

**2023 Research project delegated by National Communications Commission**

GRB: PG11208-0078

# **Research on Observation of Telecommunications Service Quality Supervision Mechanism**

Executive Summary

**Telecom Technology Center**

Feb 2024

**2023 Research project delegated by National Communications Commission**

GRB: PG11208-0078

# **Research on Observation of Telecommunications Service Quality Supervision Mechanism**

Executive Summary

**Telecom Technology Center**

Feb 2024



# Content

<b>I. Introduction.....</b>	<b>1</b>
<b>II. Analysis of International Regulations for Enhancing Telecommunications Service Quality .....</b>	<b>5</b>
1. Comparison of Legislative Policies Related to Telecommunications Service Quality.....	5
2. Comparison of Telecommunications Service Quality Indicators and Related Safeguard Measures .....	9
3. Comparison of Telecommunications Service Quality Inspection, Measurement, and Evaluation Mechanisms .....	12
<b>III. Observation of Market Competitive Landscape Before and After Telecommunications Enterprise Mergers .....</b>	<b>16</b>
1. Observation of Dynamic Trends in the Telecommunications Service Market .....	16
2. Observation of the Telecommunications Service Market Competitive Landscape.....	19
<b>IV. Conducting Symposiums and Gathering Opinions for Analysis ....</b>	<b>23</b>
1. Symposium for Mobile Network .....	23
2. Symposium for Fixed-Line Network .....	26
<b>V. Legislative Policy Recommendations for Improving Taiwan’s Telecommunications Service Quality .....</b>	<b>29</b>
1. Immediate Feasible Recommendations .....	29
2. Medium to Long-Term Recommendations .....	31
3. Recommendations for Future Studies .....	35

## Table

Table 1: Comparison Of Legislative Policies Related To Telecommunications Service Quality.....	7
Table 2: Comparison Of Telecommunications Service Quality Inspection, Measurement, And Evaluation Mechanisms.....	14

## **I. Introduction**

In accordance with Article 8 of the Telecommunications Management Act, when telecommunications enterprises provide telecommunications services, they must “disclose consumer with the information regarding service conditions, telecommunications network’s quality and data transmission management methods/conditions, in an obvious, public and reachable method”. Furthermore, telecommunications enterprises determined by the competent authority (i.e., the National Communications Commission, hereinafter referred to as the NCC) are required to comply with the special obligations stipulated in Article 18 of the Telecommunications Management Act, which states that, “With respect to the quality of telecommunications services, telecommunications enterprises shall conduct regular self-evaluation based on the items and format announced by the competent authority and then publish the evaluation results accordingly. The competent authority may regularly check and publish the investigation results.”

Based on the above provisions, on April 8, 2021, the NCC announced and simultaneously enforced the “Telecommunications Service Quality Items and Format”, comprising a total of four articles. The NCC also formulated the appendix titled “Telecommunications Service Quality Self-Evaluation Form” and required the aforementioned telecommunications enterprises to complete this self-evaluation form by December 31 of each year, starting from the year of their recognition. They are further mandated to publish the results of this self-evaluation by January 31 of the following year. The purpose of these requirements is to urge telecommunications enterprises to fulfill their obligation of disclosing telecommunications service quality.

Furthermore, in accordance with the authorization provided by Article 21 of the Telecommunications Management Act, the NCC has formulated “Standards for the Identification of Telecommunications Enterprises Which Shall Undertake Special Obligations”. According to Article 3, Paragraph 1 of these standards, “Those that use telecommunication resources or installed public telecommunications network; those providing voice-based service or data service; and those whose total telecommunications service revenue in the previous year reached more than NT\$100 million,” shall bear the obligations stipulated in Article 18 of the Telecommunications Management Act. Alternatively, in accordance with Article 79, Paragraph 1, Item 18 of the Telecommunications Management Act, “where service quality self-evaluation has not been carried out on a regular basis or the results thereof are not published,” telecommunications enterprises may be subject to a fine of over NT\$100,000 but not exceeding NT\$1 million. The telecommunications enterprises will also be notified to rectify the situation within a specified period, and if they fail to do so within the stipulated timeframe, they may be subject to repeated penalties.

However, the telecommunications services offered by telecommunications enterprises can be highly diverse, and coupled with the fact that the Telecommunications Management Act adopts a light-touch regulatory approach, in practical operation, it may be challenging to ensure the quality of telecommunications services based solely on the obligation to conduct regular self-evaluation according to the items and format specified by the competent authority and disclose the evaluation results. As a result, there may be situations where there is a gap in understanding or a difference in the published self-evaluation results due to the complexity of the services provided. This can lead to difficulties in supervision and verification by

regulatory authorities.

Therefore, the present study aimed to examine and analyze international norms and experiences related to telecommunications service quality, then apply these findings to clarify the current state of the telecommunications industry in Taiwan and the practical issues surrounding regulatory assessments. The goal was to explore how to enhance the quality of telecommunications services in Taiwan and bring them into alignment with international standards. The results of the present study serve as consistent evaluation criteria that can be used by telecommunications enterprises to conduct self-evaluation of service quality and to subsequently propose relevant legal and policy recommendations to improve telecommunications service quality in accordance with the telecommunications service environment in Taiwan.

