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Yu-li Liu<sup>a</sup> & Pin-yen Wu<sup>a</sup>

<sup>a</sup> National Chengchi University, Taiwan

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## Rethinking Taiwan's universal service policy in the broadband environment

Yu-li Liu\* and Pin-yen Wu

*National Chengchi University, Taiwan*

Universal service policy and broadband policy have been discussed by many advanced countries for over a decade. They continue to be important policies in these countries because they bridge the digital divide and increase effectiveness and competitiveness. In recent years, another issue related to these two policies is whether the universal service policy could be extended to include broadband. In 2003, the OECD started to debate the preconditions for widening the scope of the universal service obligation to include broadband. In 2005, the EU also began formal public consultations to discuss the possibility of revising the Universal Service Directive to include broadband as part of the universal service obligation. In 2006, the government of Taiwan revised the universal service regulation to extend the scope of this service to broadband in uneconomic areas. This paper aims to re-examine Taiwan's universal service policy in the broadband environment. It discusses whether the government of Taiwan has adopted the broadband universal service policy in legal terms, and asks what the connection should be between universal service policy and broadband policy in Taiwan.

**Keywords:** universal service; broadband policy; broadband universal service; digital divide; Taiwan

### Introduction

Universal service policy and broadband policy have been discussed by many advanced countries for over a decade. They continue to be important policies in these countries because they bridge the digital divide and increase effectiveness and competitiveness. In recent years, another issue related to these two policies is whether the universal service policy could be extended to include broadband. The scope of the universal service policy varies around the world, as does the definition of broadband across countries. In 2003, the Organization for Economic Co-operation and Development (OECD) discussed the preconditions for extending the universal service policy to include broadband. Two years later, the European Union (EU) also discussed whether it was necessary to revise the Universal Service Directive to include broadband as part of the universal service obligation (USO).

Switzerland was the first European country to extend the scope of its universal service policy to include broadband. Finland stipulated that it was a constitutional right for its people to have broadband access. Since July 2010, people in Finland have been able to have access to at least one Mbps broadband. In the United Kingdom, the government has also set a goal to provide broadband to all British people by 2012. The European Commission likewise initiated a comprehensive review of universal service in 2010, including considerations to expand the USO to broadband USO

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\*Corresponding author. Email: [yuliliu2009@gmail.com](mailto:yuliliu2009@gmail.com)

(B-USO), with a more definite proposal expected in 2011. Similarly, the American National Broadband Plan has also established medium- and long-term goals for fixed and mobile universal broadband access. Therefore, it is time to reconsider the scope of the universal service policy in the broadband environment.

Taiwan believes that its universal service policy is advanced compared to that of many advanced countries. In December 2006, the government of Taiwan amended the “Regulation for Telecommunications Universal Service” and incorporated data access in uneconomic areas within the scope of universal service. In 2007, by implementing the “Broadband for Villages” project, Taiwan claimed to be the first country in the world to have provided broadband access in every village. Does this then mean that the universal service policy has included broadband as part of the USO in legal terms? Since 2002, Taiwan has announced several broadband policies. It has set a goal to provide 80% of households with 100 Mbps broadband access by 2013. (The original government plan was to accomplish the goal by 2015.)

What is the connection between the universal service policy and broadband policy in Taiwan? The goal of the broadband policy is to encourage the public to adopt broadband, whereas the goal of the universal service policy is to bridge the digital divide for people in uneconomic areas. This paper aims to re-examine Taiwan’s universal service policy in the broadband environment. It discusses whether the government of Taiwan has adopted the broadband universal service policy, as well as what should be the connection between the universal service policy and broadband policy in Taiwan.

### **Literature review**

Several previous papers have focused on the universal service policy since the 1990s. Dordick and Fife (1991) reviewed the impact on universal service by the American Telephone and Telegraph Company’s (AT&T) divestiture, arguing that it was necessary to understand the social, cultural, and geographical factors of telephone usage. Hudson (1994) suggested that regulators and policy-makers had been forced to re-examine the concept of universal service in a changing environment. By drawing on Federal Communications Commission (FCC) and census data covering the period 1980–1983, Schement (1995) argued that universal service was a basic right possessed equally by everyone in the information society regardless of his or her social status, income, or language. During this period, most studies focused on a basic definition of universal service and the feasibility of its policy.

The Telecommunications Act of 1996 redefined universal service as an “evolving level of telecommunications services”. Its policies were intended to promote access to advanced telecommunications and information services (Mueller, 1997). Since then, many efforts have been made to enlarge the scope of universal service. Beachboard, McClure and Bertot (1997) argued that the Telecommunications Act of 1996 limited the definition of universal service to telecommunications services, and other information services related to the public interest were left unresolved. In addition to the above critiques of the 1996 Telecommunications Act, there were many debates on the importance of universal service in the information society during the same period. Bauer (1999) asserted that since the EU telecommunications market relies on free competition, it is necessary to establish an explicit mechanism for universal service to ensure that all the citizens have the same basic rights in the information society.

Moreover, Benjamin and Dahms (1999, as cited in James, 2002) emphasized that the targets of universal access would change over time – when one target is met, universal access is redefined at a higher level.

With the extended scope of universal service, a voluminous amount of literature has replaced the term universal service with “universal access” or uses both terms at the same time. In 1998, the ITU published a report referred to as “The World Telecommunication Development Report 1998: Universal Access”, which claimed:

Universal service is a concept that has increasingly become focused upon connection of individual households to the public telephone network.

The concept of universal access is that everyone, at home or at work, should be within a reasonable distance of a telephone.

However, Bertot, McClure and Owens (1999) argued that the International Telecommunication Union (ITU) 1998 Report confused universal service with universal access because it ignored the importance of clearly determining the necessary requirements for first establishing connectivity (access), and only then deciding what type and level of services should be made universally available to a specific community.

De Reuck and Joseph (1999) emphasized that the implementation of universal service needed to be modified according to the development of information technology in order to accommodate participatory democracy in modern society. Valletti (2000) pointed out that in some developed countries, there is no longer any need for a universal service policy in the telecommunications industry. With the development of communications technology and the trend toward digital convergence in the twenty-first century, many studies related to universal service have gradually focused on the Internet and broadband access. James (2002) emphasized that the scope of universal service should meet the demand for new information technology, such as the wireless Internet. In 2003, the OECD published a report examining the question of whether the scope of universal service should be widened to include broadband. The conclusion suggests that because broadband technologies and applications are still at an early stage of development, it is not yet necessary to include broadband in the universal service obligation (OECD, 2003). However, van Eijk (2004) advocated that based on the policies and the development of the market, the universal service concept should be extended to broadband Internet access in the EU.

In 2005, the EU formally discussed broadening the scope of the Universal Service Directive (USD) to include broadband in the first periodical review. They concluded that only a small, although rapidly growing, minority of European consumers were using broadband at that time; therefore, the EU decided not to include broadband services within the scope of universal service (EC, 2005, 2006). In 2008, the EU's second review found that 36% of EU households had fixed broadband access. This suggests that while the number of narrowband connections is progressively decreasing, the EU has acted very quickly to confront the question of whether broadband should be included in the framework of universal service obligations or not (EC, 2008).

