operations, and the web application can be downloaded through the standard web browser. Signing up an account is needed.
2. Effectiveness	50	5 (high)	 Be able to conduct the activities within the specified period. Considering the outputs of the RiceSAP, the application is a role model for Smart Agriculture. The relevant agencies can adopt the concept to develop useful applications for farming. The average satisfaction rate of 22 participants attending the application monitoring event in Phra Nakhorn Si Ayutthaya province, together with 16 farmer respondents, accounts for 83.80 percent, and the average satisfaction rate of 6 officers accounts for 81.00 percent. The average satisfaction rate of 27 participants attending the application monitoring event in Roi Et province, together with 20 farmer respondents, accounts for 85.40 percent, and the average satisfaction rate of 5 officers accounts for 92.00 percent.
	Final Rating		4.00 (Relatively high)

3.3) Development Project of Smart Pig Farm using LoRaWAN

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	5 (high)	 Be able to conduct the activities within the specified period The outcomes have demonstrated the results of the temperature sensors, the humidity sensors, and the electricity power meter sensor on the online website accurately. In addition, the top-view and side-view photos of pigs can be analyzed to find the pig weights with an accuracy of +/-1.86 kilograms from the average pig weight of 105 kilograms. Thus, the parameters of the temperature, the humidity, the electricity power and the pig weight can be developed further to create platforms for other pig farms in the future.

Dimension	Weighting (Percentage)	Rating	Explanation
			 The research knowledge can be disseminated to other business operators, especially the SMEs, for further development and competitiveness improvement to compete with the developed countries that adopt technology to enhance their outputs. Moreover, the public sector can monitor and forecast the rice products of each province as well as the disasters via the web application, in order to prescribe the policies or the economic strategy. The impact of system installation will be on the labor cost decreasing by 10 percent, and the output increasing by 10 percent, as well as facilitating the employees and enhancing the work efficiency by placing the location indicator devices at the employees.
2. Effectiveness	50	5 (high)	 Be able to conduct the activities within the specified period. The project develop a pretotype of smart pig farm using LoRaWAN Network to apply the LoRaWAN network to the farm prototype by installing 3 LoRaWAN Gateway Stations to be a data transmission medium between all sensors such as temperature sensors, humidity sensors, and electricity power meter sensor. The CCTV cameras are used to analyze to find dead pigs and calculate the weights of pigs using photo, to track the behaviors of pigs, environment and electricity system. All data including pig sales volumes are shown on an online website accurately which will benefit the pig farming operator. With the technology, it can reduce cost incurred by dead pigs and weight cheating in trading. In addition, the information of sensor system can be analyzed to determine the optimal food quantity and environment for pig farming. The knowledge of the research can be disseminated to other business operators, especially the SMEs.
	Final Rating		5.00 (High)

3.4) The project on the warning system and water quality monitoring for the floating-basket fish farming along the Mekong River

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 The satisfactory results of device efficiency about installing, testing, and the water quality monitoring. Regarding the level of knowledge gained and the satisfaction to the project administration, the overall satisfaction level of the project is at a high level.
2. Effectiveness	50	4 (Relatively high)	 The two objectives are achieved, including 1) developing a warning system and the water quality monitoring for the floating-basket fish farming, 2) utilizing the warning system and the water quality monitoring to reduce the fish death rate. The participants can implement knowledge to operations to a great extent.
	Final Rating		4.00 (Relatively high)

3.5) Thai People's Engagement, Risk from Social Media and Competence in Digital Intelligence and Literacy Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 The survey research has been conducted by collecting data with 4 age ranges sample groups, consisting of 15 - 22 years, 23 - 39 years, 40 - 59 years, and 60 years or more, in a total of 2,580 samples from every region nationwide. The results can be summarized as follows: The survey result on social media engagement shows that the most popular online social media used by the sample groups are LINE (89,96%), Facebook (88.80%), YouTube (72.36%), Instagram (34.34%) and Twitter (15.66%), with an average frequency of 7 - 8 times per day, for the purpose of entertainment such as movies watching, music listening, funny video clips watching; communications with family members, relatives, friends and intimates; news update and events; and work or study. Thus, the researchers suggest that the activities to increase knowledge and skills according to the usage, should be organized in order to use social media usage shows that there are 15 types of social media risks. The age group of 23 - 39 years people is at higher risk than others. Hence, the mitigation of the online social media risks should be emphasized, while the social media usage skills and capabilities should be reinforced, with a focus on responses to the violence-content confrontation risk. The survey result on digital intelligence and online social media literacy shows the high scores of social media access and usage aspect, information evaluation, utilization, identity and citizenship, and risk reduction. Thus, the researchers suggest that the capabilities in these aspects should be reinforced. The age group of 23 - 39 years people is at higher risk than others. Hence, the mitigation of the online social media risks should be emphasized, while the social media usage skills and capabilities should be reinforced, with a focus on responses to the violence-content confrontation risk. The survey result on digital intelligence and online social media literacy shows the high scores of social media access and usage aspect,
2. Effectiveness	50	4 (Relatively high)	• The survey results shows that the most popular social media used by the sample groups are LINE, Facebook, and YouTube, with an average frequency of 7 - 8 times per day, 0.5 - 1 hour each, for the purpose of entertainment, communications, news update, and work or study. The overall social media engagement of the sample groups is at a moderate level, but giving LIKE or LOVE to the contents, posting texts, photos, and video clips are in high level. According to the sample groups' data, some of their stories will be posted on online social media. However, the top 5 risks on the social media include 1) violent contents 2) advertisement of the uncertified products 3) unreliable health contents 4) fake news and 5) sexual contents.

Dimension	Weighting (Percentage)	Rating	Explanation
			In addition, the overall digital intelligence and the online social media literacy of the sample groups are in a high level, while there are 2 aspects in a moderate level which are the understanding of the social media context, and social communications, which can be used as a guideline to enhance the safe utilization of the social media, adapting the digital literacy concept to the digital intelligence and literacy concept. People can utilize social media safely at minimum risks.
	Final Rating		4.00 (Relatively high)

3.6) The Hun Sai Thai (Thai String Puppets) for Consumer Caring

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 Be able to conduct the activities within the specified period. In fact, the project has been conducted during December 3, 2018 - April 10, 2019, sooner than the specified period of 120 days during December 3, 2018 - June 30, 2019. The target group is the students in primary and secondary education, 300 students per school (20 schools, in a total of 6,000 students). After finishing the activities, there are 5,678 students participating in the project, less than the specified number. There are some schools, such as the Tessaban 4 (Rattanakosin 200 years) School and Wat Phai Lom School, with more participants than the target, while some schools have less, such as Anuban Dan Makham Tia School and Bansungthong School.
2. Effectiveness	50	4 (Relatively high)	 The Hun Sai Thai for Consumer Caring "Wai Man Tan Online Thailand 4.0" activities have achieved the objectives. The public relations activities have been conducted in 20 schools in 6 regions nationwide, which meet the objectives. The outcomes show that students who watched the string puppets show and participated in the activities felt joyful, happy, impressed and wanted the activities to be organized at the school again if there was a further opportunity. Also, the teachers and students wanted to have more activities and more engagement in the activities as well.
	Final Rating		4.00 (Relatively high)

3.7) The Yes Share Sure Like: YSSL Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	3 (Moderate)	 The workshops on "Build the immunitymedia literacy for the youth" have a total of 12,212 participants, 2,212 people higher than the target. The satisfaction survey and the participant evaluation show that 57 percent of the participants have the understanding of media literacy, especially legal knowledge. However, some participants do not know that some actions or behaviors are risking to break the laws and can be prosecuted. Thus, the knowledge on media analyzing and related laws gained from the project is crucial for the participants. Currently, the "Yes Share Sure" Facebook Fan Page has 22,500 members, with 101 stories, and 170,000 visits. To extend the operation of the Fan Page sustainably, it is suggested that Fan page needs an administration agency.
2. Effectiveness	50	4 (Relatively high)	 The workshops on "Build the immunitymedia literacy for the youth" for 100 organizations, have a total of 12,212 participants, 2,212 people higher than the target. The workshops have been held in 3 provinces, more than 63 educational institutes, such as 22 institutes in Surin and 15 institutes in Chonburi, have utilized and disseminated 2 sets of the multimedia, which are the "Online Media Threats" documentary, and the "Computer Crime Act" and "Sure And Share" infographics. The satisfaction survey has been conducted, which is divided into 5 parts as follows: 1) Knowledge gained from the training course (contents and course): the participants gain knowledge at every level. From the in-depth analysis, 72.5 percent of the participants have been knowledge uplifted in 2 levels, for example, from the lowest to moderate level, or from moderate to the highest level. It shows that the contents and the course are suitable for the target groups. 2) The assessment results on the instructors convey methods are at a high level. 3) The training materials for knowledge providing are divided into 2 types as follows: 3.1) Presentation multimedia has the assessment result at 49.5 percent (highest). Most students prefer video clips and cartoons to narrative lectures, as multimedia helps create understanding and learning from pictures, sounds and music. Some students want to be multimedia producers as well. 3.2) Printed media, titled "Sure And Share" guidebook has the assessment result at 46 percent (high). The participants consider it as a useful media with comprehensible contents, case studies, and accurate sources of information. 4) The knowledge application which is the way that participants apply the training content or the benefits received from the training has the assessment result at 57 percent (high). 5) The learning environment such as the venue/ equipment/ food etc. has the assessment result at 45 percent (high).
	Final Rating		3.50 (Relatively high)

3.8) The project on local and regional program producer development to produce programs for children, the youth and families

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	2 (Relatively low)	 The seminars in 6 provinces have been organized with 60 episodes program production. Overall, the participants understand and cooperate in the project. However, there are under-quality works in 29 groups. The analysis shows that some of the participants do not realize the importance of the work completion, neglect the work assignment, or do not cooperate with group work, resulting in under-quality work (in some groups). According to the outputs of the project, 9 out of 60 episodes are of A to Aquality documentary, which meet the Committee's satisfaction.
2. Effectiveness	50	4 (Relatively high)	 As the second project, the work preparation can be done faster. The target groups have been expanded and the public relations have been made through 5 channels of Next Step, including Samrujlok, Animal Show, MySci, Khongdee Thailand, and Busaba Café, with their audiences nationwide and online channels via www.nextsteptv.com/foundation, Facebook of Samrujlok, MySci, and Khongdee Thailand, and Twitter of Samrujlok with 2.5 million followers. Thus, out of 550 participants, a total of 302 qualifying participants have been selected by the committee. The project outcomes assessment shows that the participants have significantly improved from the first training project, due to the improved equipment, devices, and experiences. After the seminar, the participants are required to evaluate the project, in the aspects of course and instructors, training venue, project team, and equipment and facilities with 1-5 scores. 5 means highly satisfied. The average results are as follows: The media ethics course and the instructors: 4.44 The documentary producer development course and the instructors: 4.53 The training venue: 4.59 The project team: 4.51 The equipment and facilities: 4.52 The overall results are at a good level as the scores of every topic are above 4. Regarding the project duration, some groups identified that it was too short, causing the delay or failure to submit their works on time. Additional time has been given to the delayed groups. Besides, the contents of course are very detailed while the project duration is not sufficient.
	Final Rating		3.00 (moderate)

3.9) The career path guiding camp project to upskill the students and the undergraduates in Kamphaeng Phet and nearby provinces for the careers in IT, broadcasting, television, and telecommunications businesses

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	5 (high)	 The participants satisfaction of the training accounts for 87.60 percent, higher than expected. The students and the undergraduates are highly interested in operation base, IT base, radio program production base, news reporter base and the fiber optic engineering base. Some obstacles of organizing the training include the difficulties in coordination with the network and participating schools. However, the activities have been conducted smoothly. Thus, 1,720 participants joined the training, higher than expected at 1,000 people.
2. Effectiveness	50	5 (high)	 The project has achieved the career path objectives of guiding to the students and undergraduates in Kamphaeng Phet and nearby provinces for the careers in IT, broadcasting, television and telecommunications businesses, in a total of 1,720 participants. The training course enables the participants to adapt knowledge to their education and career path planning. The students and undergraduates in Kamphaeng Phet and nearby provinces gain knowledge and understanding in the career path on IT, broadcasting, television, and telecommunications businesses, more than expected. As a result, the understanding assessment accounts for 81.09 percent (higher than expected at 80 percent).
Final Rating			5.00 (high)

3.10) The Knowledge Development for Broadcasting Media Executive Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 Be able to conduct the activities within the specified period. Due to the COVID-19 pandemic, the Thai Press Development Foundation has amended the intermediate mass communication executive course in broadcasting business, by reducing 18 hours of the training duration to comply the course with the specified timeframe. Thus, the participants in all groups have been satisfied with the training and passed all criteria.
2. Effectiveness	50	5 (high)	 The project has achieved the objectives and the defined indicators. The academic group has confirmed that the training is very useful. The knowledge gained from the course can be applied further to develop the teaching. Besides, the experiences gained from the course can be used as the case studies. The satisfaction of the participants of the course is very high. The project has created the network, cooperation and integration of every sector such as academics, lawyers, attorneys, judges, and private sector development organizations.
Final Rating			4.50 (high)

3.11) The Rak Santi Project to promote media literacy and the roles of the youth to develop the southern border provinces

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	5 (high)	The project has achieved the objectives, and the activities have been conducted to meet the target, including the training to provide knowledge for the youth (Rak Santi), media literacy, allegorical multicultural field trips, and the peaceful ideology incubator camps. The youth have the most understanding in media literacy in the aspect of art appreciation and utilization in the media. The second is the meaning interpretation from the media, such as stereotypes, and hate speech.
2. Effectiveness	50	4 (Relatively high)	 The project has been completed prior to the specified timeframe. The youth project participating in the project is highly satisfied with the operations of the Peaceful of Southern Boundary's Organization (POSBO). The knowledge, skill, and ability to analyze the situations and solutions have the least impact on the youth, compared to other skills. Thus, the media literacy should be promoted to the youth to acquire new knowledge, skills, and open up to new information about the situation in the area from trustworthy and knowledgeable person, especially to those in the 3 southern border provinces, and 4 districts in Songkhla, as some organizations or opponent groups use media and communication techniques to create discourse about the history of Patani and religions, with the purpose to manipulate the youth with distorted doctrines.
Final Rating			4.50 (high)

3.12) The Social Media Smart Page Award Project to promote information literacy

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	The project has been achieved within the specified timeframe of the contract. The Page with most Likes and followers is the Young Pride Club, with more than 20,000 followers, while the Page with the least Likes and followers is the Zex Sod Song, with 2,000 followers.
2. Effectiveness	50	3 (moderate)	Overall, all the Pages can provide original contents according to the contract. The Page that produces contents and monitors related information more than required is the Young Pride Club. The Page that produces contents less than required is the Zex Sod Song. However, the overall operation of the project has achieved the objectives in the satisfying level.
Final Rating			3.50 (relatively high)

3.13) The Media Literacy Kit and Activity Development Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	3 (moderate)	The media has created young characters to pass on knowledge. (Remark: From the examination of the character design in the document, and the monitoring on YouTube, only a preliminary explanation can be described.)
2. Effectiveness	50	3 (moderate)	The project aims to promote research & development, and media literacy, to produce the Media Literacy Kit and organize human resources training courses for young children. (Remark: From the examination of character design in the document, and the monitoring on YouTube, only a preliminary explanation can be described.)
	Final Rating		3.00 (moderate)

3.14) The Mahidol Channel Kids Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 The average number of audiences per episode is 26,571 people, higher than specified. (3 programs, 112 episodes, a total audiences of 2,976,000 people) The programs have been broadcasted through Thai PBS channel, in a total of 112 episodes, accounting for 62 percent, higher than specified in the plan The Mahidol Kids Care Van roaming activities have been conducted in 12 small and medium schools in 3 regions, 3 provinces which are Ubon Ratchathani, Chiang Rai and Satun, for 1,564 students, and 215 teachers, in a total of 1,779 people, which is higher than specified. There are some obstacles in project operations. For example, the youth nowadays prefer watching contents via online platforms to TV. It is necessary to revise the plan for appropriateness. The Mahidol Kids programs must be TV-based programs, which lessens the flexibility, fun, and spontaneity, unlike the online programs. The programs disseminated online for the earthy childhood audients may not be the same dissemination channel as the program for primary school audiences as the online media or YouTube has categorized their audiences clearly.
2. Effectiveness	50	5 (high)	 The programs have been applied further in 12 schools. The programs meet the specified objectives. The study shows that, after the Mahidol Kids Care Van activities, the teachers have applied the Mahidol Kids programs with their teachings, accounting for 94.1 percent. The most applied program is Animal Speak, in the sciences subject. The outcomes of the teaching applied by the program show that the teaching creates more fun for the students, accounting for 36.11 percent. Also, more activities are required by the teachers to be conducted.
Final Rating			4.5 (high)

3.15) Koateekla TV Program Project

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	The project has been completed within the timeframe. The overall satisfaction survey shows that the participants in a general public group and the people with disabilities group are highly satisfied with the project.
2. Effectiveness	50	4 (Relatively high)	 The project operation has achieved the objectives and the KPIs. (The key success factors of the project is to produce 50 episodes, not less than 25 minutes each) with Closed Caption for the hearing impaired to access to the programs via online channels such as Facebook Fan Page, YouTube, Instagram, and LINE, with 325,494 visits and 10,988 followers. According to the satisfaction survey, the general public and the people with disabilities group are highly satisfied with the project, and think that the documentary is useful and inspirational. The contents support the self-esteem and self-development of the general public and the disabled to create a livable society. Moreover, the contents promote equality, positive attitudes, and coexistence in the society, as well as reducing the digital divide.
	Final Rating		4.00 (Relatively high)

3.16) The media literacy promoting project for people through the "Nok-Poo" program

Dimension	Weighting (Percentage)	Rating	Explanation			
1. Efficiency	50	4 (Relatively high)	 The people (the respondents) are satisfied with the overall program, accounting for 85.40 percent, higher than the target specified in the project. The average number of overall audience of all channels per 1 episode was 191,262 times, higher that the specified average. 			
2. Effectiveness	50	4 (Relatively high)	The project operation has achieved the specified objectives. According to the project assessment, the respondents recognize/ understand the main points of the Nok Roo program the impact of media on life and society, and the media content consideration, accounting for 87.4 percent, higher than the target specified in the project.			
	Final Rating		4.00 (Relatively high)			

3.17) The media literacy promoting project for people through the "THE YES SIR" program

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	4 (Relatively high)	 69 percent of the sample group (562 people) recognizes the story telling in Sitcom which is more comprehensible. 88.22 percent of the sample group (719 people) thinks that "The YES SIR" program fits a sitcom type as short series are more comprehensible. In addition, 78.8 percent of the sample group think that the program can create understanding in advertising literacy for the consumers, and content analyzing. The satisfaction of the sample groups to "The YES SIR" program is at a high level at 78.26 percent. The most satisfying topic is creating social responsibility in every sector, accounting for 81.20 percent.
2. Effectiveness	50	4 (Relatively high)	The project utilization evaluation shows that the sample groups benefited at a high level with an average of 80.03 percent which is the media exposure, media selection were at a highest level and expressing opinions, interacting and sharing information consciously were at a high level, accounting for 81.4 percent.
	Final Rating		4.00 (Relatively high)

3.18) Surrey the Attitude and Demand of people with hearing Disabilities towards Television programs of NBTC.

Dimension	Weighting (Percentage)	Rating	Explanation
1. Efficiency	50	5 (High)	 Be able to achieve the objectives and goals of the project. Be able to gather the information of the people with hearing impaired and communication problem in 5 regions nationwide, in a total of 2,023 samples for quantitative information, and 39 samples for qualitative information within the timeframe, higher than expected as 2,000 samples and 30 samples for quantitative and qualitative information respectively. The outcomes of data collecting, on the attitude and requirement survey of the people with hearing impaired and communication ploblem, include the acknowledgement of organizations in the media consumers' requirements which can be applied to enhance the operation efficiency, stimulate the conscience of TV producers, and stipulate the policy recommendations.
2. Effectiveness	50	5 (High)	 The project has achieved the following objectives; 1) understand the opinions and requirements of the people with hearing impaired and communication problem on a series of TV-program under the supervision of NBTC both qualitative and quantitative. 2) analyze the survey results and prepare the policy recommendations to the NBTC to improve the TV program contents and program types to match the consumers who have hearing disabilities and interpretation difficulties. 3) enhance the social responsibility of the agencies in creating and stimulating the conscience of TV producers to the consumers who have hearing disabilities and interpretation difficulties.

Dimension	Weighting (Percentage)	Rating	Explanation		
			• The survey shows that most of the samples (consumers who have hearing disabilities and communication problem) are very interested in the TV programs under the NBTC regulation, especially the news programs and satisfied with the program quality as they contain sign language service in many channels, in compliance with the requirements of the people with hearing disabilities and communication problem, accounting for 50 percent. As a result, the recipients gain more benefits from received information. Besides, the target groups are satisfied with the overall TV programs under the NBTC regulation with the score of 8-10. The study in TV media aspect shows that, currently, the broadcasting programs contain sign language interpretation and Closed Captions in a certain level; however, people with hearing disabilities and communication problem think that they do not receive such services. Such problems may result from unclear communications between the TV operators and the consumers about the add-on services. Thus, the public relations about the services should be arranged in the following aspects. 1) Providing guidance on the technologies usage relating to the sign language receiving for the hearing impaired 2) Publishing the program schedules that contain the sign language and Closed Caption services for the convenience of program watching planning		
	Final Rating		5.00 (high)		

4) The operations of the granted projects by the BTFP in 2021 have achieved the objective of Section 55 of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecosmmunications Services B.E. 2553 (2010) and its amendment, by driving the development on broadcasting, television, and telecommunications services, as well as being a mechanism to develop the country in many dimensions, including economy, human resources management, society development, and safety, as follows:

• Economic Development Dimensions: The BTFP has allocated the fund to research and development in broadcasting, television, and telecommunications businesses, that focus on the innovation of 5G and digital technologies application in various fields. The fund has supported the technology distribution

to every economic level, such as Chula 5G Test Center in Chulalongkorn University, the 5G Trial Project for Autonomous Shuttle pod, the Project on Artificial Intelligence Development through IT network for Thai Industries, the Research and Development Project on Open Hardware and Open Guideline for Sustainable Agriculture, the SMART Coffee Plantation Model with IoTs, Sensors, and AI to uplift the Thai Coffee Industry.

In addition, the BTFP has granted the research fund to many projects that create benefits directly to the nation's economy and the broadcasting and telecommunications industries, resulting in reducing dependency on the technology from abroad, reducing the cost of technology imports, and stimulating investment in broadcasting, television, and telecommunications industries, as well as related industries.

• Society Development Dimensions:

The BTFP focus on the research and development to improve the quality of life of children, the youth, the elderly, and the underprivileged, such as producing documentaries for social benefits producing, programs for children and the youth, producing programs to promote media literacy, the Stop Fake News Project, the Short Film Awards Project for the topic of "the society-given opportunity", to promote the contents regarding opportunities and standpoints for the inmates.

• Human Resources Development

Dimensions: The BTFP has supported the human resources development in broadcasting, television, telecommunications, and information technology industries, such as the Knowledge Development for broadcasting media executive project, the community media learning center development project for empowering the communications of the community TV producers, the training project on promoting digital marketing for communities in Lampang and nearby provinces, the local and regional TV producers development project to produce the documentaries for community improvement, and the training project on Blockchain for business.

• Security Dimensions: The BTFP has emphasized on adopting digital technology for safety of lives and assets, such as the project on personal data protection development on Internet of Things (IoTs), the online system project to develop the cybersecurity expert, the research and development of radar systems for detecting unauthorized drones.

3. The operation framework of 2022

3.1 Policy and strategy goals

In 2022, the Fund Management Committee has set the goals for the fund policy and strategy implementation as follows:

- (1) Revising and implementing the 4-Year Action Plan of the Broadcasting and Telecommunications Research and Development Fund for Public Interest B.E. 2563 - 2566 (2020 -2023) to achieve the specified targets
- (2) Preparing the budget limit and the fund allocation time frame of 2023, and preparing the guidelines on cooperation with other related organizations, in order to allocate the fund to cover the targets in grassroots level, operating proactively in promoting understanding of the fund allocation to the target groups thoroughly and equally, revising the fund allocation process, such as regulations, notifications, and contracts, to comply with the proactive policies of the Fund Management Committee, as well as creating communications channels to reply the questions about the application for the fund allocation, and applying the research for sustainable development of the nation.

3.2 Objectives of the fund allocation

The NBTC has approved the budget framework and fund allocation guidelines of 2022, in a total of 1,220.00 million baht, as proposed by the Fund Management Committee. Details are shown in Table 29.

Table 29: Budget framework and Fund Allocation Guidelines of 2022

Unit: Million baht

No.	Fund Allocation Limit of 2022	Amount
1	Category 1: Projects or activities proposed by the eligible applicants (No budget limit for the fund allocation of 2022 as the operation assessment has been conducted at the end of 2021, according to the 4-year Action Plan. The results will be reviewed for the Action Plan revision, and determined the direction of the fund allocation of the coming year for the utmost benefits.	-
2	Category 2: Projects specified by the Fund Management Committee.	720.00
	2.1 Success-based projects under the policy of the Fund Management Committee (Strategic Grant)	500.00
	- Broadcasting and television businesses	150.00
	- Telecommunications businesses	150.00
	- Spectrum management and satellites businesses	50.00
	- Research and development	150.00
	2.2 Fund for collaboration with the public sector	200.00
	2.3 Ongoing projects (agreement with the granted organizations)	20.00
3	Category 3: Projects or operations specified by the NBTC to achieve the BTFP objectives.	-
4	Category 4: Fund for supporting the Thai Media Fund according to Section 52 (5) of the Act.	500.00
	Total	1,220.00

Source: Research and Development Fund Bureau, Office of the NBTC

3.3 Goal on monitoring and evaluation efficiency of the Fund's Expenditure

The BTFP has set goals for management system development to enhance the operation efficiency.

As a result, the fund has been managed effectively. The regulations and criteria relating to the operations have been developed to cover the work process with transparency, bringing information technology system to facilitate the operations of the Research and Development Fund Bureau and the grantees efficiently.

In addition, the BTFP has conducted the instructions for applying for the grants, publicized on the BTFP website, as well as handbook copies to clarify the application process and operation procedures to the applicants and stakeholders. Moreover, the BTFP has invested the resources to upskill and reskill the BTFP's human resources to implement the BTFP plans and policies for achievements, regarding plan and policy analytical skill, project monitoring and evaluation, finance and accounting, research and intellectual property management, foreign languages, as well as conducting public relations of the BTFP performances, achievements, and information that promotes the BTFP image and benefits the society.



Broadcasting and Television Services

Competition in Telecommunications Services



of the State and People



Quality of Service and Telecommunications Service Rates that are Important to the People



Trends of Broadcasting, Television, and Telecommunications Industries in 2022

Report on Market Situation and Competition in Broadcasting, Television, and Telecommunications Services in 2021



Market Situation and Competition in Broadcasting and Television Services

The dynamic change of broadcasting and television services has been affected by many factors, for example, technology dynamics that leverage the competition between traditional media and new media, the investment portals, the COVID-19 pandemic, and consumer's behavior and preference changing, that cause a massive challenge for the service providers in broadcasting and television industries.

In 2021, the Office of the NBTC has analyzed the broadcasting and television markets as follows:

1. The Television Market in 2021

1.1 The television viewing behavior in 2021

The television viewing survey on daily-basis (monthly average) from every network¹³ in 2021¹⁴ shows that the nationwide audiences were likely to spend less time in television viewing in the first half of the year (Quarter 1-2), while they spent more time for television

viewing in Quarter 3. However, time spending in television viewing of the audiences in Quarter 4 decreased. By considering the digital television audiences exclusively, the overall time spending for television viewing in 2021 decreased in Quarter 1 and 2, accounting for 1.16 percent and 5.49 percent respectively. In Quarter 3, it increased at 0.87 percent, while it decreased in Quarter 4 at 0.57 percent.

 $^{^{13}}$ The viewing of the nationwide audiences of digital terrestrial, cable, and satellite television networks

The television viewing behavior analysis is divided into 4 periods, including <u>Quarter 1</u>: January - March 2021, which was the time of the second wave of the COVID-19 pandemic, <u>Quarter 2</u>: April - June 2021, which was the beginning of the third wave of the COVID-19 pandemic, <u>Quarter 3</u>: July - September 2021, which was the peak of the third wave of the COVID-19 outbreak, as the number of infected people had increased more than 5,000 a day, according to the Department of Disease Control report, and <u>Quarter 4</u>: October - December 2021, which was the early phase of the COVID-19 relief measures implementation, such as lockdown lifting, and easing curfew measures

By considering the monthly data, it shows that the highest time spending of digital television viewing was in October 2021, at the average duration of 3 hours and 56 minutes. The audience behaviors in other networks were also alike. Details are shown in Chart 7 and 8. The information shows that, the average duration of television viewing in every network

of Quarter 3/2021 increased, as Quarter 3 was the peak of the COVID-19 outbreak. People focused on the news about the pandemic closely. However, in Quarter 4, the audiences were likely to spend less time in television viewing as the COVID-19 relief measures of the government. As a result, many people were working onsite and returning to their normal routines.

