

Abstract

Keywords: 5G vertical applications, 5G smart bus, 5G dedicated network

I. Origin of Research

In coordination to the 5G promotional strategies of National Communications Commission (NCC), the first focus is on the intelligent transportation service applications in 5G vertical applications while setting the goal of facilitating future 5G smart bus proof of business (PoB) plan. According to the requirements of this project, it can be divided into four major work directions: “Summary of Policies, Regulatory Adjustment, and Cases of 5G Vertical Applications and Intelligent transportation”, “Preliminary Survey on 5G Smart Bus Service Promotional Strategy”, “Preparation of Legal System for 5G Vertical Application Environment”, and “5G vertical application Environment Work Coordination”.

In terms of summary of policy/laws and regulations/cases, in this research domestic and foreign promotion situations and important cases are collected and summarized to serve as the reference for future empirical plan. In order to promote the establishment of 5G smart bus service, there are two work items of 5G smart bus industrial profile survey and passenger demand survey have been done in this research to serve as the reference for future establishment of service applications. In terms of preparation for legal environment and work coordination, suggestions for amendment have been proposed with respect to dedicated network related laws and regulations in order to improve the promotion of legal environment of 5G vertical field, and international symposiums and seminars have been organized to collect latest international status and establish the communication platform for domestic stakeholders; in addition, necessary project coordination and analytical consultation have also been conducted in coordination with the request by NCC, such as data collection during international seminars related to 5G and intelligent transportation services and assistance in organizing educational training for NCC staff, in order to further strengthen the research foundation for the development of vertical applications by telecommunication industry.

II. Research Method and Process

This research adopted many research methods for different work items. Literature analysis method is used for data collection and analysis of policies, laws and regulations, and empirical cases in various countries. Contextual interview, passenger characters, and participatory workshop are used for the research on 5G smart bus passenger demand. Expert interview is used for 5G smart bus industrial profile survey. International symposiums and seminars can serve as the communication platform for domestic stakeholders in order to collect opinions from all sectors with respect to subjects related to 5G empirical and environmental preparations.

III. Important Findings

The data collection of 5G vertical application policies and intelligent transportation policies and regulations of different key countries have been completed, including US, UK, Germany, Japan, and Singapore. In addition, preliminary survey with respect to the promotional strategy of 5G smart bus service has also been conducted in this research for data collection and analysis at the industry end and

demand end. In addition to the data collection, an international symposium and three seminars have been organized in this research based on the topics of 5G vertical applications and intelligent transportation in order to fully include opinions of different stakeholders. Meanwhile, in order to cooperate with the empirical cases of 5G vertical applications promoted by NCC, our research team has participated in several meetings convened by NCC to facilitate the smooth progress of 5G vertical application empirical case. Our research team has also provided regulatory analysis suggestions for dedicated telecommunication and 5G dedicated network and organized educational training for staff of central and local government employees in order to enhance the readiness of Taiwan for 5G vertical application development. In terms of the assistance in promoting 5G vertical application empirical case, this research has assisted NCC to promote the cooperation between Chunghwa Telecom and domestic intelligent transportation operator to establish 5G smart bus service plan in Xinyi Special District, and the strategy suggestions have been proposed in this research according to the survey result.

IV. Primary Suggestions

The short-term and medium-to-long-term suggestions with respect to various work items in this research are as shown below:

(1) Immediate and feasible suggestions

Suggestions for 5G vertical applications policy directions in Taiwan	
NCC	<ul style="list-style-type: none"> ▪ Cross-ministry and local government cooperation ▪ Strengthening the establishment of single contact window.
Suggestions for 5G intelligent transportation policy directions in Taiwan	
Government agencies, such as MOTC and local governments	<ul style="list-style-type: none"> ▪ Recommended central policies/definite division of labor between central and local government. ▪ Promotion of intelligent transportation empirical test and construction by government and industry. ▪ Building public trust. ▪ Formulating laws and regulations related to intelligent transportation. ▪ Clarifying ethical and moral dialectics.
NCC	<ul style="list-style-type: none"> ▪ Playing the role of coordinator to integrate relevant project resources to help local government.
Suggestions for adjustment of dedicated telecommunication laws and regulations in Taiwan	
NCC	<ul style="list-style-type: none"> ▪ It is suggested that, in the draft of amendment of dedication telecommunication act, the validation period of dedicated telecommunication network license (radio station license) with respect to “Administrative Regulations for the Establishment and Operation of a Dedicated Telecommunications Network”, “Administrative Regulations on the Civil Aircraft Radio Stations”, and “Administrative Regulations on the Civil Aircraft Radio Stations” should be modified to 5 years in order to facilitate the license management by the administration department. ▪ The suggestion is to continue with the observation of market operation situation of proof of business (PoB) before making the decision on law amendment.

	<ul style="list-style-type: none"> • It is suggested that the connection to the public network should be determined by the pattern of network usage. If it is for providing telecommunication service for the general public, it should be a part of the public network. If it is used for internal communication of a private enterprise, it should be included in the category of dedicated telecommunication network. This is for reaching the balance during communication in the dedicated telecommunication network. • It is suggested that, in case of any addition of requirements of dedicated telecommunication items in the future, relevant laws and regulations can be formulated by referring to the international classification method. • The formulation of special law could be the more appropriate option for the regulations of 5G vertical field experiment.
Suggestions for 5G smart bus industrial development strategies in Taiwan	
Government agency	<ul style="list-style-type: none"> • Promoting the development of integrated sub-system. • Promotion of closed service scenario field test.
Suggestions for 5G smart bus service establishment directions in Taiwan	
Intelligent transportation operators, and government agencies such as MOTC and local governments	<ul style="list-style-type: none"> • Locating functional application related stakeholders. • Conducting feasibility studies with respect to short-term, mid-term, and long-term functions. • Making 5G smart bus vision video.

(2) Medium-to-long-term suggestions

Suggestions for 5G vertical applications policy directions in Taiwan	
NCC	<ul style="list-style-type: none"> • Encouraging vertical application experiment (budget subsidy).
Suggestions for 5G intelligent transportation policy directions in Taiwan	
Government agencies such as MOTC and local governments	<ul style="list-style-type: none"> • Planning for extended infrastructure.
Information and communication operators	<ul style="list-style-type: none"> • Promoting the establishment of two major directions for system end and service end scenarios.
Bus operators	<ul style="list-style-type: none"> • Assisting local bus operators in transformation.
Suggestions for 5G smart bus industrial development strategies in Taiwan	
Government agencies, research institutions, and industrial alliances	<ul style="list-style-type: none"> • Promoting IoV related infrastructure • Promoting the innovation by transportation operators • Promoting the export of integrated solution
Suggestions for 5G smart bus service establishment directions in Taiwan	
Intelligent	<ul style="list-style-type: none"> • Collecting user feedback to conduct “Iteration Design”

transportation operators, and government agencies such as MOTC and local governments	<ul style="list-style-type: none"> ▪ Expanded collection of needs of different types of potential bus users ▪ Launching 5G smart bus advertisement corresponding to different types of users
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