In early 2006, the OECD outlined a systematic procedure for considering USO status for broadband (OECD, 2006). For instance, the government needed to consider whether broadband was an essential service of significant social importance.

It needed to estimate the degree of expected market penetration of broadband service and assess the nature and extent to which broadband would not be made available by the market. The government needed to identify the objectives and desired outcomes more clearly. It also needed to consider the social and economic disadvantages incurred by those without access to broadband if there were no government intervention in this expected market situation and to estimate the costs of intervention to widen broadband deployment through the use of the USO mechanism.

Turner (2006) admitted that including broadband was indeed an important consideration in terms of national policy. At the Global Symposium for Regulators, Lie (2007), the telecommunications consultant for ITU, indicated that some developed countries had started to draw up policies for broadband universal access. Bourguignon and Ferrando (2007) found that in some cases, universal service obligations could act as a first mover advantage for incumbent firms or as barriers to entry for potential competitors. Jordan (2009) focused on the considerations of a universal service fund, indicating that the convergence of telephone networks, wireless networks, the Internet, and cable networks would pose additional serious long-term challenges to the universal service fund. Alleman, Rappoport, and Banerjee (2010) indicated that it was necessary to decide whether wireless and/or broadband services should be included in the definition of universal services. Ruhle et al. (2010) argued that financing via a universal service fund would only mean a reallocation of investments and financing within the telecommunications sector, and disagreed with the idea of including the Next Generation Access (NGA) Internet in the scope of universal service at that time.

In 2010, the World Bank systematically introduced the latest trend in the development of broadband policy. It summarized the key policies and programs for building the broadband ecosystem in three stages: promotion, oversight, and universalization. During the third stage, governments needed to consider expanding universal service obligations to include broadband, and they usually utilized three approaches to diffuse broadband to rural areas and underserved groups. In the first approach, the governments used regulations to require the dominant incumbent to develop a nationwide network that provided services to rural areas and underserved groups. The second approach was that the dominant provider was committed to constructing networks in rural areas of a certain scale without government support and expanding networks in remote areas with a certain level of subsidies. The third approach directly involved local governments, the central government, or public organizations in network construction and service delivery (World Bank, 2010).

### **Concept and definition of universal service**

Universal service is one of the most important concepts in the old scheme of communication regulation, and it can be viewed as the foundation of information policy for most of the twentieth century (Meyerson, 1997; Schement, 1995). In 1907, “universal service” first appeared in the slogan “one system, one policy, universal service” coined by AT&T president Theodore Vail. At that time, the American telephone network was in the middle of the early competitive period. The “universal service” problem received much attention in telephone competition because at that time competing telephone companies refused to interconnect with each other.

Even subscribers in the same city could not call each other if they were customers of competing networks (Mueller, 1997).

The issue was resolved when the Willis-Graham Act was passed in 1921, exempting telephone companies from the antitrust laws and making it possible for them to “unify the service” by merging competing telephone exchanges. Universal service entailed that all telephone subscribers should be connected to each other. Therefore, the “universal service” that Vail coined in 1907 was in fact referred to as a “unified service” (Meyerson, 1997; Mueller, 1997).

In 1991, the OECD described three main characteristics of universal service (OECD, 1991):

- (1) Universal geographic availability - Wherever a person lives or works, the level, price and quality of communications service must be the same.
- (2) Reasonable cost or affordability - Any consumer, particularly those vulnerable disadvantaged ones, should not be placed an unreasonable burden due to maintaining and using the communication service.
- (3) Non-discriminatory accessibility - A person's level of physical and mental ability does not preclude that person in terms of access to communications services.

### **The rationale for universal service obligations**

Early in 1991, Bertot et al. (1999) generalized five key reasons for establishing a universal service mechanism that promotes the development and implementation of various technology infrastructures at the national and international levels:

- (1) Societal advancement - Creating an educated and engaged citizenry through universal service policies.
- (2) Public good - Removing socio-economic barriers by providing access to technologies at reasonable cost.
- (3) Economic development - Providing corporations with technologically literate employees through equal access opportunities.
- (4) Global competitiveness - Enhancing international competitiveness through a technologically literate population.
- (5) Network externalities - Increasing the value of technology infrastructure by promoting use that is more widespread.

The OECD (2006) also identified economic, social, and political rationales in support of universal service obligations with more specific explanations. An economic rationale suggests that the adoption of communications services could lead to broader effects throughout the economy, including enhancing economic growth, boosting productivity, increasing a country's ability to compete globally, promoting regional development, and raising standards of living. With regard to a social rationale, by implementing universal service obligations, those living in remote rural areas, those on low incomes, the disabled, and other vulnerable groups have more opportunities to access public services or emergency services and thus fully participate in society. Therefore, a social rationale is often referred to as a socially equal rationale. Finally, a political rationale indicates that in the telecommunications industry, the nature of the universal service obligation is essentially a political decision. It argues that universal



service is also driven by social inclusion considerations related to e-governance objectives.

### **International development: EU, UK, Finland, USA**

#### ***The EU***

The Universal Service Directive lays down the basic principles for universal service, which it defines as “the minimum set of services, of specified quality to which all end-users have access, at an affordable price in the light of national conditions, without distorting competition” (EC, 2002). In 2009, the Citizens’ Right Directive amended the Universal Service Directive, offering flexibility to member states to define the data rates that would be sufficient to permit functional Internet access and thus to decide whether to include broadband in the universal service obligation (BEREC, 2010; EC, 2009).

Although the EU still refuses to include broadband in universal service obligations at the community level, in 2005 it began to formally discuss “broadband for all” on the one hand, and broadband universal service on the other (Bohlin & Teppayayon, 2010). Following lengthy discussions, the European Commission launched the “Europe 2020 Strategy” in March 2010. As part of the Strategy, the “digital agenda for Europe” was especially important because it set as its objective the bringing of basic broadband to all Europeans by 2013. It sought to ensure that all Europeans would have access to much higher Internet speeds of above 30 Mbps and that 50% or more of European households could subscribe to Internet connections of above 100 Mbps by 2020 (EC, 2010a, 2010b).

During the same period, the EU continued formal discussions of the possibility of updating the universal service to include broadband. These discussions have taken place since the first periodical review in 2005 and later in 2008. The preliminary conclusion for both reviews is that broadband has not yet reached the majority of people, implying that expanding the scope of universal service has not yet been fulfilled (EC, 2005, 2008).

#### ***The UK***

In the United Kingdom (UK), the Secretary of State for Trade and Industry specified that universal services must be provided throughout the UK, as stipulated in the Universal Service Orders (2003). Two major telecommunications operators, BT and Kingston, were required to provide a narrowband connection capable of “functional Internet access” upon reasonable request and at uniform prices, irrespective of geographical location (Ofcom, 2005, 2009).

In 2009, the Department of Culture, Media, and Sports (DCMS) and the Department for Business, Innovation & Skills (BIS) launched the Digital Britain Final Report, which outlined the UK Government’s strategic vision for ensuring that the country was at the leading edge of the global digital economy. Two major projects for promoting broadband availability in the UK were raised in the report: the Universal Service Commitment and the Next Generation Final Third Project. The Universal Service Commitment ensured that, by 2012, the broadband connection at 2 Mbps would be delivered through upgrades to the existing copper and wireless networks (DCMS & BIS, 2009).