Chart 7: Duration of Daily Television Viewing (Monthly Average) in Every Network (Nationwide)



Source: AGB Nielsen Media Research

Chart 8: Duration of daily television viewing (monthly average) in digital terrestrial network (nationwide)



Source: AGB Nielsen Media Research

1.2 Competition of Service Providers

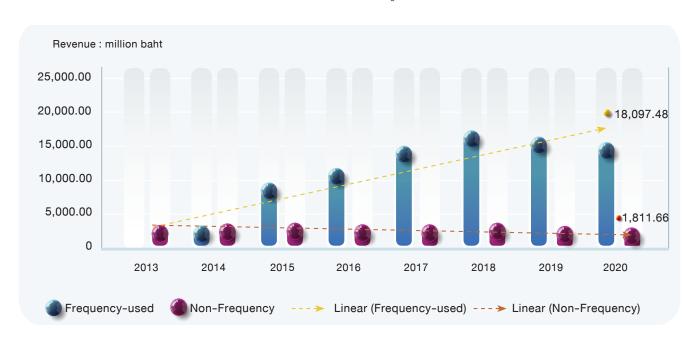
1) Business Values

The market value of the frequency-used service providers or digital television service providers, calculated from the revenue of the television operators declared to the Office of the NBTC in 2021, which was the latest year that the licensees filed the documents for license fee payments of the fiscal year 2020¹⁵, in a total of 18,097.48 million baht. By considering the market value during 2015 - 2020, the trend of overall market was likely to increase; on the other hand, the trend slightly declined in 2019, due to the COVID-19 pandemic, which causing the products manufacturers and services providers

to minimize their advertising cost, affecting the impact on the advertising revenue of the digital terrestrial television operators.

The market value of the non-frequency television services or cable TV, satellite TV and IPTV was calculated from the revenue of the operators, filed to the Office of the NBTC. In 2021, which was the latest year that the operators filed their documents for license fee payment, it showed that, the total revenue of all non-frequency television service licensees was 1,811.66 million baht in 2020¹⁶. However, the revenue trend has continually decreased since 2016. Details are shown in Chart 9.

Chart 9: Revenues of Frequency-Used and Non-Frequency used of Television Services since the year 2013 - 2020



Source: Broadcasting Tariffs Bureau, Office of the NBTC

¹⁵ Data as of June 30, 2021

¹⁶ Data as of June 30, 2021

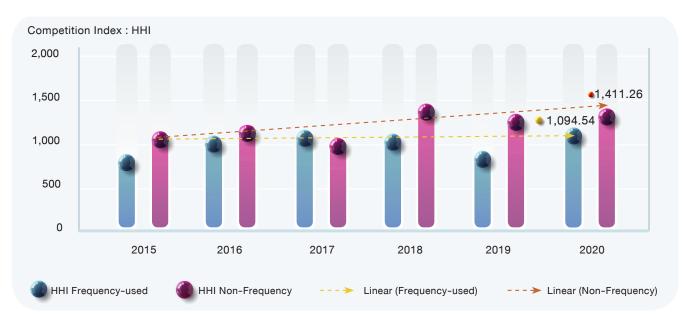
2) Competition Level

According to the Herfindahl Hirschman-Index (HHI)¹⁷, the HHI value was 1,094.54, indicating that, the digital terrestrial television market was moderately concentrated (range from 1,000 - 1,800) in 2020. The market concentration slightly increased from the previous year. However, by considering the overall market together with the market share calculated from the revenue, the digital terrestrial television market was not monopoly, under the Notification of the NBTC on Criteria on Identifying Operators

with Significant Market Power in Each Relevant Market, and the Measures for Prevention of Monopoly or Unfair Competition B.E. 2557 (2014).

The non-frequency television market was moderately concentrated (range from 1,000 - 1,800) in 2020. The concentration of the market slightly increased from the previous year. However, by considering the overall market together with the market share calculated from the revenue, the non-frequency television market was not a monopoly. Details are shown in Chart 10.

Chart 10: HHI of Frequency-Used and Non-Frequency used of Television Services since the year 2015 - 2020



Source: Calculated from the data of operators, submitted to the Office of the NBTC

 $^{^{17}}$ HHI value is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers.

By considering the change of total revenue, the market trend of the television industry since 2019 onwards has been declining. The advertising value in the digital television business has been likewise declining, accounting for a 10.37 percent decrease during 2019 - 2020, due to the COVID-19 pandemic which affected the overall economy including the television advertising industry. However, the digital television advertising value of 2021 slightly increased, accounting for only 1.62 percent increase from the previous year. Details are shown in Chart 11.

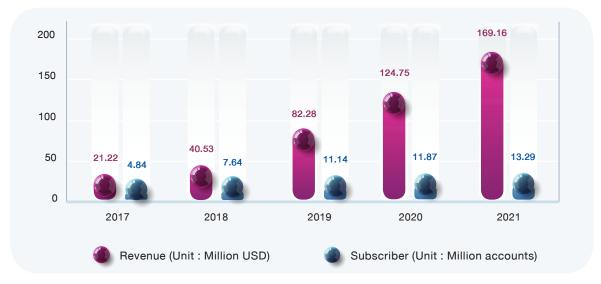
The declining revenue of the television industry has been affected by the new and emerging technologies, which change audiences' viewing behaviors. A large group of viewers turn to new internet platforms, or video streaming which enables the audiences to view the programs at any time anywhere. Obviously, the subscribers of video streaming platforms are continually and dramatically blooming, resulting in the platform providers' revenue increase, unlike the television industry's revenue. Details are shown in Chart 12.

Chart 11: Percentage of the Digital Television Advertising Value During 2017 - 2021¹⁸



Source: AGB Nielsen Media Research

Chart 12: Number of Video Streaming Subscribers and Revenues of Video Streaming
Providers in Thailand During 2017 - 2021



Source: Omdia (2021)

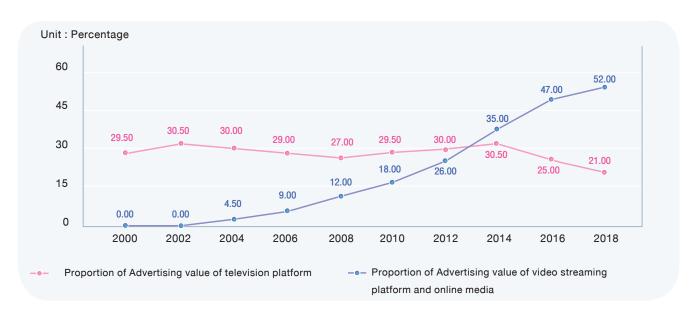
¹⁸ Advertising value is an estimate of advertising rate card on the digital TV channels, surveyed by AGB Nielsen Media Research

From the chart above, it is clear that the video streaming service has made the competition in the television industry more intense, and affected the television operators. However, video streaming has visibly transformed the global media landscape and impacted viewing behavior not only in Thailand, but also worldwide. For example, according to the Australian Competition and Consumer Commission Report, the competition of television industry in Australia in 2020 was intense. The advertising value of video streaming platforms and online media has experienced massive growth since 2004, and continued to expand at a rapid pace, while the advertising value of the television advertising value, which was the majority revenue of the television operators, has gradually been decreasing since 2014. As a new technology, the video streaming has disrupted the industry, and become a significant challenger to the traditional television service providers. Details are shown in Chart 13.

Thus, the dynamic technology enables the online platforms to provide contents

just the same as the traditional media such as television. It creates an option for people to receive information and program contents. However, the intense competition between the traditional media and the video streaming platforms has strongly challenged the television operators. The declining trend of revenue has become a major constraint for the television operators, as it led to the decrease in capital to produce qualified content. As a result, it would finally affect the overall market competition. As the content is the key to establish and expand a sturdy audience base, the television operators need to address the audiences' changing behavior by expanding to online channels. Together with the fierce competition in the television industry, some operators encounter competition difficulties, and have to withdraw from the market eventually. Thus, the NBTC has supported the television operators to upskill in many aspects. One of them is introducing the guidelines on structural problems solving, such as the law amendment to comply with the dynamic environment.

Chart 13: Comparison of Proportion of the Television Advertising Value, Video Streaming Platforms and Online Media in Australia During 2000 - 2018



1.3 Competition of Network and Facility Providers

1) The Business Values

The business values of the digital terrestrial television provision are calculated from the revenue of the television operators, declared to the Office of the NBTC in 2021 for license fee payments (the fiscal year of 2020), in a total of 1,622.66 million baht. By considering the market value during 2015 - 2020, the trend of the overall market has declined since 2017, as the revenues have decreased continually every year.

In addition, by considering the market value during 2015 - 2020, in the fiscal year of 2020¹⁹, which was the latest year that the operators filed their documents for license fee payment, the total revenue of all non-frequency television service licensees was 3,097.09 million baht (divided into the satellite network service revenue for 1,728.20 million baht, the cable network service revenue for 690.81 million baht, and IPTV network service revenue for 678.08 million baht). Details are shown in Chart 14.

Revenue: million baht 3,000.00 2,500.00 1,622.66 2,000.00 1,500.00 1.000.00 500.00 0.00 2015 2016 2017 2018 2019 2020 Revenue Satellite Revenue Digital Revenue Cable Revenue IPTV

Chart 14: Revenue of Frequency-Used and Non-Frequency used of Television Network During 2015 - 2020

Source: Broadcasting Tariffs Bureau, Office of the NBTC

2) Competition Level

According to the Herfindahl Hirschman-Index (HHI) analysis in the fiscal year of 2015 - 2020, the HHI value of the digital terrestrial television market was 3,965.01, indicating that the market was highly concentrated (higher than 1,800) in 2020. Although the market concentration slightly decreased from the previous year, it was considered as highly concentrated. However, as the digital terrestrial television provision may affect the public interest, the NBTC has carried out the price regulation to encourage market

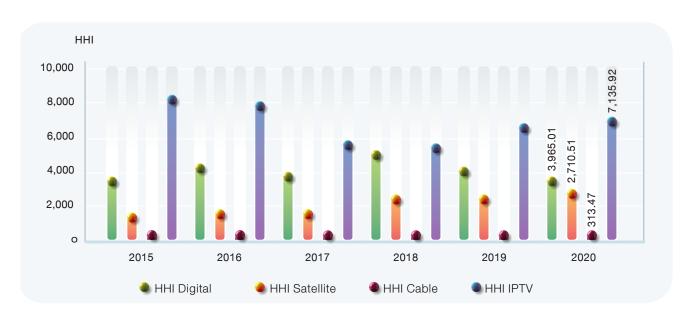
competition at the affordable rates, under the Notification of the NBTC regarding the guidelines on tariff regulation in broadcasting and television services, and the Notification of the NBTC on calculation method for rental charge of digital terrestrial television network.

Considering the market concentration of the satellite, cable and IPTV networks, only the cable network is lightly concentrated (HHI value below 1,000), due to a large number of the operators and the revenue diversification, leading to the efficient market competition.

contrary, the market concentration of the satellite and IPTV networks are fairly high. The NBTC has considered the qualitative factors of the operators and found out that the market competition presently has changed in many aspects, such as the dynamic technology, investment channels, and changing consumer behavior. Also, the service alternatives have been vastly emerging, such as non-traditional

broadcasting networks. The NBTC has carried out the regulations to prevent anti-competition practices, under the Notification of the NBTC on Criteria on Identifying Operators with Significant Market Power in Each Relevant Market, and the Measures for the Prevention of Monopoly or Unfair Competition in broadcasting and television B.E. 2557 (2014). Details are shown in Chart 15.

Chart 15: HHI of Frequency-Used and Non-Frequency used of Television Service Provision During 2015 - 2020



Source: Calculated from the data of operators, submitted to the Office of the NBTC

2. Market Situation of Broadcasting Services 2021

2.1 The proportion of the radio service access frow every channel in 2021, According to the survey of the radio service access of Thai people aged above 12 years old, listening to the 40 FM main radio stations (87.5 MHz - 107 MHz)

from every channel (such as radio, mobile phones, and computers, etc.) in Bangkok and its vicinities areas, In 2021, the radio service access rate of every channel accounted for 16 percent of the nationwide population, considered as 1 percent decrease from the previous year. Details are shown in Chart 16.

(Precentage)

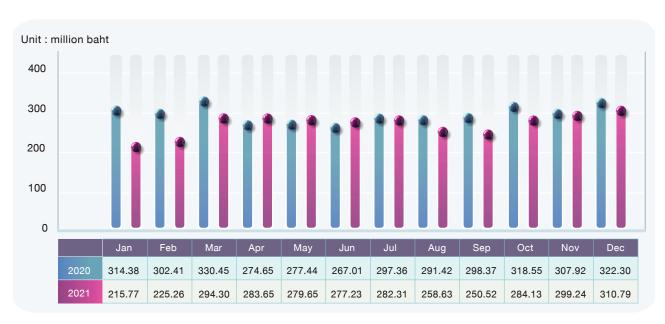
Chart 16: The Proportion of the Radio Service Access from Every Channel During 2012 - 2021

2.2 The advertising value in the broadcasting service in 2021

In 2021, the advertising value via the high power radio broadcasting stations in FM system (88.0 - 91.5, 93.0 - 103.5 and 104.5 - 107.0 MHz) in Bangkok and its vicinities areas accounted for 3,261.13 million baht. Compared to the previous year, the advertising value via the high power radio broadcasting station in 2020 accounted for 3,602.25 million baht, or 341.12 million baht higher than the value of 2021,

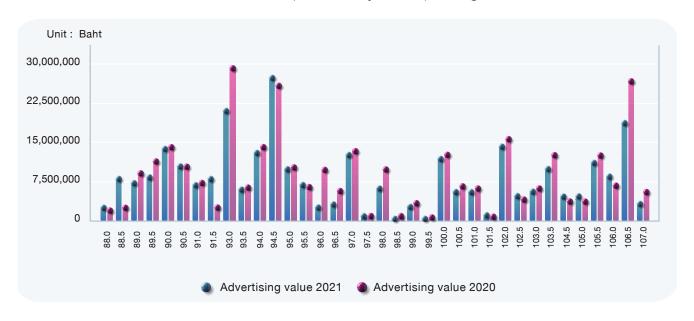
accounting for 9.47 percent. By considering the advertising value of each station, it shows that, the top 10 stations with the highest advertising revenue are the following: 94.5 MHz (Countrymusic), 93.0 MHz (Easy listening), 106.5 MHz (Easy listening), 102.0 MHz (News), 90.0 MHz (Country music), 94.0 MHz (Easy listening), 97.0 MHz (News), 100.0 MHz (Traffic report), 105.5 MHz (Easy listening), and 90.5 MHz (News) respectively. Details are shown in Chart 17 and 18.

Chart 17: The Advertising Value of FM high power radio broadcasting Stations in Bangkok and its vicinities areas During 2020 - 2021



Source: AGB Nielsen Media Research

Chart 18: The Advertising Value of 36 FM high power radio broadcasting Stations in Bangkok and its vicinities areas (classified by station) During 2020 - 2021



Remark: No data collection of 99.5 MHz in 2021 Source: AGB Nielsen Media Research

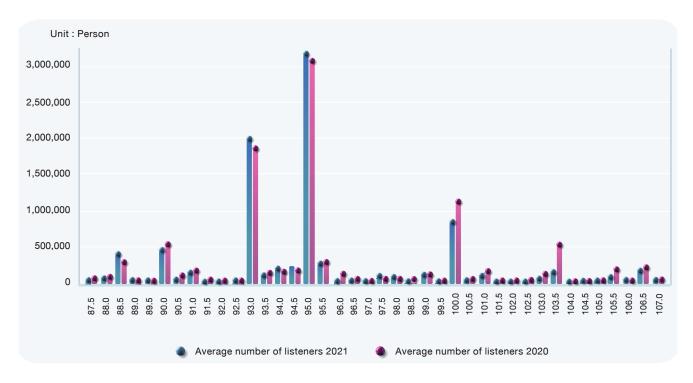
2.3 The Number of Radio Listeners in 2021

According to the survey of the radio service access of Thai people aged above 12, listening to the 40 FM high power radio broadcasting stations (87.5 MHz - 107.00 MHz) from every channel (such as radio, mobile phones, and computers, etc.) in Bangkok and its vicinities areas , in 2021, there were 10,273,083 people per month, decreasing from 2020 for 904,067 people, accounting for 8.09 percent. By considering the

information of each station, it shows that the top 10 stations with the most listeners in 2021 are the following: 95.0 MHz (Country music), 93.0 MHz (Easy listening), 100.0 MHz (Traffic report), 90.0 MHz (Country music), 88.5 MHz (Easy listening), 95.5 MHz (Easy listening), 94.0 MHz (Easy listening), 94.5 MHz (Country music), 106.5 MHz (Easy listening), and 91.0 MHz (Traffic report) respectively. Details are shown in Chart 19.



Chart 19: The Number of 40 FM high power radio broadcasting Stations Listeners in Bangkok and its vicinities areas (classified by station) During 2020 - 2021



2.4 Market Competition Analysis in Audio Broadcasting Service via the advertising value and proportion of the audience. By considering the advertising value and the number of listeners in audio broadcasting service, most of the popular radio stations are likely to have high advertising value. The most popular and competitive station is the country music station. Also, the easy listening²⁰ and traffic report stations are popular among the listeners. Details are shown in Table 30. However, it is noticeable that, the advertising

revenue of 95.0 MHz country music station, which has the highest number of listeners, is not ranked in the top 10 stations with the highest revenue. On the contrary, the advertising revenue of the news stations, which are not ranked in the top 10 stations with the highest number of listeners, are at the top of the highest revenue stations list, such as 102.0 MHz and 97.0 MHz stations. Besides, the advertising value in the audio broadcasting industry relies on not only the number of listeners, but also the connection with the advertising agencies.

Table 30: The Top 10 Radio Stations with the Highest Number of Listeners and the Highest Revenue During 2020 - 2021

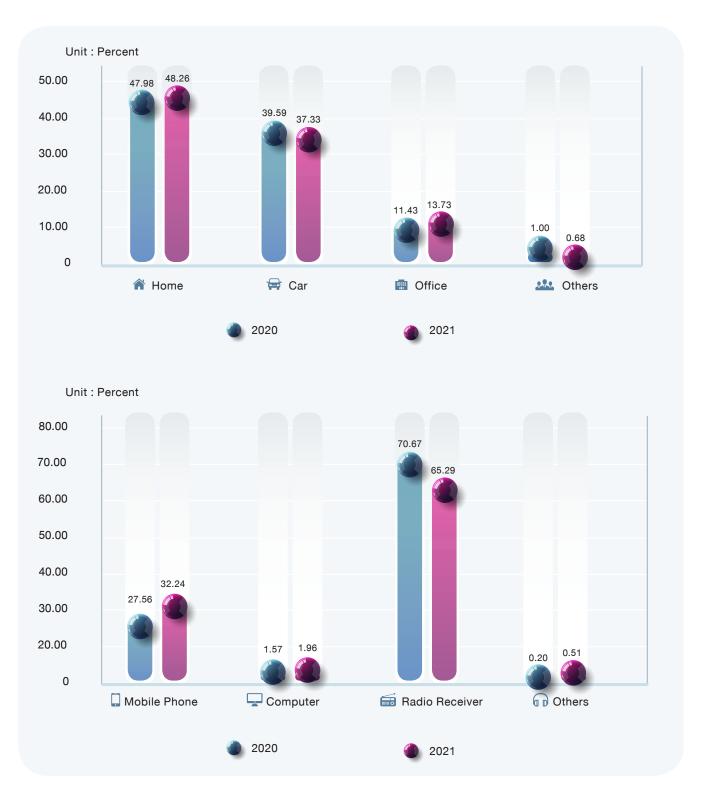
Rank	Stations with the Highest Number of Listeners		Stations with the Highest Advertising Revenues		
	2021	2020	2021	2020	
1.	95.0 MHz	95.0 MHz	94.5 MHz	93.0 MHz	
	(Country music)	(Country music)	(Country music)	(Easy listening)	
2.	93.0 MHz	93.0 MHz	93.0 MHz	106.5 MHz	
	(Easy listening)	(Easy listening)	(Easy listening)	(Easy listening)	
3.	100.0 MHz	100.0 MHz	106.5 MHz	94.5 MHz	
	(Traffic report)	(Traffic report)	(Easy listening)	(Country music)	
4.	90.0 MHz	90.0 MHz	102.0 MHz	102.0 MHz	
	(Country music)	(Country music)	(News)	(News)	
5.	88.5 MHz	103.5 MHz	90.0 MHz	94.0 MHz	
	(Easy listening)	(Easy listening)	(Country music)	(Easy listening)	
6.	95.5 MHz	88.5 MHz	94.0 MHz	90.0 MHz	
	(Easy listening)	(Easy listening)	(Easy listening)	(Country music)	
7.	94.0 MHz	95.5 MHz	97.0 MHz	97.0 MHz	
	(Easy listening)	(Easy listening)	(News)	(News)	
8.	94.5 MHz	106.5 MHz	100.0 MHz	100.0 MHz	
	(Country music)	(Easy listening)	(Traffic report)	(Traffic report)	
9.	106.5 MHz	105.5 MHz	105.5 MHz	103.5 MHz	
	(Easy listening)	(Easy listening)	(Easy listening)	(Easy listening)	
10.	91.0 MHz	94.5 MHz	90.5 MHz	105.5 MHz	
	(Traffic report)	(Country music)	(News)	(Easy listening)	

2.5 Radio Listening Behavior in 2021.

According to the survey of the radio service access of Thai people aged above 12, years old listening to the 40 FM high power radio broadcasting stations (87.5 MHz - 107.00 MHz) from every channel (such as radio, mobile phones, and computers, etc.) in Bangkok and its vicinities areas, in 2021, most people prefer radio listening at homes, on car, at offices, and others, at the percentage of 48.26, 37.33, 13.73, and 0.68 percent respectively.

In addition, most people prefer listening via radio receivers (65.29 percent), mobile phones (32.24 percent), computers (1.96 percent), and others (0.51 percent). By comparing the radio listening behavior in 2021 and 2020, the trend of listeners at homes and offices are likely to increase. Likewise, the trend of radio listening via mobile phones, computers, and other channels are rising as well. Details are shown in Chart 20.

Chart 20: Radio Listening Behavior, (classified by place and device) During 2020 - 2021



Market Situation and Competition in Telecommunications Services

The telecommunications market situation can be divided into 3 categories, which are fixed-line service market, mobile service market and internet market. In 2021, the market situation and competition in telecommunications services are analyzed as follows:

1. Market of Fixed-line Service

Regarding the fixed-line service market of Thailand in 2021, the number of subscribers was 4.63 million numbers, decreasing by 7.40 percent from 2020. The ratio of the fixed-line subscribers per number of households nationwide accounted for 20.75 percent. According to the market share of fixed-line service of 2021, National Telecom Public Company Limited (NT)²¹

had the largest market share, accounting for 67.48 percent, as the fixed-line business requires huge amounts of investment which naturally leads to monopoly. Secondly, True Internet Corporation Company Limited (TICC) had 27.47 percent of the market share, followed by Advanced Wireless Network Company Limited (AWN) for 2.58 percent, respectively. It is difficult for the new service providers to enter the market due to the fully saturated market, changing consumer behaviors, replacement services with new technologies, which offer more convenient service at lower cost. Thus, to enter the market may not be worth the investment. Details are shown in Chart 21 and 22.





Number of fixed-line subscribers

Proportion of subscribers per number of households nationwide (Percentage)

²¹ In 2021, TOT Public Company Limited (TOT) and CAT Telecom Public Company Limited (CAT) have been merged into National Telecom Public Company Limited (NT)

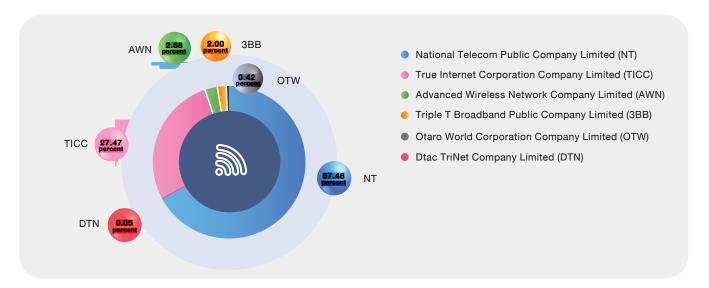


Chart 22: Market Share of Fixed-Line Service classified by Operators in 2021

Source: Telecommunications Policy and Resources Management Bureau, Office of the NBTC

2. Mobile Service

Regarding the mobile service market of Thailand in 2021, the number of mobile subscribers was 117.76 million numbers, increasing by 1.26 percent from 2020. The mobile penetration rate accounted for 173.20 percent. According to the market share of mobile service of 2021, Advanced Wireless Network Company Limited (AWN) had the largest market share,

accounting for 44.49 percent, Secondly, True-Move H Universal Communication Company Limited (TUC) had 32.69 percent of the market share, followed by Dtac TriNet Company Limited (DTN) for 19.47 percent and National Telecom Public Company Limited (NT) for 3.35 percent respectively. Details are shown in Chart 23. In addition, the HHI value of the mobile service was 3,453 in 2020, and 3,438 in 2021.

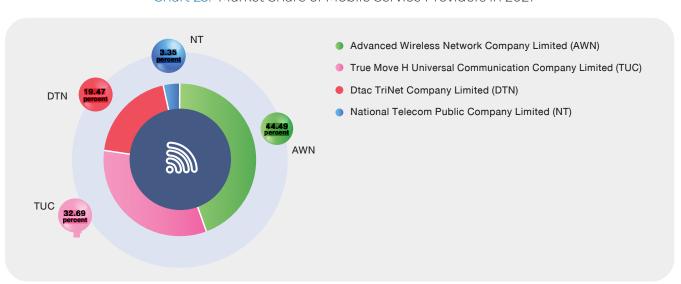


Chart 23: Market Share of Mobile Service Providers in 2021

3. Market of Internet Service

The internet service in Thailand today offer various types of service. Fixed broadband and mobile broadband service are most used among consumers. Details are as follows:

3.1 Fixed Broadband

Nowadays, the market of Narrowband Internet service, such as Dial-up internet, has been gradually faded away from the internet service market. Mostly, the broadband internet connections have been switched from xDSL (Digital Subscriber Line) to FTTP (Fiber to the Premises) technologies. In 2021, the number of fixed broadband subscribers increased to 13.16 million subscribers, accounting for 14.48

percent compared to 2020. By considering internet accessibility, the proportion of the fixed broadband subscribers was 18.69 subscribers per 100 inhabitants, or 57.19 households out of 100 households have subscribed to the internet service

According to the fixed broadband service market share of 2021, True Corporation Public Company Limited (TRUE) had the largest market share, accounting for 35.29 percent, followed by Triple T Broadband Public Company Limited with 27.78 percent of the market share. In addition, the HHI value of the fixed broadband service was 2,705 in 2020, and 2,626 in 2021. Details are shown in Chart 24 and 25.

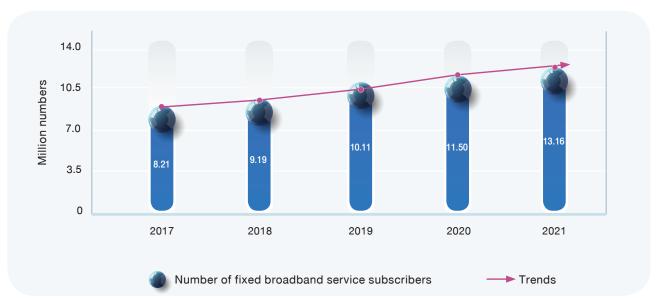


Chart 24: Number of Fixed Broadband Service Subscribers During 2017 - 2021

Unit: Percentage 38.42 37.94 40.00 37.65 36.56 35.29 29.80 33.21 30.00 32.02 31.43 27.78 20.37 18.17 17.17 20.00 16.24 16 72 13.62 10.00 11.65 7.95 6.35 10.26 5.29 4.92 4.42 3.83 2.95 0.00 2017 2018 2019 2020 2021 TOT Public Company Limited (TOT) National Telecom Public Company Limited (NT) TRUE Corporation Public Company Limited (TRUE) 🔭 Triple T Broadband Public Company Limited (3BB) * Advanced Wireless Network Company Limited (AWN) - Others

Chart 25: Market Share of Fixed Broadband Service During 2017 - 2021

Source: Telecommunications Policy and Resources Management Bureau, Office of the NBTC

3.2 Mobile Broadband Service

In 2021, the number of mobile broadband subscribers was 65.98 million numbers, 4.62 percent increase compared to 2020. The population access rate was 96.68 percent. According to the mobile broadband service market share of 2021, Advanced Wireless Network Company Limited (AWN) had the largest market

share, accounting for 46.66 percent, followed by True Move H Universal Communication Company Limited (TUC) with 30.14 percent of the market share, and Dtac TriNet Company Limited (DTN) with 20.47 percent respectively. In addition, the HHI value of the mobile broadband service increased from 3,497 in 2020 to 3,509 in 2021. Details are shown in Chart 26 and 27.