The chapter arrangement of this paper is as follows:

Chapter II focuses on the countries of Singapore, the United Kingdom (UK), and the United States (US). It provides a comprehensive review and analysis of the latest regulations and practices implemented by these countries to improve telecommunications service quality and compares said policies with those implemented in Taiwan.

Chapter III collects and summarizes merger cases involving Taiwanese telecommunications enterprises, then analyzes the competitive landscape before and after market consolidation, including aspects such as pricing, quality, and consumer rights. This analysis aims to provide the requesting unit with insight into industry dynamics.

Chapter IV involves conducting two symposiums, bringing together experts, scholars, telecommunications enterprises, industry associations, and

relevant organizations in the field. The aim is to gather opinions on the future vision and policy recommendations for improving the quality of telecommunications services in Taiwan. These discussions seek feasible strategies for adjusting the implementation of telecommunications service quality inspections.

Chapter V examines international and domestic literature and secondary data to assess the practical issues faced by the existing quality standards for telecommunications services in Taiwan. Additionally, recommendations regarding inspection methods are provided for telecommunications enterprises determined by the competent authority as having special obligations, *i.e.*, those who are required to regularly inspect their telecommunications service quality and publish the inspection results. The objective is to enhance the quality of telecommunications services in Taiwan, thereby creating and maintaining a high-quality industry environment.

## **II. Analysis of International Regulations for Enhancing Telecommunications Service Quality**

The present study conducted an analysis of the legislative policies, telecommunications service quality indicators, related safeguard measures, and mechanisms for measuring and evaluating telecommunications service quality in Singapore, the UK, and the US. A comparison and analysis was carried out to identify similarities and differences between these countries and Taiwan.

### **1. Comparison of Legislative Policies Related to Telecommunications Service Quality**

Singapore's regulatory authority for overseeing telecommunications service quality is the Infocomm Media Development Authority (IMDA), which is primarily empowered by the "IMDA Act" to establish relevant practice standards and guidelines. As a result, the IMDA has issued the "Code of Practice for Competition in the Provision of Telecommunication and Media Services 2022" to ensure compliance with minimum service quality standards in the information and communications industry. Service providers are required to adhere to these standards and regularly submit service quality reports.

In the UK, the Office of Communications (Ofcom) serves as the regulatory authority and operates in accordance with the responsibilities and expectations conferred by the "Communications Act 2003". Ofcom regularly reviews general conditions and mandates that Electronic Communications Network (ECN) and Electronic Communications Service (ECS) providers comply with relevant obligations and standards. They maintain

telecommunications service quality through voluntary or mandatory codes of practice.

In the US, due to its federal system, regulations concerning telecommunications service quality are governed both by the Federal Communications Commission (FCC) and state or local governments. Additionally, the implementation of the Measuring Broadband America (MBA) Program, which encourages voluntary participation from service providers, promotes information transparency and compliance with relevant obligations and standards for providers.

As for Taiwan, in addition to the aforementioned provisions of Article 18 of the “Telecommunications Management Act”, a provision in Article 17 of the Act states that, “Telecommunications enterprises designated by the competent authority shall set forth terms and conditions of standard service contract, specify the rights and obligations between them and subscribers, and submit the said standard service contract to the competent authority for approval before implementation.” This requirement also has a certain impact on ensuring service quality.

Table 1: Comparison of legislative policies related to telecommunications service quality

Country	Regulatory Authority	Legal Basis	Regulated Entities	Regulatory Approach
Singapore	Infocomm Media Development Authority (IMDA)	<ul style="list-style-type: none"> <li>➤ IMDA Act</li> <li>➤ Telecommunications Act</li> <li>➤ Code of Practice for Telecommunication Service Resiliency, Code of Practice for Competition in the Provision of Telecommunication and Media Services</li> </ul>	<ul style="list-style-type: none"> <li>● Telecommunications license holders</li> <li>● Regulated entities</li> </ul>	Regulated entities must comply with the minimum standards for Quality of Service or user Quality of Experience (QoE) set by IMDA, or face penalties and other legal sanctions (such as mandatory improvements).
UK	Office of Communications (Ofcom)	<ul style="list-style-type: none"> <li>➤ Communication Act 2003</li> <li>➤ Voluntary Broadband Speeds Code of Practice, Code of Practice on Consumer Complaint Handling and Dispute Resolution, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● Electronic Communications Network (ECN) providers</li> <li>● Electronic Communications Service (ECS) providers</li> </ul>	ECN/ECS providers must adhere to Ofcom's General Conditions (GCs), with violations potentially resulting in fines of up to 10% of the turnover.
US	Federal Communications Commission (FCC) and	<ul style="list-style-type: none"> <li>➤ Code of Federal Regulations (CFR) - Telecommunication</li> <li>➤ Rules for Broadband Consumer</li> </ul>	<ul style="list-style-type: none"> <li>● All telecommunications operators</li> <li>● MBA participants (13</li> </ul>	Telecommunications operators are encouraged to provide information transparency and comply with mandatory legal regulations, with penalties for