It is noteworthy that although the policy of broadband universal access is indicated in the Digital Britain Final Report, broadband access is still not defined in the scope of universal service obligations in the UK. Specifically, the UK government has agreed that the delivery of broadband at 2 Mbps by 2012 as defined in the Digital Britain Final Report is a “commitment” rather than the legally binding ruling of an “obligation” (BBC News, 2009, 2010).

### *Finland*

In order to meet the transition goal set by the EU’s Universal Service Directive of 2003, the Finnish Government amended the Communications Market Act to include data access in the scope of universal service (MTC, 2008a, 2008b). In December 2008, the Finnish Government adopted a Resolution on the national action plan and identified two major goals: first, every permanent resident and permanent office of a business or public administration body should have access to broadband connection with an average rate of at least 1 Mbps by 1 July 2010. Second, 100 Mbps broadband connection is to be made available for permanent residents and permanent offices of businesses and public administration bodies throughout Finland by 31 December 2015 (Finland Government, 2008; MTC, 2009).

Pursuant to Section 60 c(2) of the Communications Market Act, the service providers assigned by the Finnish Communications Regulatory Authority (FICORA) should provide the minimum 1 Mbps of the downstream rate of functional Internet access. However, due to practical factors that would directly affect the data access rate, the average minimum downstream rate was accepted at 750 Kbps within a measuring period of 24 h and 500 Kbps in any four-hour measuring period (MTC, 2008b, 2009).

Another means of promoting the 1 Mbps broadband connection by 2010 is license regulation. If a telecom company is unable to prove that a corresponding level of service can be implemented with other technology, an obligation of 1 Mbps broadband service will be added to the license and granted to that company. Furthermore, license renewal will also become a means of achieving the goal of 1 Mbps broadband access (MTC, 2008b).

### *The USA*

In early 2009, the US Congress directed the Federal Communications Commission (FCC) to develop a National Broadband Plan to ensure that every American has “access to broadband capability”. In March 2010, the FCC published *Connecting America: The National Broadband Plan*, which outlined six major goals to accelerate broadband infrastructure and availability in the USA by 2020. Among them, the third goal is particularly related to universal service: Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose (FCC, 2010; Screen Digest, 2010).

The National Broadband Plan also requires 4 Mbps of actual download speed and 1 Mbps of actual upload speed, with an acceptable quality of service for interactive applications. With this target, the USA set the highest universalization requirement in terms of a broadband access rate. Furthermore, the FCC would



review and reset this definition every four years in the future to make sure the definition was suitable for current circumstances (FCC, 2010).

The third major goal and the requirement of a 4 Mbps download speed are both directly related to the existing universal service mechanism in the USA. The FCC plans to amend the existing universal service mechanism and to use up to \$15.5 billion from the existing Universal Service Fund (USF) over the next decade to foster the deployment of broadband.

## Universal service policies in Taiwan

### *The development and implementation of the universal service policy*

Initially, the universal service policy in Taiwan included only voice. Subsequently, data access by elementary schools, high schools, and public libraries was included, in addition to data access service in uneconomic areas. The implementation of the universal service policy can be divided into several stages:

#### *Single provider stage: cross-subsidization was allowed earlier (1996 to 2001)*

The universal service policy is an important telecommunications policy in many countries around the world. Before 1996, because Chunghwa Telecom (CHT) was state-owned and the only fixed line carrier at that time, it was asked to provide universal service to uneconomic areas by subsidizing the losses with profits from its other business. In 1996, the government revised the Telecommunications Act and added the universal service obligations to the law. In 1997, the government announced its plan to establish the universal service system in its Telecommunication Liberalization White Paper. In 1999, before the government established the new fixed networks, it revised the Telecommunications Act by restricting telecom carriers to cross subsidizing their losses while providing universal service. In 2000, the government granted three new fixed-line licenses to the Taiwan Fixed Network, New Century InfoComm Tech Co., and Asia Pacific Broadband Telecom (APBT, whose former name was Eastern Broadband Telecom). One year later, the Ministry of Transportation and Communications (MOTC) set the Regulation for Telecommunications Universal Service and the Principles for Establishing the Telecommunications Universal Service Fund Oversight Committee. The main functions of the Telecommunications Universal Service Fund Oversight Committee include assessment of the annual implementation plans and subsidy applications for universal service, auditing and assessment of the incomes and expenses of the Telecommunications Universal Service Fund, and the evaluation of the performance of the universal service regime, and so on.

#### *Multi-providers stage: universal service fund mechanism started to work (2002 to 2005)*

In 2002, the Universal Service Fund mechanism began operation. Since then, multi-providers have participated in providing universal services. However, new participants, such as Taiwan Fixed Network, New Century InfoComm Tech Co., and Asia Pacific Broadband Telecom (APBT), provided data access services only because they did not have last-mile advantages like CHT. Subsequently, CHT was not

solely responsible for the losses. Like other new providers, CHT could apply for subsidies from the Telecommunications Universal Service Fund. During this period, CHT was the only provider of a voice service in uneconomic areas.

*Government intervention stage: extending the scope of universal service to broadband in uneconomic areas by project (2006 to 2010)*

In February 2006, the Radio and TV Department of the Government Information Office (GIO), the former broadcasting authority, and the Directorate General of Telecommunications (DGT), the former telecommunications authority, were integrated to become the National Communications Commission (NCC). Because the Supreme Court ruled the selection process of the NCC Commissioners as unconstitutional in July 2006, the first-term NCC Commissioners were challenged by the DPP-led Executive Yuan and the DPP legislators.<sup>1</sup> They needed to work harder and “smarter” in order to prove their legitimacy to the newly established agency.

The “Broadband for Villages” project was one of the important projects in the NCC’s annual plan. No one criticized the “Broadband for Villages” project in public, except those who had to contribute money to the universal service fund. The NCC decided to implement its “Broadband for Villages” project because not only were people in remote areas grateful for the NCC’s policy but also the media and the public gave more approval to the NCC. The operators were willing to comply with the NCC because they were afraid the NCC might resort to an “administrative check-up”, which would mean that they would harass the operators by checking on unnecessary matters. In October and December 2006, the NCC revised the Regulation for Telecommunications Universal Service in order to legitimize its “Broadband for Villages” policy. The following revisions were introduced:

- (1) Removing free seashore radio and safety service: if other government agencies allocated budgets for these kinds of services, the NCC could use the money for its “Broadband for Villages” project and other related measures.
- (2) Gradually shortening the scope for public payphones in uneconomic areas.
- (3) Including data communication access in uneconomic areas.
- (4) Data communication access should be provided in an economic and effective way (both wireline and wireless service are acceptable).
- (5) “Telecommunications Universal Service on Data Transmission” was redefined as “Service for the provision of access to the Internet Service over a wireline or wireless Broadband Telecommunications Network.”

This amendment was very important because it meant that the scope of universal service was extended to data access in uneconomic areas.