Chart 26: Number of Mobile Broadband Service Subscribers During 2018 - 2021 85.58 88.76 92.56 96.68 100 75

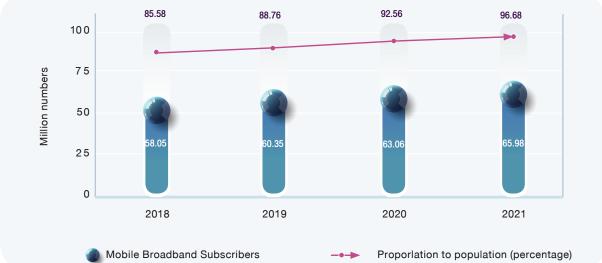
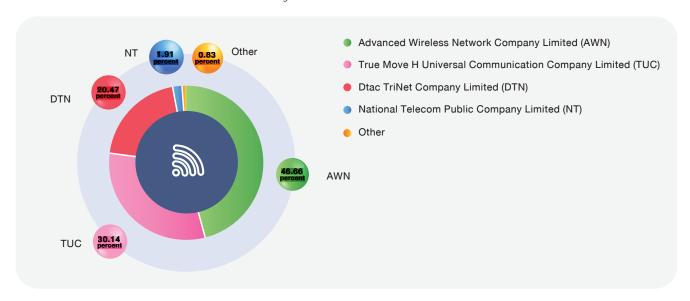


Chart 27: Market Share Calculated by Subscribed number for mobile internet service in 2021





The Observation on the Action in the Nature of dominance in Broadcasting, Television, and Telecommunications Services which has impacted the Benefits of the State and People

1. Broadcasting and Television Services

According to the Notification of the NBTC on Regulatory Measures for Business Merger in Radio and Television Broadcasting Businesses, published in the Royal Gazette on August 20, 2018, it defines the market domination in radio and television broadcasting services in Category 2: Market domination by persons with mutual benefit. That if any market dominance action occurs, both directly and indirectly, by person with mutual benefit which may lead to monopoly or anti-competition, the NBTC may prescribe specific measure to prevent the monopolistic practices or actions that cause unfair competition

In 2021, there were no licensee's actions that involved market domination both directly and indirectly in broadcasting services, which did not affect the public interest, according to Section 31 and 32 of the Broadcasting Business Act B.E. 2561 (2018), and the relevant notifications. Thus, regarding competition regulatory practices in broadcasting business, if there is a complaint or evidence showing that a licensee conducts unfair practices, such as price discrimination, prescribing unfair conditions to other licensees, or other behaviors that may affect the competition in broadcasting business, the NBTC shall prescribe measures or orders to the licensee to restrain from such behavior, and resolve the

consequences, according to the Notification of the NBTC on Criteria on Identifying Operators with Significant Market Power in Each Relevant Market, Measures for the Prevention of Monopoly or Unfair Competition B.E. 2557 (2014), and the relevant notifications. In 2021, merger and acquisition in broadcasting business were reported to the NBTC to comply with the Notification of the NBTC on Regulatory Measures for Business Merger in Radio and Television Broadcasting Businesses. After considering the business mergers of the licensees, it showed that the mergers complied with the Notification of the NBTC on Regulatory Measures for Business Merger in Radio and Television Broadcasting Businesses. At present, there has been no evidence showing that the mergers have caused negative effects on the market competition.

1) The merger of GMM Channel Company Limited and its subsidiary (digital terrestrial television service licensee in Standard-Definition) aimed to restructure and improve internal operations. After monitoring, it is found that the merger has not affected the competition of the market. As a result, no specific measures are required, under the Notification of the NBTC on Criteria on Identifying Operators with Significant Market Power in Each Relevant Market, and Measures for the Prevention of Monopoly or Unfair Competition B.E. 2557 (2014).

2) The merger of TOT Public Company Limited and CAT Telecom Public Company Limited, which were 100 percent owned by the Ministry of Finance, was regarded as a merger of affiliated companies, under Section 153 of the Public Limited Companies Act B.E. 2535 (1992) and its amendment. The merger of the two companies led to the formation of a new company, National Telecom Public Company Limited. After monitoring, it is found that the merger has not affected the competition of the market. As a result, no specific measures are required, under the Notification of the NBTC on Criteria on Identifying Operators with Significant Market Power in Each Relevant Market, and Measures for the Prevention of Monopoly or Unfair Competition B.E. 2557 (2014).

3) The acquisition of DN Broadcast Company Limited (DN) by JKN Global Media Public Company Limited (JKN) aimed to manage the liquidity due to the declining revenue, and increase the business operation efficiency and the competitive capabilities. By considering the competition aspect, the acquisition of DN, regarded as a small television service provider, by JKN, a parent of company of JKN News Company Limited (a non-frequency terrestrial television

service licensee), has not affected the competition of the digital terrestrial television business, and the non-frequency terrestrial television business. As a result, no specific measures are required, under the Notification of the NBTC on Criteria on Identifying Operators with Significant Market Power in Each Relevant Market, and Measures for the Prevention of Monopoly or Unfair Competition B.E. 2557 (2014).

2. Telecommunications Service

In 2021, there was a merger case of the state-owned telecommunications operators between TOT Public Company Limited and CAT Telecom Public Company Limited, according to the Cabinet's approval on January 14, 2020, to form a new state enterprise, National Telecom Public Company Limited on January 7, 2021.

Also, in Quarter 3/2021, there was another merger case of the affiliated companies between Triple T Internet Company Limited and Triple T Broadband Public Company Limited, on August 1, 2021, to restructure the operation system of the companies. The merger process was completed according to Section 6 of the Notification of the NBTC on Regulatory Measures on Merger in Telecommunications Business.

Quality of Service and Telecommunications Service Rates that are Important to the People

The NBTC has regulated the telecommunications business, prescribed the criteria and standards of service quality, and regulated the tariff of telecommunication services, to ensure high quality of service at reasonable price for consumers.

In 2021, the major performances and achievements are as follows:

1. Quality of Service Regulations

The NBTC has revised the Notification of the NBTC on quality of service standards for telecommunications services, to comply with the International Mobile Telecommunications-2020 (IMT-2020 Standard). The purpose of the revision was to ensure that consumers get the standardized telecommunications services. The additional targets and indicators for the mobile services have been set and used as a reference for telecommunications service quality regulations. The revision also aimed to support technology development of the country, and promote the highest benefits to consumers. Accordingly, the public hearing about the notification draft was organized on October 8, 2021.

In 2021, the Office of the NBTC has regularly monitored telecommunications services quality, according to the Notification of the NBTC on quality of service standards for telecommunications services, which stipulates that the licensees are required to provide standardized telecommunications services as specified in the appendix²² of the Notification. The service providers are required to test their

service quality with the specified indicators, and file reports quarterly to the Office of the NBTC. Besides, the Office of the NBTC has re-tested the quality of service regularly in the cases where the services have not complied with the standards, as well as receiving complaints from the consumers. Furthermore, the Office of the NBTC has coordinated with the operators to follow-up the complaint resolutions. The monitoring results are summarized as follows:

1.1 Quality of Service monitoring by the reports of the telecommunications operators

1) Quality of fixed telecommunication network services

The fixed telecommunication network services include fixed-line telephone and public telephone. According to the quality-of-service reports of the fixed-line service operators, submitted to the Office of the NBTC, during Quarter 1/2021 - 3/2021, the service provisions of all operators met the targets and/or exceeded the quality of service targets, specified in the relevant NBTC notifications. It indicates the efficiency of telecommunications service provision, in terms of telecommunications network, services, problem-solving, and communication accuracy and convenience.

Quality of service indicators, appeared in the appendix of the Notification of the NBTC on quality of service standards for telecommunications services was published in the Royal Gazette on October 25, 2019, No. 136 Special Chapter 265, consisting of

¹⁾ Fixed telecommunication services mean the service provision through fixed telecommunications network such as copper wire network, fiber optic network, or both. The services include fixed-line telephony, public telephone, and data services. The quality indicators are as follows: (1) general quality indicators (2) voice quality indicators, and (3) data quality indicators.

²⁾ Mobile services mean the service provision through mobile telecommunications network for Land Mobile Service. The quality indicators include (1) general quality indicators (2) voice quality indicators, and (3) data quality indicators.

2) Quality of mobile network services According to the quality of service reports of 7 mobile service operators²³, consisting of the Mobile Network Operators (MNOs) and Mobile Virtual Network Operators (MVNOs), submitted to the Office of the NBTC, the overall service provisions of the operators during Quarter 1/2021 - 3/2021 met the quality of service targets, specified in the NBTC notifications, except Dtac TriNet Company Limited (DTN) that the response time for accessing customer-service call center did not met the target specified in the Notification. In this regard, the response time for accessing customer-service call center of DTN in Quarter 3/2021 was 80 seconds, resulting from large numbers of people contacting the Call Center 1516 and 1678 to inquire the information about COVID-19 vaccination, promotional service packages, services, billing payment, and the government's co-pay campaign. Thus, the response time for accessing customer-service call center of DTN was below standard in July and August 2021.

To solve the problem, DTN has increased the number of call center agents, and online contact channels to provide information, as well as offering the Interactive Voice Response system to assist consumers. As a result, the average waiting time decreased to 60 seconds in September, complying with the NBTC Notification, and the Notification of the Office of the NBTC regarding guidelines on quality of service indication and surveillance areas, and service quality reports preparation and dissemination for fixed network and mobile network services.

In Quarter 3/2021, the surveillance areas for mobile network services monitored by the operators in the data transfer category of RTT, FTP and HTTP, Details are shown in Table 31.



 ⁴ Mobile Network Operators (MNOs) include (I) Advanced Wireless Network Company Limited (AWN), (2) Dtac TriNet Company Limited (DTN),
 True Move H Universal Communication Company Limited (TUC), and (4) National Telecom Public Company Limited (NT)

^{2) 3} Mobile Virtual Network Operators (MVNOs) include (1) Loxley Public Company Limited, (2) The White Space Company Limited, and (3) Feels Telecom Corporation Company Limited

Table 31: Surveillance Areas for Mobile Network Services in 2021

Area	Monitoring Area (Quarter 1/2021)	Monitoring Area (Quarter 2/2021)	Monitoring Area (Quarter 3/2021)
Regional surveillance areas	Northeastern RegionMajor and minor routes in regional areasRoutes in community areas (within the same district)	Southern Region - Major and minor routes in regional areas - Routes in community areas (within same district)	Central /Eastern Region - Major and minor routes in regional areas - Routes in community areas (within same the district)
Surveillance areas in Bangkok and	Routes in Bangkok and its vicinities areas	Routes in Bangkok and its vicinities areas	Routes in Bangkok and its vicinities areas
its vicinities areas	Special routes (Special routes include Chalerm Maha Nakhon Expressway (Expressway Stage 1), Sirat Expressway (Expressway Stage 2))	Surveillance areas 1. Suvarnabhumi Airport 2. Don Mueang Airport 3. Bangkok Bus Terminal (Chatuchak) 4. Bangkok Bus Terminal (Borommaratchachonnani) 5. Bangkok Bus Terminal (Ekkamai) 6. Bangkok Railway Station (Hua Lamphong)	Five community areas (include tourist attractions, public parks, shopping malls, universities, etc.)

Source: Telecommunications Technology and Standard Bureau, Office of the NBTC

$\,$ 1.2 Quality of service monitoring by the Office of the NBTC

In 2021, the Office of the NBTC has carried out the quality of mobile service provision of 4 operators, including Advanced Wireless Network Company Limited (AWN), Dtac TriNet Company Limited (DTN), True Move H Universal Communication Company Limited (TUC), and National Telecom Public Company Limited (NT)²⁴, as described below.

1) According to the quality of voice service monitoring by considering Successful Call Ratio and Drop Call Rate within the same network, the voice service provision of all operators in Quarter 3/2021 met the quality of service standards. The Successful Call Ratio was 99.94 percent, higher than the target (not less than 90 percent), and the Drop Call Rate was 0.00 percent, better than the target (not exceeding 2 percent). Details are shown in Table 32.

²⁴ National Telecom Public Company Limited (NT) was formed by the merger of TOT Public Company Limited (TOT) and CAT Telecom Public Company Limited (CAT) on January 7, 2021.

Table 32: Test Results of Voice Service Within the Same Network in 2021

Quality of service Indicators	Targets	Test Results In case of voice calling within the same network			
		Quarter 1	Quarter 2	Quarter 3	
Successful Call Ratio	Not less than 90 percent	99.95	99.95	99.94	
Drop Call Rate	Not exceed 2 percent	0.01	0.00	0.00	

Remark: The test was conducted in 26 areas, including the Office of the NBTC Head Office (Sailom), the Office of the NBTC, Region1 (Bangkok), NBTC Sub-region Office 11 (Samut Prakarn), NBTC Sub-region Office 12 (Chanthaburi), NBTC Sub-region Office 13 (Suphan Buri), NBTC Sub-region Office 14 (Prachin Buri), NBTC Sub-region Office 15 (Phra Nakhon Sri Ayutthaya), NBTC Sub-region Office 16 (Ratchaburi), the Office of the NBTC, Region 2 (Khon Kaen), NBTC Sub-region Office 21 (Roi Et), NBTC Sub-region Office 22 (Ubon Ratchathani), NBTC Sub-region Office 23 (Nakhon Ratchasima), NBTC Sub-region Office 24 (Udon Thani), NBTC Sub-region Office 25 (Nakhon Phanom), the Office of the NBTC, Region 3 (Chiang Mai), NBTC Sub-region Office 31 (Lampang), NBTC Sub-region Office 32 (Lamphun), NBTC Sub-region Office 33 (Phitsanulok), NBTC Sub-region Office 34 (Chiang Rai), NBTC Sub-region Office 42 (Phuket), NBTC Sub-region Office 43 (Nakhon Si Thammarat), NBTC Sub-region Office 44 (Surat Thani), and NBTC Sub-region Office 45 (Chumphon).

Source: Telecommunications Enforcement Bureau, Office of the NBTC

2) According to the quality of voice service monitoring by considering Successful Call Ratio and Drop Call Rate in different network callings, the voice service provision of all operators in Quarter 3/2021 met the quality of service

standards. The Successful Call Ratio was 99.57 percent, higher than the target (not less than 90 percent), and the Drop Call Rate was 0.02 percent, better than the target (not exceeding 2 percent). Details are shown in Table 33.

Table 33: Test Results of Voice Service in Different Networks Callings in 2021

Quality of service Indicators	Targets	Test Results In case of voice calling in different networks			
		Quarter 1	Quarter 2	Quarter 3	
Successful Call Ratio	Not less than 90 percent	99.60	99.75	99.57	
Drop Call Rate	Not exceed 2 percent	0.02	0.00	0.02	

Remark: The test was conducted in 26 areas, including the Office of the NBTC Head Office (Sailom), the Office of the NBTC, Region 1 (Bangkok), NBTC Sub-region Office 11 (Samut Prakarn), NBTC Sub-region Office 12 (Chanthaburi), NBTC Sub-region Office 13 (Suphan Buri), NBTC Sub-region Office 14 (Prachin Buri), NBTC Sub-region Office 15 (Phra Nakhon Sri Ayutthaya), NBTC Sub-region Office 16 (Ratchaburi), the Office of the NBTC, Region 2 (Khon Kaen), NBTC Sub-region Office 21 (Roi Et), NBTC Sub-region Office 22 (Ubon Ratchathani), NBTC Sub-region Office 23 (Nakhon Ratchasima), NBTC Sub-region Office 24 (Udon Thani), NBTC Sub-region Office 25 (Nakhon Phanom), the Office of the NBTC, Region 3 (Chiang Mai), NBTC Sub-region Office 31 (Lampang), NBTC Sub-region Office 32 (Lamphun), NBTC Sub-region Office 33 (Phitsanulok), NBTC Sub-region Office 44 (Chiang Rai), NBTC Sub-region Office 42 (Phuket), NBTC Sub-region Office 43 (Nakhon Si Thammarat), NBTC Sub-region Office 44 (Surat Thani), and NBTC Sub-region Office 45 (Chumphon).

Source: Telecommunications Enforcement Bureau, Office of the NBTC

3) According to the quality of data service monitoring by considering FTP Data Transfer Ratio, and HTTP Successful Data Loading Ratio, the data service provision of all operators in Quarter 3/2021 met the quality-of-service standards. Details are shown in Table 34 and 35.

Table 34: Test Results of Data Services with 3G Technology in 2021

	Quality of service Indicators		Test Results of Data Services with 3G Technology		
			Quarter 1	Quarter 2	Quarter 3
FTP Download	FTP Data Transfer Ratio, subject to specified average data transfer speed	Not less than 0.750 Mbps	8.30	7.49	7.30
	FTP Frequency of Successful Transfer Ratio	Not less than 80 percent	98.62	97.85	98.04
FTP Upload	FTP Data Transfer Ratio, subject to specified average data transfer speed	Not less than 0.300 Mbps	4.29	4.23	4.33
	FTP Frequency of Successful Transfer Ratio	Not less than 70 percent	97.35	96.66	97.03
HTTP	HTTP Successful Data Loading Ratio	Not less than 80 percent	99.63	98.99	98.42

Remark: The test was conducted in 14 areas, including the Office of the NBTC Head Office (Sailom), NBTC Sub-region Office 11 (Samut Prakarn), NBTC Sub-region Office 12 (Chanthaburi), NBTC Sub-region Office 14 (Prachin Buri), NBTC Sub-region Office 15 (Ayutthaya), the Office of the NBTC, Region 2 (Khon Kaen), NBTC Sub-region Office 23 (Nakhon Ratchasima), NBTC Sub-region Office 24 (Udon Thani), the Office of the NBTC, Region 3 (Chiang Mai), NBTC Sub-region Office 34 (Chiang Rai), NBTC Sub-region Office 35 (Nakhon Sawan), the Office of the NBTC, Region 4 (Songkhla), NBTC Sub-region Office 41 (Yala), and NBTC Sub-region Office 45 (Chumphon).

Source: Telecommunications Enforcement Bureau, Office of the NBTC

Table 35: Test Results of Data Services with 4G Technology in 2021

	Quality of service Indicators		Test Results of Data Services with 4G Technology		
			Quarter 1	Quarter 2	Quarter 3
FTP Download	FTP Data Transfer Ratio, subject to specified average data transfer speed	Not less than 2.5 Mbps	24.68	24.44	24.47
	FTP Frequency of Successful Transfer Ratio	Not less than 80 percent	98.99	98.11	98.66
FTP Upload	FTP Data Transfer Ratio, subject to specified average data transfer speed	Not less than 0.5 Mbps	11.74	12.13	12.04
	FTP Frequency of Successful Transfer Ratio	Not less than 70 percent	98.40	95.67	98.37
HTTP	HTTP Successful Data Loading Ratio	Not less than 80 percent	99.51	98.75	98.81

Remark: The test was conducted in 13 areas, including the Office of the NBTC Head Office (Sailom), the Office of the NBTC, Region 1 (Bangkok), NBTC Sub-region Office 13 (Suphan Buri), NBTC Sub-region Office 16 (Ratchaburi), NBTC Sub-region Office 21 (Roi Et), NBTC Sub-region Office 22 (Ubon Ratchathani), NBTC Sub-region Office 25 (Nakhon Phanom), NBTC Sub-region Office 31 (Lampang), NBTC Sub-region Office 32 (Lamphun), NBTC Sub-region Office 33 (Phitsanulok), NBTC Sub-region Office 42 (Phuket), NBTC Sub-region Office 43 (Nakhon Si Thammarat), and NBTC Sub-region Office 44 (Surat Thani).

Source: Telecommunications Enforcement Bureau, Office of the NBTC

In addition to the quality of service monitoring of 4 mobile operators at the Office of the NBTC (Sailom), Regional Offices of the NBTC, and District Offices of the NBTC, the NBTC has also carried out the following operations.

- The quality of service testing of mobile services, to comply with the standard regulations, has been conducted in 26 provinces for station-testing, and 51 provinces for mobile-testing, in 3 ways consisting of (1) main routes in Bangkok and its vicinities area, (2) routes along community areas in districts, and (3) major and minor highways (one digit and two digits routes) by selecting some areas randomly, as well as testing according to the complaints, in a total of 161 cases.
- The quality of service testing of mobile services by consumer usage in LTE-Advanced technology or higher, has been conducted in 74 provinces, in 6 ways consisting of (1) Routes along community areas in Bangkok and its vicinities area, (2) Main routes in Bangkok and its vicinities area, (3) Major routes in the regional surveillance areas, (4) Minor routes in the provincial surveillance areas, and (6) Border areas.

2. Telecommunications Tariffs Regulations

The NBTC has carried out the telecommunications tariffs regulations to promote high quality telecommunications services provision at reasonable prices, and encourage fairness to consumers and operators, by taking public interest into account.

2.1 Fixed-line Service Tariffs

At present, there are 7 fixed-line telephone service providers, including National Telecom Public Company Limited (NT), True Internet Corporation Company Limited (TICC), Advanced Wireless Network Company Limited (AWN), Triple T Broadband Company Limited (3BB), Dtac TriNet Company Limited (DTN), Otaro World Corporation Company Limited (OTW), and Amnex Company Limited (AMX).

In Quarter 3/2021, a total number of fixed-line subscribers was 4,718,931 numbers. NT occupied the highest market share with a total of 3,192,853 subscribers, followed by TICC with 1,294,355 subscribers, and AWN with 119,931 subscribers respectively. Details are shown in Table 36.

Table 36: Number of Fixed-Line Subscribers in Quarter 3/2021

Operators	Accumulated allocated numbers	Active numbers
National Telecom Public Company Limited (NT)	15,256,000	3,192,853
True Internet Corporation Company Limited (TICC)	2,097,000	1,294,355
Advanced Wireless Network Company Limited (AWN)	321,000	119,931
Triple T Broadband Company Limited (3BB)	188,000	92,732
Dtac TriNet Company Limited (DTN)	22,000	2,094
Otaro World Corporation Company Limited (OTW)	20,000	16,966
Amnex Company Limited (AMX)	20,000	N/A
Total	17,924,000	4,718,931

Source: Numbering Management Bureau, Office of the NBTC

The average revenue per user of fixedline service in Quarter 3/2021 was 151 baht, and the average revenue per user of public telephone service was 21 baht. By considering the weighted average of fixed-line service and public telephone service, the average revenue per user was 148 baht. Details are shown in Table 37.

Table 37: Average Revenue per User of Fixed-Line Service in Quarter 3/2021

	Quarter 3/2020	Quarter 3/2021	QoQ
Fixed-line service	170	151	-2.32
Public telephone service	17	21	-2.22
Average revenue per user per month (baht/month)	166	148	-2.22

Source: Merger and Telecommunications Market Report of Quarter 3/2021, Office of the NBTC

2.2 Mobile Service Tariffs Regulations

At present, there are 7 mobile operators in Thailand, consisting of 4 Mobile Network Operators (MNOs) which are Advanced Wireless Network Company Limited (AWN), Dtac TriNet Company Limited (DTN), True Move H Universal Communication Company Limited (TUC), and National Telecom Public Company Limited (NT), together with 3 Mobile Virtual Network Operators (MVNOs) which are Loxley

Public Company Limited, The White Space Company Limited, and Feels Telecom Corporation Company Limited. The average mobile service rates in Quarter 3/2021 has slightly increased in SMS, MMS, and internet services, compared to Quarter 3/2020. However, the average service rates of all services were below the regulating rates, according to the Notification of the NBTC on Criteria for Allocation of Telecommunications Numbers. Details are shown in Table 38.

Table 38: Average Mobile Service Rates of Quarter 3/2021

Service Rate	Voice (baht/minute)	SMS (baht/message)	MMS (baht/message)	Internet (baht/MB)
Reference rate according to the Notification of the NBTC on Criteria for Telecommunications Numbering Allocation and Management	0.60	0.89	2.33	0.16
Average service rate 2020 ²⁵	0.48	0.68	1.91	0.10
Average service rate 2021 ²⁶	0.47	0.69	1.93	0.13

Source: Telecommunications Tariff Bureau, Office of the NBTC

 $^{^{25}}$ Data on weighted average service rate based on the number of promotional packages of the operators in Q3/2020

²⁶ Data on weighted average service rate based on the number of promotional packages of the operators in Q3/2021

2.3 Regulation on international Telephone Service Rate

At present, the basic fixed line telephone operators and mobile operators have been operating international telephone service. There are 2 types of international telephone service, including (1) International Direct Dialing (IDD), which allows a caller to dial directly by a telephone or mobile phone directly subscriber, and (2) International Direct Dialing at Economical Rate, which allows a caller to dial directly at an affordable rate.

In Quarter 3/2021, there are 5 major international telephone service operators, including National Telecom Public Company Limited (NT), Dtac TriNet Company Limited (DTN), Advanced Wireless Network Company Limited (AWN), AIN GlobalComm Company Limited (AIN), and True Move H Universal Communication

Company Limited (TUC). These operators offer international telephone services by dialing access codes to make international calls in the IDD system, with 9 numbers. Besides, NT offers the Voice over Internet Protocol (VoIP) for domestic and international dialing, under "CAT2call plus", which allows a caller to use telephone service via internet on smart phone application. However, the international telephone service has been modified, since NT was found by the merger between CAT Telecom Public Company Limited (CAT) and TOT Public Company Limited (TOT). Presently, the company offers such service by dialing access codes, 001 and 009, while the former access codes, 007, 008, and 108 were terminated since June 1, 2021. Also, TUC provides 00600 as an additional access code for international telephone service. Details are shown in Table 39.

Table 39: International Telephone Service Operators in Quarter 3/2021

Na	lo. Operators	Number		
No.		IDD	IDD at Economical Rate	
1	National Telecom Public Company Limited (NT)	001, 009	CAT2call plus	
2	Dtac TriNet Company Limited (DTN)	004	00400	
3	Advanced Wireless Network Company Limited (AWN)	003	00500	
4	AIN GlobalComm Company Limited (AIN)	005	-	
5	True Move H Universal Communication Company Limited (TUC)	006	00600	

Source: Telecommunications Tariff Bureau, Office of the NBTC

By considering the overall international telephone service rates of all regions in Quarter 3/2021, the average rate was 22.21 baht/minute, or decreasing by 4.89 percent from the previous quarter, due to the adjustment of the international telephone service market. That is, in Quarter 2/2021, National Telecom Public Company Limited (NT), exclusively on TOT's former network, has terminated 2 access codes²⁷, which were 007 with the average rate of 26.64 baht, 14.04 percent

higher than the total average service rate, and 008 with the average rate of 20.39 baht, 12.71 percent lower than the total average service rate. Also, in Quarter 3/2021, TUC has been providing an additional access code which is 00600, with the average rate of 11.74 baht, 47.14 percent lower than the total average service rate. The new service provided by TUC is considered the main factor to reduce the overall service rate.

The international telephone service rate of TOT Public Company Limited access code, 108, is the same rate as of 007. At present, the access codes are used for international incoming calls (from Malaysia only) to Thailand. Thus, the service rates have not been calculated in the total average service rate.

Besides, by considering the average service rate by groups of countries, a call termination to ASEAN countries has the lowest rate, with the average rate of 8.06 baht/minute, followed by European countries (17.35 baht/minute),

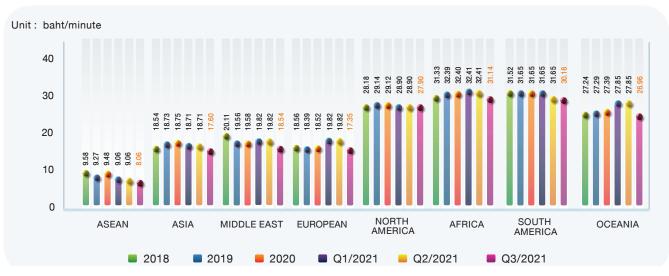
Asian countries (17.60 baht/minute), Middle East countries (18.54 baht/minute), and Oceania countries (26.96 baht/minute) respectively. Details are shown in Chart 28 and 29.

Chart 28: Average Service Rate of International Telephone Service During Q1/2018 - Q3/2021



Source: Telecommunications Tariff Bureau, Office of the NBTC

Chart 29: Average Service Rate of International Telephone Service of Each Region
During 2018 - Q3/2021



Source: Telecommunications Tariff Bureau, Office of the NBTC

2.4 Regulation International Mobile Roaming Service Rate

At present, there are 3 types of international mobile roaming service, consisting of (1) Pay per Use, (2) Flat Rate, and (3) Travel Sim. The service rate of each service type are different depending on the relevant factors, such as destination countries, traffic volume, speed, and service usage duration. There are 4 major international mobile roaming service operators, including AWN, TUC, DTN, and NT consist of:

1) Pay per Use

The international mobile roaming services can be categorized into 6 services, including domestic calls, calls to Thailand, calls to third country, receiving calls, SMS, and data service.

The domestic call service rate is charged when a caller is abroad and dials numbers of that country for both landline and mobile numbers. In Quarter 3/2021, the average domestic call service rate of ASEAN countries

was the lowest at 18.09 baht/minute, followed by European countries at 23.94 baht/minute, and Asian Countries at 26.66 baht/minute respectively. The lowest service rate in each region ranged from 0.41 - 12.22 baht/minute. In this regard, the lowest and the highest service rates of North America were at 0.41 baht/minute, and 250 baht/minute respectively. Details are shown in Chart 30.

The Call to Thailand service rate is charged when a caller is abroad and dials numbers of Thailand for both landline and mobile numbers. In Quarter 3/2021, the average Call to Thailand service rate of ASEAN countries was the lowest at 42.87 baht/minute, followed by European and Asian countries at 71.49 and 74.13 baht/minute respectively. The lowest service rate in each region ranged from 0.73 - 12.22 baht/minute. In this regard, the lowest and the highest service rates of North America were at 0.73 baht/minute and 120 - 375 baht/minute respectively. The European countries had the highest service rate at 375 baht/minute. Details are shown in Chart 31.

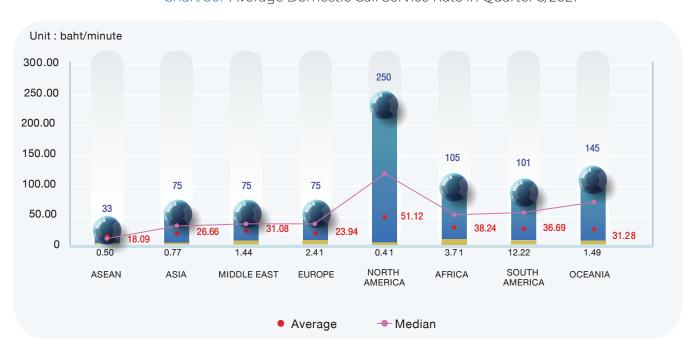


Chart 30: Average Domestic Call Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC



Chart 31: Average Call to Thailand Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC

The call to third country service rate is charged when a caller dials numbers of other countries (in case of non-citizen or non-expatriate caller). In Quarter 3/2021, the average call to third country service rate of ASEAN countries was the lowest at 53.53 baht/minute, followed by European and Asian countries at 66.19 and 76.02 baht/minute respectively, while service rate in Africa was the

highest at 114.24 baht/minute. The lowest service rate in each region ranged from 1.63 - 12.22 baht/minute. In this regard, the lowest and the highest service rates of North America were at 1.63 baht/minute and 143 - 375 baht/minute respectively. The European countries had the highest service rate at 375 baht/minute. Details are shown in Chart 32.