	various local regulatory authorities	<p>Labels</p> <ul style="list-style-type: none"> <li>➤ Measuring Broadband America (MBA) Program</li> </ul>	voluntary entities)	violations.
Taiwan	National Communications Commission (NCC)	<ul style="list-style-type: none"> <li>➤ Telecommunications Act</li> <li>➤ Telecommunications Service Quality Items and Format</li> </ul>	Telecommunications enterprises determined by the NCC for regular self-evaluation of their telecommunications service quality (Article 18)	Telecommunications operators are required to conduct self-evaluations following the format and items set by the NCC. Failure to do so or failure to disclose the results may result in fines, with a notification for correction within a specified timeframe.
		<ul style="list-style-type: none"> <li>➤ Telecommunications Management Act</li> <li>➤ Standard Service Contract Terms and Conditions for Designated Telecommunications Enterprises</li> </ul>	Telecommunications enterprises determined by the NCC, who shall set forth terms and conditions of standard service contract (Article 17)	Terms and conditions are set in accordance with Article 17 (including fee deductions for service disruptions) and submitted to the NCC for approval before implementation or prior to making changes. Those who fail to set the terms and conditions or fail to obtain approval shall be penalized.

Source: Summarized by the present study's research team

## **2. Comparison of Telecommunications Service Quality Indicators and Related Safeguard Measures**

The present study categorized the telecommunications service quality indicators mentioned in the self-evaluation form into four main types: “Application Service Data”, “Consumer Rights and Protection”, “Service Operation and Disclosure”, and “Compliance with Major Policies and Contingencies”.

### **(1) Application Service Data**

Items classified under “Application Service Data” include network availability, data upload speed, data download speed, responsiveness/latency, packet loss and jitter, continuity completion rate, network normal status (fiber optic connection), data connection success rate, data disconnection rate, time to download 2MB/5MB/10MB files, time to upload a 1MB file, etc.

In Singapore, there are mandatory regulations with defined threshold values for network availability, bandwidth utilization, responsiveness/latency, packet loss and jitter, continuity completion rate (mobile), network normal status, and voice disconnection rate. Penalties are also imposed for non-compliance. However, relatively few items are subject to evaluation. In contrast, the UK and the US place greater emphasis on government measurement of relevant items, followed by the creation of reports and analyses. In Taiwan, the focus is primarily on download speed and continuity completion rate (landline); other items are not included in the self-evaluation criteria.

## **(2) Consumer Rights and Protection**

Items categorized under “Consumer Rights and Protection” include the establishment of complaint handling and dispute resolution mechanisms, diverse or free customer service channels, multiple troubleshooting channels, and time limits for customer service response and response handling. Additionally, telecommunications enterprises are expected to explain the content of service contracts to users in a manner that ensures their understanding; provide service information disclosure and transparency, staff training, and personal data protection; meet the needs of vulnerable consumers and users with disabilities, and adhere to related fee restrictions.

In this regard, most countries have corresponding legal requirements, with the US leaning more toward industry self-regulation. Taiwan is unique in that it has a 35-second limit for customer service response and response handling time. Although the self-evaluation form lacks a specific item on establishing a complaint handling and dispute resolution mechanism, there are other mandatory regulations and requirements in place that are not included in the list of service quality evaluation items.

## **(3) Service Operation and Disclosure**

Items in the “Service Operation and Disclosure” category include telecommunications service provisioning schedule, billing accuracy, fault repair (frequency, time, and repair rate), incoming volume for fault reporting hotlines, number of users, service/business locations, radio coverage range, telecommunications service fee estimation, international data roaming services, caller identification, and explanations of other achievements related to business plans.

Compared to the UK and the US, Singapore and Taiwan have more extensive requirements for service quality indicators in this category. For instance, there are specific regulations for fault repair items, including defined frequencies, completion rates, or durations.

#### **(4) Compliance with Major Policies and Contingencies**

Items in the “Compliance with Major Policies and Contingencies” category include disaster prevention warning cell broadcast message services, free emergency voice communication services, measures taken in coordination with major government policies (such as epidemic prevention and disaster response), and other specified items related to telecommunications service quality.

With the exception of Singapore, the telecommunications service quality evaluations of all countries examined in the present study (the UK, the US, and Taiwan) included free emergency voice communication services and measures taken in coordination with major government policies as part of their criteria.

### **3. Comparison of Telecommunications Service Quality**

#### **Inspection, Measurement, and Evaluation Mechanisms**

In Singapore, telecommunications service providers are required to regularly submit telecommunications service quality reports, which are then audited by IMDA. Each quarter, IMDA publishes the performance of each service provider on their website, specifically examining whether various telecommunications service providers have met the established standards. If not, penalties are imposed. IMDA also monitors actual mobile network performance through random road tests and provides incentives to encourage consumers to download mobile apps.

In contrast, the UK and the US follow relatively similar measurement approaches, and neither country sets specific threshold standards as Singapore does. In both countries, regulatory authorities like Ofcom and FCC lead measurement programs and publish relevant reports. For broadband measurement, they both employ third-party network performance testing vendors to set up whiteboxes for data collection. For mobile network measurements, data is collected through methods such as installing SDKs or apps on user terminal devices.