*“Broadband for Villages” project (2007)*

As mentioned above, before the NCC decided to implement the “Broadband for Villages” project, it needed to legitimize its policy. It found that Article 12 of the Fundamental Communications Act stipulates that the government shall take necessary measures to promote the right of access to communications and the provision of universal service. In addition, as a result of learning that data communications access was included in the scope of universal service in the European

Union's Universal Service Directive in 2002, the NCC amended the "Regulation for Telecommunications Universal Service" in December 2006 and included data access by uneconomic areas within the scope of universal service. After finding that all 46 remote villages with no broadband could be wired at only a cost of NTD 96.5 million (about USD 3.19 million), the NCC prioritized the "Broadband for All Villages" project and completed it in late December 2007. Under the project, CHT, the dominant carrier, provided broadband access to 43 remote villages, while the Taiwan Fixed Network Corporation provided broadband access to three remote villages. After the installation, the broadband service speed was increased to above 2 Mbps. The NCC said this had made Taiwan the first country in the world to deploy broadband to all its villages.

In fact, "Broadband for All Villages" meant that as long as the ADSL line could reach one household in the village and the telecommunications operator could provide more than 2 Mbps, the village was deemed to have broadband access (C. J. Liu, personal communication, 4 May 2012). Hence, broadband was provided to the curb, not to the home. Therefore, there are still households in villages that might not have direct access to broadband, but it was much easier for households in remote areas to subscribe to broadband after the implementation of the project because the DSL line had been deployed closer to their homes.

*"Broadband for Tribe Habitants" project (2008 to 2010)*

After the NCC completed its "Broadband for Villages" project, it revised the universal service regulation in February 2008 and promoted the "Broadband for Tribe Habitants" project. The NCC selected 50 tribes based on the Internet connection demand, the number of households, local economic development, local landscape, cultural features, and tourism information provided by the Council of Indigenous Peoples of the Executive Yuan. In order to encourage more players to commit themselves to the universal service, the NCC encouraged a cable system operator, CNT CATV Co. Ltd (CNT), to apply. This was the first time that a cable system operator participated in the deployment of broadband among the tribes.

Thereafter, the NCC selected 55 tribes in 2009 and 11 tribes in 2010 for broadband deployment, which was based on a study by Chaoyang University of Technology on the demand for broadband in remote areas in Taiwan. In 2010, the NCC found that only 24 tribes did not have broadband. It granted exemptions for waiving the broadband deployment based on two criteria: (1) there was no demand for broadband; (2) the expense of deployment for one household was over two million New Taiwan dollars. Meanwhile, the NCC announced that the universal service application should return to normal, which meant that telecom carriers or cable operators having a type 1 license needed to submit their applications for universal service by 1 June of the year before the implementation year. Moreover, the government would announce the results regarding the selected providers and the service areas by 1 December of that year.

From 2007 to 2012, broadband was deployed in 46 villages and among 174 tribes, a total of 542.44 miles. The expenses amounted to 292.67 million NT dollars. In February 2008, the broadband adoption rate by the 46 villages was 4.93%. By April 2010, it had increased to 13.35%. After two more years, it had increased by only 1%. As of May 2012, the broadband penetration was 14.34% in the villages and 20.06%

Table 1. Broadband deployment in the remote areas, 2007–2012.

Promotion Strategy	2007	2008	2009	2010	2011	2012
	Every village has Broadband	Every tribe has BB	Every tribe has BB	Every tribe has BB	Return to normal	Return to normal
Areas Covered	46 villages	50 tribes	55 tribes	11 tribes	24 tribes	34 tribes
Fiber	157.22	122.13	51 nodes	26.184	10 nodes	9 nodes
Deployment (Miles)			148.82		13.6	74.49
Broadband						
Speed	Above	Above	Above	Above	Above	Above
Providers	2 Mbps	2 Mbps	2 Mbps	2 Mbps	2 Mbps	2 Mbps
	CHT (43)	CHT (42)	CHT (48)	CHT (10)	CHT (8)	CHT (9)
	TFN (3)	TFN (6)	TFN (1)	TFN (1)	CNT(2)	TFN
		CNT (2)	NCIT (2)			NCIT
Expenses (NT million)	92.9	77.8	77.3	13.6	6.9	CNT (cable)
Broadband Penetration in the remote area	4.93% (Feb., '08)	16.46% (Jan., '09)	11.04% (Jan., '10)	9.21% (March, '11)	16.53% (March, '12)	292.7
						Villages: 14.34%
						Tribes: 11.7–30.11%
	13.35% (April, '10)	25.07% (April, '10)	15.86% (April, '10)	12.47% (Feb, '12)	NA	Average for the tribes: 20.06%
	14.34% (May, '12)	30.11% (May, '12)	25.98% (May, '12)	12.47% (May, '12)	11.70% (May, '12)	ongoing

Source: M. C. Lee, personal communication, 21 November 2011; 4 May 2012.

among the tribes. Hence, the growth rate for the broadband adoption has not been satisfactory .

*The current data universal service system in Taiwan*

As mentioned above, the rationale for providing universal service includes social, economic, and political perspectives (OECD, 2006). From the social perspective, a universal service policy (USO) can improve the digital divide and ensure that people living in remote areas have the chance to access public services and emergency services. From the economic perspective, the USO can boost productivity, promote regional development, and raise the living standards of people in remote areas. From the political perspective, the USO can help people in remote areas become linked to e-governance objectives. Figure 1 explains the players and background of the data universal service policy in Taiwan. It indicates that the NCC is the government agency responsible for implementing the universal service policy. Type 1 telecommunications companies can provide universal services, as can cable system operators, as long as they have Type 1 telecommunications licenses.<sup>2</sup> The Taiwanese USO provides funding for broadband services to high schools and elementary schools, as well as public libraries. The USO must be based on laws and regulations. To provide broadband to all villages and tribes is a political decision. If there is sound industry competition, the provision of broadband will help both consumers and Taiwan's

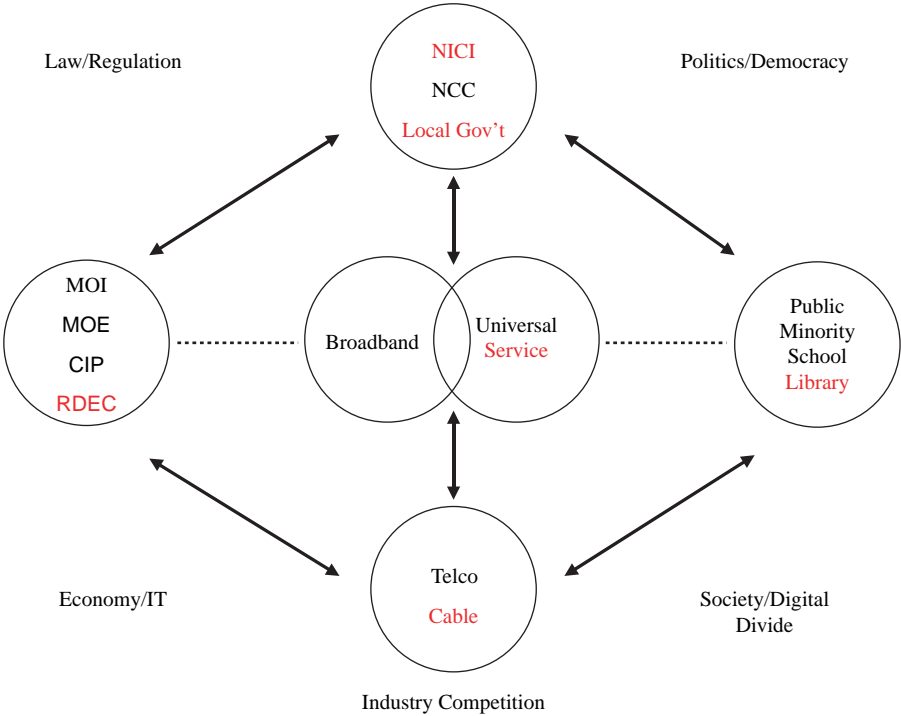


Figure 1. Players in the data universal service policy in Taiwan.

economic growth. In theory, providing broadband USO can also help reduce the digital divide.