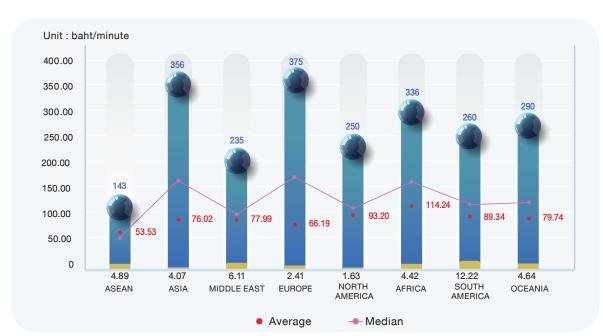


Chart 32: Average Call to Third Country Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC

The receiving call service rate is charged when a caller receives a call while staying abroad. In Quarter 3/2021, the average receiving call service rate of ASEAN countries was the lowest at 30.53 baht/minute, followed by European and Asian countries at 40.58 baht/minute and 46.37 baht/minute respectively, while North America had the highest service rate at 71.24 baht/minute.

The lowest service rate in each region ranged from 0.29 - 2.15 baht/minute. In this regard, the lowest and the highest service rates of Asia were 0.29 baht/minute and 60 - 190 baht/minute respectively. North America and South America had the highest service rate at 190 baht/minute. Details are shown in Chart 33.

Unit: baht/minute 300.00 250.00 200.00 190 190 175 185 150.00 140 140 105 100.00 71.24 62.61 60.54 56.45 50.00 50.87 46.37 40.58 0 0.34 0.95 ი 29 1 12 0.43 2.15 1.20 NORTH AMERICA SOUTH ASEAN ASIA MIDDLE EAST **EUROPE** AFRICA **OCEANIA AMERICA** Median

Average

Chart 33: Average Receiving Call Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC

The Short Message Service (SMS) service rate is charged when a user sends SMS while staying abroad. In Quarter 3/2021, the average SMS service rate of Europe was the lowest at 9.20 baht/message, followed by ASEAN and Asian countries at 9.67 baht/message and 9.78 baht/message respectively, while North America had the highest average service

rate at 11.62 baht/message. The lowest service rate in each region ranged from 0.30 - 2.04 baht/message. In this regard, the lowest and the highest service rates of Oceania countries were at 0.30 baht/message and 17 - 40 baht/ message respectively. The Oceania countries had the highest service rate at 40 baht/message. Details are shown in Chart 34.

Unit: baht/message 40.00 35.00 31 29 30.00 28 25.00 22 20 20.00 17 15.00 11.62 11.19 10.94 10.07 10.00 9.78 9.67 9.20 5.00 0 0.41 0.38 0.40 0.41 0.41 0.89 2.04 0.30 SOUTH NORTH AMERICA ASFAN ASIA MIDDLE EAST EUROPE AFRICA OCEANIA **AMERICA** Median Average

Chart 34: Average SMS Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC

By considering data roaming in 3G and 4G in each region in Quarter 3/2021, the average cost of data roaming service in ASEAN countries was the lowest at 0.12 baht/KB, followed by Europe at 0.25 baht/KB, while Africa was the highest at 0.38/KB. The lowest cost in each

region ranged from 0.00005 - 0.00239 baht/KB. In this regard, the lowest and the highest service rates of Asia were at 0.00005 baht/KB and 0.51 - 0.92 baht/KB respectively. Europe had the highest service rate at 0.92 baht/KB. Details are shown in Chart 35.

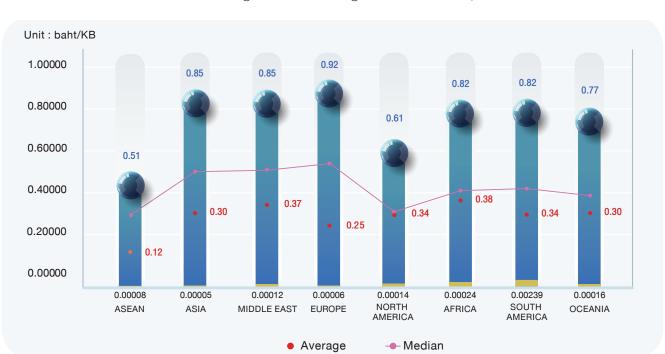


Chart 35: Average Data Roaming Service Rate in Quarter 3/2021

Source: Telecommunications Tariff Bureau, Office of the NBTC

2) Flat Rate

In Quarter 3/2021, the flat rate international roaming service can be categorized into 8 regions, including ASEAN countries, Asia the Middle East countries, Europe, North America, Africa, South America, and Oceania, with the coverage proportion at 75.97 percent. The region with the highest proportion of countries that

had flat rate international roaming service to the total number of countries was ASEAN, due to the availability of the flat rate service in all countries, followed by Europe with 93.44 percent, while Africa had the lowest coverage proportion at 38.89 percent. The most commonly used services were data, voice and SMS respectively. Details are shown in Chart 36.

Chart 36: Number of Countries Having Flat Rate International Roaming Service in Quarter 3/2021



Source: Telecommunications Tariff Bureau, Office of the NBTC

The international roaming service flat rate ranged from 93 - 9,500 baht. The countries that had the lowest service rate were cooperation

countries to reduce the roaming cost such as ASEAN countries, Japan, etc. Details are shown in Table 40.

Table 40: Price Range of Flat Rate International Roaming Service

Region	Voice service only	Data service only	Voice and Data
ASEAN	299 - 2,200 baht	93 - 9,500 baht	290 - 3,490 baht
AFRICA	350 - 2,200 baht	299 - 9,500 baht	499 - 3,490 baht
ASIA	350 - 2,200 baht	150 - 9,500 baht	290 - 3,490 baht
EUROPE	299 - 2,200 baht	150 - 9,500 baht	499 - 3,490 baht
NORTH AMERICA	350 - 2,200 baht	199 - 9,500 baht	290 - 3,490 baht
SOUTH AMERICA	350 - 2,200 baht	299 - 9,500 baht	1,690 - 3,490 baht
OCEANIA	299 - 2,200 baht	150 - 9,500 baht	290 - 3,490 baht
MIDDLE EAST	350 - 2,200 baht	300 - 9,500 baht	499 - 3,490 baht

Source: Telecommunications Tariff Bureau, Office of the NBTC

3) Travel Sim

Travel Sim offers service with flat rate and Pay per Use. When buying a travel sim, a service user is eligible for flat rate usage. The incremental usage will be charged per actual usage, of which the rate is not equal to normal service rate. Typically, the travel sim offers the flat rate for data service only. The service rate varies to the usage duration and the country to use the sim.

In Quarter 3/2021, the usage duration options have decreased in most regions, except South America. However, the lowest price

package was 99 baht, while the highest was 2,799 baht. The lowest data volume offered was 1 GB, while the highest was 15 GB. The usage duration options available were 3 - 7 options, with the minimum duration of 2 days, and the maximum of 365 days. By comparing to Quarter 2/2021, the variety of usage duration options have decreased. Besides, the minimum service rate of travel sim in each region remained the same, except North America where the service rate was up from 199 to 299 baht. Details are shown in Table 41.

Table 41: Travel Sim Package Price in Quarter 3/2021

Region	Package Price	Data Volume	Usage Duration Options
ASEAN	99 - 2,799 baht	1 - 15 GB	7
AFRICA	299 - 2,799 baht	1 - 15 GB	3
ASIA	119 - 2,799 baht	1 - 15 GB	6
EUROPE	119 - 2,799 baht	1 - 15 GB	6
NORTH AMERICA	299 - 2,799 baht	1 - 15 GB	3
SOUTH AMERICA	299 - 2,799 baht	1 - 15 GB	3
OCEANIA	119 - 2,799 baht	1 - 15 GB	6
MIDDLE EAST	119 - 2,799 baht	1 - 15 GB	6

Source: Telecommunications Tariff Bureau, Office of the NBTC

The pay-per-use travel sim services can be divided into 5 services, including domestic calls, calls to Thailand, calls to third country, receiving calls, and SMS, which is different from the pay-per-use international roaming service. The travel sim does not offer data service as it is included in

the flat-rate package. Such service rate is lower than normal pay-per-use data service rates. The service rates of 5 services mentioned earlier vary according to the countries. Details are shown in Table 42.

Table 42: Pay-per-Use Service Rate of Travel Sim in Quarter 3/2021

Services	Service Rate
Domestic Call	6 - 50 baht/minute
Call to Thailand	6 - 45 baht/minute
Call to third country	6 - 50 baht/minute
Receiving call	6 - 70 baht/minute
SMS	6 - 11 baht/message

Source: Telecommunications Tariff Bureau, Office of the NBTC

2.5 Telecommunications Services Tariffs Regulations

2.5.1 Regulations under the Notification of the NBTC on Maximum Rate of Service Tariff for Domestic Mobile Service in Parts of Incremental Usage from the Main Package

The NBTC realizes the importance of service tariff regulations in parts of the incremental usage from the main package of mobile services (off-premise rate). Such regulations relieve the expense burdens of the consumers, as well as preventing them from the unfair charges, and mitigating the effect of bill shock, by determining the maximum rate of service tariff for off-premise usage that is fair to operators and users.

In 2021, the NBTC carried out the operations according to the Notification of the NBTC on Maximum Rate of Service Tariff for Domestic Mobile Service in Parts of Incremental Usage from the Main Package, published in the Royal Gazette, effective as from December 3, 2020 onwards. In this regard, the Notification specifies the telecommunications licensees who are Mobile Network Operators (MNOs) to determine the incremental usage tariff, which must not exceed the maximum rate specified in the Notification. Thus, the NBTC shall monitor the monthly reports

of domestic mobile service tariffs, submitted by the operators, as well as the promotional packages information on the operators' websites, In order to comply with the service tariff for domestic mobile service in parts of incremental usage from the main package as prescribed in the Notification. All MNOs are required to cooperate and amend their promotional packages to conform strictly to the Notification.

According to the domestic mobile service tariffs report of September 2021, the MNOs' service tariffs complied with the Notification of the NBTC on Maximum Rate of Service Tariff for Domestic Mobile Service in Parts of Incremental Usage from the Main Package. The operations under such Notification lead to fair and non-discrimination regulations for operators and reasonable service tariff for user. The operators are able to run their business. It also helps to reduce consumer's expense burdens, and prevent them from the unfair incremental usage charges as the incremental usage have been specified clearly for the operators and the post-paid service users. Also, the NBTC has been monitoring the monthly reports regularly, and regulating the service tariff according to the NBTC Notification. Details are shown in Table 43

Table 43: Maximum Off-Premise Service Rates in Quarter 3/2021

Services	Voice (baht/minute)	SMS (baht/message)	MMS (baht/message)	Internet (baht/MB)
Specified Rate	1.60	2.50	4.50	0.90
Licensees	Maxir	mum off-premise serv	vice rates in Quarter 3	3/2021
AWN	1.50	2.50	4.00	0.90
TUC	1.50	2.50	4.00	0.90
DTN	1.50	2.50	4.00	0.90
NT (My by NT)	1.50	2.00	N/A	0.90
NT (NT mobile)	0.99	1.00	N/A	0.85

Source: Telecommunications Tariff Bureau, Office of the NBTC

2.5.2 The Notification of the NBTC on Criteria on Advance Collection of Service Tariff in Fixed Broadband Service

The NBTC has prescribed the Notification of the NBTC on Criteria on Advance Collection of Service Tariff in Fixed Broadband Service, published in the Royal Gazette on November 29, 2021, as a standard practice for the fixed broadband operators, who intend to collect advance service fee. The Notification provides consumers with more service options and benefits, resulting from higher competition among operators. The users can select their

service payment methods based on their usage, convenience, and voluntariness. It also allows the users to gain benefits or reasonable discounts by their advance service payment, and get preventing from unfair practices, due to the provision on standard of telecommunications service contracts. In addition, the Notification promotes competition in the fixed broadband industry, encourages the service providers to offer a variety of promotional packages to match consumers' needs according internet usage behavior, satisfaction and consumer's convinence with easier payment for service.



Trends of Broadcasting, Television, and Telecommunications Industries in 2022

1. Trends of Broadcasting and Television Industries in 2022

The technology advancement and the convergence in the telecommunications, broadcasting and television industries lead to content and entertainment delivery on demand of the individual consumer via the internet, or Over the Top (OTT). Viewers can directly access their favorite programs and movies through an application or a website from their gadgets everywhere and every time: smartphones, tablets, laptops, and smart TVs, etc. Also, OTT platforms offer a wide variety of contents to the viewers, unlike the conventional television broadcasting.

According to Omdia research, an independent analyst and consultancy firm specializing in media and technology, the number of OTT subscriptions in Thailand were 13.29 million accounts in 2021, or increasing by 8.45 million accounts from 2020. The blooming of OTT has affected the conventional audio and television service providers, as OTT has not been regulated under the NBTC authorities. It leads to the constraints and inequality of the market competition in the conventional broadcasting services, regulated by the NBTC, and the unregulated OTT services. These challenges have been forcing the existing operators to adjust their contents and services to match consumers' requirements, and expand their services to online platforms and applications as well. Thus, it is also the challenge for the regulator to promote and support the broadcasting and television operators to operate their businesses with fairness and sustainability.

In this regard, the NBTC has prescribed the television development strategies of the nation to suit the new context, under the Second Broadcasting Master Plan B.E. 2563 - 2568 (2020 - 2025) in Strategy 2, to adjust the regulatory practices to comply with the changing ecosystem and competition of the industry.

Furthermore, in 2021, the NBTC has appointed a working group to revise the criteria and prepare policy recommendations for regulating television and related businesses, in compliance with Strategy 2 of the Second Broadcasting Master Plan B.E. 2563 - 2568 (2020 - 2025). The working group is responsible for studying and analyzing NBTC's regulations and criteria in every aspect, and gathering opinions and recommendations from relevant sectors to develop the appropriate guidelines for broadcasting regulations on a fair basis.

2. Trends of Telecommunications Industry in 2022

The COVID-19 pandemic has affected the overall economic development, and continued to slow down Thai economy during Quarter 1 and 2 of 2021, due to the new wave of COVID-19 outbreak. The government has prescribed resolutions and measures in response to the outbreak. People have adapted their lifestyles, behaviors and businesses to comply with the new normal practices, such as work from home, and study at home, etc. Accordingly, the government has issued lockdown relief measures in Quarter 3 and 4, resulting in a slight growth in overall business operations in many sectors, including telecommunications sector.

After the 5G spectrum auctions in 2020, the operators have carried out a huge amount of investment to expand their telecommunications networks, to support 5G technology utilization be expected that the number of usage will be increase. However, the COVID-19 pandemic disrupted their businesses, as the overall performance in 2020 - 2021 has been decreasing continually until 2022. Moreover, the consumers behavior trends in purchasing smartphones have changed. Consumers trend to consider the smartphones that meet their usage patterns and the new lifestyles, focusing on worthiness and cost-saving. In this regard, the investment in the mobile service sector in 2022 is expected to slow down, as the operators have burdens of 5G spectrum license payment about 40 - 45 percent of the total revenue of 2021. Also, the operators tend to maintain the existing customers for stability, and slow down the investment to avoid losses.

The trend of telecommunication mobile services is likely to be highly competitive throughout 2021 and 2022, even though the number of mobile subscribers tend to decrease, as well as the mobile service market revenue, which has declined since 2020 to Quarter 2/2021. However, the market has been improving in Quarter 3/2021, and continued to grow, due to improving economic situation, and the expansion of consumer base through various channels to support the changing consumer behaviors. The operators have also maintained the Average Revenue per User (ARPU) of the customers, in order to maintain the companies' revenues.

In addition, according to the announcement of Charoen Pokphand (CP) Holding, the parent firm of True Corporation Public Company Limited (TRUE), and Telenor ASA, the parent firm of Total Access Communication Public Company Limited (DTAC), they have agreed to be an equal partnership between TRUE and DTAC to form a new technology company that will pursue new technology businesses, create a digital ecosystem and set up a fund to support startups, in compliance with the government policy, Thailand 4.0, to drive Thailand as a regional hub of technology. Thus, the NBTC will closely monitor the situation and the impact on the telecommunications industry.

The fixed broadband market has been indirectly affected by the changing consumer behaviors from the COVID-19 pandemic. The fixed broadband usage has been increasing since 2020, and is expected to rise in 2022. The number of fixed broadband users has also continued to rise steadily until 2022. As the market is highly competitive, it forces the operators to release new promotional packages to boost their sales. Besides, National Telecom Public Company Limited (NT) has highlighted its fiber optic network, and broadband service packages offering high speed at affordable prices. Moreover, Advanced Wireless Network Company Limited (AWN) has been accelerating the network coverage, expanding customer base to increase the market share. Thus, the overall fixed broadband market in 2022 is expected to increase by 3 percent due to the COVID-19 pademic situation, compared to the previous year, resulting from the lockdown measures, the increase of online service usage, and new normal lifestyles, such as work from home, study at home, and virtual conferences.



Budget Management in 2021

The Performance and Expenditure Budget of the Office of the NBTC in 2021

In 2021, the Office of the NBTC carried out the operations according to the Operational Plans and the Expenditure Budget of 2021, in a total of 7,039.512 million baht. The overall budget spending on the work plans (routine work) and projects of 2021, as of December 31, 2021, in total of 6,411.027 million baht, accounting for 91.07 percent of the granted budget, categorized into the expenditure budget for the mission of NBTC and the Office of the NBTC (routine work) for 3,996.167 million baht, accounting for 90.26 percent, project expenses

for 1,183.677 million baht, accounting for 95.65 percent, Central Budget for 31.396 million baht, accounting for 19.43 percent, operating expenses of the Performance Follow-up and Evaluation Committee for 89.786 million baht, accounting for 87.14 percent, and the fund contribution as required allocation by law for 1,110.000 million baht, accounting for 100.00 percent. Details are shown in Table 44.

Table 44: Performances and Expenditure Budget of 2021

Unit: million baht

NI-	Details		Fiscal Year 2021	
No.	Details	Plan Result		Percentage
1.	Expenditure Budget of the Office of the NBTC	5,929.512	5,301.027	89.40
1.1	Operating Expenses of the NBTC and the Office of the NBTC	4,427.382	3,996.167	90.26
1.2	Project Expenses	1,237.520	1,183.677	95.65
1.3	Central Budget	161.578	31.396	19.43
1.4	Operating Expenses of the Performance Follow-up and Evaluation Committee	103.031	89.786	87.14
2.	Fund Contribution as Required by Law	1,110.000	1,110.000	100.00
	Total (1 - 2)	7,039.512	6,411.027	91.07

Remark: NBTC agreed to increase the expenditure budget of 2021 for 530.079 million baht, to allocate for the spectrum license fee compensation to Thai TV Company Limited.

Source: Strategic and Budget Bureau, Office of the NBTC

Having compared the operating results according to the action plan and expenditure budget in 2021 to 2020, It is found that the expenditure budget can be spent more over 90 percent, the operating results and expenditure

budget of 2020 and 2021 accounted for 93.53 percent and 91.07 percent of the allocated budget respectively. Details are shown in table 45 and Chart 37.

Table 45: Comparison of Plan - Result and Expenditure Budget of 2020 and 2021

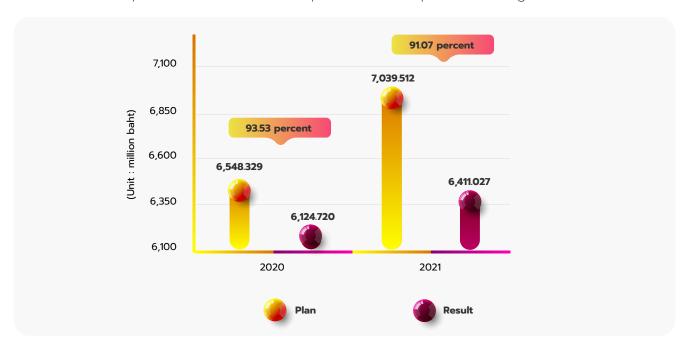
Unit: million baht

	5	F	iscal Year 2020			Fiscal Year 202	ı
No.	No. Details	Plan	Result	Percentage	Plan	Result	Percentage
1.	Expenditure Budget of the Office of the NBTC	5,713.329	5,289.720	92.59	5,929.512	5,301.027	89.40
1.1	Operating Expenses of the NBTC and the Office of the NBTC	3,763.920	3,493.898	92.83	4,427.382	3,996.167	90.26
1.2	Project Expenses	1,236.642	1,156.522	93.52	1,237.520	1,183.677	95.65
1.3	Central Budget	609.292	538.490	88.38	161.578	31.396	19.43
1.4	Operating Expenses of the Performance Follow-up and Evaluation Committee	103.476	100.810	97.42	103.031	89.786	87.14
2.	Fund Contribution as Required by Law	835.000	835.000	100.00	1,110.000	1,110.000	100.00
	Total (1 - 2)	6,548.329	6,124.720	93.53	7,039.512	6,411.027	91.07

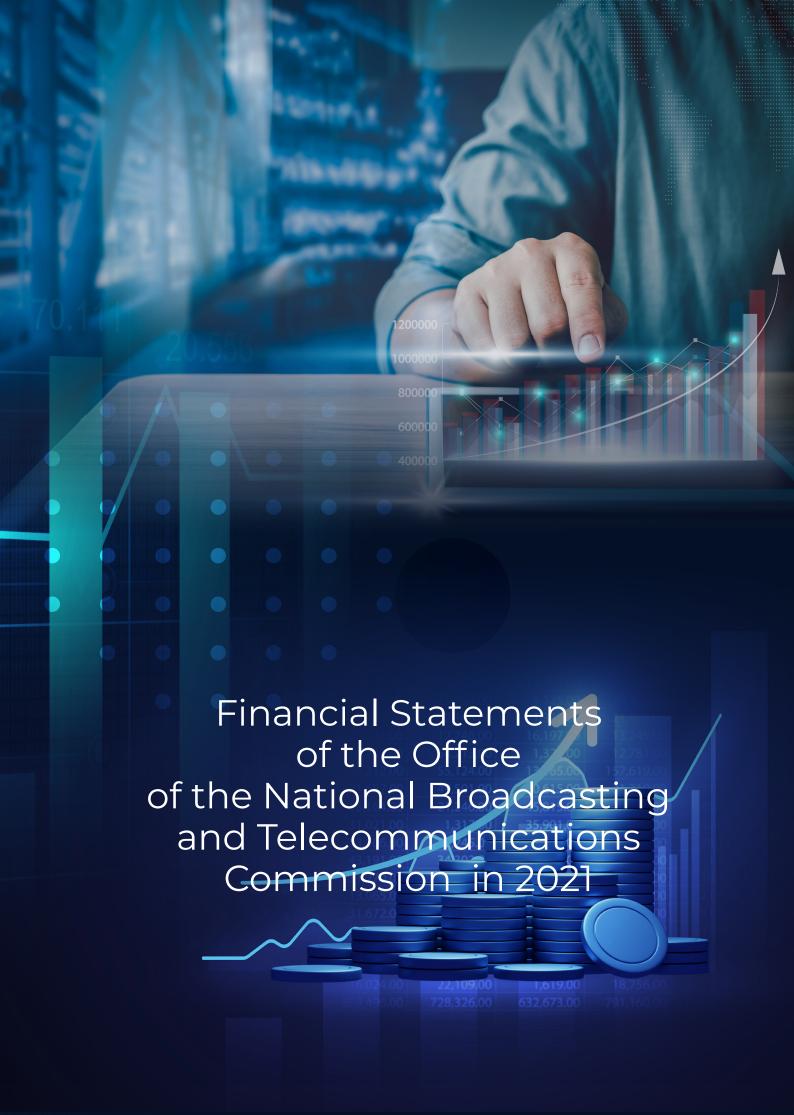
Remark: NBTC agreed to increase the expenditure budget of 2021 for 530.079 million baht, to allocate for the spectrum license fee compensation to Thai TV Company Limited.

Source: Strategic and Budget Bureau, Office of the NBTC

Chart 37: Comparison of Plan - Result of Operations and Expenditure Budget of 2020 and 2021



Source: Strategic and Budget Bureau, Office of the NBTC



The Office of the National Broadcasting and Telecommunications Commission Statement of Financial Position as of December 31, 2021

Notes (Unit:baht)

		2021	2020
Assets			
Current Assets			
Cash and Cash Equivalents	5	23,267,456,848.18	35,130,223,910.12
Short-Term Investments	6	388,100.68	385,392.95
Fee receivables	7	26,094,065.09	9,869,592.97
Current Portion of Accrued Income Receivable	8	36,418,029,879.39	37,775,474,925.89
Remaining Supplies	9	8,207,954.09	6,829,208.36
Prepaid Expenses	10	25,313,972.88	33,326,277.73
Other Current Assets	11	307,662,732.31	374,928,669.81
Total Current Assets		60,053,153,552.62	73,331,037,977.83
Non - Current Assets			
Deposit Accounts With Obligations	12	655,137,896.51	651,199,908.54
Long-Term Investments	13	225,153,488.21	223,810,624.47
Accrued Income Receivable	8	203,659,037,774.57	172,558,578,999.14
Revenue to remitted to Ministry of			
Finance according to the temporary	0.5	607.006.055.00	607.006.055.00
Protection measure Provisional Measures	27	603,806,875.00	603,806,875.00
Radiocommunications & Spectrum Rental Fee Receivables		26,583,652.25	26,583,652.25
Net Property, Plant, and Equipment	14	1,636,875,112.99	1,525,181,537.24
Net Assets from Financial Leases	15	238,695,462.66	269,198,009.49
Net Intangible Assets	16	397,039,011.01	436,947,927.36
Total Non-Current Assets		207,442,329,273.20	176,295,307,533.49
Total Assets		267,495,482,825.82	249,626,345,511.32

The accompanying notes are an integral part of these financial statements.



The Office of the National Broadcasting and Telecommunications Commission Statement of Financial Position as of December 31, 2021

	Notes		(Unit : baht)
		2021	2020
<u>Liabilities</u>			
Current Liabilities			
Creditor and Note Payable	17	349,094,669.22	520,409,160.81
Deferred Incomes	18	90,583,659.31	76,084,723.73
Estimated Current Liabilities for Employee Benefits	19	32,086,864.00	34,847,250.00
Current Portion of Deferred Public Revenue to the Treasury	20	42,464,807,231.65	40,891,173,537.71
Current Portion of Deferred Output Tax on Spectrum Auction to the treasury	21	2,109,593,265.49	2,212,560,335.13
Current Portion of Contributions to Digital Economy and			
Society Development Fund	22	2,009,059,733.01	3,880,380,170.63
Current Portion of Financial Lease Liabilities	23	87,927,766.80	98,347,946.09
Compensation, Recompense or Remuneration Liabilities			
According to the Order of Head of NCPO	24	-	5,514,341,549.46
Other Current Liabilities	25	913,929,388.35	2,143,900,725.99
Total Current Liabilities		48,057,082,577.83	55,372,045,399.55
Non-Common Link With			
Non - Current Liabilities	10	1700 575 77 / 00	10500/500700
Estimated Non - Current Liabilities for Employee Benefits	19	1,380,535,334.00	1,262,245,003.00
Deferred Public Revenue to the Treasury	20	139,053,954,955.54	117,042,917,406.08
Deferred Output Tax on Spectrum Auction to the treasury	21	12,717,438,999.94	11,288,878,999.94
Contributions to Digital Economy and Society Development Fund	22	7.070.177.077.77	/, /,O7
		7,079,137,933.33	4,403,233,933.33
Deferred Revenue from Spectrum Refarming to the BTFP Net Long-Term Financial Lease Liabilities	26 23	27,174,007,110.32 142,454,616.26	27,174,007,110.32 177,984,413.41
Spectrum Auction Payment Guarantee Deposit	8	7,500,000,000.00	8,000,000,000.00
Receivable under Provisional Measure	27	603,806,875.00	603,806,875.00
Radiocommunications and Frequency Service Deposits	21	26,583,652.25	26,583,652.25
Other Non - Current Liabilities	28	72,868,955.42	64,918,327.99
Total Non - Current Liabilities	20	195,750,788,432.06	170,044,575,721.32
Total Liabilities		243,807,871,009.89	225,416,621,120.87
Total Elabilities		243,007,071,003.03	223,410,021,120.07
Net Asset/Equity			
Capital		198,325,867.44	198,325,867.44
Revenue Above (Below) Accumulated Expenses		23,489,285,948.49	24,011,398,523.01
Net Asset/Equity		23,687,611,815.93	24,209,724,390.45
Fotal Liabilities and Net Assets/Equity		267,495,482,825.82	249,626,345,511.32

The Office of the National Broadcasting and Telecommunications Commission Financial Performance Statement as of December 31, 2021

Notes (Unit: baht) 2021 2020 Revenue Revenue from Spectrum Auction 29 60,434,701,970.19 92,912,047,787.50 Revenue of State Enterprises under 9,263,898,775.43 Section 84 Paragraph Three 30 2,004,549,395.58 Revenue from Licenses and Licensing Fee 31 5,443,517,362.83 5,904,175,375.44 Revenue from Numbering Fee 32 3,261,380,512.93 3,343,621,217.11 Revenue from the BTFP 141,804,444.47 499,006,521.11 33 34 Other Revenues 116,696,071.79 158,192,015.27 78,661,999,137.64 Total Revenue 104,821,592,312.01 Expenses Compensation, Recompense or Remuneration According to the Order of Head of NCPO 35 2,049,712,618.94 934,435,041.20 Expenses of Remittance to the Treasury 36 65,028,025,368.01 41,788,732,914.97 Expenses on Spectrum Auction and Refarming 37 20,260,239.50 30,214,513,638.55 Digital Economy and Society Development **Fund Contributions** 5,985,358,014.57 2,879,061,637.17 Expenses by the Judgment of the Supreme Administrative Court 38 35,410,419.76 771,671,395.72 Human Resources Expenses 39 1.830.310.762.86 1.718.865.919.23 Pension 40 154,547,026.83 342,534,144.69 Remuneration 41 31,077,750.00 32,131,250.00 General and Administrative Expenses 42 1,033,419,267.90 1,118,232,561.59 Material Expenses 43 36,984,320.89 48,171,492.06 Utility Expenses 70.407.371.18 78,746,329.63 44 610,793,424.38 642,705,285.30 Depreciation and Amortization 45 Financial Support for Education, Research 213,834,837.50 924,587,266.22 and Development 46 Contributions to BTFP 1,100,000,000.00 625,000,000.00 Contributions to Edtech Fund 10,000,000.00 210,000,000.00 Miscellaneous 47 8,083,842.49 73,533,680.80 78,218,225,264.81 82,402,922,557.13 **Total Expenses** Revenue Above (Below) Expense before Financial Cost 443,773,872.83 22,418,669,754.88 Financial Cost 14,014,140.06 12.081.654.05 Revenue Above (Below) Net Expense 429,759,732.77 22,406,588,100.83

The accompanying notes are an integral part of these financial statements.