The purpose of measuring relevant service quality indicators in both the UK and the US is to provide information transparency. This allows consumers to reference various metrics such as speed from different providers and choose or switch to the telecommunications operator that best suits their needs. Additionally, in the US, there is an additional effort through the Wireless Association (CTIA - Cellular Telephone Industries Association) to grant certification marks to providers. This encourages providers to improve their telecommunications service quality in hopes of ultimately

attracting more consumers to use their services.

In Taiwan, the supervision of telecommunications service quality is achieved through self-evaluation. The NCC adapted a management model in line with the regulatory framework of the Telecommunications Act. In 2021, they announced the “Telecommunications Service Quality Items and Format”, which consolidated the “Guidelines for the Implementation of Service Quality Standards for Fixed Network Telecommunications Business” and “Guidelines for the Implementation of Service Quality Standards for Mobile Broadband Business” that had been enforced under the old Telecommunications Act. Telecommunications operators are required to self-evaluate and indicate whether their voice or data services fall under “Mobile Network Telecommunication Services” or “Fixed Network Telecommunication Services”. They then have to mark each item as “Compliant”, “Non-compliant”, or “Not Applicable”. This self-evaluation serves as a means to encourage telecommunications enterprises to fulfill their obligations in disclosing service quality.

Table 2: Comparison of telecommunications service quality inspection, measurement, and evaluation mechanisms

Country	Measurement Tools	Evaluation Measures	Purpose
Singapore	<ul style="list-style-type: none"> <li>➤ Regular sampling</li> <li>➤ Reviewing service quality reports submitted by operators on a regular basis</li> <li>➤ Monitoring actual network performance through road tests, mobile apps, etc.</li> </ul>	List various service indicators and publish the performance of each operator on the IMDA website (by quarter), with penalties for mandatory standards.	Monitor whether operators comply with telecommunications service quality benchmarks and raise public awareness of telecommunications service quality.
UK	<ul style="list-style-type: none"> <li>➤ Regular surveys (setting up trackers and questionnaires)</li> <li>➤ Installation of whiteboxes, embedded devices, etc., for collecting broadband data</li> <li>➤ Road tests, evaluation of mobile network data collected through SDKs installed on user terminal devices by third-party speed testing companies</li> </ul>	Ofcom regularly analyzes and publishes various service indicators and satisfaction survey reports.	Provide consumers with information such as speed indicators so that they can select or switch to telecommunications operators that suit their needs.
USA	<ul style="list-style-type: none"> <li>➤ Reviewing the annual reports of operators</li> <li>➤ Setting up whiteboxes, mobile apps, etc., to collect network speed data</li> </ul>	FCC releases relevant measurement reports. CTIA awards certification marks.	Provide consumers with information such as speed indicators so that they can select or switch to telecommunications

			operators that suit their needs.
Taiwan	<ul style="list-style-type: none"> <li>➤ Regular completion and publishing of self-evaluation forms by operators, according to a specified format, to assess telecommunications service quality</li> <li>➤ Regular completion of satisfaction survey reports by operators</li> </ul>	<p>Conduct regular inspections and publish inspection results.</p> <p>Maintain satisfaction survey reports for future reference.</p>	<p>Encourage telecommunications enterprises to fulfill their obligations to disclose telecommunications service quality and create a friendly service environment.</p>

Source: Summarized by the present study's research team

### **III. Observation of Market Competitive Landscape Before and After Telecommunications Enterprise Mergers**

#### **1. Observation of Dynamic Trends in the Telecommunications Service Market**

##### **(1) Market Collaboration Patterns**

Collaboration among telecommunications operators arises from the nature of the industry and the demands of technological development. Faced with a continuously growing user base and increasing data traffic, it is challenging for a single operator to handle it independently. Through collaboration models such as “spectrum/network sharing” or “spectrum trading and spectrum/network sharing”, operators can share specific communication frequencies and network infrastructure. This allows for better utilization of resources, technology, and market share, leading to the provision of more products and services and rapid advancements. It also helps reduce operating costs for each operator, enhances network coverage and resource utilization efficiency, and ultimately creates an efficient communication network. This fosters diversification in service quality for consumers in Taiwan.

## **(2) Market Consolidation Patterns**

On December 30, 2021, Taiwan Mobile and Taiwan Star Telecom reached a merger agreement, and they submitted a merger application to the NCC on February 10, 2022. Additionally, on February 25, 2022, FarEasTone Telecom and Asia Pacific Telecom reached a merger agreement and submitted a merger application to the NCC on March 23, 2022.

Following the NCC review, both merger applications were approved on January 18, 2023. The Fair Trade Commission (FTC) initially approved the FarEasTone Telecom and Asia Pacific Telecom merger on July 21, 2023, and later announced additional obligations for the Taiwan Mobile and Taiwan Star Telecom merger, which was approved on October 12, 2023.

The merger of Taiwan Mobile and Taiwan Star Telecom was completed on December 1, 2023, with Taiwan Mobile being the surviving company. The merger of FarEasTone Telecom and Asia Pacific Telecom was completed on December 15, 2023, with FarEasTone Telecom being the surviving company.