The successful factors for broadband universal service include broadband infrastructure (or access), PCs, skills, affordable prices, and subsidies for the subscription fees of low-income people. There has been criticism that government agencies did not cooperate well in providing all the above-mentioned types of assistance to people in remote areas (J. Hsieh, personal communication, 2 December 2010). They established only their own goals without coordinating with other relevant government agencies. Currently, the NCC is mainly in charge of advancing the broadband infrastructure. Its role is not to subsidize PCs or subscription fees (except for middle schools, elementary schools, and public libraries), although it does encourage the three largest telecommunications carriers to donate PCs to the remote areas. Other players need to cooperate with the NCC to provide PCs, training, and subsidies for broadband subscription fees in order to make the universal service policy effective.

For instance, the Ministry of the Interior (MOI) could subsidize the broadband subscription fees of low-income households. The Ministry of Education (MOE) has established Digital Opportunity Training Centers, which provide training to people in remote areas. It encourages college students to volunteer to teach people in remote areas to reduce the digital divide. It also subsidizes part of the subscription fees for broadband access in high schools and elementary schools in remote areas. The Council of Indigenous Peoples (CIP) could provide computer literacy training to aboriginal people and send PCs to low-income aboriginal households. The Research, Development and Evaluation Commission (RDEC) could continue to donate PCs to libraries in remote areas. Students from low-income families could borrow PCs for their own use. Jimmy Hsieh, former NCC Commissioner, criticized some government agencies for overlapping with other agencies by providing similar forms of assistance, such as donating PCs, training people, or subsidizing broadband subscription fees (personal communication, 17 April 2012). He suggested that the National Information and Communications Initiative Committee (NICI) could play the role of coordinating all the government agencies. Established in 2001, NICI has the official capacity to coordinate actions among relevant government agencies to achieve its overall missions. Two of its designated missions are to accelerate the development of the IT industry and to promote Internet usage and its related applications. On some occasions, the local government could also subsidize local schools and libraries.

### *The definition and scope of universal service in Taiwan*

According to Article 20 of the Telecommunications Act, the term “universal services” means “the necessary telecommunications services of a certain quality that may be fairly enjoyed by all nationals at a reasonable price”. However, the law does not specify the telecommunications services that are necessary, which led to the regulator’s setting up the rule. Initially, “universal service” included only voice-based telecommunications in Taiwan. In 1997, the scope of universal service included only public payphones, social public phones, and basic phone service in uneconomic areas. In 2001, the former regulator, the DGT, expanded the scope by adding the seashore radio and safety telecommunications service and the school and public library data communication subsidy. In 2006, the NCC removed the seashore radio and safety



telecommunications service. However, it added data communication access in uneconomic areas, which it defined as a “single local exchange office’s service area where the avoidable costs incurred by a universal service provider for the provision of telephone service in a remote area exceeds its revenue forgone”.<sup>3</sup>

The current Regulation for Telecommunications Universal Service defines universal service as including a voice-based telecommunications universal service and a data transmission telecommunications service. Technically speaking, data communication can be either narrowband or broadband, as long as it can be connected to the Internet. Surprisingly, Article 2 of the Regulation for Telecommunications Universal Service defines “Telecommunications Universal Service on Data Transmission” as a “service for the provision of access to the Internet service over a wireline or wireless Broadband Telecommunications Network”. Article 11 of the same regulation also stipulates, “Telecommunications Universal Service on Data Transmission includes Telecommunications Universal Service on Data Transmission in uneconomic areas”. This means that the NCC adopted broadband universal service implicitly in its universal service regulation although the Telecommunications Act used the wording “necessary telecommunications services” (see Table 2). However, between 2007 and 2010, “broadband universal service” was enforced only on a “special project” basis. For instance, the NCC would locate the demand in remote areas based on the studies it commissioned and let the Type 1 operators apply. Hence, it was driven by the government’s intervention, not the people’s requests. On the surface, the telecommunications operators cooperated with the regulator, but they complained that it was not very cost effective (J. J. Kao, personal communication, 2 May 2012). The subscription rate for broadband in uneconomic areas is very low (see Table 1).

Table 2. The current universal service system in Taiwan.

Item	
Regulator	National Communications Commission
Definition	The necessary telecommunications services of a certain quality that may be fairly enjoyed by all nationals at a reasonable price.
Scope	Voice services: (1) Public phone services in the uneconomic areas (2) Phone services in the uneconomic areas Data services: (1) Data Transmission in uneconomic areas (2) Discounts on Internet access offered to local elementary and middle schools and public libraries
Providers	Incumbent operator and other type 1 telecommunications service providers
Methods for selection	Examine the applicants first, and only then designate the providers.
Sources for funding	Universal Service Fund
Contributing companies	Type 1 and Type 2 telecommunications service providers whose annual business volume is above 0.1 billion New Taiwan dollars.

Source: Wu, 2011, p. 120.

### *Selected providers of universal service*

Since CHT is the dominant telecommunications carrier and other carriers lack last-mile connectivity to the household, CHT is the only provider for the Voice-based Telecommunications Universal Service. With regard to data communications access, CHT is not the only provider. Since 2002, the new fixed networks, such as Taiwan Fixed Network, New Century InfoComm Tech Co. (NCIT), and Asia Pacific Broadband Telecom (APBT), have also applied for universal service provider status. In 2008, CNT CATV Co. Ltd (CNT), a cable operator in Nantou (the central part of Taiwan), was also encouraged by a NCC Commissioner to apply for approval as a universal service provider (see Table 1).

### *Universal Service Fund and the contributing companies*

In Taiwan, the telecommunications universal services fund is a virtual fund. According to the Telecommunications Act, a fund dedicated to universal services shall be established for achieving the goal of universal services. The losses and necessary management expenses arising from the universal services shall be shared and paid out to the Universal Service Fund by the telecommunications enterprises publicly designated by the NCC. In 2002 and 2003, the DGT set one billion New Taiwan dollars (NTD) as the criterion for participating universal service carriers. This means that if the revenue of the telecommunications enterprises was above one billion NTD, they had to share the amount of the universal service costs. As for the amount, the regulator would multiply the proportion of the revenue of the total participating universal service carriers' revenue by the universal service cost. In 2004, the DGT set 0.2 billion NTD as the criterion. In 2007, the NCC lowered the criterion to 0.1 billion NTD. This meant that more carriers shared the costs. On average, CHT shared about 53% of the costs for the past years. Between 2002 and 2003, only 10 or 11 carriers shared the costs. Between 2004 and 2011, that number doubled and more.