The Office of the National Broadcasting and Telecommunications Commission Statement of Changes in Equity For the year ended December 31, 2021

(Unit: Baht)

Balance as at December 31, 2019 - as reported

Notes

Accumulated Value from Accounting Error Adjustment of the Previous Year

Balance as at December 31, 2019 - after revision

Public Revenue remitted to the Treasury

Revenue Above (Below) Expenses of the Period

Closing Balance as at December 31, 2020

Balance as at December 31, 2020 - as reported

Accumulated Value from Accounting Error Adjustment of the Previous Year

Balance as at December 31, 2020 - after revision

Public Revenue remitted to the Treasury

Revenue Above (Below) Expenses of the Period

Closing Balance as at December 31, 2021

The accompanying notes are an integral part of these financial statements.

Capital	Revenue Above (Below) Accumulated Expenses	Total
198,325,867.44	4,475,616,617.59	4,673,942,485.03
198,325,867.44	4,475,616,617.59 (2,870,806,195.41) 22,406,588,100.83	4,673,942,485.03 (2,870,806,195.41) 22,406,588,100.83
198,325,867.44	24,011,398,523.01	24,209,724,390.45
198,325,867.44	24,011,398,523.01	24,209,724,390.45
1	1	-
198,325,867,44	24,011,398,523.01 (951,872,307.29) 429,759,732.77	24,209,724,390.45 (951,872,307.29) 429,759,732.77
198,325,867.44	23,489,285,948.49	23,687,611,815.93



The Office of the National Broadcasting and Telecommunications Commission Notes to Financial Statements For the Year Ended December 31, 2021

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The Office of the National Broadcasting and Telecommunications Commission Notes to Financial Statements For the Year Ended December 31, 2021 (Unit: million baht unless specified otherwise)

Note 1 - General Information

The Office of the National Broadcasting and Telecommunications Commission or "the Office of the NBTC" is a juristic person, having a status of a state agency, established by virtue of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment (the Act on the Organization 2010 and its amendment), to regulate and develop the broadcasting, television, and telecommunications services. The National Broadcasting and Telecommunications Commission, or "NBTC", is responsible for prescribing policies criteria, procedures, conditions, fees, and regulations, relating to spectrum management, licensing, and frequency usage regulation, telecommunications numbering management, telecommunications network access or interconnection, prevention of monopoly or unfair competition, consumer protection, and broadcasting and telecommunications services provision. Also, the NBTC has set up the Broadcasting and Telecommunications Research and Development Fund for Public Interest, or "BTFP".

The Office of the NBTC head office is located at 87 Soi 8 (Sai Lom), Phaholyothin Road, Samsen Nai, Phayathai, Bangkok 10400.

The revenue of the Office of the NBTC shall be under Section 65 of the Act on the Organization B.E. 2553 (2010), described as follows:

- (1) Spectrum license fees and business license fees under Section 42 Paragraph Two, and Section 45 Paragraph Three
- (2) Revenues or benefits accrued from the conduct of duties of the NBTC and the Office of the NBTC
- (3) Revenues derived from the Office of the NBTC's property
- (4) Money and property donated to the Office of the NBTC under the NBTC's regulations for the operation of the Office of the NBTC
- (5) Subsidies from the government

The revenue of the Office of the NBTC under (1) and (2) after deducting by operating expenses, necessary burden costs, fund contributions under Section 52, Edtech Fund under the law on national education, and Digital Economy and Society Development Fund under the law on digital economy and society development. The rest shall be remitted as public revenue.

Note 2 - Financial Reporting Criteria

2.1 These financial statements have been prepared according to the Public Sector Accounting Standards and Policies, prescribed by the Ministry of Finance, as well as the Public Sector Accounting Principles, Standards and Policies, and Accounting Practices regarding Financial Statement Preparation of Public Sector, as specified in the Urgent Note of the Comptroller General's Department, No. MF 0410.2/C.479 dated October 2, 2020.

The financial statements have been conducted on a historical cost basis, unless disclosed otherwise in the accounting policy.

The financial statements of the Office of the NBTC include accounting transactions of headquarters and regional offices, which are obligated to submit the financial report according to the Public Accounting Standards.

2.2 The financial statements do not include the BTFP financial statement, as the Fund was established under the Act on the Organization B.E.2553 (2010) and its amendment, in accordance with the Note of Ministry of Finance, No. MF 0410.2/C.2, dated January 28, 2019 on practical guidelines for the financial statement preparation for public sector stipulating that while the Public Sector Accounting Standard No. 35 on Consolidated Financial Statement has not yet become effective, The Consolidated Financial Statement Practices for Public Sector, which stated that the organizations and their subsidiaries should conduct the financial consolidation without intercompany eliminations. The intercompany transactions should be stated in the Notes to Financial Statements. However, the consolidated financial statements are for administrative purposes, and are not required to submit to the Office of the Auditor General of Thailand.

The BTFP financial statements for the year ended December 31, 2021, which are excluded from the financial statements above as follows:

Statement of Financial Position

	2021
Assets	
Current Assets	
Cash and Cash Equivalents	22,681.78
Accrued Broadcasting Fund Contribution Income	151.50
Accrued Telecommunications Fund Contribution Income	5,781.48
Accrued Bank Deposit Interest Receivable	188.80
Office of the NBTC receivable	278.44
Short-Term Investments	41,695.05
Other Current Assets	1,106.93
Total Current Assets	71,883.98

Note 2 - Financial Reporting Criteria (continued)

	2021
Non - Current Assets	
Accrued Income from Spectrum Refarming	27,174.01
Property and Equipment	0.26
Infrastructure Assets	10,308.28
Total Non - Current Assets	37,482.55
Total Assets	109,366.53
Liabilities and Net Assets/Equity	
Liabilities	
Current Liabilities	
Short-Term Payable	11,351.42
Office of the NBTC Payable	275.00
Other Current Liabilities	155.59
Total Current Liabilities	11,782.01
Non - Current Liabilities	
Long -Term Payable	3,089.51
Deferred Fund Contribution Income	48,545.23
Long -Term Deposit	55.18
Other Non - Current Liabilities	162.28
Total Non - Current Liabilities	51,852.20
Total Liabilities	63,634.21
Net Asset/Equity	
Capital	2,926.32
Revenue Above Accumulated Expenses	42,806.00
Total Net Asset/Equity	45,732.32
Total Liabilities and Net Assets/Equity	109,366.53

Note 2 - Financial Reporting Criteria (continued)

Financial Statement

	2021
Revenues	
Allocated Revenue from Office of the NBTC	1,100.00
Accrued Broadcasting Fund Contribution	151.23
Accrued Telecommunications Fund Contribution	8,714.26
Bank Deposit Interest	326.17
Revenue from Administrative Fine	60.06
Other Revenues	244.22
Total Revenues	10,595.94
Expenses	
Expenses for Supporting the Fund's Mission	1,097.16
Expenses from Licensees Payment to Support the USO Plan	
Implementation	475.74
Miscellaneous	141.80
Depreciation and Amortization	1,593.25
Total Expenses	3,307.95
Revenue above Net Expense	7,287.99

Note 3 - The New Public Accounting Standards & Policies, and the Revised Public Accounting Standards & Policies

The Ministry of Finance has implemented the New Public Accounting Standards and Policies, described as follows:

The Public Accounting Standards and Policies have been effective for the accounting period starting on or after October 1, 2019 onwards.

- The Public Accounting Standard, No. 9, regarding revenues from exchange items

The above Public Accounting Standards have no significant effect on the current period of the financial statement.

The Public Accounting Standards and Policies have been effective for the accounting period starting on or after October 1, 2020 onwards.

- The Public Accounting Standard, No. 23, regarding revenues from non-exchange items The management believes that the above Public Accounting Standards have no significant effect on the current period of the financial statement.

Note 4 - Significant Accounting Policy Summary

4.1 Cash and Cash Equivalents

Cash and Cash Equivalents consist of cash on hand, demand deposits, and non-obligation time deposits with less than 3-month tenure.

4.2 Short-Term Investments

Short-term investments refer to time deposits with at least 3 months tenure, but not exceeding 12 months.

4.3 Fee Receivable

Fee receivable refers to net value to be received after deducting allowances for doubtful accounts, estimated from balance audit at the end of the accounting period.

Allowances for doubtful accounts are considered from doubtful accounts, estimated from the remaining debt values at the end of period according to payment history, current financial status of debtors, and legal proceedings against debtors, as well as considering the percentage of debt age and outstanding balance at the end of the period. The doubtful debts are recognized as an integral part of miscellaneous in the financial performance statement.

Allowances for doubtful accounts for the fee receivables are analyzed as follows:

- The outstanding fee receivables not exceeding 180 days, estimating allowance for doubtful accounts at a rate of 0 percent
- The outstanding fee receivables between 181 365 days, estimating allowance for doubtful accounts at a rate of 25 percent
- The outstanding fee receivables between 366 730 days, estimating allowance for doubtful accounts at a rate of 50 percent
- The outstanding fee receivables overdue longer than 730 days, estimating allowance for doubtful accounts at a rate of 75 percent
- The fee receivables under legal proceedings, estimating allowance for doubtful accounts at a rate of 100 percent

4.4 Accrued Income Receivable

Accrued Income Receivable include annual income from licensing fees, calculated from the licensee's operating revenues occurred in the accounting period, and to be paid annually within one hundred and fifty days from the end of the period, according to the Notification of the NBTC on Licensing Fee for Operating Radio or Television Broadcasting Business B.E. 2555 (2012), and the Notification of the NBTC on Licensing Fee for Telecommunications Business, as well as the revenues from spectrum auction according to Section 42 and 45 of the Act on the Organization B.E. 2553 (2010) and its amendment, the Announcement of the Head of National Council for Peace and Order (NCPO) No. 80/2014, the Order of the Head of NCPO NO. 76/2016, and the Order of the Head of NCPO NO. 9/2018.

4.5 Radiocommunications and Spectrum Services Fee Receivables

Radiocommunications and spectrum services fee receivables are the receivables collected from debtors by the Office of the NBTC on behalf of the Ministry of Finance. The entry will be recorded in parallel with the 'radiocommunications and spectrum services fee receivables' deposit account. When the debt is paid, the deposit account will be transferred to the deferred public revenue to the Treasury account in the section of radiocommunications service fees and violation fines.

4.6 Remaining Supplies

Remaining Supplies refers to the assets utilized by the organization for its operations. Basically, the inventory includes non - durable goods, which are not high in values, such as office supplies. It will be recorded on the periodic basis, and calculated by the weighted average method, shown as current assets in the statement of the financial position.

4.7 Properties and Equipment

- 4.7.1 Buildings and structures, including building improvement are shown by the net book value, derived from cost price deducted by accumulated depreciation, while the net book value of the building under construction is shown by the cost price.
- 4.7.2 Equipment, recognized by the entries with the minimum price per unit or set starting at 10,000 baht, except the entries acquired before 2020, is shown by the net book value, derived from cost price deducted by accumulated depreciation as follows:
- The equipment acquired before 1997 is not recognized in the account, but recognized in the Asset Control Register.
- The equipment acquired during 1997 2002 is recognized only by the entry with the value starting at 30,000 baht, while the equipment that valued less than 30,000 baht is recognized as expense in the Undervalued Inventory Account.
- The equipment acquired during 2003 2007 is recognized only by the entry with the value starting at 5,000 baht, while the equipment that valued less than 5,000 Baht is recognized as expense in the Undervalued Inventory Account.
- The equipment acquired during 2008 2018 is recognized only by the entry with the value starting at 10,000 baht, while the equipment that valued less than 10,000 Baht is recognized as expense in the Undervalued Inventory Account.
- The equipment acquired from 2019 onwards is recognized as durable goods, with long service life.

The cost price includes the direct cost relate with provide asset, in order to availability for administrative's purpose.

The cost price includes the material cost, direct labor cost, and other direct costs relating to asset acquisition.

The details of building and equipment entries with different types, service life, and significant costs, will be recognized separately.

The subsequent cost refers to the cost that occurs after the initial recognition of the item, which will be recognized as an integral part of net book value of the building and equipment entries. When there is a high probability that the organization will gain economic benefits or service capacity from the future entry, the cost value can be reliably measured, and the replaced item is deducted from the account with the book value. Also, the cost from the building maintenance and equipment will be recognized as an expense when occurred.

Depreciation is recognized as an expense in the financial performance statement, calculated with the Straight Line Method by the estimated useful life, according to the Note of the Comptroller General's Department, No. MF 0410.3/C.43 date January 29, 2019 regarding Public Accounting Manual for Lands, Buildings and Equipment as follows:

Type of Asset	Useful Life
Building and Building Improvement	3 - 20 years
Electric Appliance and Radio	5 - 15 years
Computer	3 years
Vehicle and Transport	8 years
Office Supply and Others	2 - 8 years

4.8 Intangible Assets

Intangible assets include the direct cost of computer program development, systems, and website production costs by procurement process. The Office of the NBTC has the right to control the asset utilization, and expect to gain economic benefits or service capacity from the asset for more than 1 year. The intangible asset entry is shown by the cost price deducted by accumulated amortization.

The intangible assets acquired since 2020, recognized only by the entries with the minimum price per unit or set starting at 10,000 baht, except the entries acquired before 2020, are shown by the net book value, which derived from cost price deducted by accumulated amortization as follows:

- The intangible asset acquired during 2010 2013 is recognized only by the entry with the value starting at 50,000 baht, while the entry that valued less than 50,000 baht is recognized as expense in the Undervalued Inventory Account.
- The intangible asset acquired during 2014 2018 is recognized only the entry with the value starting at 30,000 baht, while the entry that valued less than 30,000 baht is recognized as expense in the Undervalued Inventory Account.
- The intangible asset acquired in 2019 is recognized only by the entry with the value starting at 20,000 baht, while the entry that valued less than 20,000 baht is recognized as expense in the Undervalued Inventory Account.

Amortization of the intangible assets are recognized as expense in the financial performance statement, calculated with the straight line method by the estimated useful life, which are computer programs with 3 years useful life.

4.9 Deferred Incomes

Deferred incomes from the spectrum auction revenues for digital television service are recognized by the actual expense, relating to the digital television service provision. The accrued incomes are recognized as liability in the deferred income statement.

4.10 Provisions

Provisions are recognized when the Office of the NBTC has the liabilities occurred presently or resulted from the past events, and there is a high probability that the economic benefits will be paid as the settlement, and the liabilities are estimated reliably. The provisions are considered by the discounted cash flow method, based on the expected future cash flows, in order to reflect the present value which varies by time and risk of debt. The incremental provision by time is recognized as a financial cost.

4.11 Remittance as Public Revenue to the Treasury

Revenue or benefits derive from the operations under the authorities of the NBTC and the Office of the NBTC, such as revenue received in a year after deducting the organization's operating expenses, necessary burdens, the contributions to the fund according to Section 52, the Edtech Fund under the law on national education, and the Digital Economy and Society Development Fund under the law on digital economy and society development. The surplus is remitted as public revenue. Furthermore, the Office of the NBTC shall remit the surplus from burden costs of the prior years, which could not be spent completely within 2 years, as public revenue, including any items or projects that the budget have been set up, but have not been spent, or incurred debt obligations within the fiscal year. Those items or projects will be canceled. Then, the Office of the NBTC shall remit the budget of such items or projects as public revenues.

4.12 Revenue from Spectrum Auction

Revenue from spectrum auction, after deducting the cost of organizing the event and the contribution to the Digital Economy and Society Development Fund, under the law on digital economy and society development, shall be remitted as public revenue, according to the Act on the Organization B.E.2553 (2010) and its amendment.

4.13 Revenue from Spectrum Licensing Fee for Digital Television Service Provision

The first installment of the spectrum licensing fee payment for the digital television service provision, in the category of national commercial service, shall be remitted to the BTFP. The minimum price fee will be used for supporting people to receive the digital television service thoroughly, in compliance with the Notification of the NBTC on Criteria, Procedures and Conditions on Spectrum Auction for Digital Television Service Provision, in Category of National Commercial Service, B.E. 2556 (2013), and Section 53 (2) of the Act on the Organization B.E. 2553 (2010) and its amendment.

The revenue from the spectrum licensing fees for digital television service provision after deducting expenses, shall be remitted as public revenue, according to the Announcement of the National Council for Peace and Order (NCPO) No.80/2014. Also, prior to the announcement date, if the revenue has not been remitted to the BTFP, it shall be remitted as public revenue, after deducting the expenses, within fifteen days from the effective date of the Announcement, according to the Order of the Head of NCPO No.76/2016 regarding changes in spectrum licensing payment terms of the measures to promote the broadcasting and telecommunications businesses for public interest, the Order of the Head of NCPO No.9/2018 regarding the measures to mitigate the impacts on the broadcasting and telecommunications operators by suspending the license fee payments, not exceeding 3 years. The licensees shall pay the interest on the payment due date of each installment to the Office of the NBTC, at the rate of the policy interest rate, declared by the Financial Policy Committee, Bank of Thailand. In addition, the revenue shall be remitted as public revenue according to the Order of the Head of NCPO No.4/2019 on Measures for Resolving Problems on Broadcasting and Telecommunication Business Operation by waiving the spectrum licensing fee, under the criteria, procedures and conditions prescribed by the Office of the NBTC.

4.14 Employee Benefits

The Office of the NBTC is not governed by the Labor Protection Law, the Labor Relations Law, Social and the Compensation Law. The Office of the NBTC regulations regarding the employee benefits are as follows:

4.14.1 Short-Term Employee Benefits

The provisions of short-term employee benefits are recognized as expenses in the financial performance statement, without calculating Discounted Cash Flows. The liabilities are recognized by the amount expected to be paid for special remuneration and welfare, as short-term cash or legal obligations or inferred obligation to be paid, as a result of the employee's work in the past, and this obligation is reasonably estimated.

4.14.2 Employee Benefits after Retirement

1) Contributions Plan

The Office of the NBTC has set up the provident fund for employees, as a welfare to promote employees' savings, by contributing to the fund according to organization's regulations of the Office of the National Telecommunications Commission (NTC) on Provident Fund of Employees of the Office of the National Telecommunications Commission B.E. 2549 (2006). The assets of the provident fund are separated from the organization's assets, and are managed by the external fund manager. The fund consists of employees' saving money and contributions from the Office of the NBTC. Such contributions are recognized as expenses in the financial performance statement for the transaction period.

2) Pension Benefit Plan

The Office of the NBTC is obligated to pay compensation to employees upon their retirement, according to the NBTC Regulation on Employee's Pension and Welfare after Retirement B.E. 2555 (2012), which is regarded as pension benefit.

The provisions of employee pension benefit are recognized in the statement of financial position with the present value of the obligations at the end of the period. The obligations are annually calculated by the independent actuary, with the projected unit credit method.

The debts occurred in the transition period, derive from the difference of the benefit obligations and the liabilities in the statement of financial position for the employee benefit plan, according to the existing accounting policy at the accounting policy changing date. The Office of the NBTC recognizes them by calculating the full amount of retained earnings with the retrospective adjustment method.

The full amount of historical service cost is recognized in the profit or loss as soon as the plan is revised or scaled down, or when the Office of the NBTC recognizes the relevant restructuring costs.

4.15 Revenue Recognition

The Office of the NBTC recognizes each type of revenues as follows:

- Revenue from spectrum auction under Section 41, Section 45 Paragraph Two of the Act on the Organization B.E. 2553 (2010) and its amendment, is recognized on an accrual basis. According to the content of relevant agreements.
- Revenue from radiocommunications frequency remuneration is recognized on an accrual basis.
- Revenue from licensing fees under the Radiocommunications Act has been upon the approval of application recognized.

- Revenue from business licensing fees is recognized on an accrual basis.
- Revenue from the numbering fees is recognized monthly on an accrual basis.
- Revenue from spectrum transfer licensing fees is recognized upon the license approval.
- Revenue from application fees is recognized by revenue type upon the application approval.
- Revenue from the 1 Por Nor radio broadcasting station is recognized monthly on an accrual basis.
- Revenue from other fees are recognized upon the receipt of forms.
- Revenue from interest earned is recognized on a time proportional basis.
- Other revenues apart from revenues mentioned above are recognized on an accrual basis.

4.16 Revenue of State Enterprise under Section 84 Paragraph Three

The Section 84 Paragraph Three of the Act on the Organization B.E.2553 (2010) and its amendment stipulates that, when the specified period of 3 years has elapsed since the effective date of the Act, the state enterprise revenue derived from the licensing, concession, or contracts, according to Paragraph Two, under the law regarding private sector participation with the state undertakings whether the undertaking is in whole or in part, shall be deducted by the business licensing fees calculated from the income generated from the licensing, concession, or contracts, the expenses for supporting the provision of universal basis telecommunications and social services in accordance with the governent policies and Section 50 in part of calculating from income base which is generated from the authorization, concession on contract, and the operating expenses of licensing, concession, or contracts, as prescribed by the Ministry of Finance. The surplus shall be remitted to the Office of the NBTC. Accordingly, the Office of the NBTC shall remit such revenue as public revenue.

4.17 Revenue from Service Provision on Behalf of the State

Revenue from service provision on behalf of the state is the revenue under the NBTC Notification on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) Section 7.

During the protection period, the service providers shall receive the service fees on behalf of the state, by separating the receipt account specifically. They have to report the income and its profit, deducted by the interconnection cost, the telecommunications numbering fees, the administrative cost, and other necessary operating costs, as well as submitting the surplus to the NBTC for auditing before forwarding as the public revenue.

4.18 Contributions to Support Education, Research and Development

Contributions to support education, research and development are recognized as expenses upon granting approval to the eligible agencies. The remaining funds, returned in the fiscal year, shall be deducted from the contributions. If the funds are returned after the disbursement period, they will be recognized as returned revenue from contributions to support education, research and development, shown as other non-operating revenues. Such criteria shall apply to the similar items.

4.19 Operating Expenses of the BTFP

The operating expenses of the Broadcasting and Telecommunications Fund for Public Interest (BTFP) refer to assets for BTFP operations, human resources expenses, committee meeting allowance, public relations expenses, meeting administration expenses, operational supplies costs, utility costs, etc. They are disbursed by the Office of the NBTC, according to the BTFP regulations.

Note 5 - Cash and Cash Equivalents

	2021	2020
Cash	0.10	0.11
Petty Cash	0.50	0.50
Deferred Cheque	0.88	2,504.90
Financial Institutions Deposits		
Current Account Deposits	209.53	144.20
Saving Account Deposits	23,029.93	32,454.04
Time Account Deposits with less than 3-month tenure 26.52		26.47
Total Cash and Cash Equivalents	23,267.46	35,130.22
Cash and Cash Equivalents consist of		
Cash and Cash Equivalents of income under Section 65 (1) - (2)	3,831.87	4,835.92
Cash and Cash Equivalents of income under Section 65 (3) - (5)	126.36	126.35
Cash and Cash Equivalents of Guarantee Deposits and Others	19,309.23	30,167.95
Total Cash and Cash Equivalents	23,267.46	35,130.22

Note 6 – Short-Term Investments

	2021	2020
Time Account Deposits with 3-12 months tenure	0.39	0.39
Total Short-Term Investments	0.39	0.39
Short-Term Investments consist of		
Short-Term Investment from Deposits	0.39	0.39
Total Short-Term Investments	0.39	0.39

Note 7 - Fee Receivables

	2021	2020
Radio Frequency Remuneration Receivables	7.61	0.03
Numbering Fee Receivables	812.13	804.00
Service Licensing Fee Receivables	85.65	85.89
Debtors	29.28	29.02
Total	934.67	918.94
Subtract Allowances for Doubtful Accounts	(908.58)	(909.07)
Total Fee Receivables	26.09	9.87

Note 7 - Fee Receivables (continued)

To analyze the accrued debt age, the Office of the NBTC's fee receivables can be categorized by accrual debts as follows:

Outstanding Debt less than 180 days

Outstanding Debt more than 180 days but not exceeding 365 days

Outstanding Debt more than 365 days but not exceeding 730 days

Outstanding Debt more than 730 days

Having Legal Dispute

Total

2021	2020
15.35	0.95
1.57	1.28
2.14	4.84
25.33	22.16
890.28	889.71
934.67	918.94

The numbering fee receivables as of December 31, 2021 and 2020 were 812.13 and 804.00 million baht respectively. They consisted of the numbering fee receivables of True Move Company Limited (TrueMove) during March 1, 2014 - December 31, 2015, for 647.29 million baht, and the extra money for 141.13 million baht, as a total of 788.42 million baht. TrueMove has not paid the numbering fees to the Office of the NBTC, by reasoning that it had to comply with the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) (Provisional Measures for Consumer Protection). The measures restrict the company to exploit the inactive numbers, resulting in the telecommunications numbering fee burden for the company. However, as the numbering fee can be recognized as a cost to subtract from the service revenue, TrueMove have requested the Office of the NBTC to exempt all telecommunications numbering fees from September 16, 2013 (as from the termination of contract) onwards. The numbering fee amount of September 16, 2013 to February 28, 2014, in a total of 190.97 million baht, that had already been paid to the Office of the NBTC, was refunded by the company.

According to the resolution of the Meeting No. 12/2014 Telecommunications Commission (TC) meeting on May 7, 2014, the committee disapproved TrueMove's request for the numbering fee exemption. Also, in the resolution of the Meeting No. 26/2014 NTC meeting on October 14, 2014, the committee assigned the Office of the NBTC to comply with the legal procedures. Then, on August 31, 2015, the Office of the NBTC had filed the lawsuit to the Administrative Court against TrueMove, as in the Undecided Case Meeting No. 490/2016, which has been in the legal process. However, the Office of the NBTC was the defendant for the compensation occurred for the operations under the Provisional Measures for Consumer Protection, as the expenses were higher than the revenue of the plaintiff, and for the refund of paid-up numbering fee, as in the Undecided Case No. 2013/2015, with the monetary value claim for 16,265.06 million baht, together with 7.5 percent per annum interest rate. According to the Administrative Court's order, the following cases have been consolidated; Undecided Case No. 1712/2016, 2392/2018, 490/2016, and 1228/2016, taking the Undecided Case No. 2013/2015 as the main case, and is in the process of preparing additional clarifications on other issues.

Note 8 - Accrued Income Receivable

	2021	2020
Current Portion		
Accrued Income from 1800 MHz Spectrum Auction	-	6,693.38
Accrued Income from TV Digital Spectrum Auction	-	402.32
Accrued Income from 900 MHz Spectrum Auction	20,331.71	20,331.71
Accrued Income from Licensing Fee	4,935.64	4,703.59
Accrued Income rom 700 MHz Spectrum Auction	11,150.68	5,644.47
Total Current Portion	36,418.03	37,775.47
Non - Current Portion		
Accrued Income from 900 MHz Spectrum Auction	69,140.83	89,472.54
Accrued Income from 700 MHz Spectrum Auction	89,205.47	47,037.20
Accrued Income from 2600 MHz Spectrum Auction	36,048.84	36,048.84
Revenue of State Enterprise under Section 84 Paragraph Three	9,263.90	-
Total Non - Current Portion	203,659.04	172,558.58
Total Accrued Income Receivable	240,077.07	210,334.05

The accrued income from 900 MHz spectrum auction as of December 31, 2021 and 2020, were 69,140.83 and 109,804.25 million baht respectively.

The accrued income from 1800 MHz spectrum auction as of December 31, 2021 and 2020, were 20,331.71 and 6,693.38 million baht respectively.

The accrued income from 700 MHz spectrum auction as of December 31, 2021 and 2020, were 100,356.15 and 52,681.67 million baht respectively.

The accrued income from 2600 MHz spectrum auction as of December 31, 2021 and 2020, were 36,048.84 and 36,048.84 million baht respectively.

The licensees submitted the guarantee deposits on December 31, 2021 and 2020, in a total of 7,500.00 and 8,000.00 million baht, together with the letters of guarantee from commercial banks, according to the Financial Institution Business Act B.E. 2551 (2008), to guarantee the payments for the remaining installments, recognized as the accrued revenue from the spectrum auction according to the notification of the NBTC. Nonetheless, according to the Order of the Head of the National Council for Peace and Order (NCPO) No. 4/2019 on Measures to Solve Problems on Broadcasting and Telecommunication Business Operation, dated April 11, 2019, Section 6 Paragraph Two, it stipulates the Office of the NBTC to consider the restructuring of the 900 MHz payment term to be 10 equal installments. The first installment shall start from the license granted year. As the Office of NBTC approved the payment restructuring in 2020, the licensees were obligated to pay installment of the year 2020, together with the compensation of the previous year.