At this point, Taiwan's mobile communication market has undergone a structural change, officially entering a competitive landscape with three major players. Following the completion of the aforementioned mergers, the two new companies—New Taiwan Mobile and New FarEasTone Telecom—now possess bandwidth and technological advantages that are different from those of the past, giving them a more competitive edge.

Both the NCC and the FTC have established clear conditions for the two merger cases to ensure that the surviving companies (New Taiwan Mobile and New FarEasTone Telecom) improve network quality and protect

user rights. The NCC, for example, requires the surviving companies to invest over NT\$60 billion in capital expenditures over the next 5 years and resolve the issue of excess bandwidth by a specified deadline. The merged companies are also required to provide various solutions, such as voluntarily returning spectrum, transferring it to other telecom operators, or engaging in spectrum exchanges. Failure to make the necessary corrections on time may result in fines and the suspension of spectrum usage.

Regarding the handling of excess bandwidth, the present study proposed the following possible approaches:

- **For New FarEasTone Telecom:** The excess bandwidth that needs to be addressed by June 30, 2024, is the 100 MHz in the 28 GHz frequency band. Returning the excess bandwidth is a feasible approach; however, whether it should be returned unconditionally or compensated based on the residual frequency value should be determined by the Ministry of Digital Affairs (MODA). Furthermore, the MODA should plan the use of the returned spectrum. If it cannot be efficiently reallocated and remains idle, it may not promote effective spectrum utilization.
- **For New Taiwan Mobile:** The excess bandwidth that needs to be addressed by June 30, 2024, is the 10 MHz of excess bandwidth below 1 GHz frequency. Returning the excess bandwidth or conducting a frequency exchange with Chunghwa Telecom are both feasible approaches. However, whether it should be returned unconditionally or compensated based on the residual frequency value should be determined by the MODA.

## **2. Observation of the Telecommunications Service Market**

### **Competitive Landscape**

#### **(1) Pricing**

The market landscape changed after the merger, entering a new phase of three major players. Telecommunications providers may ensure their market share through technological innovation and resource integration. The design of pricing plans reflects significant trends. Before the merger, the pricing of the three major telecommunications companies was similar. To adapt to the merger, the surviving companies gradually adjusted their market prices and introduced various new pricing plans. The absorbed companies, on the other hand, adopted pricing strategies on the eve of the merger, aiming to capture one last wave of customers.

Due to the minor differences in pricing, it is expected that user choices will lean toward network service quality, user experience quality, and the demand for additional services and convenience. In today's market environment, consumers place greater emphasis on the overall service quality and experience, which may also become a key factor for telecommunications operators to gain a competitive edge in the market.

#### **(2) Service Quality**

According to statistics from the NCC, there are currently 30 million base stations in Taiwan, with a 5G network coverage rate of 94.36%. This is primarily attributed to government subsidies and intense competition among telecommunications operators. As of the third quarter of 2023, the 5G network coverage rates of the three major telecommunications operators are close to 100%. This means that the majority of residents in Taiwan can enjoy

stable high-speed 5G network services. As of June 30, 2023, Taiwan ranks 6th globally in 5G availability, highlighting the country's proactive investment and efficiency in 5G network infrastructure development.

### **(3) Consumer Rights**

According to the monthly survey conducted by the Telecommunications Consumer Mediation Center, complaints related to mobile communications services are predominant. Looking at the period from January to November 2023, the number of complaints filed against telecommunications operators revealed varying trends. Complaints against all five telecommunications operators increased compared to the beginning of the year. This increase was attributed to factors such as the dismantling of base stations and network infrastructure mergers, which impacted consumers and are thus reflected in the rising number of complaints. This phenomenon underscores the need for both market leaders and other telecommunications operators to strengthen their communication quality. During the subsequent merger process, they must aim to provide higher-quality services, meet user demands, and maintain market competitiveness.

To safeguard consumer rights in light of telecommunications enterprise mergers, regulatory authorities can fulfill an effective oversight role through transparent and publicly available information. Based on the aforementioned reasons, the present study proposed that regulatory authorities should regularly disclose the following information and observation indicators to provide references for consumers.

## **A. Network Coverage Rate**

By providing actual statistics on changes in network coverage rates for different regions, speed tests, and the availability of specific services before and after mergers, consumers can clearly visualize the changes. If New Taiwan Mobile and New FarEasTone Telecom can consistently disclose actual data on changes in network coverage rates after the merger, it will significantly alleviate consumer concerns about the two merger cases.

## **B. Continuity of User Agreements and Pricing Plans**

When telecommunications operators regularly disclose reports on the continuity of user agreements and pricing plans to consumers, it enhances transparency regarding the operators' commitments and their fulfillment. Consumers can gain a clear understanding of whether the protections in their existing user agreements are still in effect, and they can also monitor the continuity of specific pricing plans for certain user groups. This disclosure allows consumers to monitor their own rights and clarify whether the 1-year guarantee in the original user agreement continues to be upheld. It also helps address issues related to changes in user service volumes after integration and network congestion affecting consumer usage rights.

Additionally, telecommunications operators can provide consumers with monthly statistics on the number of complaints filed and the number of complaints resolved as part of their dispute resolution tracking. This allows consumers to understand the handling of complaint cases after the merger.