The universal service expenses decreased drastically for voice and public phone items. The voice service expenses amounted to 1.32 billion NT dollars in 2002, but declined to 494.9 million NT dollars in 2010. The public phones service expenses

Table 3. Number of participating universal service carriers.

Year	Turnover, Annual business volume (NT\$)	No. of Companies	Regulator
2002	1 billion	10	DGT
2003	1 billion	11	DGT
2004	0.2 billion	20	DGT
2005	0.2 billion	19	DGT
2006	0.2 billion	20	NCC
2007	0.1 billion	29	NCC
2008	0.1 billion	28	NCC
2009	0.1 billion	24	NCC
2010	0.1 billion	24	NCC
2011	0.1 billion	22	NCC

Source: National Communications Commission.

Table 4. Universal services expenses, 2002–2010.

Year item	2002	2003	2004	2005	2006	2007	2008	2009	2010
Voice–UnE	1,315.1	1,033.8	952.9	840	765.7	475.4	490.3	497.5	494.9
Public phone UnE	827.9	625.7	413.4	392.9	283.3	171.8	157.8	151.4	127.3
Seashore radio & safety	231.9	178.1	142.4	147.1	138.4	0	0	0	0
School & Public library	86.7	100.2	114.3	181.3	158.9	177.7	180.9	187.4	166.9
Data service UnE	0	0	0	0	0	59	54	58	58.5
Total expenses (NT million)	2,461.6	1,937.7	1,623	1,561.4	1,346.1	883.8	883,	894.3	847.7

Source: National Communications Commission 1 USD = 30 NTD

amounted to 828 million NT dollars, but declined to 127 million NT dollars in 2010. There was no more funding for seashore radio and safety telecommunications from 2007. The subsidy for schools and public libraries was 87 million NT dollars in 2002, increased to 181 million NT dollars in 2005, but decreased to 167 million NT dollars in 2010. However, there were new expenses for data services from 2007 on. The total universal service expenses fell from 2.46 billion NT dollars in 2002 to 847.7 million NT dollars in 2010.

## **Evaluation of the data universal service policy in Taiwan**

### ***Benefits of data universal service projects***

In order to implement the “Broadband for Villages” project and the “Broadband for Tribe Habitants” project, the NCC amended the “Regulation for Telecommunications Universal Service” four times between 2006 and 2010. It expected that these measures could realize the goal of bringing broadband to people living in uneconomic or remote areas, thus bridging the digital divide between cities and rural regions. The NCC said that the benefits obtained after implementing the projects for installing broadband access networks in remote villages and tribes included increasing speed, reducing the digital divide, increasing jobs, promoting e-learning and the tribal economy, and enhancing efficiency.

For instance, in 2007, CHT deployed broadband in a village located at the most remote southern tip of Alishan Township. The village had 80 households, 300 residents, and five guest houses. By connecting to the Internet, the residents could turn from original agricultural production to eco-tourism based on the life experiences of the Tsou tribe. Therefore, the universal service project not only helped the local residents develop their tribal economy but also put the NCC and the universal service providers in a good light.

### ***Drawbacks of data universal service projects***

#### ***The need for broadband was over-estimated***

Some telecommunications operators were critical of the projects and stated that the demand for broadband in the uneconomic areas was often over-estimated. They said that the heads of the villages or tribes often exaggerated the demand. The expenses for broadband installation were high, but the adoption rate was low, so it was not cost effective. A manager of Taiwan Fixed Network said,

In 2010, in a remote village in Hsinchu county, when the NCC asked the local government about the broadband demand, 13 households expressed interest. However, after the broadband was deployed, only one household subscribed to our service. Even though we could be subsidized, we only had one customer. Who will pay for the maintenance fee in the future? Is it a waste? (Taiwan Fixed Network, personal communication, 3 December 2010)

#### ***Over-built problem and cost efficiency***

By promoting a data universal service policy, the NCC encouraged new carriers to apply to deploy broadband in remote areas. However, the incumbent carrier, CHT,

has extensively provided voice access, even to remote areas. It would be cheaper for it to deploy broadband to the remote areas. A manager of New Century InfoComm Tech Co. said,

When we deployed the broadband in some remote tribes, we found that they were 70% to 80% over-built with CHT's network. I also calculated the cost. If we build a line by spending 100 NT dollars, CHT only needs to spend 6 NT dollars. It is very unbalanced. The over-building is also a waste of resources. (C. J. Ho, personal communication, 24 November 2010).

### ***Other concerns for implementing the data universal service policy***

#### *The subsidy for low-income households and assistance with Internet education*

It is hotly debated whether the universal service fund should subsidize the broadband subscription fees for low-income households. All carriers argue that the government should allocate budgets to subsidize low-income households to encourage them to subscribe to broadband. The NCC also believes that subsidizing low-income households is a kind of social welfare. Therefore, the NCC argues that the Ministry of the Interior, not the NCC, should be responsible for subsidizing the broadband subscription fees of low-income people (S. H. Chang, personal communication, 7 December 2010). In addition, in remote aboriginal villages and tribes, many residents do not have computers, or they do not know how to use computers. The NCC encouraged the operators to donate computers and to provide assistance with Internet education. Although the operators cooperated with the NCC by providing the assistance, they were opposed to the idea that providing computers and Internet education to low-income households should be part of the universal service obligations.

#### *Anti-competition issues*

Since the incumbent CHT has basic networks in most of the areas, its data deployment cost is relatively low. Other carriers have criticized that there is an anti-competition issue involved: "If CHT has deployed the basic networks in the past, it should not use USF to help it upgrade its network to a fiber network which is subsidized by other carriers." (C. J. Ho, personal communication, 24 November 2010).

CHT has served in more areas and received more subsidies from the Fund. It also has more advantages than other carriers do. The important point is whether there is so much demand for broadband in the remote areas. Was the money CHT applied from the Fund reasonable? (Taiwan Fixed Network, personal communication, 3 December 2010)

Former NCC chairperson Bonnie Peng and former NCC Commissioner Kung-Chung Liu both urged the government to look into the anti-competition issues involved after they left the NCC (K. C. Liu, 2010; Peng, 2011).

In addition to the above concerns, some operators criticized the NCC's "Broadband for Villages" project and the "Broadband for Tribe Habitants" project as being government interventions. The purpose of the projects was to help the NCC accomplish its political achievement, which was to claim that Taiwan was the first country to provide broadband to all villages and tribes (Shay, 2011). They argued that the NCC was not authorized by the Telecommunications Act to extend the universal service to broadband, and it had revised the regulation only to achieve its agenda.

A sound broadband universal service policy needs to provide statistics about the number, locations, and budget for non-broadband areas. The exact demand for broadband is important to determine. The NCC should avoid the problem of “over-building”. If the universal service were funded by diverse sources, the contributing companies would not consider the cost a big burden.

In summary, the NCC’s data universal service projects are successful in that people living in uneconomic or remote areas have access to broadband, which can help their tourism programs and tribal economies. However, the goal of bridging the digital divide was not accomplished as intended because some people could not afford the subscription fees. Since the broadband penetration is 14% in the villages and 20% among the tribes, it is obvious that the broadband adoption rate is low and the outcome is not very satisfactory.