Note 8 - Accrued Income Receivable (Continued)

The accrued revenue from TV Digital spectrum auction as of December 31, 2020, in a total of 402.32 million baht, was fully paid in 2021. It was the revenue from the spectrum auction for digital television service provision, in the category of national commercial service, for 24 licenses. The Office of the NBTC received the spectrum auction revenue of 22 licenses, and transferred the full amount of such revenue to the Ministry of Finance, according to the Announcement of the NCPO No. 80/2014 on the Amendment to the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services. Besides, the revenue of the other 2 licenses, for 1,005.60 million baht, plus 70.39 million baht VAT, was 1,075.99 million baht. On February 23, 2021, the Supreme Administrative Court has made the judgment for the Undecided Case No. 108/2018 and Decided Case No. 21/2021 (the Administrative Court's former Undecided Case No. 652/2016 and Decided Case No. 452/2018), Thai TV Company Limited against the NBTC (Defendant 1) and the Office of the NBTC (Defendant 2), by resolving the verdict of the Administrative Court of First Instance, and imposing the Defendant 1 to return the spectrum licensing fee to the plaintiff for 151.73 million baht, as well as returning the letters of guarantee of the Bangkok Bank Public Company Limited No. 02118140000101 to 021118140000116, dated February 10, 2014, used as retention money to guarantee licensing payment for the 2nd to 6th installments, to the plaintiff. In the case where the letters of guarantee cannot be returned, the defendant must reimburse the plaintiff for the amount specified in such letters of guarantee. The reimbursement must be completed within 60 days as the cases become final. Furthermore, the partial court fees shall be returned to the plaintiff, while the other requests shall be dismissed. The proceedings according to the judgment completed in 2021.

The accrued revenues from business licensing fees as of December 31, 2021 and 2020 were 4,935.64 and 4,703.59 million baht respectively. Such accrued revenue refers to the revenue collected from the operators, calculated by the progressive rate of the operating income of telecommunications businesses type 1 to 3, according to the Notification of the NBTC on Licensing Fee of the Telecommunications Business and the revenue from broadcasting and television business operation, and the Notification of the NBTC on Licensing Fee of the Broadcasting Business, which imposing the operators to pay the licensing fees within 150 days, as from the end of the accounting period.

Note 9 - Remaining Supplies

Remaining Supplies

Total Remaining Supplies

2021	2020
8.21	6.83
8.21	6.83

Note 10 - Prepaid Expense

Prepaid Land Rent

Other Prepaid Expense

Total Prepaid Expense

2021	2020
19.06	26.65
6.25	6.68
25.31	33.33

Note 11 - Other Current Assets

Pending Input Tax
Advance Receivables
Accrued Interest
Advance Payment
Other Current Assets
Total Other Current Assets

2021	2020
24.35	42.57
0.41	1.23
1.03	1.63
270.84	315.20
11.03	14.30
307.66	374.93

Loan Receivable	Undue Balance	Overdue Balance less than 15 days	Overdue Balance more than 15 days	Total
2021	0.41	-	-	0.41
2020	1.23	-	-	1.23

Note 12 - Deposit account with Obligations

Special Savings account

Total Deposit account with Obligations

2021	2020
655.14	651.20
655.14	651.20

The 500.00 million baht Deposit account with obligations is the money placed in the deposit account of a commercial bank, with the obligations to maintain the deposit for the housing loans of employees.

Note 13 - Long-Term Investment

Time Account Deposits with tenure more than 12 months

Total Long-Term Investment

2021	2020
225.15	223.81
225.15	223.81

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	Total		4,576.39	110.39	(32.80)	4,653.98		3,592.03	312.31	25.62	3,878.72		861.62		1,525.18	1,636.88	
	Office Supplies and Others		392.74	18.91	(4.74)	406.91		325.76	23.35	(3.77)	345.34		17.51		78.16	79.08	
ber 31, 2021	Vehicle and Transport		197.09	0.20	(0.04)	197.25		174.15	15.51	(0.04)	179.62		1		22.94	17.63	
As at December 31, 2021	Computer		828.68	32.37	(19.96)	841.09		742.89	41.49	(13.84)	770.54		1		85.79	70.55	
	Electric Appliance and Radio		2,253.71	127.21	(7.97)	2,272.95		1,718.45	213.02	(7.97)	1,923.50		1		535.26	349.45	
	Building and Building Improvement		904.17	31.70	(60.0)	935.78		630.78	28.94	1	659.72		844.11		803.03	1,120.17	
	ltem	Cost Price	Opening Balance	Increase During the Period	Decrease During the Period	Closing Balance	Subtract Accumulated Depreciation	Opening Balance	Increase During the Period	Decrease During the Period	Closing Balance	Work in Progress	Work in Progress at Closing Balance	Book Value	As at December 31, 2020	As at December 31, 2021	

Note 14 - Property, Plant, and Equipment (continued)

As at December 31, 2020

ltem	Building and Building Improvement	Electric Appliance and Radio	Computer	Vehicle and Transport	Office Supplies and Others	Total
Cost Price						
Opening Balance	892.96	2,218.92	955.42	185.38	389.26	4,641.94
Increase During the Period	16.96	181.50	91.18	13.50	25.66	328.80
Decrease During the Period	(5.75)	(146.71)	(217.92)	(1.79)	(22.18)	(394.35)
Closing Balance	904.17	2,253.71	828.68	197.09	392.74	4,576.39
Subtract Accumulated Depreciation						
Opening Balance	605.93	1,548.91	904.78	170.81	318.04	3,548.47
Increase During the Period	28.04	303.35	55.51	4.58	29.74	421.22
Decrease During the Period	(3.19)	(133.81)	(217.40)	(1.24)	(22.02)	(377.66)
Closing Balance	630.78	1,718.45	742.89	174.15	325.76	3,592.03
Work in Progress						
Work in Progress at Closing Balance	529.64	I	ı	I	81.11	540.82
Book Value						
As at December 31, 2019	549.73	670.01	50.64	14.57	190.39	1,475.34
As at December 31, 2020	803.03	535.26	85.79	22.94	78.16	1,525.18

Note 15 - Assets from Financial Lease

As at December 31, 2021

	Computer	Vehicle and Transport	Total
Cost Price			
Opening Balance	266.79	136.22	403.01
Increase During the Period	59.90	10.80	70.70
Decrease During the Period	(0.72)	(9.92)	(10.64)
Closing Balance	325.97	137.10	463.07
Subtract Accumulated Depreciation			
Opening Balance	82.78	51.03	133.81
Increase During the Period	73.69	26.83	100.52
Decrease During the Period	(0.68)	(9.28)	(9.96)
Closing Balance	155.79	68.58	224.37
Book Value			
As at December 31, 2020	184.01	85.19	269.20
As at December 31, 2021	170.18	68.52	238.70

As at December 31, 2020

	Computer	Vehicle and Transport	Total
Cost Price			
Opening Balance	235.32	136.59	371.91
Increase During the Period	51.92	24.78	76.70
Decrease During the Period	(20.45)	(25.15)	(45.60)
Closing Balance	266.79	136.22	403.01
Subtract Accumulated Depreciation			
Opening Balance	38.30	46.78	85.08
Increase During the Period	65.18	25.45	90.63
Decrease During the Period	(20.70)	(21.20)	(41.90)
Closing Balance	82.78	51.03	133.81
Book Value			
As at December 31, 2019	197.02	89.81	286.83
As at December 31, 2020	184.01	85.19	269.20

Note 16 - Intangible Assets

Cost Price
Opening Balance
Increase During the Period
Decrease During the Period
Closing Balance
Subtract Accumulated Amortization
Opening Balance
Increase During the Period
Decrease During the Period
Closing Balance
Work in Progress
Work in Progress at Closing Balance
Book Value

Note 17 - Creditor and	Note Payable
------------------------	--------------

Creditors	
Paychecks	
Total Creditors and Note Payables	

Note 18 - Deferred Income

As at December 31

Deferred Radiocommunications Remunerations
Deferred Numbering Fee
Others
Total Deferred Incomes

2021	2020
1,689.74	1,363.96
118.42	325.78
(0.33)	-
1,807.83	1,689.74
1,336.79	1,145.35
198.77	191.44
(1.16)	-
1,534.40	1,336.79
123.61	84.00
397.04	436.95

2021	2020
212.18	269.82
136.91	250.59
349.09	520.41

2021	2020
67.66	59.10
8.59	8.06
14.33	8.92
90.58	76.08

Note 19 - Estimated Liabilities for Employee Benefits

Pension Benefit Plan

According to the NBTC Regulation on Employee's Pension and Welfare after Retirement B.E. 2555 (2012), the Office of the NBTC is obligated to pay compensation to employees upon their retirement, or employees forced to leave their jobs without guilt, or died, who have been worked for the organization at least one year, as well as the resigning employees without guilt, who have been worked for the organization at least three years. Also, their resignations have been approved by the appointing person or the designated person. Such employees shall receive the pension amounts by calculating the working duration multiplied by the amount of the last salary.

In the case where an employee is injured or harmed during their duties, he/she shall receive an extra pension, which is 24 times the amount of the last salary. If died before receiving the extra pension, he/she shall receive the extra pension at 30 times the amount of the last salary.

The Office of the NBTC provides the pension fund account, as a budget source for employees' pensions after retirement. The source of funds consists of the initial money allocated from the annual expenditure budget, allocated money from the expenditure budget, interest of the pension fund, and others. In the case of insufficient pension funds to be paid to the employees, the Office of the NBTC shall reimburse the employee pension from the Office of the NBTC's Central Budget.

The present value of the provisions for employee benefits to be paid is as follows:

Current Provisions for Employee Benefits

Non - Current Provisions for Employee Benefits

Present Value of Provisions for Employee Benefits

2021	2020
32.09	34.85
1,380.53	1,262.24
1,412.62	1,297.09

Changes in the present value of the provisions for employee benefits for the year ended December 31 are as follows:

Opening Balance of Provisions for Employee Benefits
Current Service Cost
Historical Service Cost
Net Interest of Net Provisions for Employee Benefits
Total
Actuarial Gains
Total
Paid Employee Benefits
Closing Balance of Provisions for Employee Benefits

2021	2020
1,297.09	993.54
131.31	147.36
-	214.76
20.83	20.00
152.14	382.12
-	(41.52)
152.14	340.60
(36.61)	(37.05)
1,412.62	1,297.09

Note 19 - Estimated Liabilities for Employee Benefits (continued)

Actuarial Gains for the year ended December 31 are as follows:

Experience Changes Financial Assumption Changes Total

2021	2020
-	(7.63)
-	(33.89)
-	(41.52)

Main assumptions for actuarial gains and losses are as follows:

Main Assumantians	Ago Dongo	Percentage	per Annum
Main Assumptions	Age Range	2020	2021
1. Discount Rate		0.51 to 2.77	1.76 to 3.94
2. Inflation Rate		2.0	2.5
3. Salary Increase Rate	Less than 40 years	8.0	8.0
	From 40 to less than 55 years	6.0	6.0
	From 55 years and above	4.0	4.0
4. Employee Turnover Rate	Less than 30 years	3.0	3.0
	From 30 to less than 55 years	1.0	1.0
	From 55 years and above	0.0	0.0

5. Mortality Rate

The assumptions relating to the future mortality rate derive from Thai Mortality Ordinary Table 2017 (TMO 2017) with the rate revision at 3.0 percent per year.

Sensitivity of Main Assumptions

Changes in each main assumption, relating to actuarial analysis, may occur reasonably at the end of period. The results of assumption sensitivity analysis of the impact of the defined benefit plan obligations as of December 31 are as follows:

Impact of the Defined Benefit Plan Obligations

	Changes in Assumption	Increase in Assumptions		Decrease in A	Assumptions
	Percentage	million baht		millior	n baht
		2021	2020	2021	2020
Discount Rate	1.00	(165.97)	(155.77)	198.62	186.13
Expected Salary Increase Rate	1.00	205.67	179.19	(174.10)	(152.27)
Employee Turnover Rate	20.00	(9.61)	(6.82)	9.81	6.98
Revision of Mortality Rate	1.00	0.84	0.63	(0.93)	(0.70)

Risks involved in the benefit plan, under the projected unit credit method, are the differences between the assumptions and the actual salary increase rate, the employee turnover rate, and the mortality rate. For example, the actual salary increase rate which is higher than expected rate, and the employee turnover rate which is less than expected rate, may result in actuarial losses. Moreover, the current economic situations may affect the discount rate, which is used to measure the fair value of liabilities. However, this benefit plan has no risk to the organization or investment, as the plan does not involve fund establishment.

Note 19 - Estimated Liabilities for Employee Benefits (continued)

The analysis of employee benefit payment maturity without discount rate of 2021 is shown below.

As at December 31, 2021
Provisions for Employee Benefits
Total

Current Portion	Non- Current Portion (more than 1 year but not exceeding 3 years)	Long-Term Portion (more than 3 years)	Total
million baht	million baht	million baht	million baht
32.09	123.76	5,017.42	5,173.27
32.09	123.76	5,017.42	5,173.27

Note 20 - Deferred Public Revenue to the Treasury

		Transactions Per		
	Opening Balance As at January 1, 2021	Accrued Remittance Increase (Decrease)	Remittance	Closing Balance As at December 31, 2021
Current Portion				
Radiocommunications Service Fee and Violation Fines	0.02	-	(0.02)	-
Fines	3.96	3.48	(3.96)	3.48
Revenue from 700 MHz Spectrum Auction	0.47	10,912.15	(2,458.44)	8,454.18
Revenue from 900 MHz Spectrum Auction	24,743.77	15,199.38	(21,508.33)	18,434.82
Revenue from 1800 MHz Spectrum Auction	10,636.11	2.99	(5,317.18)	5,321.92
Revenue from TV Digital Spectrum Auction	613.48	53.04	(665.24)	1.28
Revenue from 2600 MHz Spectrum Auction	5.32	0.01	-	5.33
Revenue from 26 GHz Spectrum Auction	26.11	7,585.48	(7,583.61)	27.98
Revenue from Beautiful Number Auction	0.20	0.05	(0.20)	0.05
Revenue from Section 84	2,004.55	9,263.90	(2,004.55)	9,263.90
Revenue from the 1 Por Nor Radio Station	27.85	25.64	(27.85)	25.64
Remittance as Public Revenue 2019	499.01	-	(499.01)	-
Remittance as Public Revenue 2020	2,330.32	-	(2,330.32)	-
Remittance as Public Revenue 2021	-	926.23	-	926.23
Total Current Portion	40,891.17	43,972.35	(42,398.71)	42,464.81
Non - Current Portion				
Revenue from 700 MHz Spectrum Auction	31,310.46	37,206.23	-	68,516.69
Revenue from 900 MHz Spectrum Auction	80,193.44	(15,195.20)	-	64,998.24
Revenue from 2600 MHz Spectrum Auction	5,539.02	-	-	5,539.02
Total Non - Current Portion	117,042.92	22,011.03	-	139,053.95
Total Deferred Public Revenue to the Treasury	157,934.09	65,983.38	(42,398.71)	181,518.76

Note 20 - Deferred Public Revenue to the Treasury (continued)

	Opening Balance	Transactions during the Period alance		Closing Balance
	As at January 1, 2021	Accrued Remittance Increase (Decrease)	Remittance	As at December 31, 2021
Current Portion				
Radiocommunications Service Fees and Violation Fines	2.01	0.02	(2.01)	0.02
Fines	11.61	3.96	(11.61)	3.96
Revenue from 700 MHz Spectrum Auction	-	0.47	-	0.47
Revenue from 900 MHz Spectrum Auction	50,129.16	18,439.96	(43,825.35)	24,743.77
Revenue from 1800 MHz Spectrum Auction	5,332.34	5,318.93	(15.16)	10,636.11
Revenue from TV Digital Spectrum Auction	2,228.12	27.48	(1,642.12)	613.48
Revenue from 2600 MHz Spectrum Auction	-	616.44	(611.12)	5.32
Revenue from 26 GHz Spectrum Auction	-	2,279.03	(2,252.92)	26.11
Revenue from Premium Number Auction	180.45	0.20	(180.45)	0.20
Revenue from Section 84	-	2,004.55	-	2,004.55
Revenue from the 1 Por Nor Radio Station	98.60	27.86	(98.61)	27.85
Remittance as Public Revenue 2018	2,800.58	-	(2,800.58)	-
Remittance as Public Revenue 2019	2,010.92	499.01	(2,010.92)	499.01
Remittance as Public Revenue 2020	-	2,343.95	(13.63)	2,330.32
Total Current Portion	62,793.79	31,561.86	(53,564.48)	40,891.17
Non - Current Portion				
Revenue from 700 MHz Spectrum Auction	-	31,310.46	-	31,310.46
Revenue from 900 MHz Spectrum Auction	98,624.08	(18,430.64)	-	80,193.44
Revenue from 1800 MHz Spectrum Auction	5,317.18	(5,317.18)	-	-
Revenue from TV Digital Spectrum Auction	1,005.60	(1,005.60)	-	-
Revenue from 2600 MHz Spectrum Auction	-	5,539.02	-	5,539.02
Total Non - Current Portion	104,946.86	12,096.06	-	117,042.92
Total Deferred Public Revenue to the Treasury	167,740.65	43,657.92	(53,464.48)	157,934.09

Note 21 - Deferred Output Tax on Spectrum Auction to the treasury

	2021	2020
Current Portion		
900 MHz Spectrum Auction	1,330.11	1,330.11
1800 MHz Spectrum Auction	+	437.89
TV Digital Spectrum Auction	-	26.32
700 MHz Spectrum Auction	729.48	369.26
Accrued Revenue - Telecommunications	50.00	48.98
Total Current Portion	2,109.59	2,212.56
Non - Current Portion		
900 MHz Spectrum Auction	4,523.23	5,853.35
700 MHz Spectrum Auction	5,835.88	3,077.20
2600 MHz Spectrum Auction	2,358.33	2,358.33
Total Non - Current Portion	12,717.44	11,288.88
Total Deferred Output Tax on Spectrum Auction to the treasury	14,827.03	13,501.44

Note 22 - Contributions to Digital Economy and Society Development Fund

	Opening	Transactions du	uring the Period	
	Balance As at January 1, 2021	Accrued Remittance Increase (Decrease)	Remittance	Closing Balance As at December 31, 2021
Revenue from Section 65	322.88	1,302.19	(1,459.80)	165.27
700 MHz Spectrum Auction	-	668.98	(334.49)	334.49
900 MHz Spectrum Auction	1,680.85	-	(1,109.88)	570.97
1800 MHz Spectrum Auction	1,876.65	-	(938.32)	938.33
26 GHz Spectrum Auction	-	1,338.28	(1,338.28)	-
Total Current Portion	3,880.38	3,309.45	(5,180.77)	2,009.06
700 MHz Spectrum Auction	-	2,675.91	-	2,675.90
900 MHz Spectrum Auction	3,425.76	-	-	3,425.76
2600 MHz Spectrum Auction	977.47	-	-	977.47
Total Non - Current Portion	4,403.23	2,675.91	-	7,079.14
Total Contributions to Digital Economy				
and Society Development Fund	8,283.61	5,985.36	(5,180.77)	9,088.20

Note 22 - Contributions to Digital Economy and Society Development Fund (continued)

	Qu	Transactions du	ring the Period	
	Opening Balance As at January 1, 2020	Accrued Remittance Increase (Decrease)	Remittance	Closing Balance As at December 31, 2020
Revenue from Section 65	371.87	1,387.16	(1,436.15)	322.88
900 MHz Spectrum Auction	1,109.89	570.96	-	1,680.85
1800 MHz Spectrum Auction	938.32	938.33	-	1,876.65
2600 MHz Spectrum Auction	-	108.61	(108.61)	-
26 GHz Spectrum Auction	-	405.81	(405.81)	-
Total Current Portion	2,420.08	3,410.87	(1,950.57)	3,880.38
900 MHz Spectrum Auction	3,996.72	(570.96)	-	3,425.76
1800 MHz Spectrum Auction	938.33	(938.33)	-	-
2600 MHz Spectrum Auction	-	977.47	-	977.47
Total Non - Current Portion	4,935.05	(531.82)	-	4,403.23
Total Contributions to Digital Economy and				
Society Development Fund	7,355.13	2,879.05	(1,950.57)	8,283.61

In compliance with the Development of Digitality for Economy and Society Act B.E. 2560 (2017) Section 24, the contributions to Digital Economy and Society Development Fund as of December 31, 2021 and 2020, were 9,088.20 and 8,283.61 million baht respectively. The Office of the NBTC has allocated the budget, at 15 percent of the revenue from spectrum allocation and the Office of the NBTC revenue, as from January 25, 2017 onwards.

Note 23 - Financial Lease Liabilities

Total Minimum Financial Lease Payable
Interest of Hire-Purchase Contract/Deferred Financial Lease
Present Value of the Total Minimum Financial Lease Payable

Total Minimum Financial Lease Payable

Deferred Interest of Hire-Purchase Contract/ Financial Lease

Present Value of the Total Minimum Financial Lease Payable

As at December 31, 2021

Less than 1 year	1 - 5 years	Total
96.85	150.57	247.42
(8.92)	(8.12)	(17.04)
87.93	142.45	230.38

As at December 31, 2020

Less than 1 year	1 - 5 years	Total
109.62	191.44	301.06
(11.27)	(13.46)	(24.73)
98.35	177.98	276.33

Note 23 - Financial Lease Liabilities (continued)

Changes in financial lease liabilities are as follows:

Closing Balance as at January 1
Increase in Financial Lease Liabilities
Reimbursement of Financial Lease Liabilities
Deferred Interest of Financial Lease
Closing Balance as at December 31, 2020

2021	2020
276.33	290.11
36.64	86.19
(99.62)	(101.16)
17.03	1.19
230.38	276.33

Note 24 - Compensation, Recompense or Remuneration Liabilities According to the Order of Head of NCPO

Compensation, Recompense or remuneration Liabilities according to the Order of Head of NCPO as of December 31, 2020, 5,514.34 million baht, were the borrowed money from the BTFP for operations under the Order of NCPO No. 4/2019 on Measures for Resolving on Broadcasting and Telecommunication Business Operation, by settling compensation, recompense or remuneration to the operators affected by the spectrum refarming.

Note 25 - Other Current Liabilities

Total Other Current Liabilities	
Other Current Liabilities	
Revenue Department Payable	
Accrued Withholding Tax	
Accrued Expenses	

2021	2020
404.08	1,136.95
4.26	15.42
491.71	960.53
13.88	31.00
913.93	2,143.90

Note 26 - Deferred Revenue from Spectrum Refarming to the BTFP

The deferred revenue from spectrum refarming to the BTFP as of December 31, 2021 and 2020, in a total of 27,174.01 million baht, was the money to be remitted to the BTFP, according to the spectrum refarming ratio, in order to reallocate such spectrum under the Notification of the NBTC on Criteria and Procedures for Spectrum Licensing for International Mobile Telecommunications Service in the Frequency Band of 700 MHz, 1800 MHz, 2600 MHz, and 26 GHz. The BTFP shall disburse the fund to those affected by spectrum refarming as compensation, recompense or remuneration, according to the Act on the Organization, B.E. 2553 (2010) and its amendment.

Note 27 - Receivable under Provisional Measure

Receivable under the provisional measure as of December 31, 2021 and 2020 were 603.81 and 603.81 million baht. It was the revenue from service provision on behalf of the state in 2019, in a total of 603.81 million baht, deriving from the remittance of minimum income from mobile service provision on the spectrum bands of 1800 MHz and 850 MHz during the consumer protection period, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013). According to Section 7 of the Notification, it assigns the service providers to be the payees of the service provision revenue on behalf of the state during the protection period, by separating the receipt account, and reporting the income and its profit, deducted by the interconnection cost, the numbering fee, the administrative cost, and other necessary operating costs. Then, the surplus shall be submitted to the Office of the NBTC for auditing before forwarding as public revenue. However, the service provider has disputed the order of the office of the NBTC on the remittance of the said revenue and is in the process of filing a lawsuit with the Administrative Court.

Note 27 - Receivable under Provisional Measure (continued)

Such revenue from service provision on behalf of the state, in a total of 603.81 million baht, has already been remitted as public revenue, shown as remittance to the Ministry of Finance under the provisional measure.

Note 28 - Other Non - Current Liabilities

	2021	2020
Contract Insurance Deposits	59.41	54.81
Performance Insurance	6.68	8.93
Damage Insurance	6.07	0.51
Deposit of the Monument Construction	0.39	0.39
Other Deposits	0.32	0.28
Total Other Non - Current Liabilities	72.87	64.92

Note 29 - Revenue from Spectrum Auction

	2021	2020
Revenue from TV Spectrum Auction	52.81	20.76
Revenue from 700 MHz Spectrum Auction	51,460.00	52,752.00
Revenue from 2600 MHz Spectrum Auction	-	37,433.89
Revenue from 26 GHz Spectrum Auction	8,921.89	2,705.40
Total Revenue from Spectrum Auction	60,434.70	92,912.05

Note 30 - Revenue of State Enterprises under Section 84 Paragraph Three

The revenue of state enterprises under Section 84 Paragraph Three of the year ended December 31, 2021 and 2020, in a total of 9,263.90 and 2,004.55 million baht respectively, were the revenue from spectrum allocation for telecommunications services under the Act on the Organization B.E. 2553 (2010) and its amendment. The Act stipulates that, when the specified period of three years has elapsed since the effective date of the Act, the state enterprise revenue derived from the licensing, concession, or contracts, according to Paragraph Two, under the law regarding private sector participation with the state undertakings whether the undertaking is in whole or in part, shall be deducted by the operating expenses. The surplus shall be remitted to the Office of the NBTC. Accordingly, the Office of the NBTC shall remit such revenue as public revenue.

Note 31 - Revenue from Licenses and Licensing Fee

	2021	2020
Revenue from Radiocommunications Remunerations	294.92	128.36
Revenue from Licensing Fees under Radiocommunications Act	-	208.10
Revenue from Telecommunications Service Licensing Fees	4,897.85	5,299.81
Revenue from Broadcasting Service Trial Fees	56.70	37.06
Revenue from Television Service Licensing Fees	173.79	218.47
Revenue from Drone Service Licensing Fees	3.96	1.03
Revenue from Satellite Orbit Usage Licensing Fees	6.78	0.01
Revenue from Licensing Fees under Section 70	8.15	8.06
Revenue from Other Fees - Telecommunications	0.05	-
Revenue from Other Fees - Broadcasting	1.32	3.28
Total Revenue from Licenses and Licensing Fees	5,443.52	5,904.18

Note 32 - Revenue from Numbering Fee

Revenue from Beautiful Number Auction
Revenue from Numbering Fee
Total Revenue from Numbering Fee

2021
-
3,261.38
3,261.38

2020
-
3,343.62
3,343.62

Note 33 - Revenue from the Broadcasting and Telecommunications Research and Development Fund for Public Interest (BTFP)

Revenue from the BTFP of the year ended December 31, 2021 and 2020, in a total of 141.80 and 499.01 million baht respectively, were the subsidy for the satellite television signal transmission expenses, remained from closing the account of the BTFP, according to the resolution of the BTFP Committee No. 12/2020 on October 29, 2020. Such revenue shall be remitted as public revenue.

Note 34 - Other Revenues

Revenue from the 1 Por Nor Radio Station Interest Earned Other Revenues Total Other Revenues

2021
25.79
66.11
24.80
116.70

2020
30.07
65.01
63.11
158.19

Note 35 - Compensation, Recompense or Remuneration According to the Order of Head of the National Council for Peace and Order (NCPO)

Compensation from returning TV Digital Licenses

Compensation for MUX Operators

Total Compensation, Recompense or Remuneration According to the

Order of Head of NCPO

2021
_
2,049.71
2,049.71

2020
345.24
589.20
934.44

Note 36 - Expenses of Remittance to the Treasury

Remittance from 900 MHz Spectrum Auction
Remittance from 1800 MHz Spectrum Auction
Remittance from TV Digital Spectrum Auction
Revenue of State Enterprise under Section 84 Paragraph Three
Remittance from Beautiful Number Auction
Remittance from 700 MHz Spectrum Auction
Remittance from 2600 MHz Spectrum Auction
Remittance from 26 GHz Spectrum Auction
Total Expenses of Remittance to the Treasury

2021
4.18
2.99
53.04
9,263.90
0.05
48,118.38
0.01
7,585.48
65,028.03

2020
9.33
1.75
27.48
2,004.55
0.20
31,310.93
6,155.46
2,279.03
41,788.73

Note 37 - Expenses on Spectrum Auction and Refarming

	2021	2020
Allocated Expenses to the BTFP from Retrieved Spectrum Auction	-	30,174.34
Multiband Auction Operating Expenses	13.22	40.17
Satellite Auction Operating Expenses	7.04	-
Total Spectrum Auction Expenses	20.26	30,214.51

Note 38 - Expenses by the Judgment of the Supreme Administrative Court

	2021	2020
Expenses by the Judgment of the Supreme Administrative Court	35.41	771.67
Returning Letters of Guarantee for TV Digital Spectrum Auction	-	1,005.60
Expense of Remittance from TV Digital Spectrum Auction	-	(1,005.60)
Total Expenses by the Judgment of the Supreme Administrative Court	35.41	771.67

The expenses by the judgment of the Supreme Administrative Court of the year ended December 31, 2020 were 771.67 million baht. On February 23, 2021, the court made the judgment for the Undecided Case No. 108/2018 and Decided Case No. 21/2021 (the Administrative Court's former Undecided Case No. 652/2016 and Decided Case No. 452/2018), of a company (Plaintiff) against the NBTC (Defendant 1) and the Office of the NBTC (Defendant 2), by resolving the verdict of the Administrative Court of First Instance, and imposing the Defendant 1 to return the spectrum licensing fee to the plaintiff for 151.73 million baht, and to return the letters of guarantee of the Bangkok Bank Public Company Limited No. 02118140000101 to 02118140000116, dated February 10, 2014, used as retention money to guarantee licensing payment for the 2nd to 6th installments, to the plaintiff. In the case of the letters of guarantee cannot be returned, the defendant must reimburse the plaintiff for the amount as specified in such letters of guarantee. The reimbursement must be completed within 60 days as the cases become final. Furthermore, the partial court fees shall be returned to the plaintiff, while the other requests shall be dismissed.