### **C. Capital Expenditure and Network Construction**

This indicator not only provides information on financial expenditures but also reveals the scope and progress of investments in network infrastructure. Specific capital expenditures (annual data) reveal the scale and purposes of telecommunications operators' investments in the industry, such as building new base stations, technological upgrades, or maintenance, among others. For consumers, this is an opportunity to gain insight into how telecommunications operators are safeguarding consumer rights.

Furthermore, after a merger, telecommunications operators may face less competitive pressure; therefore, their motivation for investment and development may be different from before. At this time, transparent disclosure of the actual progress of network construction (such as the number of 4G and 5G base stations in each city and county each month) allows consumers to understand whether operators are continuing to invest in updating and improving network infrastructure to safeguard communication quality and services.

## **IV. Conducting Symposiums and Gathering Opinions for Analysis**

### **1. Symposium for Mobile Network**

#### **( 1 ) Maintaining the Self-Evaluation Mechanism for Telecommunications Operators**

Participants hoped to clarify the legislative purpose and spirit of telecommunications management. They proposed that the Telecommunications Management Act, as a soft law, should be responsible for disclosing service quality, whereas other regulations with mandatory requirements should not be included in the evaluation of telecommunications service quality. They argued against the need to add more regulatory items for monitoring telecommunications service quality.

The regulation of telecommunications service quality focuses on consumer rights and experiences and aims to determine current consumer needs. Regulatory authorities oversee telecommunications service quality to make it easier for consumers to understand the quality of services offered by different providers, which enables them to choose the telecommunications provider that suits their needs.

#### **( 2 ) Developing Service Quality Measurement Standards and Methods**

Participants discussed the measurement standards and methods for service quality indicators. They believed that these indicators should consider a combination of international service quality benchmarks and the

specific conditions of Taiwan. Compared to other countries, Taiwan has significant variations in population density and terrain, along with different telecommunications usage habits. Taiwanese consumers often use mobile broadband as a substitute for fixed-line services, and there are various impediments to the deployment of base stations. Additionally, Taiwan has fewer telecommunications frequency bands than other countries. Therefore, the measurement indicators for service quality must be adapted to the specific circumstances in Taiwan.

Some participants also mentioned that there are differences in bandwidth and the number of base stations among various mobile broadband operators. The regulatory authority should establish measurement methods or standards, and if necessary, consider outsourcing to independent third-party organizations. The measurement standards should be objectively feasible, and the measurements should not turn into a competition among telecommunications operators, which would impose a heavy burden on operators without significant benefits for consumers.

### **(3) Maintaining the Current Audit Mechanism**

Participants expressed that audits by accountants should not be introduced in the supervision of telecommunications service quality, claiming that accountants are not familiar with telecommunications service quality in their business, and their regulatory scope does not include telecommunications services. The existing audit mechanisms, such as random inspections and complaint investigations, should be maintained. Regulatory authorities can conduct audits through administrative checks or engage third-party impartial organizations. In the past, there has been a practice of outsourcing service quality assessments to third-party impartial

organizations, making audits by accountants a lower-priority option.

The regulatory authority can conduct administrative inspections in collaboration with measurement units, and if there is a shortage of manpower for evaluation, third-party impartial organizations can be commissioned to carry out such inspections. Administrative inspections should also be integrated with other administrative units to alleviate the burden on operators.

#### **(4) Overall Recommendations for the Telecommunications**

##### **Service Quality Regulatory Mechanisms**

Participants recommended that the methods of implementing telecommunications service quality regulations should be clear and well-defined, following consistent standards and procedures, and providing data to assist consumers in making choices. The regulatory authorities should create incentives for mobile broadband providers to continuously improve and may include complaint handling, dispute resolution mechanisms, protection for vulnerable and disabled individuals, and the 7-day trial period within the scope of service quality to protect consumer rights.

Participants also expressed hope that regulatory authorities will engage in extensive communication with telecommunications operators before making changes to regulatory mechanisms. Imposing too many mandatory obligations along with administrative inspections can lead to the wastage of administrative resources and burdens on the operators. Improving telecommunications service quality should take the consumer experience as its starting point.

## **2. Symposium for Fixed-Line Network**

### **(1) Maintain Minimal Regulations for Telecommunications**

#### **Service Quality Supervision**

Participants believed that if the regulatory authority wants to add more monitoring items for telecommunications service quality, it should engage in more frequent and effective communication with telecommunications operators. The regulatory authority should also prioritize consumer involvement in telecommunications service quality supervision, allowing consumers to understand transparent information.

Participants also advocated following a voluntary approach similar to that of European and American countries, where self-regulation and quality standards are in place. Taiwan has a more rigorous regulatory framework with a self-evaluation system and regulatory audits by the governing authority. The suggestion was to maintain the soft law spirit of the Telecommunications Management Act, with a primary focus on self-regulation by telecommunications operators.

### **(2) Clarifying Potential Disputes before Implementing**

#### **Whiteboxes**

Participants believed that the benefits of implementing whiteboxes internationally lie in their stability and rapid data acquisition. However, long-term monitoring through whiteboxes may raise privacy concerns. The key to addressing this issue is to ensure that customers are thoroughly informed and consent to the data collection. If sensitive personal information is involved, it should be collected by legal authorities.