### **The connection between broadband policy and universal service policy**

#### ***Broadband development in Taiwan***

As of September 2011, the broadband penetration of households in Taiwan was 80.7% (FIND, 2012). More than 51% of households had subscribed to 8 Mbp and above. According to NCC statistics, in December 2011, 42.1% of households had subscribed to FTTx, 38.9% to xDSL, and 18.6% to cable modem. Table 5 shows the growth of the broadband subscribers via different technologies. The growth calculated based on subscriber accounts and reported to the NCC by the broadband operators directly. It is obvious that the number of DSL subscribers is decreasing, because more than half of its subscribers have upgraded to the FTTx service. In fact, most DSL and FTTx users subscribe to CHT’s service. Therefore, CHT is the dominant player in the broadband market.

#### ***Broadband policy in Taiwan***

Taiwan’s broadband policy can be traced to 1997 when the National Information Infrastructure (NII) promoted the “Three million people connected to the Internet in

Table 5. Wireline broadband subscribers.

Date	ADSL	FTTx	Cable Modem	Leased Line	Total
2003/12	2,548,570	3,594	452,459	22,670	3,027,293
2004/12	3,163,107	6,095	526,209	21,974	3,717,385
2005/12	3,722,750	15,923	541,310	21,234	4,301,217
2006/12	3,822,744	179,621	419,912	29,575	4,397,904
2007/12	3,684,259	527,968	502,629	26,375	4,692,275
2008/12	3,268,978	1,016,229	648,910	34,003	4,911,866
2009/12	2,581,593	1,532,164	810,034	19,874	4,943,665
2010/12	2,360,485	1,957,840	927,637	19,064	5,265,026
2011/12	2,124,588	2,302,158	1,013,796	23,540	5,464,082

Note: Calculated based on subscriber accounts (Source: National Communications Commission)



three years” plan and launched the broadband policy. In May 2002, the government of Taiwan announced the “Challenge 2008” Six-year National Development Plan to transform Taiwan into a high-tech service island. In order to improve the nation’s IT proficiency and the competitiveness of the domestic IT industries, the government launched the e-Taiwan Program (also known as Digital Taiwan) as part of the Challenge 2008 Plan. One of the most important aspects of the e-Taiwan plan was to install broadband Internet in every household, with the goal of reaching six million households by the end of 2007. The NCC’s “Broadband for Villages” project was derived from the 2002 plan. In fact, it was not easy to accomplish the goal, because the incumbent CHT had been dominating the DSL market. Other fixed networks and ISPs complained about lacking the last mile (Liu, 2008).

In 2004, the NICI, coordinating with MOI and the Ministry of Economic Affairs (MOEA), proposed the “M-Taiwan Program”, which is composed of two parts: the “Broadband Backbone Construction Plan” and the “Mobile Taiwan Application Promotion Plan”. The former plan aimed at solving the “Last Mile” problem and was implemented by the MOI. The government allocated 30 billion NT dollars to build a second broadband, which local governments would rent to the new fixed networks, cable operators, or mobile phone operators. However, the “Broadband Backbone Construction Plan” failed because the broadband construction coverage was low and inefficient. It was therefore strongly criticized by the telecommunications industries and even investigated by the Control Yuan in 2009.

In 2008, the government announced the Ubiquitous Network (u-Taiwan) project, which aimed to provide Taiwan with innovation telecommunications and develop a ubiquitous network for Taiwanese people. The project was intended to promote the nation’s broadband coverage to 80% with 30 Mbps by 2011, promote people’s information literacy, teach 80% of remote-area people how to use computers, promote e-commerce among 500,000 small and medium-sized enterprises, donate computers to low-income household students, and so on.

Five government agencies were involved in providing budgets for IT educational training, but they did collaborate very well (J. Hsieh, personal communication, 2 December 2010). In “creating a fair e-opportunity plan”, several promotion plans had connections with data universal service, but there were no linkages with the NCC’s Broadband for Villages Project. The u-Taiwan project was formally terminated at the end of 2008 because the KMT-led government had other plans for the ICT policy.

In December 2008, the Executive Yuan passed a three-year “i-Taiwan” plan to develop 12 national infrastructures in order to expand the value-added economy. Of the 12, the “Intelligent Taiwan” project was designed to establish a broadband convergence network, for which the goal was to have broadband access with 80% coverage and 30 Mbps speed by 2012 and 70% coverage and 50 Mbps speed by 2016. Although these plans, such as promoting computer possession and assisting with computer literacy, had connections with data universal service regulation, the Project did not mention the role of the NCC.

In July 2010, the Executive Yuan announced the “Digital Convergence Development Plan” to help Taiwan catch up with the USA, the EU, Japan, and Korea. The plan included six promotion plans and strategies. Three are related to broadband development and are aimed to promote next generation networks, promote wireless broadband network, and balance the digital divide and promote universal service. More specifically, these three goals are as follows:

- (1) Provide 80% of households with wireline broadband network at 30 Mbps by 2012 and 100 Mbps by 2015
- (2) Have 6 million optical fiber network subscribers by 2015
- (3) Have 2 million wireless broadband subscribers by 2015

However, only a small portion of the Digital Convergence Plan is concerned with bridging the digital divide and promoting universal service. It only mentions 2 Mbps broadband access for the tribes and effective use of the Cable TV Fund. In other words, there is no direct linkage between the broadband policy and universal service policy in this plan.

On 23 December 2011, during the Presidential election period, the Democratic Progressive Party (DPP) Presidential candidate, Tsai Ing-wen, included in his campaign the provision of 100 Mbps broadband to all by 2013. Subsequently, the Kuomintang (KMT)-led government also announced it would provide 100 Mbps by 2013 to support its Presidential candidate Ma Ying-jeou. In fact, even some NCC Commissioners did not think this promise could be fulfilled unless the government gave more incentives to the carriers. Technology is not an issue for consumers; the key success factors for higher speed broadband adoption are price and application. However, most telecommunications operators believed the government's broadband policies had failed, because the DSL and FTTx markets were still dominated by CHT. The competing carriers felt that the broadband policies should not only rely upon CHT's performance. Even though the government used fancy names, such as e-Taiwan, m-Taiwan, and u-Taiwan, the reality is that other carriers still could not compete with CHT because CHT controls most of the last mile.

### *Reassessment of the scope of universal service in Taiwan*

Although the NCC has tried to extend the scope of universal service to broadband through special projects, such as the "Broadband for Villages" project and the "Broadband for Tribe Habitants" project, this does not mean that there is a formal "broadband" universal service policy in Taiwan. Unlike Finland, which considers broadband (at least 1 Mbps) as a basic human right and part of the universal service obligation, Taiwan's regulator only revised the regulation rather than the law to include "data service" as part of the universal service.

Data service is not equivalent to broadband service, although they may overlap. In its documents for USO providers, the NCC used only the terms universal service or data service. It did not use the term broadband universal service even though the providers were required to provide 2 Mbps to the residents of the designated villages and tribes. Broadband universal service has to ensure that all people have access to broadband, whereas data universal service applies only to uneconomic areas. In addition, broadband universal service has to make sure all people can afford the broadband service, whereas data universal service focuses on only broadband accessibility in uneconomic areas.