Note 39 - Human Resources Expenses

	2021	2020
Employee Payroll	1,150.16	1,057.01
Special Remuneration	222.33	191.56
NBTC Remuneration	19.37	19.37
Monthly Remuneration	126.72	143.82
Medical Expenses	158.20	150.54
Welfares	53.08	68.75
Provident Fund	100.45	87.82
Total Human Resources Expenses	1,830.31	1,718.87

Note 40 - Pension

	2021	2020
Pension	152.14	340.60
Medical Expenses	2.41	1.93
Total Pension	154.55	342.53

Note 41 - Remuneration

	2021	2020
Meeting Allowance	31.08	32.13
Other Remunerations	-	-
Total Remuneration	31.08	32.13

Note 42 - General and Administrative Expenses

	2021	2020
Domestic Travel Expenses	12.19	29.83
Rental Fees	150.96	144.83
Maintenance Fees	314.06	314.29
Service Fees	157.13	178.96
Entertainment	2.73	3.26
Formality Fees	10.69	13.61
Taxes and Charges	17.73	16.82
Training Costs	5.05	26.47
Public Relations Expenses	118.47	176.35
Meeting Administrative Expenses	16.38	23.46
Radiocommunications Calibration Expenses	1.96	7.92
Consultant Fee	221.95	178.41
Money for Donation and Charity	0.04	0.09
Miscellaneous	4.06	0.84
International Travel Expenses	0.02	3.09
Total General and Administrative Expenses	1,033.42	1,118.23

Note 43 - Material Expenses

Material Costs	29.05	38.87
Equipment Costs below the Threshold	7.93	9.30
Total Material Expenses	36.98	48.17

Note 44 - Utility Expenses

	2021	2020
Electricity	31.43	34.60
Water Supply	0.98	1.10
Office Telephone Usage	1.99	1.93
Mobile Phone Usage	17.01	19.04
DSTV Service	0.07	0.07
Internet Service	15.85	18.94
Postage	3.08	3.07
Total Utility Expenses	70.41	78.75

Note 45 - Depreciation and Amortization

	2021	2020
Depreciation - Building and Building Improvement	28.94	25.23
Depreciation - Electric Appliance and Radio	213.03	261.27
Depreciation - Computer	41.50	50.76
Depreciation - Vehicle and Transport	5.51	4.58
Depreciation - Office Supply and Others	100.52	23.91
Depreciation - Financial Lease	23.35	90.63
Total Depreciation	412.85	456.38
Amortization - Computer Program	197.94	186.33
Total Amortization	197.94	186.33
Total Depreciation and Amortization	610.79	642.71

Note 46 – Financial Support for Education, Research and Development in Broadcasting and Telecommunications Businesses

	2021	2020
Financial Support for Education, Research and Development	212.98	919.91
Education Fund Expenses	0.85	4.68
Total Financial Support for Education, Research and Development in		
Broadcasting and Telecommunications Businesses	213.83	924.59

Note 47 - Miscellaneous

Losses from Asset Disposal	7.14	8.98
Losses (Gain) from Termination of Financial Lease	0.91	2.37
Doubtful Accounts	0.03	62.18
Total Miscellaneous	8.08	73.53

Note 48 - Dispute and Litigation

1. The significant disputes and litigations, having the Office of the NBTC as the plaintiff, with the total monetary value claims of 5,716.55 million baht, consist of the following cases:

1.1 The Office of the NBTC was the plaintiff for the breach of lease of the 98.5 MHz radio station, and claimed for compensation, according to the Undecided Case No. 9278/2015 (Undecided Case No. 4800/2010, Decided Case No. 4067/2011), with the monetary value of 42.63 million baht. Currently, it is in the process of debtor's assets investigation for legal execution.

1.2 The Office of the NBTC was the plaintiff for the breach of lease of the 1 Por Nor radio station, and claimed for compensation, according to the Undecided Case No. 17794/2014 (Undecided Case No. 6024/2009, Decided Case No. 1935/2011), with the monetary value of 63.87 million baht. The Supreme Court has sentenced the defendant to pay compensation, as the debtor has no assets for compulsory performance.

1.3 The Office of the NBTC was the plaintiff for the offense of remitting the revenue from mobile service on the 1800 MHz spectrum during the consumer protection period, as from the effective date of the Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) until the ending date of service provision of mobile phone service in the frequency band of 1800 MHz according to the Undecided Case No. 1228/2016, with the monetary value of 3,637.64 million baht. Also, the Office of the NBTC was the defendant of the Undecided Case No. 2013/2015, 1712/2016, 2392/2024 and 490/2016, which have been consolidated by the Court's order, having the Central Undecided Case No. 2013/2015 as the main case. The case has been adjudicated by the Administrative Court, together with the Undecided Case No. 1441/2016, with the monetary value of 950.56 million baht. Besides, the Office of the NBC was the defendant of the Undecided Case No. 1997/2015 and 2399/2018, which have been consolidated by the Court's order, having the Undecided Case No. 1997/2015 as a main case. The Court has been considering the schedule for the verdict announcement.

1.4 The Office of the NBTC was the plaintiff for the offense of the breach of radiocommunications devices rental contract, according to the Undecided Case No. 2618/2006 (Decided Case No. 646/2007), with the monetary value of 8.18 million baht, which have been in the process of investigating and collecting the debtor's assets.

1.5 The Office of the NBTC was the plaintiff for the offense of overdue payment for annual licensing fees, according to the Undecided Case No. 2730/2019 (Decided Case No. 1550/2020), with the monetary value of 34.77 million baht, which have been in the trial process of the Appeal Court.

1.6 The Office of the NBTC was the plaintiff for the offense of overdue payment for annual licensing fees, according to the Undecided Case No. 2731/2019 (Decided Case No. 4952/2019), with the monetary value of 100.52 million baht, which have been in the process of investigating the debtor's assets for legal execution.

1.7 The Office of the NBTC was the litigant of the dispute relating to overdue payment of mobile numbering fee, and increased fee during March 2014 - December 2015, according to the Undecided Case No. 490/2016, with the monetary value of 878.38 million baht. Accordingly, on August 25, 2021, the defendant filed a statement to submit the Central Administrative Court's judgment. The public prosecutor, as an assignee of the litigant, has issued the formal note dated September 10, 2020, to submit the statement.

- 2. The significant disputes and litigations, having the Office of the NBTC as the defendant, with the total monetary value claims of 92,796.06 million baht, consist of the following cases:
- 2.1 The Office of the NBTC was the defendant for the administrative contract dispute, according to the Undecided Case No. 701/2017 (Undecided Case No. 1370/2015, Decided Case No. 1911/2017), with the monetary value of 9.32 million baht, which have been in the trial process of the Supreme Administrative Court.
- 2.2 The Office of the NBTC was the defendant for the offense of prescribing the administrative fine of 80,000.00 baht per day, as the Office has not collected the consumer data regarding advance mobile service tariff collection, considered as infraction of Section 38 and 96 of the Notification of the National Telecommunications Commission (NTC) on Criteria on Telecommunications Numbering Allocation and Management B.E. 2551 (2008), according to the Undecided Case No. 1607-1608/2015 (Undecided Case No. 1859/2011, 3117/2012, Decided Case No. 2579-2580/2015), with the monetary value of 94.56 million baht. Accordingly, the judgment has been filed on November 1, 2021.
- 2.3 The Office of the NBTC was the defendant for the offense of prescribing the administrative fine of 100,000.00 baht per day, as the plaintiff has defined the mobile service terms regarding advance mobile service tariff collection. Such act was considered as infraction of Section 11 of the Notification of the NTC on Standards of Telecommunications Service Contract B.E. 2549 (2006), according to the Undecided Case No. 173/2017 (Undecided Case No. 75/2013, Decided Case No. 1071/2017), with the monetary value of 24.40 million baht. In this case, the Supreme Administrative Court did not conduct the trial. If a party requests a court trial, it shall deem the date of November 30, 2021 as the first day of trial, according to the Undecided Case No. 660/2016 (Undecided Case No. 56/2013, Decided Case No. 717/2016), with the monetary value of 24.00 million baht, which the court set the date of March 31, 2020 as the final day of fact-finding, as well as the Undecided Case No. 1720/2016 (Undecided Case No. 55/2013, Decided Case No. 2168/2016), with the monetary value of 23.30 million baht, which the court scheduled the first day of trial on September 29, 2020 and no court sitting needed. Accordingly, the Supreme Administrative Court has been scheduling the appointment for the verdict announcement.

2.4 The Office of the NBTC was the defendant for the offense of prescribing the administrative fine of 140,000.00 baht per day by the Secretary-General of the NBTC, according to the resolution of the NTC No.13/2015 on June 30, 2015, and the verdict of the Undecided Case No. 100/2018 (Undecided Case No. 1927/2015, Decided Case No. 510/2018), with the monetary value of 58.94 million baht, which the court set the date of July 7, 2020 as the final day of fact-finding. Also, the Court has considered the Undecided Case No. 53/2019 (Undecided Case No. 1933/2015 and Decided Case No. 2464/2018), with the monetary value of 62.72 million baht, which filing the appeal of 4 defendants on October 11, and October 15, 2019. The Court scheduled the final day of fact-finding on August 11, 2020.

2.5 The Office of the NBTC was the defendant for the infringement of the administrative agency or government official, by prescribing the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), and the Notification of the NBTC on Provisional Consumer Protection in Case of Termination of Licensing, Concession under the NCPO Order No. 94/2014 on Suspension of Operation under Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services Laws. The plaintiff required the defendant to pay compensation for 8,577.62 million baht with a 7.5 percent per annum interest rate, according to the Undecided Case No. 1651/2015, which had been in the process of fact-finding. The defendant filed the objection on the fact clarification petition and indictment amendment on June 30, 2020, and July 2, 2020. The Administrative Court has scheduled the first day of trial on January 28, 2022.

2.6 The Office of the NBTC was the defendant for the offense of claim for damages occurred from operation under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), as the expenses were higher than the revenue of the plaintiff, and refund request for the paid-up numbering fee, for 190.97 million baht, according to the Undecided Case No. 2013/2015, with the monetary value of 16,265.06 million baht with a 7.5 percent per annum interest rate. The Administrative Court rendered the order to consolidate the following cases; Undecided Case No. 1712/2016, 2392/2018, 490/2016, and 1228/2016, having the Undecided Case No. 2013/2015 as the main case. It is in the process of the clarification preparation.

2.7 The Office of the NBTC was the defendant for the offense of imposing an order to remit the revenue from service provision under the Provisional Measures on Consumer Protection, according to the Undecided Case No. 1997/2015, with the monetary value of 627.64 million baht. The Court scheduled the first day of trial on December 24, 2021.

2.8 The Office of the NBTC was the defendant for the offense of imposing an order for the plaintiff to pay the administrative fine of 210,000.00 baht per day, until the plaintiff submitted the completed account separation report of 2012, under the Notification of the NBTC on Criteria and Procedures for Account Separation Report of Telecommunications Service, according to the Undecided Case No. 215/2018 (Undecided Case No. 59/2016, Decided Case No. 1517/2018), with the monetary value of 22.89 million baht. The verdict was resolved on April 11, 2019, and the Supreme Administrative Court scheduled the final day of fact-finding on June 16, 2020.

2.9 The Office of the NBTC was the defendant for the dispute over the revenue and expenses in the provisional consumer protection period, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), and the Notification of the NBTC on Provisional Consumer Protection in Case of Termination of Licensing, Concession under the NCPO Order No. 94/2014 on Suspension of Operation under Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services Laws, according to the Undecided Case No. 741/2016, with the monetary value of 1,881.45 million baht with a 7.5 percent per annum interest rate. The Office has filed an objection on the petition to amend the indictment, and the request appended to the plaint of the Defendant 1, Defendant 2, and Defendant 3 on July 14, 2020.

2.10 The Office of the NBTC was the defendant for the dispute over unlawful act of the administrative agency or government official (the order imposed the party to pay the special numbering fee unlawfully), according to the Undecided Case No. 123/2015 (Undecided Case No. 397/2011, Decided Case No. 2112/2015), with the monetary value of 656.51 million baht. The Supreme Administrative Court has scheduled the first day of trial on January 26, 2021. According to the Legal Telecommunications Bureau's practices, no court sitting needed for an uncomplicated summon. Currently, it is in the process of scheduling the verdict hearing, and preparing the power of attorney.

2.11 The Office of the NBTC was the defendant for the dispute over unlawful act and infringement of the administrative agency or government official (request for revoking the resolution of the NBTC No. 8/2010 on April 2, 2010, and revoking the administrative fine of 166,666.67 baht per day), according to the Undecided Case No. 894/2014 (Administrative Case No. 1113/2010, Decided Case No. 1177/2014), with the monetary value of 13.50 million baht. The Court scheduled the final day of fact-finding on April 28, 2020.

2.12 The Office of the NBTC was the defendant for imposing the administrative fine of 20,000.00 baht per day, as the plaintiff have not made the telecommunications interconnection contract, which regarded as the infringement of Section 26 and 64 of the Telecommunications Act B.E. 2544 (2001), according to the Undecided Case No. 1065/2012 (Undecided Case No. 1033/2010, Decided Case No. 1178/2012), with the monetary value of 59.72 million baht. The Court scheduled the final day of fact-finding on November 5, 2020. It is in the process of interlocutory relief consideration.

2.13 The Office of the NBTC was the defendant for the offense of telecommunications equipment and network lease in the provisional consumer protection period, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), according to the Undecided Case No. 918/2015, with the monetary value of 5,365.84 million baht with a 7.5 percent per annum interest rate, which filing the objection for indictment amendment and the request appended to the plaint of the Defendant 1 on June 30, 2020, and of the Defendant 2 and Defendant 3 on July 3, 2020. The Central Administrative Court scheduled the first day of trial on January 28, 2022.

2.14 The Office of the NBTC was the defendant for the offense of the resolution of the NTC No. 32/2015 on December 2, 2015 for imposing the Telecommunications Type 2 with having own network, and Type 3 licensees to be responsible for provision of Universal Service Obligations (USO) as follows:

- According to the Undecided Case No. 161/2018, the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The defendant filed the additional pleadings on February 22 and 25, 2019.
- According to the Undecided Case No. 174/2018, the defendant reimbursed and submitted its clarification on November 30, 2021.
- According to the Undecided Case No. 175/2018, the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The defendants submitted the clarifications to the Central Administrative Court on December 1, 2021.
- According to the Undecided Case No. 176/2018, the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The defendant submitted the clarifications on November 29, 2021.
- According to the Undecided Case No. 270/2018, the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The case has been in the trial process of the Central Administrative Court.
- According to the Undecided Case No. 6/2021 (Undecided Case No. 183/2021, Decided Case No. 1790/2020), the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The resolving verdict was sent by post on August 23, 2020.
- According to the Undecided Case No. 7/2021 (Undecided Case No. 181/2018, Decided Case No. 1788/2020), the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The resolving verdict was sent by post on August 25, 2020.
- According to the Undecided Case No. 11/2021 (Undecided Case No. 182/2018, Decided Case No. 1789/2020), the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The resolving verdict was sent on September 20, 2021.
- According to the Undecided Case No. 52/2021 (Undecided Case No. 119/2018, Decided Case No. 1788/2020), the monetary value was a 4 percent of revenue from telecommunications business operation (during January 1, 2011 May 30, 2012), together with the extra money of outstanding debts amount multiplied by the MLR+2 loan interest. The resolving verdict was sent by post on February 26, 2021.

2.15 The Office of the NBTC was the defendant for the offense of the request for remittance of mobile service provision revenue in the 900 MHz spectrum band, during the provisional consumer protection period under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) and its amendment, according to the Undecided Case No. 175 - 176/2020 (Undecided Case No. 661/2017, 736/2017, Decided Case No. 802 - 803/2020), with the monetary value of 7, 221.00 million baht. Currently, it is in the trial process of the Supreme Administrative Court.

2.16 The Office of the NBTC was the defendant for the offense of having the resolution and/or order to pay the administrative fine of 1,239,538.88 baht per day, which regarded as the infringement of the Notification of the NTC on Mobile Number Portability (MNP) Porting Process Manual and Conditions, according to the Undecided Case No. 1361/2017, with the monetary value of 21.07 million baht. The additional pleadings were filed on November 15, 2018. The Administrative Court rendered the order to consolidate with the Undecided Case No. 1995/2010, having the Undecided Case No. 1361/2017 as the main case.

2.17 The Office of the NBTC was the defendant for the offense of having the resolution and/or order to pay the administrative fine of 169,244.00 baht per day, which regarded as the infringement of the Notification of the NTC on Mobile Number Portability (MNP) Porting Process Manual and Conditions, according to the Undecided Case No. 1370/2017, with the monetary value of 7.33 million baht. The additional pleadings have been filed on April 30, 2019.

2.18 The Office of the NBTC was the defendant for the offense of having the resolution and/or order to pay the administrative fine of 5,400,591.64 Baht per day, which regarded as the infringement of the Notification of the NTC on Mobile Number Portability (MNP) Porting Process Manual and Conditions, according to the Undecided Case No. 306/2020 (1283/2015), and the Undecided Case No. 307/2020 (1357/2020), with the monetary value of 221.42 million baht. The resolving verdict was filed on May 12, 2021.

2.19 The Office of the NBTC was the defendant for breach of duty, or delay in digital television transition, according to the Undecided Case No. 1539/2015 (Decided Case No. 1884/2019), with the monetary value of 1,875.86 million baht. Currently, it is in the trial process of the Administrative Court.

2.20 The Office of the NBTC was the defendant for imposing the order to revoke the television business license, according to the Undecided Case No. 1163/2015 (159/2019), with the monetary value of 15.00 million baht. Currently, it is in the trial process of the Administrative Court.

2.21 The Office of the NBTC was the defendant for the offense of damage claims, occurred by operation under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) and its amendment, during November 1, 2015 - December 3, 2015, according to the Undecided Case No. 1712/2016, with the monetary value of 709.65 million baht. The Administrative Court rendered the order to consolidate with the Undecided Case No. 2013/2015, 2392/2018, 490/2016, and 1228/2016, having the Undecided Case No. 2013/2015as the main case. Currently, it is the process of clarification preparation.

2.22 The Office of the NBTC was the defendant for the dispute over the revocation request of the NBTC's resolution relating to operational fee payment for trial radio renewal, according to the Undecided Case No. 195/2019, with the monetary value of 42.59 million baht. Currently, it is in the trial process of the Central Administrative Court.

2.23 The Office of the NBTC was the defendant for the dispute over the resolution of the NBTC No. 20/2018 on October 31, 2018, which approving the criteria and consideration result of network usage fee of the plaintiff in mobile service provision in the 900 MHz spectrum band, during the provisional consumer protection period, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E.2556 (2013), according to the Undecided Case No. 1775/2019, with the monetary value of 5,564.87 million baht. The Central Administrative Court received the defendant's testimony on October 25, 2021.

2.24 The Office of the NBTC was the defendant for the dispute over the revocation request of the NBTC's resolution relating to the remittance of mobile service provision revenue in the 1800 MHz spectrum band, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), according to the Undecided Case No. 2399/2018, with the monetary value of 241.88 million baht. The defendant submitted the testimony on November 6, 2019. The Administrative Court rendered the order to consolidate the Undecided Case No. 1997/2015 and 2399/2018, having the Undecided Case No. 1997/2015 as the main case. Also, the Court scheduled the first day of trial on December 24, 2021.

2.25 The Office of the NBTC was the defendant for the dispute over the resolution of the NBTC No. 20/2019 on November 26, 2019, which approving the criteria and audit report of remitted public revenue from service provision during the provisional consumer protection period, profit calculation guidelines, and the remittance of mobile service provision revenue, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) and its amendment, and the NBTC's resolution No. 5/2020 on March 25, 2020, which prescribing the operators to remit additional revenue from the mobile service provision, as well as the notice of dispute resolution and its amendment, according to the Undecided Case No. 648/2020, with the monetary value of 132.80 million baht. The defendant filed the testimony during March 3 - 4, 2021, and submitted the additional testimony by registered post on January 7, 2022.

2.26 The Office of the NBTC was the defendant for the dispute over Agenda 5.3.6 of the resolution of the NBTC No. 10/2020 on June 10, 2020, regarding the compensation details confirmation of the 2500 - 2690 MHz spectrum refarming from MCOT Public Company Limited. The resolution was regarded as unlawful and unfair determination of the plaintiff's spectrum holding duration, which was 6 years and 5 months, and inappropriate compensation value, which was separated into installments to be in line with the installments of the 2600 MHz spectrum auction payment, according to the Undecided Case No.2239/2020, with the monetary value of 3,235.84 million baht. The Central Administrative Court received the testimony on September 15, 2021.

2.27 The Office of the NBTC was the defendant for the unlawful order/regulation regarding spectrum auction payment and returning letters of guarantee, according to the Undecided Case No. 1942/2019, with the monetary value of 27.00 million baht. Currently, it is in the trial process of the Central Administrative Court.

2.28 The Office of the NBTC was the defendant for the dispute over the revocation request of the NBTC's order, and the Agenda 5.2.5 of the resolution No. 17/2018 on September 5, 2018 prescribing the plaintiff to remit additional revenue from service provision, under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013), for 2,311.97 million baht with its interest. Moreover, the plaint included the revocation request of the Administrative Order according to the NBTC's resolution, and consideration result of the revenue audit working panel and the Office of the NBTC, regarding the revenue and expenses of the plaintiff occurred from the service provision under the Notification of the NBTC on Provisional Measures for Consumer Protection in case of Termination of Licensing, Concession, or Contracts of Mobile Service Provision B.E. 2556 (2013) and its amendment, during November 1, 2015 - December 3, 2015, according to the Undecided Case No. 2392/2018. The Administrative Court rendered the order to consolidate the Undecided Case No. 2013/2015, 1712/2016, 490/2016 and 1228/2016, having the Undecided Case No. 2013/2015 as the main case.

2.29 The Office of the NBTC was the defendant for the dispute over the NBTC's resolution No. 5/2020 on March 25, 2020, and No. 9/2020 on May 17, 2020, regarding the final day of administrative fine in the case that the plaintiff did not comply with the Notification of the NTC on Mobile Number Portability (MNP) Porting Process Manual and Conditions, according to the Undecided Case No. 2212/2020, with the monetary value of 604.87 million baht (the amount included the monetary value of 221.42 million baht from the Undecided Case No. 306/2020 (1283/2015) and 307/2020 (1357/2017)). Currently, it is in the process of additional testimony preparation, due on January 8, 2022. The period extension request has been submitted to the Court.

2.30 The Office of the NBTC was the defendant for the dispute over the Agenda 5.3.6 of the resolution of the NBTC No. 10/2020 on June 10, 2020, regarding the compensation details confirmation of the 2500 - 2690 MHz spectrum refarming, according to the Undecided Case No. 2229/2020, with the monetary value of 15,879.84 million baht with a 7.5 percent per annum interest rate. The announcement was submitted to the Court by post on November 19, 2021.

2.31 The Office of the NBTC was the defendant for the dispute over the Agenda 5.2.15 of the NBTC's resolution No. 5/2020 on March 25, 2020, regarding the remittance of mobile service provision revenue of the 850 MHz and 1800 MHz spectrum band, during the provisional consumer protection period, since the effective date of the provisional measures, according to the Undecided Case No. 642/2021, with the monetary value of 143.71 million baht. The Office of the NBTC submitted the formal note to the Office of the Attorney General on November 22, 2021, requesting for a period extension for 30 days, as from the former due date.

Note 49 - Obligations

Service Contract Obligations

The Office of the NBTC had the service contract obligations for public relations and maintenances, in a total of 148.63 million baht (2020 - 13.24 million baht)

Capital Expenditure Obligations

Non - accrued Contracts

Land, Building and Structure Equipment and Others Total

2021
1,950.85
614.34
2,565.19

2020
2,278.92
455.38
2,734.30

Procurement Contract Obligations and Other Services Obligations

As of December 31, 2021 and 2020, the Office of the NBTC has the obligations from the procurement contracts and other services, which can be categorized by contract period as follows:

Less than 1 year

More than 1 year but not exceeding 5 years

Total

Lease Agreement
Space Rental Fee
Property Rental Fe
Land Lease
Service Agreement
Area Fee
Total Obligations

Lease Agreement
Space Rental Fee
Property Rental Fee
Land Lease
Service Agreement
Area Fee
Total Obligations

2021	2020
562.58	259.42
-	-
562.58	259.42

As at December 31, 2021

Less than 1 Years	1 - 5 Years	Total
36.26	21.07	57.33
20.59	18.18	38.77
9.49	-	9.49
8.45	-	8.45
74.79	39.25	114.04

As at December 31, 2020

3.50
3.12
2.27
6.76
5.65

Note 50 - Statement of Expenditure Budget Status

Statement of Expenditure Budget Status of the Fiscal Year 2021

Item	Net Budget after Transfer Change	Purchase Order/ Contract	Disbursement	Balance
1. Expenditure Budget	5,929.51	1,515.78	3,785.24	628.49
1.1 Operating Expenses of the NBTC and the Office of the				
NBTC	4,427.38	398.72	3,597.44	431.22
1.2 Project Expenses	1,237.52	1,023.10	160.57	53.84
1.3 Central Budget	161.58	23.87	7.53	130.18
1.4 Operating Expenses of the				
Performance Follow-up and				
Evaluation Committee	103.03	70.09	19.70	13.26
2. Allocated Budget to the Fund	1,110.00	-	1,110.00	-
Total	7,039.51	1,515.78	4,895.24	628.49

Statement of Reserved Budget for Overlapping Disbursement (Before the Fiscal Year 2021

Balance
1.70
1.70
288.08
12.90
274.83
-
0.35
289.78

Statement of Expenditure Budget Status of the Fiscal Year 2020

ltem	Net Budget after Transferred Change	Purchase Order/ Contract	Disbursement	Balance
1. Expenditure Budget	5,713.33	1,168.13	4,121.59	423.61
1.1 Operating Expenses of the				
NBTC and the Office of the				
NBTC	3,763.92	329.02	3,164.88	270.02
1.2 Project Expenses	1,236.64	767.68	388.84	80.12
1.3 Central Budget	609.29	0.84	537.65	70.80
1.4 Operating Expenses of the				
Performance Follow-up and				
Evaluation Committee	103.48	70.59	30.22	2.67
2. Allocated Budget to the Fund	835.00	-	835.00	-
Total	6,548.33	1,168.13	4,956.59	423.61

Note 51 - Subsequent Events

According to the 12th Senate Meeting (2nd General Ordinary Session), on December 20, 2021, the senate has voted for approving the appointment of persons to hold a position of National Broadcasting and Telecommunications Commissioners by secret balloting method, under Section 69 Paragraph 1(3). The result was approved by the votes of not less than half of the total existing senators. Accordingly, on January 14, 2021, the five approved candidates for holding the NBTC commissioners had chosen the NBTC Chairman. The President of the Senate has submitted the formal note to inform the Prime Minister to present the list of names to His Majesty the King for appointment, in compliance with Section 16 Paragraph Three of the Act on the Organization to Assign Radio Frequency and to Regulate the Broadcasting and Telecommunications Services B.E. 2553 (2010) and its amendment.

Note 52 - Public Revenue Report

The public revenue report is the separated statement, accompanying the financial statement, which is an integral part of the financial statement remarks.

The Office of the National Broadcasting and Telecommunications Commission Public Revenue Statement For the Year Ended December 31, 2021

	2021		2020
Collected Public Revenue			
Public Revenue - Non-Tax Revenue	65,983.38		44,663.52
Total Collected Public Revenue	65,983.38		44,663.52
Subtract Public Revenue Drawn Back from the Treasury	-		-
Public Revenue Allocated by Law	-		-
Total Net Collected Public Revenue	65,983.38		44,663.52
Deferred Public Revenue to the Treasury at the Beginning of the Period	157,934.09		167,740.65
Deferred Public Revenue to the Treasury	(42,398.71)		(53,464.48)
Deferred Public Revenue to the Treasury	181,518.76		158,939.69
Adjusted Deferred Public Revenue to the Treasury	-		(1,005.60)
Net Public Revenue Transaction	181,518.76	:	157,934.09

	2021	2020
Public Revenue - Non-Tax Revenue		
Radiocommunications Service Fee and Violation Fines	-	0.02
Fines	3.48	3.96
Revenue from 900 MHz Spectrum Auction	4.18	9.32
Revenue from 1800 MHz Spectrum Auction	2.99	1.75
Revenue from TV Digital Spectrum Auction	53.04	27.48
Revenue from 700 MHz Spectrum Auction	48,118.38	31,310.93
Revenue from 2600 MHz Spectrum Auction	0.01	6,155.46
Revenue from 26 GHz Spectrum Auction	7,585.48	2,279.03
Revenue from Beautiful Number Auction	0.05	0.20
Revenue of State Enterprises under Section 84 Paragraph Three	9,263.90	2,004.55
Revenue from the 1 Por Nor Radio Station	25.64	27.86
Surplus remitted as Public Revenue of 2019	-	499.01
Surplus remitted as Public Revenue of 2020	-	2,343.95
Surplus remitted as Public Revenue of 2021	926.23	-
Total Public Revenue - Non-Tax Revenue	65,983.38	44,663.52



Internal Audit Report of the Office of the NBTC in the Fiscal Year 2021

According to the Order of the National Broadcasting and Telecommunications Commission (NBTC) No. 2/2564, dated February 19, 2021, the Internal Audit Committee has been appointed, comprising of 5 members as follows:

(1) Admiral Jeerapat Pansakun	Chairman
(2) Miss Siluck Punnoum	Commissioner
(3) Rear Admiral Wonsuree Boonmee	Commissioner
(4) Dr. Anada Pruetti-angkura	Commissioner
(5) Mrs. Supa Yaimuang	Commissioner

The Internal Audit Committee has performed its duties and responsibilities under Section 3 of the Regulation of the National Broadcasting and Telecommunications Commission on Internal Audit B.E. 2554 (2011), without interference from the NBTC, the Office of the NBTC, and any organizations, as well as the Ministry of Finance's Internal Control Standards for Government Agencies B.E. 2561 (2018) and its amendment.