Participants also highlighted the complexities and other variables associated with whitebox deployment. They mentioned that disputes arising from equipment, manpower, costs, and how to address these demands are challenging aspects. In European and American countries, the installation of whiteboxes is voluntary. If whitebox deployment were to be considered, it could be done by soliciting volunteers to create measurement plans, which would help confirm the accuracy of self-evaluation by telecommunications operators. However, at this stage, there is no need to implement whitebox monitoring.

### **( 3 ) Auditing through Administrative Investigation or Outsourcing to Third Parties**

Participants hoped to rely primarily on the operators' self-evaluation with data backup as a supplementary approach, implementing low-level regulation. If the regulatory authority has any doubts about operators' capacity for self-evaluation, the regulatory authority can initiate administrative investigations or outsource audits to impartial third-party organizations. In comparison to the aforementioned options, utilizing accountants for certification would be an inferior choice. Industry representatives at the meeting believed that if audits were to be entrusted to third-party organizations, data collection must be limited to client-side information, as information on the operator's system side involves sensitive data and confidentiality concerns, leading to a risk of data leakage during third-party audit.

## **( 4 ) Overall Recommendations for the Telecommunications**

### **Service Quality Supervision Mechanism**

Participants suggested that regulatory authorities should adopt a goal-oriented approach when setting quality standards. They pointed to the voluntary self-regulation standards used in other countries; this approach relies on market forces to monitor and drive continuous improvement in service quality by operators. Participants feared that imposing additional administrative regulations would increase administrative costs for operators.

Participants also suggested that the current evaluation system should not be altered. They believed that competition in the telecommunications industry will intensify in the future, leading to better protection of service quality and consumer rights. With strong regulatory oversight and cooperation from operators, service quality in the telecommunications sector can be effectively maintained. They recommended sticking to a model where operators commit to self-regulation, thus maintaining a low level of regulation.

## **V. Legislative Policy Recommendations for Improving Taiwan's Telecommunications Service Quality**

### **1. Immediate Feasible Recommendations**

Compared to the other countries investigated in the present study, the service quality evaluation items in Taiwan are relatively comprehensive. The symposium participants generally believed that the current self-evaluation system is operating well, as there have been no serious issues with service quality. Therefore, there is no need to adjust the existing system, and instead, resources should be invested in other more innovative areas. Based on these findings, the authors of this paper suggest that in the short term, adjustments can be made to the self-evaluation items to better align with the current operational situation.

#### **(1) Mobile Communication Services**

The quality of mobile communication services varies greatly depending on factors such as the environment, relative speed, peak/off-peak times, terminal devices, etc. Considering the many variables that affect self-evaluation results, it is not recommended to significantly increase the self-evaluation items.

However, with the increased use of technology in modern society, especially during the post-pandemic era, there has been a significant rise in demand for services such as video conferencing, social media platforms, live streaming interactions, and gaming—all of which require sufficient connection speeds. Moreover, international practices, as seen in countries like the UK and the US, include this item in their measurement scope. Therefore, the authors of this paper suggest considering the addition of “data

upload speed” as a self-evaluation item for consumers to refer to.

Furthermore, regarding the “data download speed disclosure” for mobile communication services, the current self-evaluation form involves telecommunications enterprises selecting 100 locations for self-disclosure of average download speed. However, the present study indicated that measurements for mobile communication should consider various factors and potential interferences. Therefore, the regulatory authority should establish more detailed and consistent measurement standards for telecommunications enterprises to follow, which would also benefit consumers by providing meaningful comparisons.

## **(2) Fixed Communication Services**

First, regarding fixed communication services, the recommendations for adding the “data upload speed” self-evaluation item align with the suggestions made earlier for mobile communication services.

Second, both the UK and the US have observed video streaming and disconnection issues. Considering that a significant portion of Taiwan’s population primarily goes online to “watch videos”, the authors of this paper suggest adding a self-evaluation item for “measuring video streaming and disconnection issues”, which can be designated and announced by the NCC.

Furthermore, regarding “responsiveness/latency”, in addition to Singapore’s specific limits of  $\leq 30$  ms for local and  $\leq 300$  ms for international latency, both the UK and the US conduct regular measurements. Latency related to external bandwidth is meaningful for consumers; therefore, adding a self-evaluation item for “responsiveness/latency” is recommended.

Additionally, regarding the “access completion ratio”, while Singapore has mandatory compliance indicators for access completion ratio, they are limited to mobile communication services. The UK also observes the access completion ratio for mobile communication services. In comparison, Taiwan does not have specific regulations for mobile communication services but sets a  $\geq 97\%$  indicator for busy-hour landline services. Other countries do not have specific regulations for landline services; therefore, this item is recommended for deletion.

Finally, the symposium participants expressed that the “telecommunications service price calculation” indicator was initially established to ensure the quality of voice services. However, current user habits have shifted toward data-centric usage. Therefore, it is worth considering whether this item is still necessary. Based on observations of international practices in countries like Singapore, the UK, and the US, where this item is not present, and considering the need to keep up with the times, it is recommended to remove this item.