There have been discussions about whether broadband connection is a basic human right. In November 2011, Dr. Hamadoun Touré, Secretary General of the International Telecommunications Union, declared that broadband communications were a basic universal human right. Touré argued that broadband would be increasingly required for education and healthcare. He said that people would not be

able to meet the Millennium Development goals in health without e-health, in education without e-education and that government services could not be provided without e-government services (Bailey, 2011).

In Taiwan, before the 2012 Presidential election, both the DPP and KMT Presidential candidates campaigned for broadband connection as a basic human right. In March 2012, the NCC Chairperson Su Herng was asked to declare whether broadband was a basic human right in the Legislative Yuan. She said that people should have the right of access to information. However, broadband was only one of the tools to help people connect to the Internet. The country should use a high standard to determine which right should be regarded as a basic human right. Obviously, the NCC's data universal service policy aims to reduce the "digital divide" for people living in uneconomic areas, while the two Presidential candidates set a higher goal for the government to reach.

Between 2002 and 2010, broadband policies in Taiwan did not have a direct linkage with the universal service policy. While Finland and the UK both established the goal "broadband to all" before discussing higher broadband speed, in Taiwan the Digital Convergence Development Plan referred to only wireless broadband to all (95% or 98%). With regard to the wireline broadband, the Plan did not establish the goal of reaching all people as long as it could provide 80% of households with the broadband network at 100 Mbps. In February 2012, in order to help the Executive Yuan to achieve the goal of its "Digital Convergence Development Plan", the NCC decided to urge selected operators to upgrade the 2 Mbps to 10 Mbps in uneconomic areas (C. J. Liu, personal communication, 2 May 2012). In fact, as of May 2012, 70% of the uneconomic areas had a broadband network at the speed of 10 Mbps. It should not be difficult for the CHT to accomplish the government's goal if the respective local governments allow it to dig up public roads when necessary (J. J. Kao, personal communication, 2 May 2012).

## Conclusion

Although the Telecommunications Act did not use the wording "data service" or "broadband service" in the universal service obligation provision, since the NCC revised the Regulation for Telecommunications Universal Service in December 2006, there has been an implicit broadband universal access policy. By reexamining the broadband policy and the universal service policy in Taiwan, we find that the government in Taiwan has relied too much upon CHT, because its broadband penetration accounts for about 80% of the market, and the government (MOTC) still owns 35% of the company. CHT seems to be more willing to help the government to achieve its policy goal although it also complains about the asymmetrical regulation against it. With regard to the "Broadband for Villages" project and "Broadband for Tribe Habitants" project, CHT has also cooperated well with the regulator. In the past, whenever there was no applicant for the uneconomic areas, the regulator would designate CHT as the provider. If other operators were interested, they would have had the privilege of being considered first, which is the reason that the NCC was not confronted with many difficulties in accomplishing its broadband universal service policy goal.

One positive aspect of the NCC's two universal service projects was that it cared about the digital divide, agricultural development, local economies, and job opportunities in the uneconomic areas. However, providing broadband access cannot

necessarily solve the problem of the digital divide because many residents in the uneconomic areas still do not subscribe to broadband, do not have computers, or do not know how to use computers. When the problems of broadband accessibility and availability are solved, affordability may still be a factor in non-adoption. That is why the broadband adoption rate was below 14% in most construction places and the outcome was not satisfactory. Therefore, other government departments, such as the MOI, MOE, CIP, and RDEC, should collaborate with the NCC in subsidizing broadband subscription fees or the purchase of PCs. NICI could take charge of coordinating resources among governmental agencies to make effective use of all resources.

According to OECD's consideration, before the government considers USO status for broadband (OECD, 2006), it should consider whether broadband is an essential service of significant social importance. It needs to identify the objectives and desired outcomes clearly. It also needs to estimate the costs of intervention to widen broadband deployment by using the USO mechanism. Because Taiwan's regulator considered the cost, the funding source, and the goals of bridging the digital divide and helping the local economy, it should have no regrets about the policy. The NCC claimed that Taiwan is the first country to have broadband in every village and tribe. Following the broadband installation stage, the next move is to promote higher speed and affordable pricing.

By comparing the approaches adopted by Finland, the UK, and the USA with those used in Taiwan, this study suggests that because the government plans to provide 80% of households with the wireline broadband network at 30 Mbps by 2012 and 100 Mbps by 2013, it can urge selected operators to upgrade the speed to 30 Mbps by 2013 and 100 Mbps by 2014 in the uneconomic areas. As the rate of broadband adoption by the public increases, most people will benefit from the broadband network. The government can then consider allocating money to subsidize the construction of broadband in the uneconomic areas as well as the subscription fees of low-income people (van Eijk, 2004). In the convergence world, fixed broadband is not the only solution for people to connect to the Internet, so the government should consider both wireline and wireless technologies. In addition, the government should not only rely on incumbent players or national operators. Some regional or other qualified operators should be encouraged to provide data service as well. Government and telecommunications operators should cooperate closely and strive to deliver broadband services to all the people in Taiwan. When accessibility, affordability, and availability are not the problems, the next issue for the operators to face is broadband application. After all, content and application are driving factors in the use of higher-speed Internet.

## Notes

1. The DPP-led administration was not satisfied that most NCC Commissioners were nominated by the KMT party. They argued that since the Prime Minister (Premier) was questioned by the legislators in the Legislative Yuan (Congress), other political parties should not nominate the NCC Commissioners. It was so-called responsible politics. However, both the ruling party and the opposition parties negotiated the NCC Organization Act, and they passed the Act before the Commission was established. The Executive Yuan asked the Supreme Court to interpret the NCC Organization Act. The Court's conclusion was that the selection process was unconstitutional, but that the NCC was constitutional. The NCC Commissioners were in an awkward situation. They decided to stay at the Commission until the Act was revised and the new Commissioners were selected.

2. According to the Telecommunications Act, a Type I telecommunications enterprise refers to an enterprise that installs telecommunication line facilities and equipment in order to provide telecommunications services. The aforementioned telecommunications line facilities and equipment refer to network transmission facilities connecting the sending and receiving terminals, the switching facilities installed for integration with the network transmission facilities, and the auxiliary facilities of both.  
A Type II telecommunications enterprise refers to any telecommunications enterprise other than a Type I telecommunications enterprise.
3. Article 13 of Regulation for Telecommunications Universal Service.

### Notes on contributors

**Yu-li Liu** is a professor of the Department of Radio and TV at National Chengchi University in Taiwan. She served as one of the first-term Commissioners of the National Communications Commission (NCC) from 2006 to 2008. She has published numerous books, including *Multi-channel TV and Audience*, *Cable TV Management and Programming Strategy*, *Cable TV Programming and Policy in China*, *Radio and TV*, *Telecommunications*.

**Pin-Yen Wu** is working at Network Marketing Department of Asia Pacific Telecom. She received her MA degree from the Department of Radio and TV at National Chengchi University in Taiwan in 2011. Her research interests include media law and policy, telecommunications, cable TV, new communications media, etc.

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