The Internal Audit Committee's performance in 2021 has focused on preventive monitoring and recommendations for improving the efficiency of the regulatory practices, as well as emphasizing on consistently monitoring and follow-up of risks, which might affect the performance of the NBTC and the Office of the NBTC.

Accordingly, the Committee has organized 14 meetings to consider the significant issues as follows:

1. Prescribing and revising the charter of the Internal Audit Committee and the Internal Audit Committee Administration Department, in compliance with the Ministry of Finance's Internal Control Standards for Government Agencies B.E. 2561 (2018) and its amendment, and the organizational situation.

- 2. Monitoring the efficiency and appropriateness of the risk and anti-corruption management, which may affect the office of the NBTC significantly, and conducting sufficiency assessment and following up operations under the risk management plan, as well as offering recommendations for the most efficient risk management.
- 3. Verifying the internal control evaluation of the Office of the NBTC, including the performance evaluation of the Office of the NBTC's monitoring-related bureaus, and offering recommendations for improvement.
- 4. Monitoring the operating systems under efficient regulatory practices, to comply with the NTBC regulations and operational standards, focusing on the target-oriented operations, objective and be in line with the NBTC's policies.
- 5. Verifying the Office of the NBTC's financial statements, by auditing the accounting, and financial statements preparation, which no evidences of incorrect statements against the financial reporting standards have been found.
- 6. Auditing and evaluating the performance of the Office of the NBTC, relating to financial operations, accounting and supply management, and offering recommendations for improvement, as well as monitoring the operations according to the recommendations in the internal audit report of the year ended December 31, 2020.
- 7. Monitoring the operations and assessing the project expenditure of the Office of the NBTC, to ensure that the project operations have complied with the vision, mission, strategic plan and strategy of the office of the NBTC, no evidence of inappropriate conducts against the relevant rules and regulations have been found, as well as offering recommendations for improvement to the most efficient project.

From the operations mentioned above, the Internal Audit Committee concluded that the overall performance of the Office of the NBTC in 2021 was efficient and transparent, in line with good governance, and related regulations and criteria. The budget expenditure was costeffective, and the risk management and internal control were sufficiently and efficiently performed. Moreover, the financial statement preparation has been well-prepared in compliance with the certified accounting standards, as well as the disclosure of the financial statements has been conducted appropriately and reliably.

The Internal Audit Committee offered the regulatory recommendations to the operations and the management straightforwardly by preparing the internal audit report and recommendations to the NBTC for every 180 days period.

Furthermore, the Committee has visited the regional offices of the NBTC to ensure the understanding of internal audit practices, and be informed about the problems and challenges occurring, as well as offering encouragement for regional staff and useful recommendations for operation improvement.

Besides, due to the COVID-19 pandemic, the operating process of the Internal Audit Committee has been transformed by adopting digital technology to work management and coordination, in line with the Office of the NBTC's major policies of 2021 which emphasize on digital transformation in the organization. The Office of the NBTC has also accelerated and consolidated the operations management system, and developed the crucial infrastructure to foster the organization's growth in the digital technology era.

Admiral Whom Vingo

(Jeerapat Pansakun)

Chairman of the Internal Audit Committee



Important Work Plan in 2022

Regulating the satellite sevice for the benefits of the nation and people, continuing from the policy in 2021, which initiating the satellite orbit licensing. The The NBTC and the Office of the NBTC NBTC is responsible for full regulation after the concession contracts ended in 2021. has prescribed policies of 2022 to drive the organization towards success and sustainability in broadcasting, telecommunications, and communication satellite services development, keeping pace with dynamic technological changes, and serving as a key mechanism to drive the economy and society to achieve the sustainable development goal. The key work Preparing licensing and spectrum use plan is categorized into 8 missions as follow: regulations, to support the ligislation of the Royal Decree based on Section 30 of the Act on the Organization (No.3) B.E. 2562 (2019) 4K Television Broadcasting Trials Revising regulations of broadcasting and telecommunications businesses to match the ecosystem of the industries Preparing for spectrum auctions to support the 5G technology development policy Transforming the Office of the NBTC to be fully-digitalized, and maintaining the standard of the Integrity and Transparency Assessment in the AA level Setting up the National Spectrum Monitoring Center Promoting broadband internet access and utilization, and expanding service Coverage to the target groups according to Universal Service Obligations

Expenditure Budget Plan of the Office of the NBTC in 2022

According to the resolution of the NBTC meeting No. 23/2021 on December 8, 2021, the expenditure budget 2022 of the Office of the NBTC has been approved, in a total of 6,765.781 million baht, as necessary for operations under the key missions of the organization, complying with the National Strategy Plan, the National Digital Economy and Society Development Plan

and Policy, and other relevant plans at various levels, including 3 NBTC Master Plans, and The Strategic Plan of the Office of the NBTC as well as the operations under urgent key missions to implement key policies of the government and the NBTC considering the achievement and benefits of the nation and people. Details are shown in Table 46.

Table 46: Expenditure Budget Plan of the Office of the NBTC in 2022

No.	Details	Amount (million baht)
1.	Expenditure Budget of the Office of the NBTC	5,755.781
1.1	Operating Expenses of the NBTC and the Office of the NBTC	3,867.511
	Human Resources Expenses	1,888.486
	General and Administrative Expenses	1,389.188
	Expenses on Lands, Buildings and Equipment	202.192
	Other Expenses	387.645
1.2	Project Expenses	1,447.207
1.3	Central Budget	338.000
1.4	Operating Expenses of the Performance Follow-up and Evaluation Committee	103.063
2.	Allocated Budget to the Funds	1,010.000
2.1	Broadcasting and Telecommunications Research and Development Fund for Public Interest	1,000.000
2.2	Edtech Fund	10.000
	Total (1 - 2)	6,765.781

Source: Strategic and Budget Bureau, Office of the NBTC

The expenditure budget plan 2022 of the Office of the NBTC, in the amount of 5,755.781 million baht, consists of work plans (routine works) and projects excluding the allocated budget to

the fund, sorted by the Strategic Plan of the office of the NBTC (No.2) B.E. 2561 - 2564 (2018 - 2021). Details are shown in Chart 38 and Table 47.



Chart 38: Expenditure Budget Plan 2022 of the Office of the NBTC, Sorted by Strategy

- Strategy 1: Improving the organization to ensure good governance and become a high performance in sustainable fashion, with the allocated budget in total of 3,606.632 million baht. It aims to drive the organization to be sustainably high performance, elevate management process to reach the international standards, and transform to a fully-digitalized organization as well as support the human resource development for excellence, and implementation of organization management plans, including strategic and internal affairs plans, for 2,722.832 million baht, as well as the budget to support 25 projects, for 883.800 million baht.
- Strategy 2: Urging the mobilization of relevant Master Plans to achieve their desirable outcomes in accordance with national development, with an allocated budget in a total of 1,289.605 million baht, divided into the budget to drive the missions regarding spectrum and satellite management, and national communication resources efficient management, as well as regulating broadcasting and telecommunications services in a free and fair manner, for 957.232 million baht, and the budget to support 33 projects, for 332.372 million baht.
- Strategy 3: Strengthening digitalization for sustainable national development, with an allocated budget in a total of 677.625 million baht, divided into the budget to support

research and development in broadcasting and telecommunications services to be sustainable through enhancing the capacity in research and development of broadcasting, television, and telecommunications services for public interest in order to reduce the digital divide and utilize the use of digital, building cybersecurity for people, and initiating collaboration with relevant sectors, for 452.304 million baht, and the budget to support 17 projects for 225.321 million baht.

• Strategy 4: Enhancing strategic management, with an allocated budget in a total of 181.918 million baht, divided into the budget to drive the mission regarding human resource development in policy and strategic analysis fields, the mission to support the operations of the Internal Audit Committee, and the Performance Follow-up and Evaluation Committee, and the mission to support operation of strategic management of the Office of the NBTC, as well as building mutual awareness of key success factors in strategic management, in order to formulate integration to drive strategies into systematic national development, which will benefit the nation by developing the follow-up and evaluation system, creating strategic work cultures, and upskilling the human resource in policy and strategic analysis fields to expertise, for 176.204 million baht, and the budget to support 2 projects for 5.714 million baht.

Table 47: Project Budget Support 2022, Sorted by Strategy

Unil: million baht

No.	Details	Budget
Stra	egy 1: Improving the organization to ensure good governance and become a high performance in su	of 2022 Istainable
	fashion for 25 Projects	
1	Sai Yai Sai Lom Project (Early Retirement) of the fiscal year 2022	87.500
	Total Budget 87.500	
_	Proposed Budget 2022 87.500	
2	Project for the construction of new office building of the Office of the NBTC	420.851
	Total Budget 2,743.000 Appropriation Budget 2019 685.750	
	Appropriation Budget 2020 534.133	
	Appropriation Budget 2021 681.324	
	Proposed Budget 2022 420.851	
	Committed Budget to 2023 420.942	
3	Project on Construction Design for BTS Skywalk Connecting Nonthaburi Civic Center Station to the new office building of the Office of the NBTC	3.600
	Total Budget 3.600	
	Proposed Budget 2022 3.600	
4	Project on Space Design for the Office of the NBTC Region 1 on Chaengwattana Road	14.665
	Total Budget 14.665	
_	Proposed Budget 2022 14.665 Decide to a LT Information Contains and Building According to the group of the	1/5 696
5	Project on IT Infrastructure System and Building Assembly System of the new office building Office of the NBTC	145.676
	Total Budget 582.705	
	Proposed Budget 2022 145.676 Committed Budget to 2023 437.029	
6	Project on develop the advance payment and Monitoring the medical expenses reimbursement system of the Office of the NBTC	7.495
	Total Budget 10.707	
	Appropriation Budget 2021 3.212	
	Proposed Budget 2022 7.495	
7	NBTC Service Portal Project	10.721
	Total Budget 15.316	
	Appropriation Budget 2021 4.595 Proposed Budget 2022	
8	Proposed Budget 2022 Project to Improve the efficiency of electronic documentation system of the Office of the NBTC	12.013
0	Total Budget 17.161	12.013
	Appropriation Budget 2021 5.148	
	Proposed Budget 2022 12.013	
9	NBTC Employee Portal Development Project	4.430
	Total Budget 14.765	
	Proposed Budget 2022 4.430	
	Committed Budget to 2023 10.335	
10	Single Point Data Searching System Development Project	13.000
	Total Budget 20.000	
	Appropriation Budget 2021 7,000 Proposed Budget 2022	
	Proposed Budget 2022 13.000	

No.	Details		Budget of 2022
11	Project on NBTC Scholarship Program 2022 for NBTC officials (Overseas Master Degree) Total Budget Proposed Budget 2022 Committed Budget to 2023 Committed Budget to 2024	7.500 3.000 3.000 1.500	3.000
12	Part-Time Research Project 2022 for NBTC officials Total Budget Proposed Budget 2022	0.550 0.550	0.550
13	Project on Cyber Security of the Office of the NBTC website Total Budget Appropriation Budget 2020 Appropriation Budget 2021 Proposed Budget 2022 Committed Budget to 2023	17.827 2.828 4.600 6.000 4.399	6.000
14	Project on Improve Financial and Accounting System, Revenue Administrative System, Asset and Procurement Management System Total Budget Appropriation Budget 2020 Appropriation Budget 2021 Proposed Budget 2022	29.746 11.942 10.449 7.355	7.355
15	Project on System Development for Personal Data Protection Act B.E. 2562 (2018) (PDPA) Compliance Total Budget Appropriation Budget 2021 Proposed Budget 2022	8.065 4.032 4.033	4.033
16	Project on Electric Durable Article Procurement of the Office of the NBTC for 7 Items Total Budget Proposed Budget 2022	31.824 31.824	31.824
17	Project on Computer Network System Improvement of the Office of the NBTC for 1 System Total Budget Proposed Budget 2022	8.471 8.471	8.471
18	Single Sign-On Management System Development Project Total Budget Proposed Budget 2022 Committed Budget to 2023	33.676 21.889 11.787	21.889
19	Centralized Management Multi Platform Development and Laboratory Improvement Project Total Budget Proposed Budget 2022	10.220 10.220	10.220
20	Construction and Building Assembly Project of the office of the NBTC Sub-region Office (Roi-Et) Total Budget Proposed Budget 2022 Committed Budget to 2023	69.027 20.708 48.319	20.708
21	Project on Durable Article Procurement and Installation for the Auditorium of the Office of the NBTC Region 2 for 3 Items Total Budget Proposed Budget 2022	9.059 9.059	9.059

No.	Details	Budget of 2022
22	Security System Integration Project of the Office of the NBTC Region 2	4.645
	Total Budget 6.636	
	Proposed Budget 2022 4.645	
	Committed Budget to 2023 1.991	
23	Construction Project of the Office of the NBTC, Region 3	10.230
	Total Budget 54.600	
	Appropriation Budget 2020 19.800	
	Appropriation Budget 2021 24.570	
	Proposed Budget 2022 10.230	
24	Project on landscape Construction and building Assembly of the Office of the NBTC Sub-region Office (Chiang Rai)	20.740
	Total Budget 30.500	
	Appropriation Budget 2021 -	
	Proposed Budget 2022 20.740	
	Committed Budget to 2023 9.760	
25	Landscape improvment and building Assembly Project	5.125
	Total Budget 12.400	
	Appropriation Budget 2021 7.275	
	Proposed Budget 2022 5.125	
Stra	tegy 2: Urging the mobilization of relevant Master Plan to achieve their desirable outcome in accorda	nce with
	national development for 33 Projects	
1	Project to Study trend and Satellite Services model and Thailand's Regulatory Guideline	2.282
	Total Budget 4.565	
	Appropriation Budget 2021 2.283	
	Proposed Budget 2022 2.282	
2	Project on illegal content detection system of Regional radio and television broadcasting	9.495
	Total Budget 94.950	
	Appropriation Budget 2019 19.002	
	Appropriation Budget 2020 38.004	
	Appropriation Budget 2021 28.449	
	Proposed Budget 2022 9.495	
3	Project on Vehicle Provision for monitoring and Searching Radio Signal for 26 items	78.835
	Total Budget 226.655	
	Appropriation Budget 2021 147.820	
	Proposed Budget 2022 78.835	
4	Project on Handheld Radio Frequency Analyzer Provision for Real-Time Bandwidth 100 MHz, 10 MHz - 42 GHz Bandwidth with equipment for 4 Sets	12.114
	Total Budget 14.252	
	Appropriation Budget 2021 2.138	
	Proposed Budget 2022 12.114	
5	Project on Frequency Scanner and Transmission Station Searching Device Provision for 4 Sets	21.000
	Total Budget 28.000	
	Appropriation Budget 2021 7.000	
	Proposed Budget 2022 21.000	

No.	Details	Budget of 2022
6	Project on Antenna Set Provision for Handheld Radio Frequency Analyzer for 5 kHz - 26.5 GHz for 25 Sets Total Budget Appropriation Budget 2021 Proposed Budget 2022 36.008	36.008
7	Project on Spectrum Monitoring System Integration and Long - Distance Station Control Total Budget 8.925 Appropriation Budget 2021 - Proposed Budget 2022 7.586 Committed Budget to 2023 1.339	7.586
8	Project to Study on frequency propagation Impact on Railway signaling system of rail transport for regulatory purposes of the Office of the NBTC Total Budget Appropriation Budget 2021 Proposed Budget 2022 Committed Budget to 2023 5.504	3.670
9	Project to supply mobile licensing vehicle development of the Office of the NBTC Region 3 for 1 items Total Budget Appropriation Budget 2021 Proposed Budget 2022 Committed Budget to 2023 12.750	12.750
10	Prototype Development Project on Radio Frequency Monitoring and Management System of the National Spectrum Monitoring Center Total Budget Proposed Budget 2022 4.258 Committed Budget to 2023 5.203	4.258
11	Project on Radio Broadcasting Analyzing and Transcription System Development Total Budget Proposed Budget 2022 Committed Budget to 2023 5.226	4.276
12	Project on R&S control Center Nester BSM for fix Station Monitoring (5 sensors) Total Budget 30.452 Appropriation Budget 2021 - Proposed Budget 2022 7.672 Committed Budget to 2023 22.780	7.672
13	Project on Prototype Development of NBTC Spectrum Monitoring Regional Center Total Budget Proposed Budget 2022 Committed Budget to 2023 3.406	6.326
14	Project on Spectrum Propagation Monitoring Station and Regulations of the Office of the NBTC Region 4 Total Budget Proposed Budget 2022 4.500 Committed Budget to 2023 5.440	4.500

No.	Details	Budget of 2022
15	Broadcasting Monitoring and Regulatory System Development Project	6.248
	Total Budget 6.248	
	Proposed Budget 2022 6.248	
16	Project on Live Broadcasting Centers Improvement and Sport News and competition important events of Thailand	
	Total Budget 76.098	
	Proposed Budget 2022 38.049	
	Committed Budget to 2023 38.049	
17	Project on Research and Analyze Data of Digital Platform service providers in Thailand	10.029
	Total Budget 14.328	
	Appropriation Budget 2021 4.299	
	Proposed Budget 2022 10.029	
18	Prototype Project on Upskilling Human Resources in Broadcasting Industry	1.267
	Total Budget 1.267	
	Proposed Budget 2022 1.267	
19	Project on Radiocommunication e-Licensing development for Broadcasting Service (RBS)	3.697
	Total Budget 3.697	
	Proposed Budget 2022 3.697	
20	Project on Transition Support System Development for Licensing in Broadcasting Business	7.000
	Total Budget 9.999	
	Proposed Budget 2022 7.000	
	Committed Budget to 2023 2.999	
21	Project to Study Guidelines for Thailand's Television Broadcasting Regulation Development to Match	3.835
	the Changing Ecosysterm of the Industry	
	Total Budget 5.900	
	Proposed Budget 2022 3.835	
	Committed Budget to 2023 2.065	
22	Project on "Real-Time Monitoring" Spurious Emission Measurement System Development	6.313
	Total Budget 6.313	
	Proposed Budget 2022 6.313	
23	Application Software Development Project	0.410
	Total Budget 0.410	
	Proposed Budget 2022 0.410	
24	Project on FM Transmitter Technical Standard Testing Laboratories in the NBTC Regional Offices and Central	1.139
	Laboratory Improvement	
	Total Budget 1.139	
	Proposed Budget 2022 1.139	
25	Project on Right of way System Development for operation Geographic information of communication networks data base	
	Total Budget 8.983	
	Appropriation Budget 2021 4.491	
	Proposed Budget 2022 4.492	

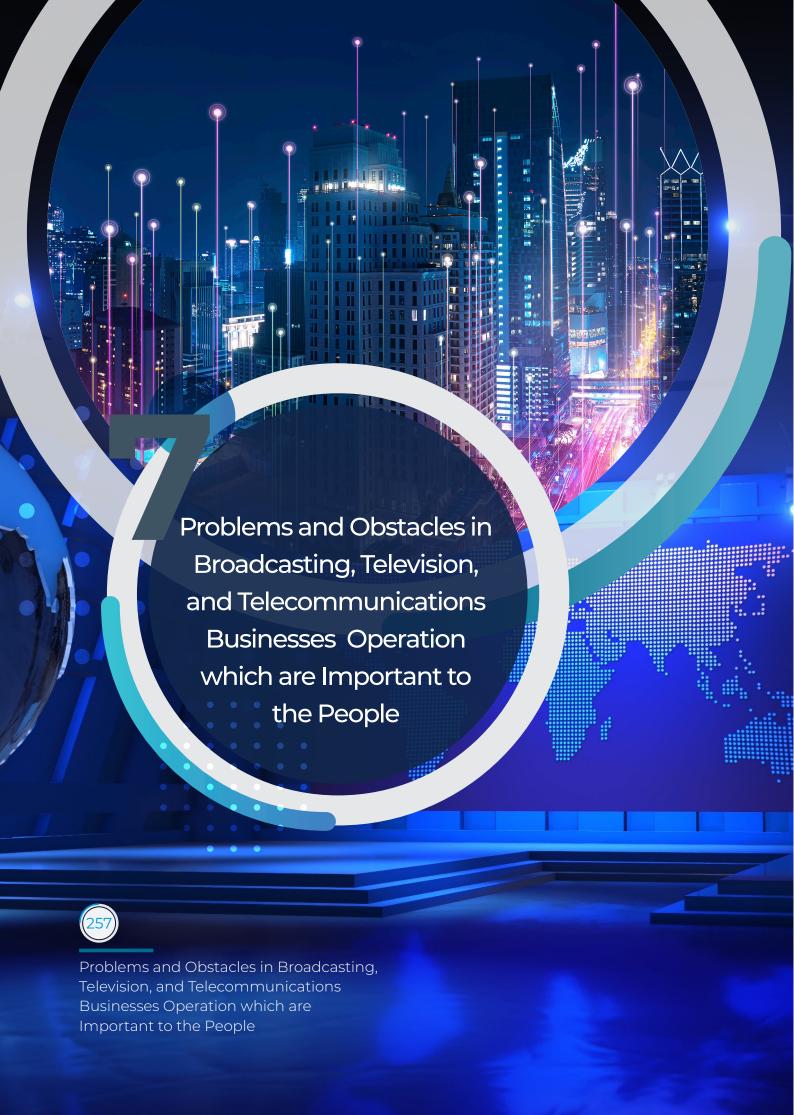
No.	Details	Budget of 2022
26	Project on Mobile Service Consumer Behavior Survey via Online Application (3 rd Year)	3.966
	Total Budget 8.813	
	Proposed Budget 2022 3.966	
	Committed Budget to 2023 4.847	
27	Bangkok's Communication Lines Survey and Database Project	6.143
	Total Budget 20.477	
	Proposed Budget 2022 6.143	
	Committed Budget to 2023 14.334	
28	Communications Lines Management System Project for People's Safety (P-Safe)	2.073
	Total Budget 4.607	
	Proposed Budget 2022 2.073	
	Committed Budget to 2023 2.534	
29	Searching and Arresting System Development Project	5.699
	Total Budget 18.997	
	Proposed Budget 2022 5.699	
	Committed Budget to 2023 13.298	
30	Project on Online Media Preparation for Creating Understandings of the National Institutions under Memorandum of Understandings between the Office of the NBTC and the National Intelligence Agency in 2022	10.000
	Total Budget	
	Proposed Budget 2022	
31	IT System Development Project for Improving the "Any Registration" System	1.332
	Total Budget 8.880	
	Proposed Budget 2022	
	Committed Budget to 2023 7.548	
32	Project on Telecommunications Interconnections Database System Development	2.910
	Total Budget 9.700	
	Proposed Budget 2022 2.910	
	Committed Budget to 2023 6.790	
33	Project on Telecommunications Service Database and Analytical Report System Development	7.000
	Total Budget 10.000	
	Proposed Budget 2022 7.000	
	Committed Budget to 2023 3.000	



No.	Details	Budget of 2022
Strat	egy 3: Strengthening digitalization for sustainable national development for 17 Projects	
1	Project on International Telecommunication Union (ITU) Council Member Election Application	20.548
	Total Budget 20.548	
	Proposed Budget 2022 20.548	
2	BTFP Project Management System Development Project (Phase 2)	1.978
	Total Budget 1.978	
	Proposed Budget 2022 1.978	
3	Information Technolgy System and Network Security Monitoring Project	0.578
	Total Budget 2.888	
	Appropriation Budget 2021 2.310	
	Proposed Budget 2022 0.578	
4	Project on enhancing Online Data Monitoring System officiency	10.000
	Total Budget 20.000	
	Proposed Budget 2022 10.000	
	Committed Budget to 2023 10.000	
5	Project to enhancing the efficiency of Central Database Management and Data Visualization	4.996
	Total Budget 4.996	
	Proposed Budget 2022 4.996	
6	Omni-Channel Contact Center Project	6.812
	Total Budget 17.030	
	Proposed Budget 2022 6.812	
	Committed Budget to 2023 10.218	
7	Data-Driven Organization Preparation Project	5.818
	Total Budget 10.579	
	Proposed Budget 2022 5.818	
	Committed Budget to 2023 4.761	
8	Project on Illegal Content Detection System for Television Broadcasting for 1 System	18.500
	Total Budget 18.500	
	Proposed Budget 2022 18.500	
9	Cooperation Project on Court Circular Production and Royal Ceremony Live Broadcasting	15.000
	Total Budget 15.000	
	Proposed Budget 2022 15.000	
10	Cooperation Project on Live Broadcasting Center Management for the Asian Games 2022 Broadcasting	17.500
	Total Budget 17.500	
	Proposed Budget 2022 17.500	
11	Project to Survey and Storage of Inaccessible Terrestrial Television Signal Area Data for Universal Ser	
	Total Budget 10.000	
	Proposed Budget 2022 10.000	
12	"New Social Media and Social Movements in Thailand" Study Project Studon Human Resources Development in Media Industry	4.796
	Total Budget 4.796	
	Proposed Budget 2022 4.796	

No.	Details	Budget of 2022
13	Project on illegal content detection system for Resional of radio and television broadcasting - Phase 2 Total Budget Appropriation Budget 2021 Proposed Budget 2022 Committed Budget to 2023 130.000 43.334 21.666	65.000
14	Project on Raising Awareness on Cyber Threats Total Budget 2.000 Proposed Budget 2022 2.000	2.000
15	Project on Revenue Collection Supporting System Development for USO Service Provision Total Budget Proposed Budget 2022 3.869	3.869
16	Project on Supporting for the provision of universal basic telecommunication services and social service Total Budget 144.630 Proposed Budget 2022 28.926 Committed Budget to 2023 28.926 Committed Budget to 2024 28.926 Committed Budget to 2025 28.926 Committed Budget to 2025 28.926	28.926
17	Mobile ID Monitoring System Develoment Project - Phase 3 Total Budget 9.000 Proposed Budget 2022 9.000	9.000
Stra	tegy 4: Enhancing strategic management for 2 Projects	
1	Project on Research and Development the Operations Monitoring and Evaluation of the Office of the NBTC Strategic Plan Total Budget Proposed Budget 2022 1.964 Committed Budget to 2023 7.855	1.964
2	Project on Social Dimensional Outputs Monitoring and Evaluation with CIPP Model for Broadcasting cluster Total Budget 5.000 Proposed Budget 2022 Committed Budget to 2023 1.250	3.750





Problems and Obstacles

in Broadcasting, Television, and Telecommunications Businesses Operation which are Important to the People



1. Changes in Consumer Behavior

Due to the ongoing COVID-19 pandemic, the government has imposed preventive measures to control the spread of the disease, by restricting numbers of traveling and supporting the Work from Home policy, as well as shutting down the entertainment venues, such as theaters, to reduce the COVID-19 transmission, which driving consumer behavioral changes in media and entertainment industries.

Audiences have preferred consuming online content more, especially entertaining programs. Thus, in 2021, an Over-the-Top (OTT) media service, which offers versatile content, TV programs, movies, and videos, to viewers via the internet, has been growing steadily.

OTT platforms have been the most popular media channel for users to consume content, as users can access the services from anywhere, at anytime, and be able to select the content based on their interests and watch them on-demand. These are the charm of OTT that carquen consumers heart, and any device. This also disrupts media consumption trends in the future. For example, animation programs' young audiences shift to OTT platforms instead of television broadcasting, as they can watch any programs continuously and conveniently. Furthermore, the OTT platforms gain more advantages over traditional service providers, as the OTT platforms are not under strict regulations, and are neither required to be licensed, nor pay any license fee and network cost. As a result,

TV service providers have to transform themselves to keep pace with the changing industry ecosystem. Today, many major TV service providers have been creating their own platforms to support the massive contents. Although they are not able to make much money from the platform, However, interesting content is the key factor to attract consumer attention, regarded as the most significant competitive advantage. Indeed, anyone who possess the attractive and high-quality content has more bargaining power on the television service providers

2. Digital Literacy Enhancement for the Radio and Television Service Providers

The Office of the NBTC has developed the Electronic Broadcasting System (e-BCS) as an additional service channel for the radio and television service providers to apply for licenses online via internet, without on-site document submitting, in compliance with the NBTC's digital organization policy. However, some problems and obstacles due to pushing the radio and television service providers applying licenses online via internet have been found. For example, even though the Office of the NBTC has organized digital literacy training for the radio and television service providers, some still have limited digital literacy and resources, such as e-mails usage, internet access, and computer literacy. Thus, the Office of the NBTC continues to promote digital literacy for the service providers consistently, to prepare them for the operational transition from traditional licensing to electronic licensing.

3. Organizing Overhead Communication Lines and Bringing Communication Systems Underground

Due to a large number of disordered communication lines on the power poles from network expansion, the Office of the NBTC has prepared the plans for organizing overhead communication lines, and bringing communication systems underground, to support the government's mission to turn Bangkok to ASEAN Metropolis. The plans involve relevant agencies to cooperate in the Committee on Organizing Overhead Communication Lines and Bringing Communication Systems Underground, consisting of the Office of the NBTC, Metropolitan Electricity Authority (MEA), Provincial Electricity Authority (PEA), Bangkok Metropolitan Administration (BMA), Metropolitan Waterworks Authority, and telecommunications operators. In 2021, the obstacles of such operations were as follows:

- 1) The operations under the plans have been slowed down due to the COVID-19 pandemic.
- 2) As the number of communication lines to be organized have been increasing every year, the telecommunications operators have to bear the burden cost and investment in organizing both overhead communication lines, and communication systems underground, such as construction expenses, cable conduit leases, unused cables dismantling costs, and communication lines organizing costs. It is possible that the operators may offset their burden cost by raising prices. Besides, another obstacle in cable conduit construction is the complicated permission process to access the local government organizations' areas, resulting in the overall operation delay.



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