## **2. Medium to Long-Term Recommendations**

### **(1) Revision of the Fee Standards for Regular Inspections**

According to Article 3 of the “Fee-charging Standards of Processing Telecommunications Management”, the inspection fee is set at NT\$250,000 per case. The legislative reason for this fee is based on Article 11 of the “Regulations Governing the Standards of the Calculation and Payment of Examination Charges and Annual Supervisory Fees and the Collection of Official Fees” issued by the Financial Supervisory Commission (FSC). The authors of this paper believe that the fixed fee of NT\$250,000 per case lacks flexibility. Given the diverse nature of telecommunications services provided

by telecommunications enterprises, and to align with the cost recovery principle, the inspection fee should be calculated to reasonably cover the government's associated costs in terms of manpower and resources.

Building on the previous point, the present study suggested two possible solutions. A. Maintaining the Reference to the FSC: Continue using a per person-day calculation for the inspection fee but refine it further by leveraging past experiences and calculating the actual cost per person-day required for each type of inspection. This would ensure that an appropriate fee is charged. B. Revenue-Based Approach: Follow the “revenue in proportion to output” principle, where the inspection fee for monitoring telecommunications service quality is calculated as a certain percentage of the telecommunications enterprise's annual revenue.

Furthermore, in accordance with Article 18 of the “Telecommunications Service Act”, the authority to initiate periodic inspections rests with the regulatory authority. To balance the authority of the regulatory body and the cost burden on telecommunications enterprises, the authors of this paper recommend conducting periodic inspections once a year.

## **( 2 ) Establishing a Mechanism for Service Quality Data**

### **Collection and Analysis**

Regarding the application service data items, such as data upload speed, data download speed, etc., the competent authority or telecommunications enterprises may commission a recognized third party to collect relevant data and conduct analysis, or the competent authority may collect relevant data and conduct analysis on its own.

Based on the practices of the countries investigated in the present study, for mobile communication services, it is recommended to measure connection speeds (including upload and download speeds) and to have two methods of data collection. The first method is to provide incentives for consumers to install an SDK or app on their terminal devices. The program's source can be designed, and data can be collected and aggregated by a third-party organization, or the data can be directly transmitted to a database established by the competent authority. The second method is to implement road testing by the regulatory authority, replacing the current practice where telecommunications enterprises select an average download speed from 100 outdoor locations with high-speed base stations licensed by the NCC that can provide normal service. This would result in more accurate speed measurements.

Regarding fixed communication services, the authors of this paper recommend measuring connection speeds (including upload and download speeds), streaming quality and disconnections, as well as responsiveness/latency. There are two complementary methods for data collection. The first method is to install third-party whiteboxes on consumers' routers to collect and analyze data. The second method is to have telecommunications enterprises provide embedded devices to consumers; data can be collected and aggregated by the telecommunications enterprises, then provided to the regulatory authority for analysis.

In summary, the regulatory authority can continuously monitor the quality of services provided by different types of telecommunications enterprises by consistently collecting relevant data.

### **( 3 ) Establishing a System for New Auditor Verification**

#### **Reports**

For items related to consumer rights and protection, service operations and disclosure, and compliance with significant policies and contingencies—items requiring evaluation beyond just efficiency data—certified public accountants (CPAs) must complete these assessments based on actual circumstances and issue audit opinions. These new auditor verification reports are not only applicable to designated telecommunications enterprises, including both mobile communication services and fixed communication services but also allow for flexible adjustments to the specific areas that regulatory authorities wish to focus on during reviews.

However, many symposium participants expressed that the accountant audit mechanism is not their preferred choice, and some even emphasized that the business matters defined in Article 39 of the “Certified Public Accountant Act” do not include telecommunications service quality. Based on the definition of the term “certified matters”, the present study determined that the audit of “telecommunications service quality” should fall within the scope of the work of certified public accountants, and in practice, the scope of the audit by accountants is broad, even extending to data protection. It is not limited to the business scope defined in Article 39 of the “Certified Public Accountant Act”.

However, in the event of doubts or concerns regarding the accountant audit reports, the NCC, as the regulatory authority, still has the power granted by the “Telecommunications Management Act” to conduct regular inspections and supervision of telecommunications enterprises.

### **3. Recommendations for Future Studies**

The present study primarily focused on providing insight into service quality supervision for telecommunications enterprises in the categories of mobile communication and fixed communication. However, the telecommunications service landscape is diverse, and regulatory authorities may identify telecommunications enterprises with specific obligations, including network data center operators, fiber optic circuit backbone service providers, cable TV operators, submarine cable circuit rental operators, and more. These entities are also subject to the special obligations required by Article 18 of the “Telecommunications Management Act” and are expected to periodically disclose the results of their self-evaluation.

With this in mind, future studies could consider examining the “Telecommunications Service Quality Items and Format” completed by the aforementioned entities. This examination could include evaluating the feasibility of including the option “Not Applicable” in various fields and potentially refining or categorizing the format. Additionally, researchers could explore the possibility of setting different inspection fees or cost-sharing mechanisms for different telecommunications service quality items. These efforts would aim to enhance the effectiveness and fairness of regulatory inspections and contribute to the overall improvement of telecommunications service quality policies in Taiwan.